Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/23**

Paper 2 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 70

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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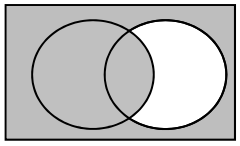
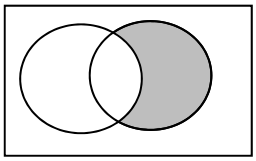
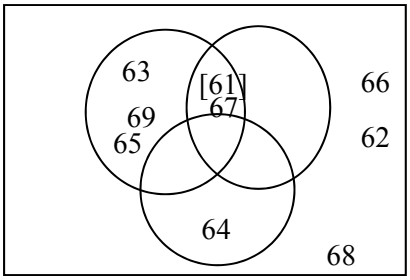
Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial marks
1	2h 32 min	**1**	
2	3.06 or 3.056…	**1**	
3	66.2 or 66.17 to 66.18	**1**	
4	Kite	**1**	
5	$9(2x + 3y)$ final answer	**1**	
6	$\frac{2}{3}$ oe	**1**	
7	1263.21	**2**	**M1** for $1200 \times \left(\frac{100 + 2.6}{100}\right)^2$ oe
8	87.77.. − 8.77.. oe	**M1**	Allow $\frac{87 - 8}{90}$ for **M1**
	$\frac{79}{90}$	**A1**	Accept $\frac{79k}{90k}$
9	$x \leqslant -1.2$ oe final answer	**2**	**B1** for –1.2 oe or **M1** for correct step to collect x's and numbers
10	64.8	**3**	**M2** for $2400 \times 30^3 \div 100^3$ oe or **M1** for 30^3 or 0.3^3 soi or *their* volume $\div 100^3$
11	150	**3**	**M2** for $(12 - 2) \times 180 \div 12$ or $180 - 360 \div 12$ or **M1** for $(12 - 2) \times 180$ or $360 \div 12$ soi 30
12	1.1[0]	**3**	**M2** for $0.88 \div \frac{100 - 20}{100}$ oe or **M1** for 0.88 associated with 80 [%]

Question	Answer	Marks	Partial marks
13	$\frac{22}{7}$ or $\frac{5}{4}$ $2\frac{1}{7} - \frac{1}{4}$	**B1**	Allow $\frac{22k}{7k}$ or $\frac{5k}{4k}$ Correct step for dealing with mixed numbers
	$\frac{88}{28}$ or $\frac{35}{28}$ $2\frac{4}{28}$ or $\frac{7}{28}$	**M1**	Correct method to find common denominator e.g. $3\frac{4}{28}$ or $1\frac{7}{28}$
	$1\frac{25}{28}$ $1\frac{25}{28}$	**A1**	
14	$(3x + 5)(x – 4)$ [=0]	**M2**	**M1** for $(3x + b)(x + a)$ where $ab = –20$ or $3a + b = –7$
	4 and $-\frac{5}{3}$ oe	**A1**	If zero scored, **SC1** for 2 correct answers from no working or other methods
15	$25x^2 – 8$ final answer	**3**	**M1** for $(5x – 3)^2 + 6(5x – 3) + 1$ **M1** for $25x^2 – 15x – 15x + 9$ soi or better
16	$\frac{12m}{p-4y}$ or $\frac{-12m}{4y-p}$ final answer	**4**	**M1** for $12m + 4xy = xp$ or $3m = \frac{xp}{4} - xy$ **M1** for $12m = xp – 4xy$ or $3m = x(\frac{p}{4} - y)$ **M1** for $12m = x(p – 4y)$ or $\frac{3m}{\frac{p}{4} - y} = x$ **M1** for $\frac{12m}{p-4y}$ To a maximum of 3 marks for an incorrect answer
17(a)	1, –4 and –9	**1**	
17(b)	Yes because 13 is an integer oe	**3**	**B2** for $[n =] 13$ or **M2** for $\sqrt{((848 – 3) \div 5)}$ or $5 \times 13^2 + 3$ [= 848] or **M1** for $5n^2 + 3 = 848$ oe
18	73.6 or 73.63 to 73.64	**4**	**B3** for 27.4 or 27.36… OR **M2** for $\frac{5.9\sin 79}{12.6}$ oe or **M1** for $\frac{\sin[C]}{5.9} = \frac{\sin 79}{12.6}$ oe and **M1dep** for 180 – 79 – *their C* (dep on at least **M1** earned)

Question	Answer	Marks	Partial marks
19(a)	$\begin{pmatrix} 11 & -6 \\ -5 & 6 \end{pmatrix}$	**2**	**M1** for two correct elements
19(b)	$\frac{1}{12}\begin{pmatrix} -6 & 0 \\ -5 & -2 \end{pmatrix}$ oe isw	**2**	**M1** for $k\begin{pmatrix} -6 & 0 \\ -5 & -2 \end{pmatrix}$ $(k \neq 0)$ or det = 12 soi
20	139 or 139.2 to 139.3	**4**	**M3** for $10^2 + \frac{1}{2} \times \pi \times 5^2$ or **M2** for $\frac{1}{2} \times \pi \times 5^2$ or **M1** for radius = 5 or [area of square]10^2
	cm^2	**1**	
21(a)	3.4	**3**	**M1** for 2 + 5 + 4 + 2 + 1 + 3 + 2 + 7 + 6 + 2 [34] **M1** for *their* 34 ÷ 10
21(b)	5	**2**	**M1** for 5, 5 identified
21(c)	[Day] 10	**1**	
22(a)	19	**1**	
22(b)	138	**3**	**M2** for 180 – (19 + 23) or 67 + (180 – 90 – 19) or better or **M1** for angle $AEB = 23$ or angle $AEC = 42$
22(c)	90	**2**	**M1** for angle $EBC = 71$ or angle $EAB = 90$
23(a)	 $A \cup B'$  $A' \cap B$	**2**	**B1** for each
23(b)(i)		**3**	**B2** for 6 or 7 correct **B1** for 4 or 5 correct

Question	Answer	Marks	Partial marks
23(b)(ii)	3	**1FT**	**FT** *their* $\mathrm{n}\left(E \cup F \cup G\right)'$
23(b)(iii)	$\varnothing$ or { }	**1FT**	**FT** *their* $E \cap F \cap G$

Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0674189480

MATHEMATICS **0580/23**

Paper 2 (Extended) **October/November 2017**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

1 Ahmed drives his car from London to Cambridge.
He leaves London at 07 45 and arrives in Cambridge at 10 17.

Work out the time, in hours and minutes, that he takes to drive from London to Cambridge.

..... h ..... min [1]

2 Calculate. $\sqrt{9+25^{-\frac{1}{3}}}$

..... [1]

3 Write \$450 as a percentage of \$680.

.....% [1]

4 A quadrilateral has one line of symmetry and no rotational symmetry.

Write down the name of this quadrilateral.

..... [1]

5 Factorise completely.

$18x + 27y$

..... [1]

6 $(\sqrt[3]{10})^2 = 10^p$

Find the value of p.

$p =$ ..... [1]

7 Adilla invests \$1200 at a rate of 2.6% per year compound interest.

Calculate the value of her investment at the end of 2 years.

\$ ..... [2]

8 Write the recurring decimal $0.8\dot{7}$ as a fraction.
Show all your working.

..... [2]

9 Solve the inequality.

$$7 - 8x \geqslant 19 + 2x$$

..... [2]

10 A model of a house is made using a scale of 1 : 30.
The model has a volume of 2400 cm^3.

Calculate the volume of the actual house.
Give your answer in cubic metres.

..... m^3 [3]

11 Calculate the size of one interior angle of a regular 12-sided polygon.

..... [3]

12 The cost of one litre of fuel in May 2015 was \$0.88 .
This was a decrease of 20% on the cost in May 2014.

Calculate the cost of one litre of fuel in May 2014.

\$ ..... [3]

13 Work out $3\frac{1}{7} - 1\frac{1}{4}$, giving your answer as a mixed number in its lowest terms.
Do not use a calculator and show all the steps of your working.

..... [3]

14 Solve by factorising.

$$3x^2 - 7x - 20 = 0$$

$x =$ ..... or $x =$ ..... [3]

15 $f(x) = 5x - 3$ $g(x) = x^2 + 6x + 1$

Find $gf(x)$.
Give your answer in its simplest form.

..... [3]

16 Make x the subject of $3m + xy = \frac{xp}{4}$.

$x =$ ..... [4]

17 **(a)** The nth term of a sequence is $6 - 5n$.

Write down the first three terms of this sequence.

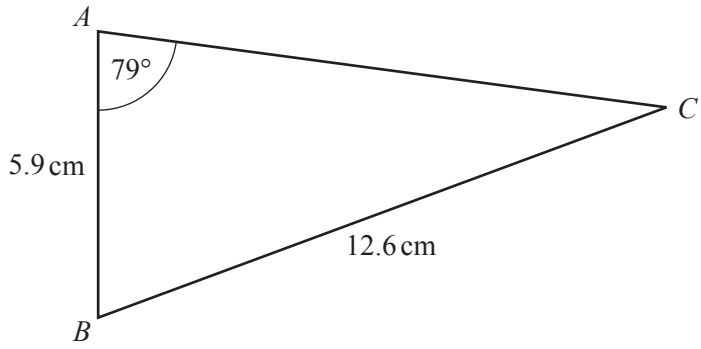
..... , ... , ... [1]

(b) The nth term of another sequence is $5n^2 + 3$.

Is 848 a term in this sequence?
Explain how you decide.

..... because ..... [3]

18



NOT TO SCALE

Calculate angle *ABC*.

Angle *ABC* = ... [4]

19 $\mathbf{M} = \begin{pmatrix} -2 & 0 \\ 5 & -6 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} -3 & 1 \\ 0 & -1 \end{pmatrix}$

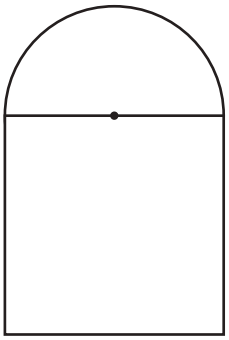
(a) Work out **NM**.

$\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

(b) Find $\mathbf{M}^{-1}$, the inverse of **M**.

$\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

20



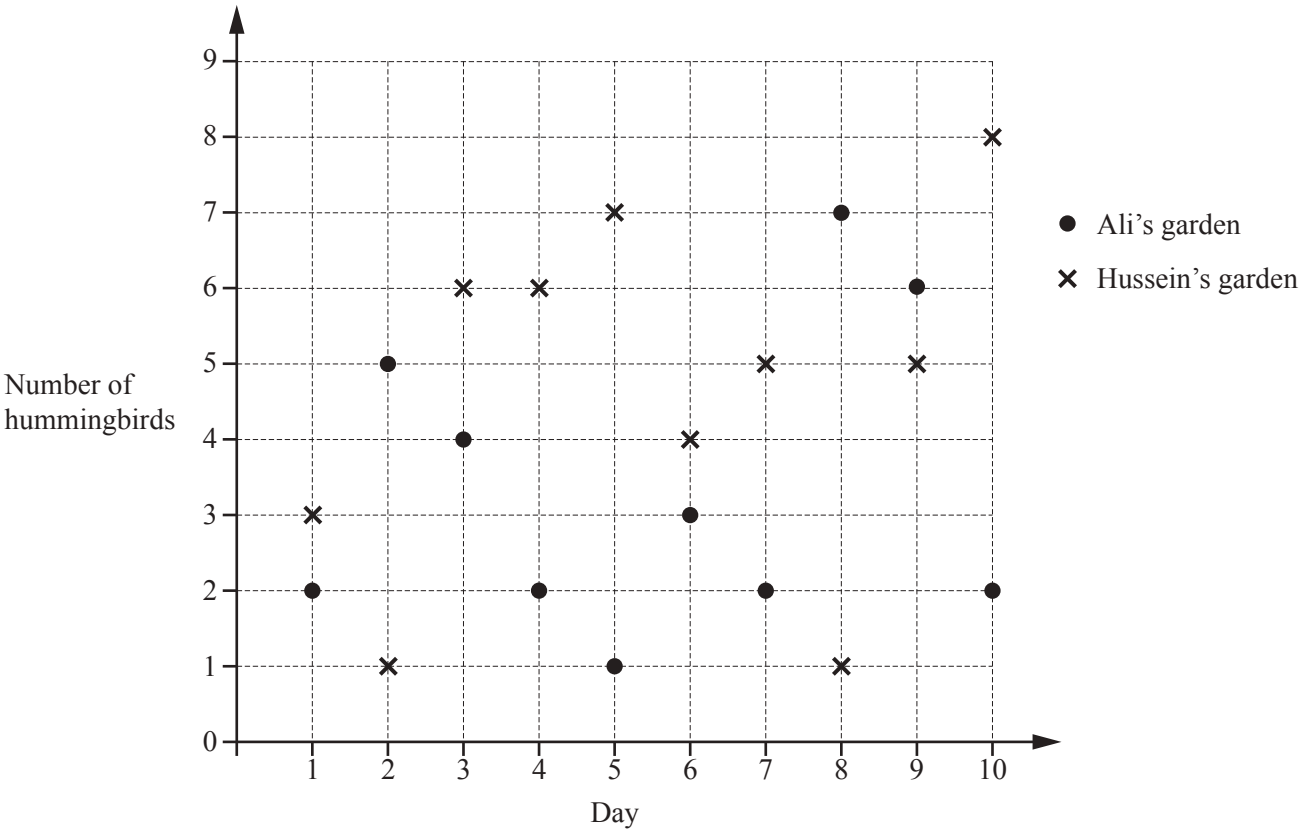
NOT TO SCALE

The diagram shows a shape made from a square and a semi-circle.

Calculate the area of the shape.
Give the units of your answer.

.... [5]

21 The diagram shows the numbers of hummingbirds seen by Ali and Hussein in their gardens each day for 10 days.



(a) Calculate the mean number of hummingbirds seen in Ali's garden each day.

..... [3]

(b) Work out the median number of hummingbirds seen in Hussein's garden each day.

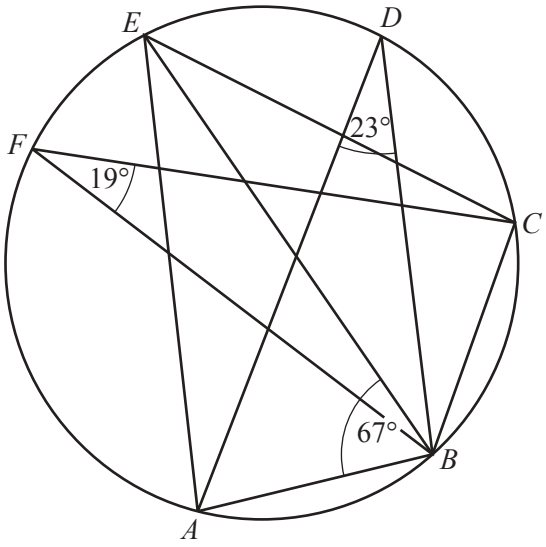
..... [2]

(c) On one of these days there were 4 times as many hummingbirds seen in Hussein's garden as in Ali's garden.

Which day was this?

Day ..... [1]

22



NOT TO SCALE

In the diagram, points A, B, C, D, E and F lie on the circumference of the circle.
Angle $BFC = 19°$, angle $ADB = 23°$ and angle $ABE = 67°$.

Work out

(a) angle BEC,

Angle $BEC =$ ..... [1]

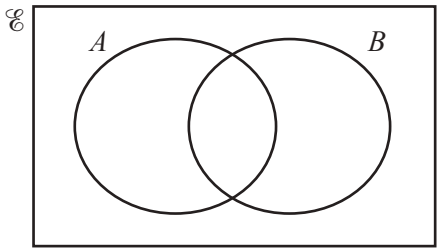
(b) angle ABC,

Angle $ABC =$ ..... [3]

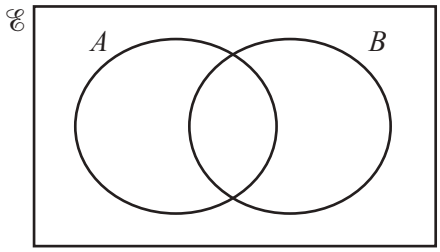
(c) angle BCE.

Angle $BCE =$ ..... [2]

23 **(a)** Shade the required regions on the Venn diagrams.



$A \cup B'$



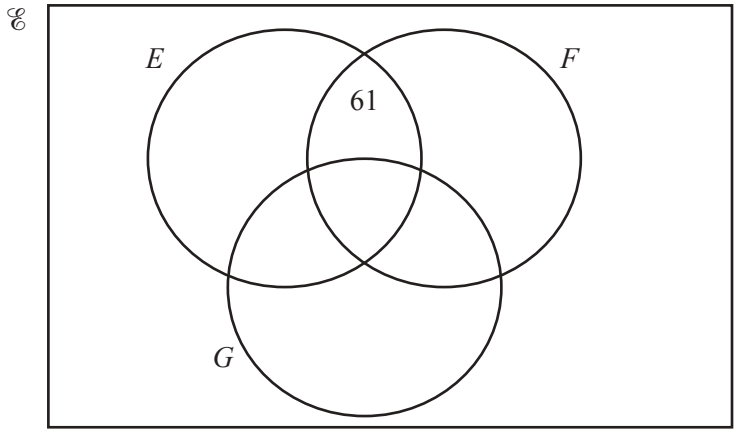
$A' \cap B$

[2]

(b) $\mathscr{E} = \{ x : x \text{ is an integer and } 60 < x < 70 \}$

$E = \{x : x \text{ is an odd number}\}$
$F = \{x : x \text{ is a prime number}\}$
$G = \{x : x \text{ is a square number}\}$

(i) Complete the Venn diagram below to show this information.



[3]

(ii) Find $\text{n}(E \cup F \cup G)'$.

..... [1]

(iii) Use set notation to complete the statement.

$E \cap F \cap G =$ ..... [1]

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Cambridge Assessment International Education

Grade thresholds – November 2017

Cambridge IGCSE Mathematics (without Coursework) (0580)

Grade thresholds taken for Syllabus 0580 (Mathematics (without Coursework)) in the November 2017 examination.

		minimum raw mark required for grade:						
	maximum raw mark available	A	B	C	D	E	F	G
Component 11	56	–	–	37	31	25	19	13
Component 12	56	–	–	39	32	25	18	11
Component 13	56	–	–	38	32	26	20	14
Component 21	70	59	49	39	33	28	–	–
Component 22	70	64	56	48	43	38	–	–
Component 23	70	53	41	30	24	18	–	–
Component 31	104	–	–	67	56	46	36	26
Component 32	104	–	–	81	68	56	45	34
Component 33	104	–	–	68	55	42	30	18
Component 41	130	94	76	59	48	36	–	–
Component 42	130	108	91	74	64	54	–	–
Component 43	130	83	63	44	33	23	–	–

Grade A* does not exist at the level of an individual component.

The maximum total mark for this syllabus, after weighting has been applied, is **200** for the 'Extended' options and **160** for the 'Core' options.

The overall thresholds for the different grades were set as follows.

Option	Combination of Components	A*	A	B	C	D	E	F	G
AX	11, 31	–	–	–	104	87	71	55	39
AY	12, 32	–	–	–	120	100	81	63	45
AZ	13, 33	–	–	–	106	87	68	50	32
BX	21, 41	179	152	125	98	81	64	–	–
BY	22, 42	189	171	146	122	107	92	–	–
BZ	23, 43	166	135	104	74	57	41	–	–

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/11**

Paper 1 (Core) **October/November 2017**

MARK SCHEME

Maximum Mark: 56

Published

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dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial marks
1	101	**1**	
2	9944	**1**	
3	2	**1**	
4	88	**2**	**M1** for $\frac{68+81+74+89+x}{5} = 80$ oe or **B1** for 400
5(a)	18.8 cao	**1**	
5(b)	19 cao	**1**	
6	1.5 oe	**2**	**B1** for 2.25 oe
7	$3x(4x + 5y – 3)$ final answer	**2**	**B1** for $3(4x^2 + 5xy – 3x)$ or $x(12x + 15y – 9)$ allow in working or correct answer spoiled If zero scored, **SC1** for $3x(4x + 5y – 3)$ with only 2 correct elements in the brackets, allow in working
8	14.25 ……. 14.35	**2**	**B1** for each correct or both correct but reversed
9	63.6 or 63.61 to 63.63	**2**	**M1** for $\pi \times 4.5^2$
10(a)	(–2, 3)	**1**	
10(b)	Correct rhombus with 4th point at (2,2)	**1**	
11(a)	$\frac{5}{9}$ cao	**1**	
11(b)	[0].09 then 9 [%]	**2**	**B1** for each

Question	Answer		Marks	Partial marks
12	$\frac{5}{3}$	$\frac{2}{3}+\frac{4}{15}$	**B1**	Allow $\frac{5k}{3k}$
	$\frac{25}{15}$ [and $\frac{11}{15}$]	$\frac{10}{15}$ [and $\frac{4}{15}$]	**M1**	Correct method to find common denominator e.g. $\frac{75}{45}$ and $\frac{33}{45}$ Follow through *their* $\frac{5}{3}$ for the **M1** mark
	$\frac{14}{15}$ cao	$\frac{14}{15}$ cao	**A1**	
13(a)	343		**1**	
13(b)	–11		**1**	
13(c)	343		**1**	
14(a)	$\begin{pmatrix}2\\7\end{pmatrix}$		**1**	
14(b)	$\begin{pmatrix}2\\5\end{pmatrix}$		**1**	
14(c)	$\begin{pmatrix}8\\20\end{pmatrix}$		**1**	
15	54		**3**	**M2** for $\frac{180\times(5-2)}{5}$ or $180-\frac{360}{5}$ or **M1** for $180 \times (5 - 2)$ or $\frac{360}{5}$
16	16.1 or 16.12 to 16.13		**3**	**M2** for $\sqrt{(18^2 - 8^2)}$ or better or **M1** for $18^2 = [\ldots]^2 + 8^2$ or better
17(a)	m^{10} final answer		**1**	
17(b)	$20x^5y^2$ final answer		**2**	**B1** for 2 out of 3 elements correct in final answer or correct answer spoiled

Question	Answer	Marks	Partial marks
18	Correct method to eliminate one variable	**M1**	
	[x =] –2	**A1**	
	[y =] 3	**A1**	If zero scored, **SC1** for both correct but no or wrong working or **SC1** for 2 values satisfying one of the original equations
19(a)(i)	99° 63° 36°	**3**	**B1** for each or **M1** for 162 ÷ 18 or 360 ÷ 40 or better If zero scored, **SC1** for 3 angles that add to 198
19(a)(ii)	Correct labelled pie chart	**1FT**	**FT** *their* table if *their* angles add to 198
19(b)	$\frac{252}{360}$ or better fraction isw	**1**	
20(a)	71.48	**2**	**M1** for 12.8 × 10.4 or 9.2 × 6.7 or for an area of a suitable rectangle from shaded area
20(b)	132	**3**	**M2** for 2 × (8 × 2 + 2 × 5 + 8 × 5) oe or **M1** for at least two of 8 × 2, 8 × 5 and 2 × 5
21(a)(i)	Correct ruled bisector with two pairs of correct arcs	**2**	**B1** for correct ruled bisector missing/wrong arcs or 2 pairs of correct arcs
21(a)(ii)	Correct ruled perpendicular bisector with two pairs of correct arcs	**2**	**B1** for correct ruled bisector missing/wrong arcs or 2 pairs of correct arcs
21(b)	Correct region shaded	**1**	Dep. on at least **B1** in **(a)(i) and B1** in **(a)(ii)**

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/12**

Paper 1 (Core) **October/November 2017**

MARK SCHEME

Maximum Mark: 56

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dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial marks
1	14 027	**1**	
2	−3	**1**	
3	1	**1**	
4	[0].00517	**1**	
5	$\frac{31}{50}$, $\frac{5}{8}$, 0.63, 64%	**2**	**B1** for 3 in correct order or **M1** for 0.62 or 62% **and** 0.625 or 62.5% or 4 fractions with a common denominator
6	10.1[0]	**2**	**M1** for [4.5 +] (7 × [0].8) or 450 + 7 × 80
7	2.1	**2**	**B1** for 2.08 or 2.079… or 2.10
8(a)	2, 3, 4, 6	**1**	
8(b)	27, 36 cao	**1**	
9	[x =] 60 [y =] 40	**2**	**B1** for each or for two numbers that add to 100
10	2.5	**2**	**M1** for 2200 or 0.055 seen or **SC1** for answer figs 25
11	32	**2**	**M1** for $\frac{1}{2} \times 33 \times h = 528$ oe
12(a)	Positive	**1**	
12(b)	No correlation oe	**1**	
13	[0].35	**2**	**M1** for 1 – (0.15 + 0.3 + 0.2)
14	361.5	**1**	
	362.5	**1**	If zero scored, **SC1** for both correct but reversed

Question	Answer	Marks	Partial marks
15	52.2 or 52.19 to 52.20	**2**	**M1** for $\sin[\ldots=]\frac{6.4}{8.1}$ oe
16(a)	(2, 5)	**1**	
16(b)	Point plotted at (7, −2)	**1**	
16(c)	Isosceles cao	**1**	
17(a)	9	**1**	
17(b)	Midpoint marked	**1**	
17(c)	Perpendicular line drawn	**1**	
18	120 nfww	**3**	**M2** for $180-\frac{360}{6}$ oe $\frac{180\times(6-2)}{6}$ or **M1** for $\frac{360}{6}$ soi by 60 or 180 × (6 − 2) soi by 720
19	Correct ruled net	**3**	**B2** for 4 more correct faces in correct position or **B1** for 2 or 3 more correct faces in correct position
20(a)	$3\frac{2}{3}$ cao	**1**	
20(b)	$\frac{3}{12}$[and $\frac{5}{12}$] oe	**M1**	For correct method to find common denominator e.g. $\frac{12}{48}$ and $\frac{20}{48}$
	$\frac{2}{3}$ cao	**A1**	
21	[y =] 0.5x + 2 oe	**3**	**M2** for [y =] 0.5x + c oe $c \neq 2$ or **M1** for $\frac{\text{rise}}{\text{run}}$ and **B1** for kx + 2, $k \neq 0$
22(a)(i)	36	**1**	
22(a)(ii)	Add 7 oe	**1**	
22(b)	4n – 2 oe	**2**	**M1** for 4n + k, $k \neq -2$ oe
23(a)	$\frac{5}{14}$ or 0.357 or 0.357…	**2**	**M1** for 7 – 2 = 11n + 3n oe or better
23(b)	18	**2**	**M1** for p – 3 = 3 × 5 or $\frac{p}{5}=3+\frac{3}{5}$

Question	Answer	Marks	Partial marks
24(a)	6	**2**	**M1** for $\frac{15}{12.5}$ or $\frac{12.5}{15}$ or $\frac{12.5}{5}$ or $\frac{5}{12.5}$ soi
24(b)	10	**2**	**M1** for $\frac{12.5}{15} \times 12$ or $12 \div \frac{15}{12}$ soi

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MATHEMATICS **0580/13**

Paper 1 (Core) **October/November 2017**

MARK SCHEME

Maximum Mark: 56

Published

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Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial marks
1	2h 32 min	**1**	
2	84	**1**	
3	Kite	**1**	
4	y^9	**1**	
5(a)	0.16	**1**	
5(b)	0.06 0.078 0.42 0.5	**1**	
6(a)	Yellow	**1**	
6(b)	$\frac{3}{16}$ or 0.1875 or 18.75%	**1**	
7	0.25 $\frac{8}{10}$ oe 80	**2**	**B1** for two correct
8	$\begin{pmatrix}11\\-7\end{pmatrix}$	**2**	**B1** for $\begin{pmatrix}11\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-7\end{pmatrix}$ or $\begin{pmatrix}15\\-5\end{pmatrix}$ seen
9	[x =] 5	**2**	**M1** for $5x - 2x = 19 - 4$ or better
10	$\frac{60\times 2}{2+4}$	**M1**	Allow 1 error
	20	**A1**	Dep on no errors in rounding
11	120	**2**	**M1** for $\frac{6}{40}$ [× 800] or $\frac{800}{40}$[×6] oe
12	1263.21	**2**	**M1** for $1200 \times \left(\frac{100+2.6}{100}\right)^2$ oe

Question	Answer	Marks	Partial marks
13(a)	Moscow	**1**	
13(b)	8	**1**	
13(c)	–7	**1**	
14(a)	Frequencies 4, 5, 6, 3, 2 cao	**2**	**B1** for 3 or 4 correct in frequency column or for fully correct tally if no frequencies
14(b)	100 to 109	**1**	**FT** *their* frequency table
15	150	**3**	**M2** for $(12 - 2) \times 180 \div 12$ or $180 - 360 \div 12$ or **M1** for $(12 - 2) \times 180$ or $360 \div 12$ soi 30
16	$\frac{22}{7}$ or $\frac{5}{4}$ $2\frac{1}{7} - \frac{1}{4}$	**B1**	Allow $\frac{22k}{7k}$ or $\frac{5k}{4k}$ Correct step for dealing with mixed numbers
	$\frac{88}{28}$ or $\frac{35}{28}$ $2\frac{4}{28}$ or $\frac{7}{28}$	**M1**	Correct method to find common denominator e.g. $3\frac{4}{28}$ or $1\frac{7}{28}$
	$1\frac{25}{28}$ $1\frac{25}{28}$	**A1**	
17	10.9 or 10.91 …	**3**	**M2** for $[BC =] \frac{8.6}{\sin 52}$ or **M1** for $\sin 52 = \frac{8.6}{BC}$ oe
18(a)	18 000	**1**	
18(b)	2.15×10^6	**2**	**B1** for answer figs 215 or correct answer not in standard form
19(a)	Ruled line through (0, 0) and (100, 60)	**2**	**B1** for (100, 60) plotted
19(b)(i)	82 to 86	**1**	
19(b)(ii)	31 to 35	**1**	
20(a)(i)	34	**1**	
20(a)(ii)	Add 6 oe	**1**	
20(b)	$3n + 8$ oe	**2**	**B1** for $3n + k$

Question	Answer	Marks	Partial marks
21(a)	168	**2**	**B1** for 8.4 seen
21(b)	[0]74	**1**	
21(c)	Correct angle bisector with correct arcs meeting AB	**2**	**B1** for correct bisector with wrong / no arcs
22	139 or 139.2 to 139.3	**4**	**M3** for $10^2 + \frac{1}{2} \times \pi \times 5^2$ or **M2** for $\frac{1}{2} \times \pi \times 5^2$ or **M1** for radius = 5 or [area of square]10^2
	cm^2	**1**	

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MATHEMATICS **0580/21**

Paper 2 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 70

Published

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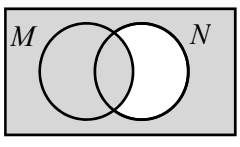
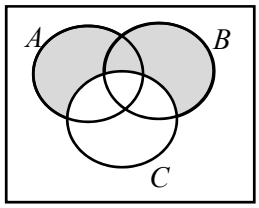
Question	Answer	Mark	Partial marks
1	101	**1**	
2	2	**1**	
3(a)	1.49220….	**1**	
3(b)	1.5	**1FT**	**FT** *their* answer to **(a)** rounded correctly to 2 significant figures
4	88	**2**	**M1** for $\frac{68+81+74+89+x}{5} = 80$ oe or **B1** for 400
5	$3x(4x + 5y - 3)$ final answer	**2**	**B1** for $3(4x^2 + 5xy - 3x)$ or $x(12x + 15y - 9)$ allow in working or correct answer spoiled If zero scored, **SC1** for $3x(4x + 5y - 3)$ with only 2 correct elements in the brackets, allow in working
6(a)	$(-2, 3)$	**1**	
6(b)	Correct rhombus with 4th point at (2,2)	**1**	
7	Diagonal line from (0, 0) to (30, 12)	**1**	
	and Horizontal line from (30, 12) to (70, 12)	**1FT**	**FT** for horizontal line from (30, *k*) to (70, *k*) where *k* is *their* 12
8	19.65 cao	**2**	**B1** for 6.55 seen (must be evaluated, not 6.5 + 0.05) or **M1** for 3 × (6.5 + 0.05)
9	7615.15	**2**	**M1** for $12\,400 \times \left(1 - \frac{15}{100}\right)^3$ oe

Question	Answer		Mark	Partial marks
10	$\frac{5}{3}$	$\frac{2}{3}+\frac{4}{15}$	**B1**	Allow $\frac{5k}{3k}$
	$\frac{25}{15}$ [and $\frac{11}{15}$]	$\frac{10}{15}$ [and $\frac{4}{15}$]	**M1**	Correct method to find common denominator e.g. $\frac{75}{45}$ and $\frac{33}{45}$ Follow through *their* $\frac{5}{3}$ for the **M1** mark
	$\frac{14}{15}$ cao	$\frac{14}{15}$ cao	**A1**	
11	54		**3**	**M2** for $\frac{180\times(5-2)}{5}$ or $180-\frac{360}{5}$ or **M1** for $180\times(5-2)$ or $\frac{360}{5}$
12(a)	343		**1**	
12(b)	−11		**1**	
12(c)	343		**1**	
13(a)	m^{10} final answer		**1**	
13(b)	$20x^5y^2$ final answer		**2**	**B1** for 2 out of 3 elements correct in final answer or correct answer spoiled
14(a)	(9, −4)		**1**	
14(b)	−5		**2**	**M1** for $t^2+12^2=13^2$ oe or **SC1** for answer 5 or ± 5
15(a)	Fewer than 6 elements from {1, 2, 3, 4, 5, 6} or ∅		**1**	
15(b)			**1**	
			**1**	

Question	Answer	Mark	Partial marks
16	Enlargement	**1**	
	$\frac{1}{3}$	**1**	
	(2, 1)	**1**	
17(a)	$(y =) \frac{72}{(x+1)^2}$ oe	**2**	**M1** for $y = \frac{k}{(x+1)^2}$
17(b)	32	**1FT**	**FT** correct evaluation from *their* equation in **(a)** using 0.5
18	Correct position of *S* with 2 pairs of correct construction arcs for line	**4**	**B3** for correct position of *S* with missing/incorrect construction arcs but correct line or **B2** for correct ruled line equidistant from the two trees with correct arcs or **B1** for correct line with no/wrong arcs or correct arcs with no line and **B1** for arc centre bird bath, radius 5 cm or *S* in correct position with no/incorrect working
19	$\frac{x^2+20x+31}{2(x-3)(x+7)}$ final answer	**4**	**B1** for a common denominator of [2]$(x – 3)(x + 7)$ seen isw **M1** for $2\times5\times(x + 7) + 2\times3\times(x – 3) + (x – 3)(x + 7)$ oe **and** must have attempted to expand all the brackets in the numerator **M1** for $10x + 70 + 6x – 18$ **or** $x^2 – 3x + 7x – 21$ **or** [2]$(5x + 35 + 3x – 9)$ or better
20(a)	1480	**1**	
20(b)	30	**3**	**M2** for $10 \times \sqrt{\frac{3960}{440}}$ or $10 \div \sqrt{\frac{440}{3960}}$ or **M1** for $\sqrt{\frac{3960}{440}}$ or $\sqrt{\frac{440}{3960}}$ or $\left(\frac{h}{10}\right)^2 = \frac{3960}{440}$ oe

Question	Answer	Mark	Partial marks
21	46.7 or 46.68 to 46.69	**4**	**M3** for tan […=] $\frac{9}{\frac{1}{2}\sqrt{12^2+12^2}}$ oe or **M1** for $\left[\frac{1}{2}\times\right]\sqrt{12^2+12^2}$ oe e.g. $\sqrt{\frac{12^2}{2}}$ and **M1** for identifying angle *MCE*
22(a)	80 to 84	**2**	**M1** for 116 to 120
22(b)	Correct curve or ruled lines	**3**	**B2** for 7 or 8 correct points **B1** for 5 or 6 correct points
22(c)	26	**2**	**B1** for 156 or 130 or for *their* 130 from *their* **increasing** curve (or lines)
23(a)	$x + y \leqslant 16$ oe $x \geqslant 4$ oe	**2**	**B1** for each mark final answers If zero scored, **SC1** for $x + y < 16$ **and** $x > 4$
23(b)	Correct shading	**3**	**M2** for lines at $x = 4$ **and** $x + y = 16$ or for correct shading of $x < 4$ or $x + y > 16$ or **M1** for line at $x = 4$ or *their* $x = 4$ or for line at $x + y = 16$ or *their* $x + y = 16$
23(c)	144	**2**	**M1** for (8, 8) selected or for $10 \times x + 8 \times y$ for any numerical point which is inside or on the boundary of *their* unshaded region

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MATHEMATICS **0580/22**

Paper 2 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 70

Published

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Question	Answer	Marks	Partial marks
1	– 3	**1**	
2	[0].00517	**1**	
3	*BC* *AB* oe	**1**	
4(a)	2, 3, 4, 6	**1**	
4(b)	27, 36 cao	**1**	
5	[*x* =] 60 [*y* =] 40	**2**	**B1** for each or for two numbers that add to 100
6	2.5	**2**	**B1** for 2200 or 0.055 seen or **SC1** for answer figs 25
7	32	**2**	**M1** for $\frac{1}{2} \times 33 \times h = 528$ oe
8	16.5	**2**	**M1** for $\frac{55}{60}$ or speed × time (numerical)
9	1.32×10^{41}	**2**	**M1** for 0.12×10^{41} or 12×10^{40} or **SC1** for figs 132
10	20.75 final answer cao	**2**	**B1** for one of 5.15, 6.25 or 9.35 seen or **M1** for (5.2 – 0.05) + (6.3 – 0.05) + (9.4 – 0.05)
11	$48.\dot{4}\dot{8} \quad -0.\dot{4}\dot{8}$ oe	**M1**	**SC1** for $\frac{48}{99}$ or $\frac{16}{33}$ or equivalent fraction with no/insufficient working
	$\frac{48}{99}$ or $\frac{16}{33}$ or equivalent fraction	**A1**	
12	$15 + 2n - n^2$ final answer	**2**	**M1** for three terms of $15 + 5n - 3n - n^2$ correct

Question	Answer	Marks	Partial marks
13(a)	$3\frac{2}{3}$ cao	**1**	
13(b)	$\frac{3}{12}$[and $\frac{5}{12}$] oe	**M1**	For correct method to find common denominator e.g. $\frac{12}{48}$ and $\frac{20}{48}$
	$\frac{2}{3}$ cao	**A1**	
14	–1, 0, 1, 2, 3	**3**	**B2** for $-2 < n \leqslant 3$ or list with one error or omission or **M1** for $-5 + 1 < 2n$ or $2n \leqslant 5 + 1$ or a list with 3 correct and no more than 1 incorrect or if zero scored, **SC1** for 5, 3, 1, –1, –3
15	$\frac{y+x}{xy}$ final answer	**3**	**B1** for $y(x+1) - x(y-1)$ **B1** for common denominator xy or **SC2** for $\frac{y-x}{xy}$ final answer
16(a)	–1	**1**	
16(b)	$-6n + 29$ oe	**2**	**M1** for $-6n + k$ (any k) or $-kn + 29$ $(k \neq 0)$
17	60	**3**	**B2** for $x = 6$ or **M1** for $29x + x = 180$ oe and **M1** for $360 \div 6$ or $360 \div$ *their* x or $180(n - 2) =$ *their* $x \times 29n$
18	Correctly eliminating one variable	**M1**	
	[x =] $\frac{2}{3}$ or 0.667 or 0.6666…	**A1**	
	[y =] $\frac{1}{3}$ or 0.333 or 0.333…	**A1**	If zero scored, **SC1** for 2 values satisfying one of the original equations or if no working shown but 2 correct answers given
19	[±] $\sqrt{y^2 - 1}$ final answer	**3**	**M1** for correct squaring **M1** for correct rearranging for x or x^2 term **M1** for correct square root
20	132	**3**	**M2** for $\frac{1}{2}(7 + 15) \times 12$ or **M1** for any correct area

Question	Answer	Marks	Partial marks
21	$\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$ oe simplified	**3**	**B2** for correct unsimplified vector for $\overrightarrow{OK}$ in terms of **a** and **b** or **M1** for a correct route for $\overrightarrow{OK}$ or $\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ or $\overrightarrow{BA} = -\mathbf{b} + \mathbf{a}$ or recognition of $\overrightarrow{OK}$ as a position vector
22	[w =] 54 [x =] 126 [y =] 60	**3**	**B1** for [w =] 54 **B1** for [x =] 126 If **B0 B0** for first two B marks then **B1** for *their* w + *their* x = 180 **B1** for [y =] 60 or for *their* w + *their* x + *their* y = 240
23	[k =] 3 [c =] 9	**3**	**M1** for $\frac{30}{360} \times \pi \times 6^2$ **M1** for $\frac{1}{2} \times 6 \times 6 \times \sin 30$
24(a)	$\frac{5}{14}$ or 0.357 or 0.357…	**2**	**M1** for $7 - 2 = 11n + 3n$ oe or better
24(b)	18	**2**	**M1** for $p - 3 = 3 \times 5$ or $\frac{p}{5} = 3 + \frac{3}{5}$
25(a)	$(x-12)(x+11)$ final answer	**2**	**B1** for $(x+a)(x+b)$ where $ab = -132$ or $a + b = -1$
25(b)	$x(x+2)(x-2)$ final answer	**2**	**B1** for $x(x^2 - 4)$ or $(x+2)(x^2 - 2x)$ or $(x-2)(x^2 + 2x)$
26	21.8 or 21.80…	**4**	**M3** for $\tan = \frac{2}{\sqrt{3^2 + 4^2}}$ oe or **M1** for $\sqrt{3^2 + 4^2}$ or $\sqrt{3^2 + 4^2 + 2^2}$ and **M1** for recognising angle QAC

Question	Answer	Marks	Partial marks
27(a)	27	**1**	
27(b)	x^2 final answer	**1**	
27(c)	$\frac{y^2}{2}$ or $0.5y^2$ final answer	**2**	**M1** for $\left(\frac{y^6}{8}\right)^{\frac{1}{3}}$ or $\left(\frac{2}{y^2}\right)^{-1}$ or better or **SC1** for answer $\frac{y^2}{c}$ or $\frac{y^k}{2}$ or $\frac{2}{y^2}$

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MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 2017**

MARK SCHEME

Maximum Mark: 104

Published

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Question	Answer	Marks	Partial marks
1(a)(i)	16	**1**	
1(a)(ii)	–15	**1**	
1(b)(i)	Friday	**1**	
1(b)(ii)	6	**1**	
1(c)(i)	1605 or 405 pm	**1**	
1(c)(ii)	4	**1**	
2(a)	180.5[0]	**3**	**M2** for $3 \times 24 + 5 \times 12.50 + 46$ oe or **M1** for 3×24 or 5×12.50 or better, soi by 72 or 62.5
2(b)	69.12	**2**	**M1** for 64×1.08 oe
2(c)	12	**3**	**M2** for $(\frac{280}{250} - 1) \times 100$ or $\frac{280-250}{250} \times 100$ oe or **M1** for $\frac{280}{250} - 1$ or $\frac{280}{250} \times 100$ or $\frac{280-250}{250}$ oe
2(d)	561	**3**	**M1** for 5.5×8.5 soi by 46.75 **M1** for *their* 46.75×12
2(e)	4287.66	**3**	**M2** for $3600 \times (1 + \frac{6}{100})^3$ oe or **M1** for $3600 \times (1 + \frac{6}{100})^2$ oe soi by 4044.96 If zero scored, **SC2** for 687.6576, 687.658, 687.66, 687.65, 687.7, 688 or 690

Question	Answer	Marks	Partial marks
3(a)(i)	Written test and a valid reason	**1**	
3(a)(ii)	Positive	**1**	
3(a)(iii)	(45,10) indicated	**1**	
3(a)(iv)	42	**1**	
3(b)(i)	29	**2**	**M1** for 6 in the correct order, 8 14 17 21 23 29… or … 29 30 32 39 41 48
3(b)(ii)	27.5 or 27.45 to 27.46	**2**	**M1** for all 11 numbers added, allowing one error or omission, and divided by 11
4(a)(i)	Correct point plotted	**1**	
4(a)(ii)	Right-angled or scalene	**1**	
4(a)(iii)	8 4	**1**	
4(a)(iv)(a)	0.5 oe	**2**	**M1** for attempt at rise ÷ run
4(a)(iv)(b)	[y =] 0.5x oe	**1FT**	Correct or **FT** *their* **(iv)(a)**
4(b)(i)	…1 …–5 –5…1 15	**3**	**B2** for 3 or 4 correct or **B1** for 1 or 2 correct
4(b)(ii)	Correct curve	**4**	**B3FT** for 8 or 9 points correctly plotted **or B2FT** for 6 or 7 points correctly plotted **or B1FT** for 4 or 5 points correctly plotted
4(b)(iii)	–2.8 1.8	**2FT**	**B1FT** for each
5(a)	51.6	**2**	**B1** for 4.3[cm]
5(b)	[0]47	**1**	
5(c)	292	**1**	
5(d)(i)	Arc centre A radius 7 cm	**1**	
	Arc centre C radius 3.5 cm	**1**	
	One point **marked** at intersection of correct arcs	**1**	If zero scored, **SC1** for any arc centred on A or C, or correct point marked with no arcs
5(d)(ii)	504	**2**	**M1** for 84 ÷ *their* time or 84 × 6
5(e)	298	**2**	**M1** for 118 + 180 oe

Question	Answer	Marks	Partial marks
6(a)(i)	1, 2, 3, 6, 9, 18 only	**2**	**B1** for 4 or 5 correct factors and no extras or 6 correct with one extra
6(a)(ii)	Any multiple of 30	**1**	
6(a)(iii)	46.2	**1**	
6(a)(iv)	15.625	**1**	
6(a)(v)	5	**1**	
6(b)	$2^3 \times 3^2$	**2**	**M1** for a complete factor tree or 2, 2, 2, 3, 3 clearly identified as factors
6(c)	240	**2**	**M1** for [16=] 2^4 or $2 \times 2 \times 2 \times 2(\times 1)$ or [30=] $2 \times 3 \times 5(\times 1)$ or lists of multiples of both at least up to 240, or any product that equals 240 or **B1** for 240*n*
6(d)	20 00 or 8 pm	**3**	**M1** for [LCM of 6 and 9 =] 18(00) or **M1** for lists of multiples **B1FT** for "2 am" + *their* 18 correctly worked out soi OR **B2** for [clock A = 2] 8, 14, 20… and [clock B = 2] 11, 20…. or **B1** for [clock A = 2] 8, 14, 20…or [clock B = 2] 11, 20…
7(a)(i)	$\frac{6}{20}$ oe	**1**	
7(a)(ii)	$\frac{5}{20}$ oe	**1**	
7(a)(iii)	0	**1**	
7(b)	[0].28 oe	**2**	**M1** for 1 – 0.3 – 0.24 – 0.18 oe or 1 – 0.72 oe
7(c)	$\frac{8}{20}$	**1**	Accept 8 ÷ 20
	$\frac{6}{15}$	**1**	Accept 6 ÷ 15
	Comparing the two fractions with equal denominators or as decimals	**1**	e.g. $\frac{8}{20} = \frac{24}{60}$ and $\frac{6}{15} = \frac{24}{60}$ or both shown equal to $\frac{2}{5}$ or [0] .4 or 40%

Question	Answer	Marks	Partial marks
8(a)	$8x + 7$ final answer	**2**	**B1** for $10x + 15$ or $-2x - 8$ or $8x + j$ or $kx + 7$ as final answer
8(b)(i)	$6x$ final answer	**1**	
8(b)(ii)	$5a$ final answer	**1**	
8(c)	$10y + 12$ or $2(5y + 6)$ final answer	**3**	**M1** for $2(3y + 1) + 2(2y + 5)$ oe **B1** for $10y + j$ or $ky + 12$ ($k \neq 0$)
8(d)	$7(m + 6) + 3m = 182$ or $7m + 42 + 3m = 182$	**2**	**B1** for $m + 6$ or $7t + 3m = 182$
	14	**3**	**M1** for $7m + 42$ [$+ 3m = 182$] **M1** for $7m + 3m = 182 - 42$ or better OR **M2** for [$m =$] $(182 - (6 \times 7)) / (7 + 3)$ or better or **M1** for $182 - (6 \times 7)$ or better
9(a)(i)	7.5	**2**	**M1** for $\frac{1}{2} \times 5 \times 3$ or evidence of counting squares
9(a)(ii)	Correct enlargement	**2**	**B1** for one line correctly scaled
9(b)(i)	Rotation [centre] (0,0) oe 180°	**3**	**B1** for each
9(b)(ii)	Correct reflection with points (–3,–3), (–1,–5) and (–6,–6)	**2**	**B1** for reflection in $y = k$ or $x = -1$
9(b)(iii)	Correct translation with points (4,4), (2,2) and (–1,5)	**2**	**B1** for a correct horizontal translation (5 to the right) or a correct vertical translation (1 up)
10(a)(i)	30	**1**	
10(a)(ii)	add 8 oe	**1**	
10(a)(iii)	$8n - 10$ oe final answer	**2**	**B1** for $8n + j$ or $kn - 10$ ($k \neq 0$)
10(b)	9	**1**	
10(c)	34	**1**	

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/32**

Paper 3 (Core) **October/November 2017**

MARK SCHEME

Maximum Mark: 104

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Abbreviations
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	45	**1**	
1(a)(ii)	10 10	**1**	
1(a)(iii)	[0].55	**2**	**M1** for (1.66 × 5) – 7.75 oe
1(b)(i)	50	**1**	
1(b)(ii)	2, 7, 4, 5, 6, 6	**2**	**B1** for 4 correct in frequency column or **B1** for correct tallies if frequency column blank or **B1** if 2, 7, 4, 5, 6, 6 seen in tally column with frequency column blank or incorrect
1(b)(iii)	Correctly scaled frequency axis	**1**	
	all heights correct	**1FT**	**FT** *their* table
	consistent width of bars	**1**	
1(b)(iv)	10 [to] 19	**1**	**FT** *their* bar chart if 5 or 6 bars or *their* table if no bar chart
2(a)	Eight thousand [and] forty-five	**1**	
2(b)(i)	64	**1**	
2(b)(ii)	61 or 67	**1**	
2(b)(iii)	68	**1**	
2(c)(i)	2×7^2 or $2 \times 7 \times 7$	**2**	**M1** for 2, 7, 7 or 2, 7^2 or $1 \times 2 \times 7 \times 7$ or $1 \times 2 \times 7^2$
2(c)(ii)	14	**2**	**M1** for (182 =) $2 \times 7 \times 13$ or 2, 7, 13 or **B1** for 2 or 7 or 2×7 as final answer

Question	Answer	Marks	Partial Marks
2(d)(i)	1296	**1**	
2(d)(ii)	29	**1**	
2(d)(iii)	14	**1**	
2(d)(iv)	0.008 or $\frac{1}{125}$	**1**	
3(a)	2, 6	**2**	**B1** mark for each
3(b)(i)	Triangle at (–3, 1) (–5, 3) (–3, 3)	**2**	**B1** for reflection in $x = k$ or $y = -1$
3(b)(ii)	Triangle at (2, 2) (2, 6) (6, 6)	**2**	**B1** for correct size and orientation, incorrect centre
3(b)(iii)	Translation	**1**	
	$\begin{pmatrix} -5 \\ 3 \end{pmatrix}$	**1**	
4(a)(i)	6 pens and 1.3[0]	**3**	**M1** for $\frac{10}{1.45}$ **M1** for $k \times 1.45$ where k is an integer
4(a)(ii)	4.76	**2**	**M1** for $5.60 \times (1 - \frac{15}{100})$ oe
4(b)	22	**2**	**M1** for ordered list of first 6 or last 6 or **B1** for 19 and 25 both identified
4(c)	3000 1500 2500	**3**	**M2** for $\frac{7000}{6+3+5} \times k$ or better, where k is 6 or 3 or 5 or **M1** for $\frac{7000}{6+3+5}$ or better implied by 500 If no working **M2** implied by one correct answer in correct place If zero scored, **M1** for all correct answers in wrong order
4(d)	909.09 or 909.1[0] or 909.0 or 909	**2**	**M1** for $\frac{1400}{1.54}$
4(e)	2160.09 or 2160.1[0] or 2160.0 or 2160	**3**	**M2** for $2000\ (1 + \frac{2.6}{100})^3$ oe or **M1** for $2000\ (1 + \frac{2.6}{100})^2$ soi by 2105.35

Question	Answer	Marks	Partial Marks
5(a)	$\frac{90}{360} \times 900$ [= 225]	**1**	
5(b)	45	**2**	**M1** for $\frac{18}{360} \times 900$ oe
5(c)	Correct pie chart	**2**	**B1** for 56° or 50° soi
5(d)(i)	0	**1**	
5(d)(ii)	$\frac{1}{20}$ cao	**2**	**M1** for $\frac{18}{360}$ or $\frac{\textit{their}\textbf{(b)}}{900}$ oe
5(e)	350	**2**	**M1** for $\frac{125}{900} \times 2520$ or $\frac{50}{360} \times 2520$ oe
6(a)(i)	95	**2**	**B1** for 9.5
6(a)(ii)	135	**1**	
6(b)(i)	Correct length and bearing	**2**	**B1** for 7.8 cm from *A* **B1** for 103° from *A*
6(b)(ii)	104	**2**	**M1** for $\frac{78}{45} \times 60$ oe or for $\frac{78}{\text{time}}$
6(c)	Correct region shaded with correct arcs	**5**	**B2** for correct bisector with correct arcs or **B1** for short bisector with correct/incorrect/no arcs or for correct arcs but no line **B2** for arc 7 cm centre *A* or **B1** for short arc 7 cm from centre *A*
7(a)(i)	Pentagon	**1**	
7(a)(ii)	Parallelogram	**1**	
7(a)(iii)	Obtuse	**1**	
7(b)(i)	2400	**2**	**M1** for $25 \times 12 \times 8$
7(b)(ii)	[0] .0024	**1FT**	

Question	Answer	Marks	Partial Marks
7(c)(i)	Radius	**1**	
7(c)(ii)	Angle [in a] semicircle, [90°]	**1**	
7(c)(iii)	50.3 or 50.26 to 50.27…….	**2**	**M1** for $2 \times 8 \times \pi$ or $16 \times \pi$
7(c)(iv)	11.5 or 11.48 to 11.49	**3**	**M2** for $\sqrt{14^2 - 8^2}$ soi or better or **M1** for $14^2 = 8^2 + CD^2$ or better
8(a)(i)	$12p - 7r$ final answer	**2**	**B1** for $12p + jr$ or $kp - 7r$ j, k can be 0 or $12p + -7r$
8(a)(ii)	$24x^5$ final answer	**1**	
8(b)	$90x + 75y$ final answer	**2**	**B1** for $90x + jy$ or $kx + 75y$ j, k can be 0 or $0.9x + 0.75y$
8(c)	$4p(3p - 2)$ final answer	**2**	**B1** for $4(3p^2 - 2p)$ or $p(12p - 8)$ or $2(6p^2 - 4p)$ or $2p(6p - 4)$
8(d)	5	**3**	**M1** for first correct step **M1FT** for second correct step
8(e)	Correctly equating one set of coefficients	**M1**	
	Correct method to eliminate one variable	**M1**	Dependent on the coefficients being the same for one of the variables. Correct consistent use of addition or subtraction using their equations.
	[x =] 2.5	**A1**	
	[y =] 11	**A1**	If zero scored, **SC1** if no working shown, but 2 correct answers given or **SC1** for 2 values satisfying one of the original equations
9(a)(i)	−6, 6, 14	**3**	**B1** for each
9(a)(ii)	Correct curve	**4**	**B3FT** for 6 or 7 points correctly plotted or **B2FT** for 4 or 5 points correctly plotted or **B1FT** for 2 or 3 points correctly plotted
9(b)(i)	Correct ruled line	**1**	
9(b)(ii)	$1.8 \leqslant x < 2.0$, 5	**1FT**	**FT** intersection of *their* curve with the line $y = 5$

Cambridge Assessment International Education
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MATHEMATICS **0580/33**

Paper 3 (Core) **October/November 2017**

MARK SCHEME

Maximum Mark: 104

Published

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Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial marks
1(a)(i)	800	**1**	
1(a)(ii)	48	**2**	**M1** for $\frac{160}{2+5+3}$ [× 3]
1(a)(iii)	60	**1**	
1(b)(i)	43.5[0]	**2**	**M1** for 3 × 7.5[0] + 2 × 10.5[0]
1(b)(ii)	7.6[0]	**2**	**M1** for $9.5\left(1-\frac{20}{100}\right)$ oe
1(c)(i)	102 138	**2**	**M1** for $\frac{85}{300}\times 360$ or $\frac{115}{300}\times 360$ or $\frac{120}{100}\times 85$ or $\frac{120}{100}\times 115$ oe
1(c)(ii)	3 correct sectors	**2FT**	**FT** if *their* angles add to 240° **B1FT** for one correct sector
1(d)	40	**3**	**M2** for $\frac{31.50-22.50}{22.50}\times 100$ or $\left(\frac{31.50}{22.50}-1\right)\times 100$ oe or **M1** for $\frac{31.50-22.50}{22.50}$ or $\frac{31.50}{22.50}-1$ or $\frac{31.50}{22.50}\times 100$ oe
2(a)(i)	9	**1**	
2(a)(ii)	4	**1**	
2(b)(i)	1.4	**1**	
2(b)(ii)	4096	**1**	
2(c)	[0].043 cao	**2**	**M1** for 0.0426… or $\frac{367}{8610}$

Question	Answer	Marks	Partial marks
2(d)	64.8	**2**	**M1** for $\frac{1}{3}\times 4.5^2\times 9.6$ or $\frac{324}{5}$
2(e)	$\sqrt{5}$ indicated	**1**	
2(f)(i)	300	**1**	
2(f)(ii)	$2^4 \times 5$ or $2 \times 2 \times 2 \times 2 \times 5$	**2**	**M1** for 2, 2, 2, 2, 5 or 2^4,5 or $1 \times 2 \times 2 \times 2 \times 2 \times 5$ or $1 \times 2^4 \times 5$
2(f)(iii)	20	**2**	**B1** for 2 or 4 or 5 or 10 as answer or $2^2 \times 5$ as answer
3(a)(i)	Chord	**1**	
3(a)(ii)	Tangent	**1**	
3(b)(i)	48	**1**	
3(b)(ii)	66	**2**	**M1** for 180 – 48 soi by 132
3(b)(iii)	42	**2FT**	**2FT** for 90 – *their* **(b)(i)** or **B1** for angle $OCQ = 90$ soi
4(a)	Scalene	**1**	
4(b)	Translation	**1**	
	$\begin{pmatrix}-5\\-4\end{pmatrix}$	**1**	
4(c)	Correct rotation Vertices (2, –1), (2, –4), (3, –2)	**2**	**B1** for correct orientation but wrong position or for rotation of 90° anticlockwise about origin
4(d)(i)	1.5 oe	**1**	
4(d)(ii)	Correct enlargement Vertices (1, 3), (3, 5), (7, 3)	**2**	**B1** for correct size and orientation, incorrect position
4(d)(iii)	4	**2**	**M1** for $\frac{1}{2}\times 6\times 2$ soi by 6 or correct method to find area of *their* triangle

Question	Answer	Marks	Partial marks
5(a)(i)	$n + 10$	**1**	
5(a)(ii)	$2(n + 10)$ oe isw	**1FT**	
5(a)(iii)	*their* **(ii)** = 52	**M1**	
	16 final answer	**B2**	**M1** for $2n = 52 - 20$ or $n = 26 - 10$ or better
5(a)(iv)	42	**1FT**	**FT** $2 \times$ *their* **(iii)** + 10
5(b)(i)	$\frac{1}{4}$ cao	**2**	**B1** for $\frac{13}{52}$ oe soi
5(b)(ii)	Correct arrow at $\frac{3}{4}$	**1**	
5(c)	2.7[00]	**2**	**B1** for answer figs 27 or for 0.45 seen
5(d)	115 125	**2**	**B1** for one correct or both values correct but reversed
6(a)(i)	4.5	**2**	**M1** for ordered list of at least 6 values or **B1** for 4.3 **and** 4.7 both identified
6(a)(ii)	8	**1**	
6(a)(iii)	5.18	**2**	**M1** for sum of 10 distances ÷ 10
6(b)(i)	15 50 or 3.50 pm	**2**	**M1** for 9 ÷ 6 or 1.5 hours oe seen
6(b)(ii)	100	**2**	**M1** for 6×1000 or $6 \div 60$ soi
6(c)(i)	Positive	**1**	
6(c)(ii)	Point (4, 68) indicated	**1**	
7(a)(i)	–3 –6 6 3	**2**	**B1** for 2 or 3 values correct
7(a)(ii)	Correct curve	**4**	**B3FT** for 7 or 8 correctly plotted points or **B2FT** for 5 or 6 correctly plotted points or **B1FT** for 3 or 4 correctly plotted points
7(a)(iii)	Ruled line $y = -5$	**1**	
7(a)(iv)	–2.5 to –2.3	**1FT**	**FT** intersection of *their* line with *their* curve

Question	Answer	Marks	Partial marks
7(b)(i)	–0.5 oe	**2**	**M1** for $\frac{\text{rise}}{\text{run}}$
7(b)(ii)	$y = –0.5x + 2$ oe	**1FT**	**FT** *their* gradient
7(b)(iii)	$y = –0.5x + 3$ oe	**2FT**	**B1FT** for $y = –0.5x + k$ oe, $k \neq 2$ or **B1** for $y = mx + 3$ oe, $m \neq –0.5$ or 0
8(a)(i)	Correct trapezium	**2**	**M1** for $AB = 8$ cm and $BC = 6$ cm or AB and DC perpendicular to AD
8(a)(ii)	124	**1FT**	**FT** *their* obtuse angle at C (or B)
8(a)(iii)	4.7	**1FT**	**FT** *their CD*
8(a)(iv)	31.25 to 32.25	**2**	**M1** for $0.5 \times 5 \times (8 +$ *their* **(iii)**$)$ oe
8(b)(i)	17 700 or 17 671 to 17 674	**3**	**M2** for $\pi \times 15^2 \times 25$ or **B1** for 15 seen If zero scored, **SC1** for answer 70 700 or 70 685 to 70 695 or $22\,500\pi$
8(b)(ii)	4800	**3**	**M2** for $2 \times 30 \times 30 + 4 \times 30 \times 25$ oe or better or **M1** for 30×30 and 30×25 or **B1** for cuboid 30 by 30 by 25 soi
9(a)	$y(y + 8)$ final answer	**1**	
9(b)	$2x + 17$ final answer	**2**	**B1** for $6x – 3$ or $–4x + 20$ or $2x + j$ or $kx + 17$ as final answer
9(c)	$\frac{k – 5m}{7}$ oe final answer	**2**	**M1** for $7p = k – 5m$ or $\frac{k}{7} = \frac{5m}{7} + p$
9(d)	Correctly equating one set of coefficients	**M1**	
	Correct method to eliminate one variable	**M1**	Dependent on the coefficients being the same for one of the variables. Correct consistent use of addition or subtraction using their equations.
	$x = 4$	**A1**	
	$y = –3$	**A1**	If zero scored, **SC1** if no working shown, but 2 correct answers given or **SC1** for 2 values satisfying one of the original equations.

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Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/41**

Paper 4 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 130

Published

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dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial marks
1(a)	2915	**2**	**M1** for 10 494 ÷ (13 + 5) oe
1(b)	1056	**2**	**M1** for 384 ÷ (10 – 6) oe
1(c)(i)	52.2 or 52.17…	**2**	**M1** for 20 ÷ 23 or 20 × 60 or 23 ÷ 60 isw If zero scored, **SC1** for answer 52.6 (from use of 0.38)
1(c)(ii)	63[.0] or 63.03 to 63.05…	**5**	**M4** for $\frac{\textit{their}\ 52.17... - 32}{32} \times 100$ oe or **M3** for $\frac{\textit{their}\ 52.17... - 32}{32}$ oe or $\frac{\textit{their}\ 52.17...}{32} \times 100$ oe OR **B2** for $\frac{5}{8}$ [hours] oe or 37.5 [minutes] or **M1** for 20 ÷ 32 or better and **M2** for $\frac{\textit{their}\ 37.5 - 23}{23} \times 100$ oe or **M1** for $\frac{\textit{their}\ 37.5 - 23}{23}$ or $\frac{\textit{their}\ 37.5}{23} \times 100$
1(d)	0.06 final answer nfww	**3**	**M1** for 11.99 ÷ 0.9276 or 12.99 × 0.9276 **A1** for 12.93 or 12.925 to 12.926
1(e)	9750	**3**	**M2** for $7605 \div \left(1 - \frac{22}{100}\right)$ oe or **M1** for (100 – 22)[%] correctly associated with 7605 seen

Question	Answer	Marks	Partial marks
2(a)	122	**4**	**B3** for 238 or 61 or 58 correctly identified in working or on diagram or **B2** for 952 seen or 74 or 119 or 29 correctly identified in working or on diagram OR Method 1 using sum of interior angles **M1** for $(8 – 2) \times 180$ or 1080 isw **M1** for *their* $1080 – 4 \times 32$ **M1** for $360 –$ *their* $952 \div 4$ OR Method 2 using isosceles triangles and square **M1** for $(180 – 32) \div 2$ or for 90 **M1** for *their* $74 \times 2 + 90$ or $90 –$ *their* 74 **M1** for $360 –$ *their* $74 \times 2 + 90$ or $90 + 2(90 –$ *their* $74)$ OR Method 3 using four kites joined to centre **M1** for $360 \div 4$ **M1** for $(360 – ($*their* $90 + 32)) \div 2$ **M1** for $2(180 –$ *their* $119)$ OR Method 4 using square around outside **M1** for $90 – 32$ **M1** for $(90 – 32) \div 2$ **M1** for $180 – 2($*their* $29)$
2(b)	105	**3**	**M2** for $360 = 2 \times y + (2y – 60)$ oe or $2(180 – y) = 2y – 60$ oe or **B1** identifying in working or on diagram a relevant angle in terms of y
3(a)	$–2.75$ or $-2\frac{3}{4}$	**2**	**M1** for $11x – 3x = –7 – 15$ or better
3(b)(i)	$(x + 11)(x – 2)$ final answer	**2**	**M1** for $(x + a)(x + b)$ where $ab = –22$ or $a + b = 9$
3(b)(ii)	–11 and 2 final answer	**1**	
3(c)	$[x] = \frac{2a}{2-y}$ or $\frac{-2a}{y-2}$ nfww final answer	**4**	**M1** for clearing the x term in the denominator **M1** for correctly removing the bracket (expand or divide by 2) **M1** for factorising to obtain single x term **M1** for *their* factor and division Incorrect answer scores 3 out of 4 maximum
3(d)	$\frac{x}{x+6}$ nfww final answer	**3**	**M1** for $x(x – 6)$ **M1** for $(x + 6)(x – 6)$

Question	Answer	Marks	Partial marks
4(a)	10, 7	**2**	**B1** for each value
4(b)	Correct curve	**4**	**B3 FT** for 10 or 11 correct points **B2 FT** for 8 or 9 correct points **B1 FT** for 6 or 7 correct points **FT** *their* table
4(c)	–1.7 to –1.55	**1**	**FT** *their* graph if one answer
4(d)	Tangent ruled at $x = 3.5$	**B1**	No daylight between tangent and curve at point of contact
	6.5 to 11	**B2**	**dep** on tangent drawn or close attempt at tangent at $x = 3.5$ **M1** for rise/run also dep on tangent or close attempt at $x = 3.5$
4(e)	line $y = 2x + 10$ ruled AND –1.3 to –1.1 1 4.1 to 4.25	**4**	**B3** for correct line (could be short) and 1 correct value or **B2** for correct line (could be short) or **B1** for [$y =$] $2x + 10$ seen If zero scored, **SC1** for no/wrong line and 3 correct values
5(a)	54, 76, 96	**3**	**B1** for each
5(b)	187 or 186.8 to 186.9 nfww	**4**	**M1** for 155, 175, 185, 200, 225 soi **M1** for Σfm with *their* frequencies from **(a)** 155 × *their* 54 + 175 × *their* 76 + 185 × *their* 96 + 200 × 92 + 225 × 42 **M1** (dep on second **M1**) for *their* $\Sigma fm \div 360$
6(a)	18 22 $4n + 2$ oe 17 26 $n^2 + 1$ oe	**6**	**B2** for 18, 22, 17, 26 or **B1** for two or three correct values AND **B2** for $4n + 2$ oe or **B1** for $4n + k$ oe or $pn + 2$ ($p \neq 0$) AND **B2** for $n^2 + 1$ oe or **B1** for $n^2 + k$ oe
6(b)	242	**1**	**FT** *their* $4n + 2$ provided a linear expression
6(c)	15	**1**	
6(d)	3	**2**	**M1** for $2 \times 1^2 + 2 \times 1 + q = 7$ oe

Question	Answer	Marks	Partial marks
7(a)	–7	**1**	
7(b)	$\frac{4}{64}$ or better	**2**	**M1** for g(4^3) soi or $\frac{4}{4^x}$ or better
7(c)	$\frac{3-x}{2}$ oe final answer	**2**	**M1** for $x = 3 - 2y$ or $2x = 3 - y$ or $\frac{y}{2} = \frac{3}{2} - x$ or $\frac{y-3}{-2}$ oe as final answer
7(d)	4^{3-2x}	**M1**	
	Correctly interprets the indices	**M1**	Dep on previous **M1** e.g. $4^3 \times 4^{-2x}$ or $4^3 \times \frac{1}{4^{2x}}$ or $\frac{4^3}{4^{2x}}$
	$\frac{64}{16^x}$ nfww	**A1**	Correct completion with no errors
7(e)	1.5	**2**	**B1** for $4^x = 8$ or better
8(a)	$\pi \times \frac{5}{2} \times l + \frac{4}{2} \times \pi \times \left(\frac{5}{2}\right)^2 = \frac{115\pi}{4}$ oe or $\frac{115\pi}{4} - \frac{4}{2} \times \pi \times \left(\frac{5}{2}\right)^2 = \pi \times \frac{5}{2} \times l$ oe	**M2**	**M1** for $\pi \times \frac{5}{2} \times l$ or $\frac{4}{2} \times \pi \times \left(\frac{5}{2}\right)^2$
	$\frac{5\pi l}{2} = \frac{65\pi}{4}$ oe or [l =] $\left(\frac{115\pi}{4} - 2 \times \pi \times 2.5^2\right) \div 2.5\pi$ oe	**B1**	nfww oe both terms must be written in terms of π nfww or correct complete method for l with decimals
	[l =] $\frac{65\pi \times 2}{4 \times 5\pi}$ or $\frac{65\pi}{10\pi}$ oe = 6.5	**A1**	Correct calculation with no errors and **B1** earned
8(b)	6	**3**	**M2** for $\sqrt{6.5^2 - 2.5^2}$ or **M1** for $h^2 + 2.5^2 = 6.5^2$ If zero scored, **SC2dep** for answer 4.15[3]…

Question	Answer	Marks	Partial marks
8(c)	72[.0…] or 71.99… nfww	**4**	**M3** for $\frac{\pi}{3} \times \left(\frac{5}{2}\right)^2 \times$ *their* 6 $+ \frac{1}{2} \times \frac{4\pi}{3} \times \left(\frac{5}{2}\right)^3$ oe or **M1** for $\frac{\pi}{3} \times \left(\frac{5}{2}\right)^2 \times$ *their* 6 oe and **M1** for $\frac{1}{2} \times \frac{4\pi}{3} \times \left(\frac{5}{2}\right)^3$ oe If zero scored, **SC3dep** for $\frac{\pi}{3} \times (5)^2 \times$ *their* 4.15 $+ \frac{1}{2} \times \frac{4\pi}{3} \times (5)^3$ oe or **SC1dep** for $\frac{\pi}{3} \times (5)^2 \times$ *their* 4.15 oe **SC1dep** for $\frac{1}{2} \times \frac{4\pi}{3} \times (5)^3$ oe
8(d)	53.7 or 53.65 to 53.67	**3**	**M1** for figs (*their* **(c)**) × 19.3 × 38.62 or better **M1** for ÷ 1000 soi
9(a)(i)	52	**2**	**M1** for (1 – 0.35) × 80 oe
9(a)(ii)	84	**1**	
9(b)(i)	$\frac{27}{729}$ oe	**2**	**M1** for $\frac{3}{9} \times \frac{3}{9} \times \frac{3}{9}$
9(b)(ii)	$\frac{144}{729}$ oe	**3**	**M2** for $\frac{2}{9} \times \frac{3}{9} \times \frac{4}{9} \times 6$ oe or **M1** for $\frac{2}{9} \times \frac{3}{9} \times \frac{4}{9}$ oe isw
9(c)	$\frac{42}{60}$ oe	**4**	**M3** for $\frac{3}{5} \times \frac{2}{4} \times \frac{1}{3} + \frac{3}{5} \times \frac{2}{4} \times \frac{2}{3} \times 3$ oe or **M2** for $\frac{3}{5} \times \frac{2}{4} \times \frac{2}{3} \times 3$ oe or for $\frac{3}{5} \times \frac{2}{4} \times \frac{1}{3} + \left(\frac{3}{5} \times \frac{2}{4} \times \frac{2}{3}\right)$ [×2] or **M1** for $\frac{3}{5} \times \frac{2}{4} \times \frac{1}{3}$ or $\frac{3}{5} \times \frac{2}{4} \times \frac{2}{3}$ oe isw or for PPG, PGP, GPP and PPP selected soi

Question	Answer	Marks	Partial marks
10(a)	$12.5^2 = x^2 + 8.5^2 - 2 \times x \times 8.5\cos 60$ oe isw	**M2**	**M1** for $\cos 60 = \frac{x^2 + 8.5^2 - 12.5^2}{2 \times x \times 8.5}$
	$156.25 = x^2 + 72.25 - 8.5x$	**A1**	or better
	$2x^2 - 17x - 168 = 0$	**A1**	with no errors or omissions
10(b)	$\frac{[--]17 \pm \sqrt{([-]17)^2 - 4(2)(-168)}}{2 \times 2}$	**2**	**B1** for $\sqrt{([-]17)^2 - 4(2)(-168)}$ or better seen and if in form $\frac{p + or - \sqrt{q}}{r}$ **B1** for $p = [- -]\ 17$ **and** $r = 2 \times 2$
	14.35, –5.85 final answers	**1, 1**	**SC1** for 14.352 to 14.353 and –5.853 to –5.852 seen or 14.3 or 14.4 and –5.8 or –5.9 as final answers or –14.35 and 5.85 as final answers or 14.35 and –5.85 seen in working
10(c)	12.2 or 12.17… nfww	**3**	**M2** for $\frac{their\ 14.35 \times \sin 46}{\sin 58}$ or **M1** for $\frac{\sin 46}{CD} = \frac{\sin 58}{their 14.35}$
10(d)	138 or 137.5 to 137.8 nfww	**3**	**M1** for $0.5 \times their\ 14.35 \times 8.5\sin 60$ **M1** for $0.5 \times their\ 14.35 \times their 12.2 \times \sin 76$
11(a)(i)	$\begin{pmatrix} 1 & -18 \\ 6 & 13 \end{pmatrix}$	**2**	**M1** for two or three correct elements
11(a)(ii)	$\frac{1}{11}\begin{pmatrix} 4 & 3 \\ -1 & 2 \end{pmatrix}$ or better isw	**2**	**M1** for det = 11 or $[k]\begin{pmatrix} 4 & 3 \\ -1 & 2 \end{pmatrix}$ isw
11(b)	Reflection	**1**	
	y-axis oe	**1**	
11(c)	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	**2**	**B1** for one correct column or row

Question	Answer	Marks	Partial marks
11(d)(i)	$\frac{1}{7}(4\mathbf{a} + 3\mathbf{b})$ or $\frac{4}{7}\mathbf{a} + \frac{3}{7}\mathbf{b}$	**3**	**M2** for correct unsimplified answer seen or $\overrightarrow{AP} = \frac{3}{7}(\mathbf{b} - \mathbf{a})$ oe or $\overrightarrow{BP} = \frac{4}{7}(\mathbf{a} - \mathbf{b})$ oe or **M1** for $\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$ or $\overrightarrow{BA} = \mathbf{a} - \mathbf{b}$ or correct route for $\overrightarrow{OP}$
11(d)(ii)	$[m =] \frac{7}{3}$ $[k =] \frac{4}{3}$	**2**	**B1** for each value or **M1** for $\frac{m}{7}(4\mathbf{a} + 3\mathbf{b}) = \mathbf{b} + k\mathbf{a}$ oe

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/42**

Paper 4 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 130

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial marks
1(a)(i)	4 : 5	**1**	
1(a)(ii)	4 : 5	**1**	
1(a)(iii)	3 : 4	**2**	**B1** for 12 : 16 or answer 4 : 3
1(b)(i)	26.8 or 26.79…	**3**	**M2** for $\frac{15600-11420}{15600}[\times 100]$ or $\frac{11420}{15600}\times 100$ or **M1** for $\frac{11420}{15600}$
1(b)(ii)	16 000 nfww	**3**	**M2** for $15600\times\frac{100}{100-2.5}$ oe or **M1** for 15600 associated with 97.5[%] seen
1(c)	1.6 or $\frac{8}{5}$	**2**	**M1** for $\frac{200\times x\times 15}{100}=48$ oe or **M1** for figs 16
1(d)	2.5 or $\frac{5}{2}$ cao nfww	**3**	**B2** for 2.49[9…] or 102.4[99…] or 1.024[99…] or 2.50 or 102.5 or 1.025 or **M2** for $\sqrt[10]{\frac{256}{200}}$ oe or **M1** for $256=200(x)^{10}$ seen

Question	Answer	Marks	Partial marks
2(a)(i)	1070 or 1072. ..	**3**	**M1** for $\pi \times 8^2 \times 2 \times 8$ **M1** for $\frac{4}{3} \times \pi \times 8^3$ or **M2** for $\frac{2}{3}\pi r^3$ or **M1** for $\pi r^2 2r - \frac{4}{3}\pi r^3$
2(a)(ii)	2.58 or 2.580 to 2.581	**3**	**B2** for $r^3 = \frac{36 \times 3}{2\pi}$ or better or **M1** for $\pi \times r^2 \times 2 \times r - \frac{4}{3} \times \pi \times r^3 = 36$ oe
2(b)(i)	4.24 or 4.241 to 4.242	**4**	**M3** for $(\pi \times 5^2 + \pi \times 5 \times \sqrt{5^2 + 12^2})$ or **M2** for $\pi \times 5 \times \sqrt{5^2 + 12^2}$ or **M1** for $5^2 + 12^2$ or $\pi \times 5^2$
2(b)(ii)	64 cao final answer	**3**	**M2** for $\frac{[k\pi] \times 5^2 \times 12}{[k\pi] \times 1.25^2 \times 3}$ or **M1** for $\frac{1}{3} \times \pi \times 5^2 \times 12$ or $\frac{1}{3} \times \pi \times 1.25^2 \times 3$ OR **M2** for 4^3 or $\left(\frac{1}{4}\right)^3$ seen or **M1** for factor 4 or $\frac{1}{4}$ soi
3(a)	7040 or 7035. …	**3**	**M1** for $\frac{1}{2} \times 100 \times 70$ oe **M1** for $\frac{1}{2} \times 100 \times 110 \times \sin 40$ oe
3(b)	374 or 375 or 374.4 to 374.5….	**5**	**M2** for $110^2 + 100^2 - 2 \times 110 \times 100 \times \cos 40$ oe or **M1** for implicit form **A1** for 5250 or 5247. … (or 72.4 or 72.43 to 72.44) **M1** for $70^2 + 100^2$
3(c)	64.3 or 64.27 to 64.28 nfww	**2**	**M1** for $\sin 40 = \frac{\text{distance}}{100}$ oe
3(d)	235	**3**	**B2** for [angle ACB =] 34.99 to 35 or [angle ABC =] 55[.0…] or **M1** for $\tan[ACB] = \frac{70}{100}$ or $\tan[ABC] = \frac{100}{70}$ or equivalent trig ratio

Question	Answer	Marks	Partial marks
4(a)(i)	Correct translation	**2**	**B1** for translation $\begin{pmatrix}6\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-2\end{pmatrix}$
4(a)(ii)	Correct rotation	**2**	**B1** for rotation 180° but other centre
4(a)(iii)	Correct reflection	**2**	**B1** for reflection in $y = -x$
4(b)(i)	Enlargement [factor] $\frac{1}{2}$ or 0.5 [centre] (0, 0) oe	**3**	**B1** for each
4(b)(ii)	$\begin{pmatrix}\frac{1}{2} & 0\\0 & \frac{1}{2}\end{pmatrix}$ oe	**2**	**B1** for matrix of form $\begin{pmatrix}k & 0\\0 & k\end{pmatrix}$ oe, $k \neq 0$ or 1
4(c)	± 2.5	**3**	**B2** for $25u^2 = 156.25$ or $5u = [\pm]12.5$ or **M1** for $(4u)^2 + (3u)^2$
5(a)	3.2 or 3.15 or 3.152 to 3.153 5.2 or 5.19 or 5.20 or 5.196…	**2**	**B1** for each
5(b)	Correct graph for $0.5 \leqslant x \leqslant 3.5$	**4**	**B3FT** for 6 or 7 correct points or **B2FT** for 4 or 5 correct points or **B1FT** for 2 or 3 correct points
5(c)	1.7 to 1.8	**1FT**	**FT** *their* graph if one answer
5(d)(i)	Any integer $k \geqslant -1$	**1**	
5(d)(ii)	Any integer $k < -1$	**1**	
5(e)	Tangent ruled at $x = -3$	**B1**	
	2.5 to 4	**B2**	**dep** on tangent drawn at $x = -3$ or close attempt at tangent at $x = -3$ **M1** for rise/run also dep on tangent at $x = -3$ or close attempt at tangent at $x = -3$

Question	Answer	Marks	Partial marks
5(f)(i)	$y = 6 - x$ ruled accurately	**M2**	**M1** for correct line but freehand or ruled line gradient –1.1 to –0.9, or through (0, 6) but not $y = 6$
	$2.85 \leqslant x \leqslant 3$	**A1**	
5(f)(ii)	[a =] 8 [b =] –48 [c =] –16	**4**	**B3** for 2 correct or $x^5 + 8x^3 - 48x^2 - 16 = 0$ seen or $-x^5 - 8x^3 + 48x^2 + 16 = 0$ seen or **M2** for correct multiplication by $8x^2$ or **B1** for answers ± 8, ± 48, ± 16 or **M1** for $\frac{x^2 \times x^3 - 8 \times 2}{x^2 \times 8} = 6 - x$ or **M1** for correct multiplication by 8 or **M1** for correct multiplication by x^2
6(a)(i)	280	**1**	
6(a)(ii)	320	**1**	
6(a)(iii)	90	**1**	
6(a)(iv)	10	**2**	**M1** for 90 written
6(b)(i)	250.2 nfww cao	**4**	**M1** for at least 4 correct mid-values **M1** for Σfx **M1 dep on second M1** for $\Sigma fx \div 100$
6(b)(ii)	Correct completion of histogram	**4**	**B1** for each correct block If zero scored, then **SC1** for correct frequency densities seen
6(c)	[22 m] further oe	**1**	
7(a)	$\frac{5}{6}$	**1**	
7(b)	$\frac{4}{36}$ oe	**2**	**M1** for $\frac{2}{6} \times \frac{2}{6}$
7(c)	20	**1**	

Question	Answer	Marks	Partial marks
7(d)(i)	Diagram completed correctly x x 3 3 3 9 x x 2 2 2 6 x x 2 2 2 6 x x 2 2 2 6 x x 1 1 1 3	**2**	**B1** for 3 correct columns or for 4 correct rows
7(d)(ii)(a)	$\frac{9}{36}$ oe	**1FT**	**FT** *their* **(d)(i)**
7(d)(ii)(b)	$\frac{4}{36}$ oe	**1FT**	**FT** *their* **(d)(i)**
7(e)	$\frac{512}{7776}$ oe	**2**	**M1** for $\left(\frac{4}{6}\right)^k \times \frac{2}{6}$ oe $k = 3$, 4 or 5 only
8(a)(i)	$7a + 9p = 354$ oe final answer	**1**	
8(a)(ii)	[a =] 21 [p =] 23	**3**	**M1** for correctly eliminating one variable **A1** for $a = 21$ **A1** for $p = 23$
8(b)(i)	$\frac{2}{x}$	**1**	
8(b)(ii)(a)	$\frac{2}{x} + \frac{3}{x-1} = 2$	**M1**	
	$2(x-1) + 3x = 2x(x-1)$ oe	**M1dep**	Both sides of the equation could be over $x(x-1)$ at this stage Dep on **M1** or 3 term equation with fractions but one sign error
	$2x - 2 + 3x = 2x^2 - 2x$ oe $2x^2 - 7x + 2 = 0$	**A1**	Answer reached with one correctly expanded line seen and no errors seen
8(b)(ii)(b)	$\sqrt{(-7)^2 - 4(2)(2)}$	**B1**	or for $\left(x - \frac{7}{4}\right)^2$
	$\frac{--7 + \sqrt{q}}{2 \times 2}$ or $\frac{--7 - \sqrt{q}}{2 \times 2}$	**B1**	or for $\frac{7}{4} + \text{or} - \sqrt{-1 + \left(\frac{7}{4}\right)^2}$
	3.19 only	**B2**	**B1** for 3.19 with other root or for 3.2 or 3.186… isw other root or for 0.31 or 0.314 or 0.3138 to 0.3139

Question	Answer	Marks	Partial marks
9(a)	3	**1**	
9(b)	$-\frac{2}{5}$ oe	**2**	**M1** for $2(1-2x)=x+4$
9(c)	$-2x-7$ final answer	**2**	**M1** for $1-2(x+4)$
9(d)	26	**2**	**B1** for h(5) soi or **M1** for $\left(x^2+1\right)^2+1$
9(e)	$\frac{1-x}{2}$ oe final answer	**2**	**M1** for $x=1-2y$ or $2x=1-y$ or $\frac{y}{2}=\frac{1}{2}-x$ or $y-1=-2x$
9(f)	$[p=]-20$ $[q=]\ 26$	**4**	**B3** for [hgf(x)] = $4x^2-20x+26$ seen and not spoilt by further working or **M1** for $(1-2x)+4$ **M1 dep** for $\left(their\ (5-2x)\right)^2+1$ **B1FT dep** for $25-10x-10x+4x^2$
10(a)	5.68 or 5.684 to 5.685	**5**	**M2** for $2x\sqrt{x^2+x^2}$ oe or $2\times\sqrt{2}\times x^2$ or **M1** for $x\sqrt{2}$ or $\sqrt{x^2+x^2}$ oe soi **M1** for $\frac{270}{360}\times\pi\times x^2$ oe **M1** for $0.5\ x^2$ oe
10(b)	4.4[0] or 4.398 to 4.401	**2**	**dep** on a correct value for k in **(a)** **M1** for $\left[x^2\right]=\frac{110}{their\ k}$

Cambridge Assessment International Education
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MATHEMATICS **0580/43**

Paper 4 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 130

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	180 ÷ (2 + 3 + 5) × 5 [= 90]	**1**	with no errors seen
1(a)(ii)	7.05 or 7.053….	**3**	**M2** for $\frac{x}{12} = \sin 36$ oe or better or **B1** for 36 or 54 seen
1(b)(i)	13	**2**	**M1** for 7.8 ÷ 3 soi
1(b)(ii)	36.9 or 36.86 to 36.87	**3**	**B1** for smallest angle identified **M1** for sin[ ] = $\frac{3}{5}$ oe or sin[ ] = $\frac{7.8}{\textit{their}\ \textbf{(b)(i)}}$ oe If zero scored, **SC1** for calculation of 53.1
2(a)	343	**1**	
2(b)(i)	1	**1**	
2(b)(ii)	x^{10} final answer	**1**	
2(b)(iii)	$9x^{16}$ final answer	**2**	**B1** for x^{12} or x^{16} or $(3x^8)^2$ seen
2(c)(i)	$2(x – 3)(x + 3)$ final answer	**2**	**M1** for $(2x + 6)(x – 3)$ or $(2x – 6)(x + 3)$ or $(x – 3)(x + 3)$
2(c)(ii)	$\frac{2(x+3)}{x+10}$ or $\frac{2x+6}{x+10}$ final answer nfww	**3**	**M2** for $(x + 10)(x – 3)$ or **M1** for $(x + a)(x + b)$ where $ab = –30$ or $a + b = 7$

Question	Answer	Marks	Partial Marks
3(a)(i)	1890	**2**	**M1** for 126 ÷ 4 [× 60] oe If zero scored, **SC1** for answer 31.5
3(a)(ii)	103.95	**4**	**M3** for $0.5 \times \left(\frac{44}{60} + \frac{55}{60}\right) \times 126$ oe or **SC3** for figs 10395 or figs 104 or **M2** for two correct area methods or for a full method without minutes to hours conversion or **M1** for one correct area with or without minutes to hours conversion
3(b)(i)	126 × 1000 ÷ (60 × 60)	**1**	
3(b)(ii)	46.3 or 46.28 to 46.29	**3**	**M2** for (1400 + 220) ÷ 35 oe or **M1** for distance ÷ speed or 1400 + 220
3(c)	180 nfww	**4**	**B3** for final answer 3 OR **M3** for $\frac{217.5}{72.5} \times 60$ oe or **M2** for 217.5 ÷ 72.5 oe or $\frac{210 \text{ to } 220}{72.5} \times 60$ or $\frac{217.5}{72 \text{ to } 74} \times 60$ or **M1** for 217.5 or 72.5 seen or $\frac{215}{73} \times 60$
4(a)	$80 < t \leqslant 100$	**1**	
4(b)	86 nfww	**4**	**M1** for midpoints soi **M1** for use of Σfx with x in correct interval including both boundaries **M1** (dep on 2nd **M1**) for $\Sigma fx \div 150$
4(c)(i)	Reference to not knowing the individual values so we do not know the highest or the lowest values	**1**	
4(c)(ii)	62.4	**2**	**M1** for 26 ÷ 150 or 360 ÷ 150 soi
4(d)	$\frac{22}{150}$ oe	**1**	

Question	Answer	Marks	Partial Marks
4(e)(i)	$\frac{90}{22350}$ oe	**2**	**M1** for $\frac{10}{150}\times\frac{9}{149}$ After zero scored, **SC1** for answer $\frac{100}{22500}$ oe
4(e)(ii)	$\frac{440}{22350}$ oe	**3**	**M2** for $\frac{10}{150}\times\frac{22}{149}+\frac{22}{150}\times\frac{10}{149}$ oe or **M1** for $\frac{10}{150}\times\frac{22}{149}$ or $\frac{22}{150}\times\frac{10}{149}$ oe After zero scored, **SC1** for answer $\frac{440}{22500}$ oe
4(f)	13, 8.5, 7.25, 1.1	**3**	**B2** for 3 correct or **B1** for 1 correct or for 3 correct FD.s 5.2, 3.4, 2.9, 0.44 oe
5(a)(i)	Image at (0, 1), (0, 2), (–3, 1)	**2**	**B1** for reflection in $y = 0$ or $x = k$
5(a)(ii)	Image at (0, 0), (0, –2), (6, –2)	**2**	**B1** for correct size and correct orientation wrong position or for 2 correct vertices plotted
5(a)(iii)	Image at (–5, 4), (–5, 5), (–2, 4)	**2**	**B1** for translation by $\begin{pmatrix}-5\\k\end{pmatrix}$ or $\begin{pmatrix}k\\3\end{pmatrix}$
5(b)	Rotation 90° clockwise oe (4, –1)	**3**	**B1** for each
5(c)(i)	(4, 1)	**2**	**M1** for $\begin{pmatrix}0&-1\\1&0\end{pmatrix}\begin{pmatrix}1\\-4\end{pmatrix}$
5(c)(ii)	(8, –1)	**2**	**M1** for $\begin{pmatrix}0&-1\\1&0\end{pmatrix}\begin{pmatrix}3&1\\0&2\end{pmatrix}\begin{pmatrix}1\\-4\end{pmatrix}$ or $\begin{pmatrix}0&-2\\3&1\end{pmatrix}\begin{pmatrix}1\\-4\end{pmatrix}$ or $\begin{pmatrix}0&-1\\1&0\end{pmatrix}\begin{pmatrix}-1\\-8\end{pmatrix}$
5(c)(iii)	Rotation 90° anti-clockwise oe Origin oe	**3**	**B1** for each

Question	Answer	Marks	Partial Marks
6(a)(i)	25.5 or 25.46…	**2**	**M1** for $\pi \times 5^2 \times h = 2000$ oe
6(a)(ii)	9.85 or 9.847…	**3**	**M2** for $[r^3=]\ 2000 \div \left(\frac{2}{3}\pi\right)$ oe or **M1** for $\frac{2}{3}\pi r^3 = 2000$ oe
6(a)(iii)	952 or 952.4….	**3**	**M2** for $[6 \times]\ \sqrt[3]{2000}^2$ or **M1** for $\sqrt[3]{2000}$ or 6 times *their* area of one face
6(b)(i)	22.5 or 22.49…	**2**	**M1** for $\frac{1}{2} \times 7 \times 10 \times \sin 40$
6(b)(ii)	$\sqrt{(10^2 + 7^2 - 2 \times 10 \times 7 \cos 40)} + 7 + 10$	**M3**	**M2** for $10^2 + 7^2 - 2 \times 10 \times 7 \cos 40$ or **M1** for correct implicit cosine rule
	23.46…	**A2**	**A1** for 6.46… or 41.7 to 41.8
6(c)	64.9 or 64.92 to 64.94	**3**	**M2** for $28.2 - 2 \times 9 = \frac{c}{360} \times 2 \times \pi \times 9$ oe or **M1** for $\frac{c}{360} \times 2 \times \pi \times 9$ soi
7(a)	9, – 6, 9	**3**	**B1** for each
7(b)	Correct graph	**4**	**B3FT** for 6 or 7 correct points or **B2FT** for 4 or 5 correct points or **B1FT** for 2 or 3 correct points
7(c)	–3.5 to –3.35 and 0.8 to 0.9..	**2FT**	**FT** *their* graph **B1FT** for either
7(d)	$a = \frac{5}{4}$ or $1\frac{1}{4}$ or 1.25 $b = -\frac{49}{8}$ or $-6\frac{1}{8}$ or –6.125	**3**	**B2** for either correct or **M1** for $[2]\left(x + \frac{5}{4}\right)^2$ seen isw or for $2x^2 + 4ax + 2a^2 + b$
8(a)(i)	5	**1**	
8(a)(ii)	$-\frac{3}{2}$ oe	**1**	
8(b)	$\left(\frac{4}{5},\ 0\right)$ oe	**2**	**M1** for $5x - 4 = 0$ soi

Question	Answer	Marks	Partial Marks
8(c)	$y = –0.2x + 11$ final answer	**4**	**M2** for $y = –0.2x + c$ oe (any form) **FT** *their* **(a)** or **B1FT** for grad = $\frac{-1}{\textit{their}}$ **(a)(i)** soi and **M1** for substitution of (10, 9) into *their* equation
8(d)	(2, 6)	**3**	**M1** for elimination of one variable **A1** for $x = 2$ or $y = 6$
8(e)	13	**3**	**M2** for $(4 + 9) \times$ *their* $2 \div 2$ oe or **B1** for 9 oe or 4 or –4 seen
9(a)	$\frac{10}{x-0.5}$ oe final answer	**1**	Accept $\frac{20}{2x-1}$
9(b)(i)	$\frac{10}{x-0.5} - \frac{10}{x} = 0.25$ oe	**M1**	**FT** *their* **(a)**
	$10x – 10(x – 0.5) = 0.25x\,(x – 0.5)$ oe	**M1**	Clears algebraic denominators or collects as a single fraction FT *their* algebraic fractions dep on two fractions with algebraic denominators
	$10x – 10x + 5 = 0.25x^2 – 0.125x$ or better	**B1**	Expands brackets
	$2x^2 – x – 40 = 0$	**A1**	Dep on **M1M1B1** and no errors seen
9(b)(ii)	$\frac{--1 \pm \sqrt{(-1)^2 - 4 \times 2 \times -40}}{2 \times 2}$ oe	**B2**	**B1** for $\sqrt{(-1)^2 - 4(2)(-40)}$ or better or **B1** for $\frac{--1+\sqrt{q}}{2\times 2}$ or $\frac{--1-\sqrt{q}}{2\times 2}$ or both
	–4.23 and 4.73 final answers	**B1 B1**	**SC1** for –4.229… **and** 4.729… or for –4.23 **and** 4.73 seen in working or for –4.73 **and** 4.23 as final answer or for –4.2 or –4.22 **and** 4.7 or 4.72 as final answer
9(b)(iii)	2 [hours] 7 [minutes]	**3**	**B2** for 2.11 or 2.114 to 2.115 or 126.8 to 126.9 or 127 or **M1** for $10 \div$ *their* positive root from **(b)(ii)**
10(a)(i)	$2^2 \times 3^2 \times 5$ oe	**2**	**M1** for 3 correct prime factors in a tree or table seen before the first error or for 2, 3, 5 identified
10(a)(ii)	540	**2**	**M1** for $2^2 \times 3^3 \times 5$ or 2×3^3 shown or answer $540k$

Question	Answer	Marks	Partial Marks
10(b)	$X = 8575$ $Y = 6125$	**4**	**B3** for $X = 8575$ or $Y = 6125$ or **B2** for $a = 5$ or $b = 1$ soi or **B1** for $1225 = 5^2 \times 7^2$ or $42\,875 = 5^3 \times 7^3$ or **M1** for $a^2 \times 7^2$ [= 1225] or $a^3 \times 7^{b+2}$ [= 42 875]

Cambridge IGCSE

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5903439311

MATHEMATICS **0580/11**

Paper 1 (Core) **October/November 2017**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 56.

This document consists of **10** printed pages and **2** blank pages.

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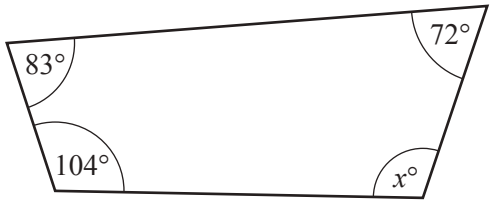
1



NOT TO SCALE

The diagram shows a quadrilateral.

Find the value of x.

$x =$ ..... [1]

2 A watch costs \$80.
The exchange rate is \$1 = 124.3 Japanese Yen.

Work out the cost of the watch in Yen.

..... Yen [1]

3 Work out.

$$2^{-4} \times 2^{5}$$

..... [1]

4 Amber's mean mark on five tests is 80.
Her marks on four of these tests are 68, 81, 74 and 89.

Work out her mark on the fifth test.

..... [2]

5 Write 18.766 correct to

(a) 1 decimal place,

..... [1]

(b) 2 significant figures.

..... [1]

6 Calculate. $\sqrt{2+\frac{0.2}{1.7-0.9}}$

..... [2]

7 Factorise completely.

$12x^2 + 15xy - 9x$

..... [2]

8 The time, t seconds, that Jade takes to run a race is 14.3 seconds, correct to 1 decimal place.

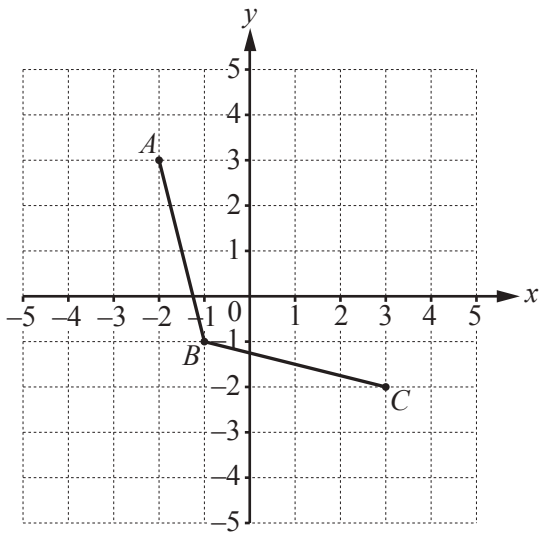
Complete this statement about the value of t.

..... $\leqslant t <$ ..... [2]

9 Calculate the area of a circle with diameter 9 cm.

..... cm^2 [2]

10



The diagram shows two sides of a rhombus *ABCD*.

(a) Write down the co-ordinates of *A*.

(..... , ...) [1]

(b) Complete the rhombus *ABCD* on the grid. [1]

11 **(a)** Write the fraction $\frac{30}{54}$ in its lowest terms.

..... [1]

(b) Complete this table.

Fraction	Decimal	Percentage
$\frac{9}{100}$	=	= .....

[2]

12 **Without using a calculator**, work out $1\frac{2}{3} - \frac{11}{15}$.
Write down all the steps of your working and give your answer as a fraction in its lowest terms.

..... [3]

13 $\sqrt{5}$ $\quad -7 \quad$ 343 $\quad -11 \quad$ 0.4 $\quad$ 2.5 $\quad \frac{1}{3}$

From this list of numbers, write down

(a) a cube number,

..... [1]

(b) the smallest number,

..... [1]

(c) a natural number.

..... [1]

14 Work out.

(a) $\begin{pmatrix} 3 \\ 2 \end{pmatrix} + \begin{pmatrix} -1 \\ 5 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $\begin{pmatrix} 6 \\ 3 \end{pmatrix} - \begin{pmatrix} 4 \\ -2 \end{pmatrix}$

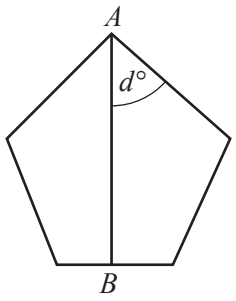
$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(c) $4\begin{pmatrix} 2 \\ 5 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

15 The diagram shows a regular pentagon.
AB is a line of symmetry.

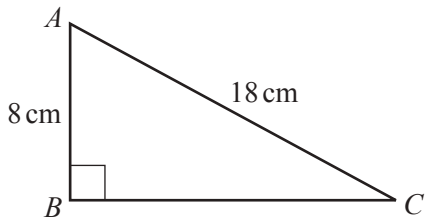
Work out the value of *d*.



NOT TO SCALE

d = ... [3]

16



NOT TO SCALE

Calculate the length of *BC*.

BC = ... cm [3]

17 Simplify.

(a) $(m^5)^2$

..... [1]

(b) $4x^3y \times 5x^2y$

..... [2]

18 Solve the simultaneous equations.
You must show all your working.

$$3x + 4y = 6$$
$$6x - y = -15$$

$x =$ .....

$y =$ ..... [3]

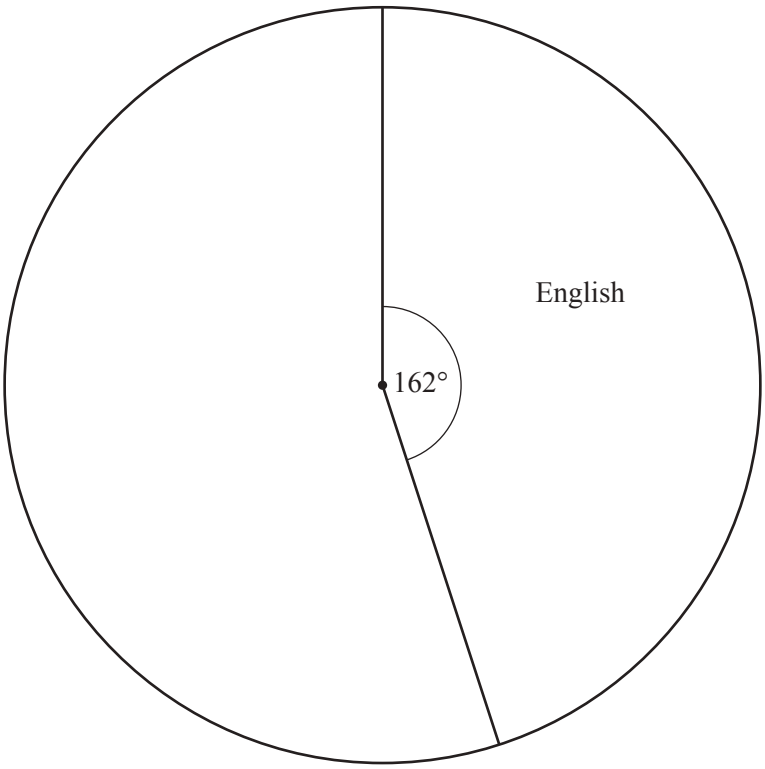
19 **(a)** Juan asks 40 people which language they speak at home.
The table shows the results.

Language	Frequency	Pie chart sector angle
English	18	162°
French	11	
Spanish	7	
Other	4	

Juan wants to draw a pie chart to show this information.

(i) Complete the table. [3]

(ii) Complete the pie chart.



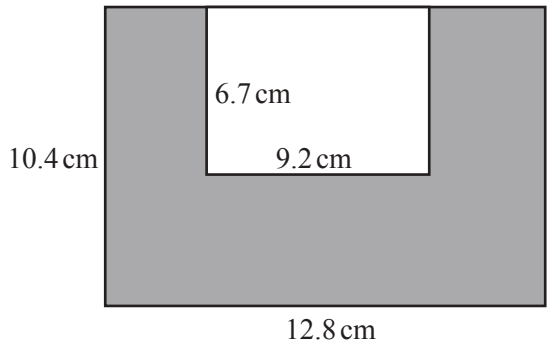
[1]

(b) Mansoor also asks some people which language they speak at home.
In Mansoor's pie chart, the sector angle for Portuguese is 108°.

Write down the fraction of these people who do **not** speak Portuguese at home.

..... [1]

20 (a)



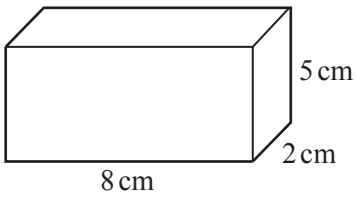
NOT TO SCALE

The diagram shows a small rectangle inside a large rectangle.

Work out the shaded area.

..... cm^2 [2]

(b)

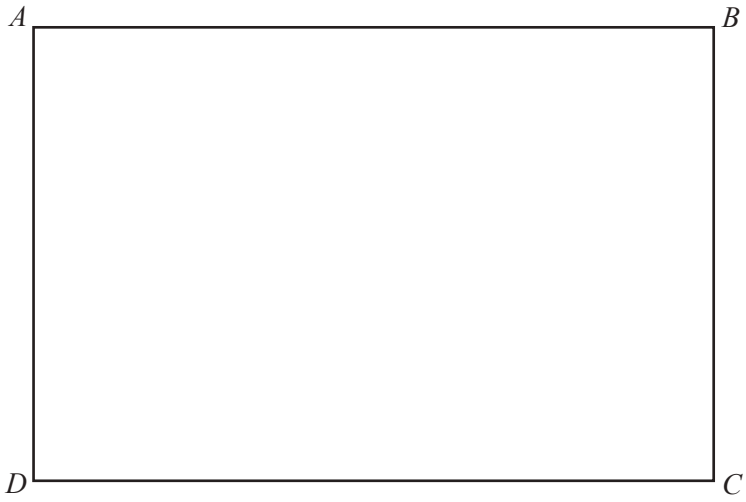


NOT TO SCALE

Work out the surface area of this cuboid.

..... cm^2 [3]

21 The diagram shows a rectangle $ABCD$.



(a) In this part, use a straight edge and compasses only and show your construction arcs.

Construct

(i) the bisector of angle DCB, [2]

(ii) the perpendicular bisector of DC. [2]

(b) Shade the region containing the points inside the rectangle that are

- nearer to D than to C

and

- nearer to BC than to DC. [1]

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/12**

Paper 1 (Core) **October/November 2017**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

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For π, use either your calculator value or 3.142.

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The total of the marks for this paper is 56.

This document consists of **10** printed pages and **2** blank pages.

1 Write, in figures, fourteen thousand and twenty seven.

..... [1]

2 One day, at noon, in Maseru, the temperature was 17 °C.
At midnight the temperature was 20 °C lower.

Work out the temperature at midnight.

..... °C [1]

3 Write down the value of 12^0.

..... [1]

4 Write 5.17×10^{-3} as an ordinary number.

..... [1]

5 Write the following in order of size, starting with the smallest.

$\frac{31}{50}$ 64% $\frac{5}{8}$ 0.63

..... < ..... < ..... < ..... [2]
smallest

6 A taxi journey costs \$4.50, plus 80 cents for each kilometre travelled.
Julianna travels 7 km.

Work out the cost of her journey.

\$ ..... [2]

7 Work out.

$$\frac{6.32+2.06}{4.15-0.12}$$

Give your answer correct to 1 decimal place.

..... [2]

8 **(a)** 1 and 12 are factors of 12.

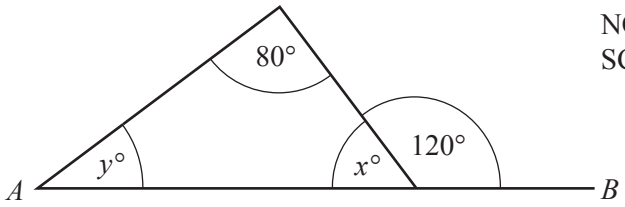
Write down all the other factors of 12.

..... [1]

(b) Write down the multiples of 9 between 20 and 40.

..... [1]

9



NOT TO SCALE

In the diagram, AB is a straight line.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [2]

10 Write 55 g as a percentage of 2.2 kg.

.....% [2]

11 The area of a triangle is 528 cm^2.
The length of its base is 33 cm.

Calculate the perpendicular height of the triangle.

..... cm [2]

12 **(a)** As the temperature increases, the number of ice creams sold increases.
What type of correlation is this?

..... [1]

(b) Write down the type of correlation there is between the height of an adult and the amount of money they earn.

..... [1]

13 Bastian has a bag containing four types of sweet.
He takes a sweet from the bag at random.

Sweet	Mint	Fruit	Toffee	Chocolate
Probability	0.15	0.3		0.2

Complete the table.

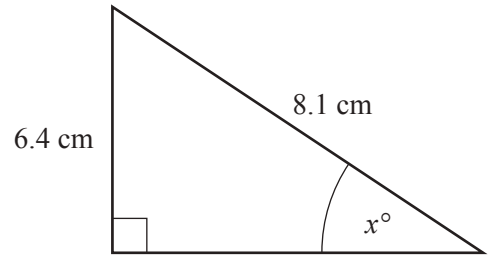
[2]

14 The length, l metres, of a ship is 362 m, correct to the nearest metre.

Complete the statement about the value of l.

..... $\leqslant l <$ ..... [2]

15

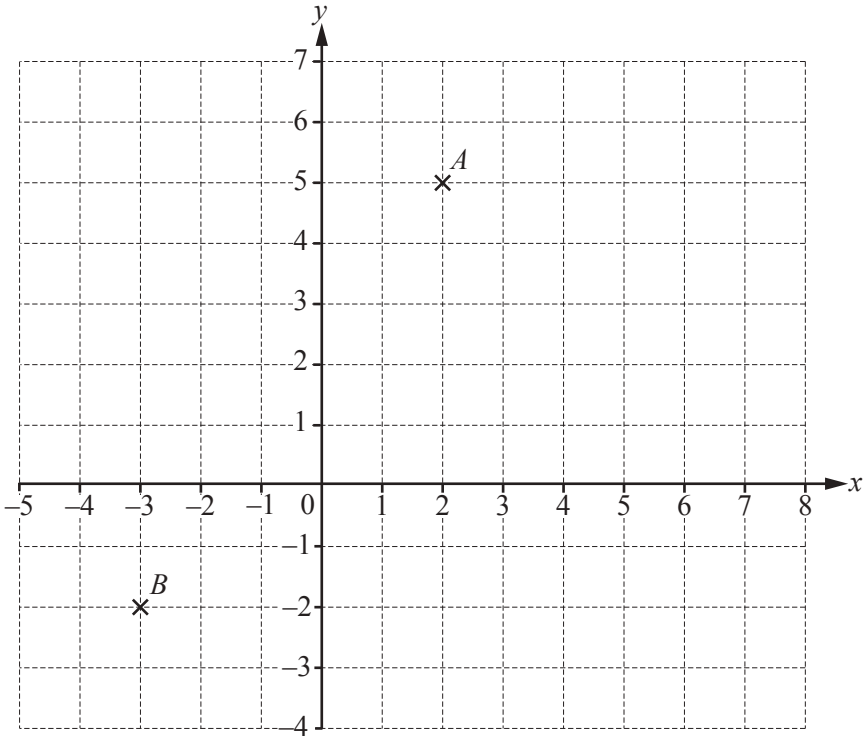


NOT TO SCALE

Calculate the value of x.

$x =$ ..... [2]

16



(a) Write down the co-ordinates of point A.

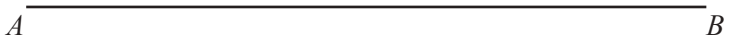
(..... , ...) [1]

(b) Plot point C at $(7, -2)$. [1]

(c) Write down the mathematical name of the triangle formed by joining the points A, B and C.

..... [1]

17 AB is a straight line.



(a) Measure the length of AB.

..... cm [1]

(b) Mark the midpoint of AB. [1]

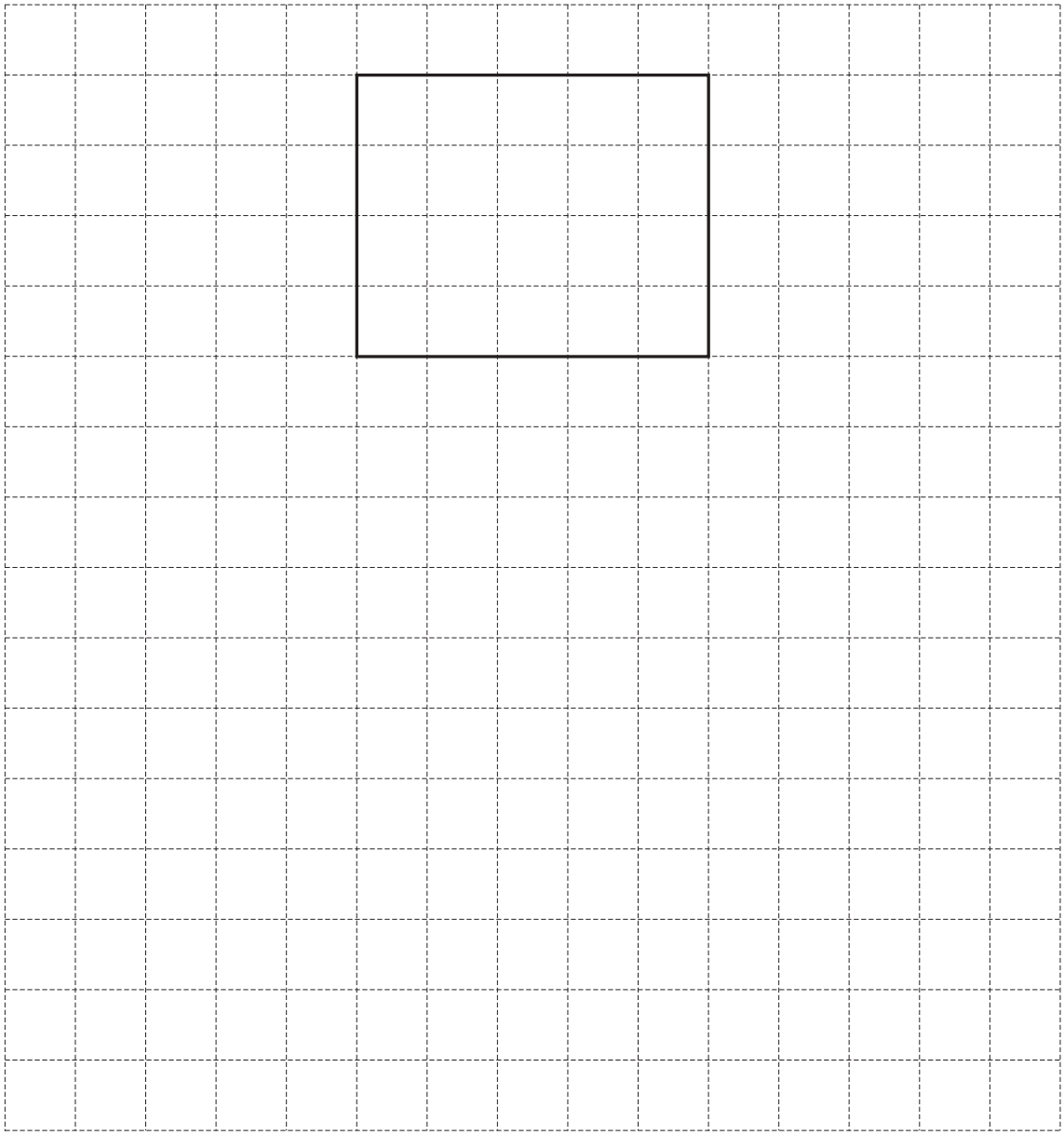
(c) Draw a line perpendicular to AB. [1]

18 Find the size of the interior angle of a regular hexagon.

..... [3]

19 A cuboid measures 5 cm by 4 cm by 3 cm.

On the 1 cm^2 grid, draw an accurate net of this cuboid.
One face has been drawn for you.



[3]

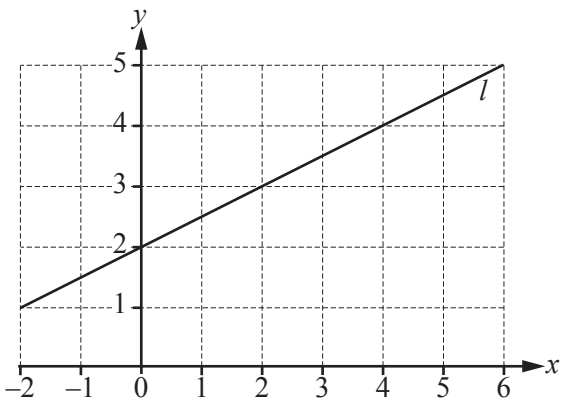
20 **(a)** Write $\frac{11}{3}$ as a mixed number.

..... [1]

(b) **Without using a calculator**, work out $\frac{1}{4}+\frac{5}{12}$.
Show all the steps of your working and give your answer as a fraction in its lowest terms.

..... [2]

21



Find the equation of the line l in the form $y = mx + c$.

$y =$ ..... [3]

22 **(a)** These are the first four terms of a sequence.

8 15 22 29

(i) Write down the next term.

..... [1]

(ii) Write down the rule for continuing the sequence.

..... [1]

(b) These are the first four terms of a different sequence.

2 6 10 14

Find an expression for the nth term of this sequence.

..... [2]

23 Solve the equations.

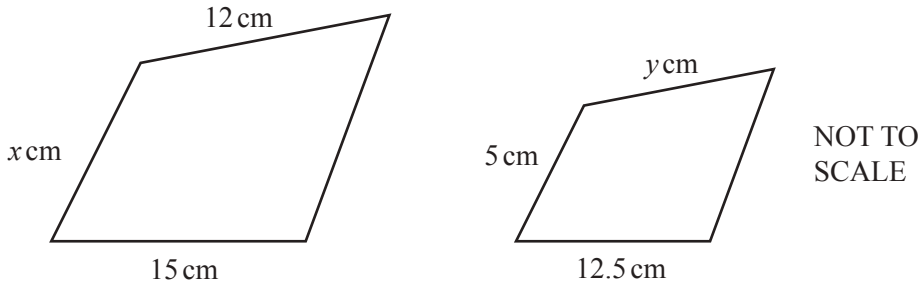
(a) $7-3n=11n+2$

$n=$ ..... [2]

(b) $\frac{p-3}{5}=3$

$p=$ ..... [2]

24



The two shapes are mathematically similar.

Find the value of

(a) x,

$x =$ ..... [2]

(b) y.

$y =$ ..... [2]

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5923717197

MATHEMATICS **0580/13**

Paper 1 (Core) **October/November 2017**

1 hour

Candidates answer on the Question Paper.

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1 Ahmed drives his car from London to Cambridge.
He leaves London at 07 45 and arrives in Cambridge at 10 17.

Work out the time, in hours and minutes, that he takes to drive from London to Cambridge.

..... h ..... min [1]

2 Work out 16% of $525.

$ ..... [1]

3 A quadrilateral has one line of symmetry and no rotational symmetry.

Write down the name of this quadrilateral.

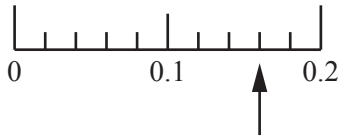
..... [1]

4 Simplify.

$y^4 \times y^5$

.....[1]

5 **(a)**



Write down the number the arrow is pointing to on this scale.

..... [1]

(b) Write these numbers in order of size, starting with the smallest.

0.42 0.06 0.5 0.078

..... < ..... < ..... < .....[1]
smallest

6 A bag contains 16 counters.
3 are red, 6 are blue and the rest are yellow.
Jay takes a counter from the bag at random.

(a) Write down the colour Jay is most likely to take.

..... [1]

(b) Write down the probability that the counter is red.

..... [1]

7 Complete the table.

Fraction		Decimal		Percentage
$\frac{1}{4}$	=		=	25%
	=	0.8	=	

[2]

8 $\mathbf{s} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$ $\mathbf{t} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$

Work out $5\mathbf{s} - \mathbf{t}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

9 Solve the equation.

$$5x + 4 = 19 + 2x$$

$x =$ ..... [2]

10 By writing each number correct to 1 significant figure, estimate the value of $\dfrac{59.2 \times 1.97}{2.04 + 3.85}$.

..... [2]

11 In a survey of 40 workers, 6 cycle to the office.
The office has a total of 800 workers.

Estimate how many of the 800 workers cycle to the office.

..... [2]

12 Adilla invests $1200 at a rate of 2.6% per year compound interest.

Calculate the value of her investment at the end of 2 years.

$ ..... [2]

13 The table shows the temperature at midday in some cities on 1st February.

City	Temperature
Berlin	6 °C
Moscow	–10 °C
Stockholm	1 °C
Toronto	0 °C
Warsaw	–2 °C

(a) Write down the city with the lowest temperature.

..... [1]

(b) Work out the difference between the temperature in Berlin and the temperature in Warsaw.

..... °C [1]

(c) The temperature in Minsk was 3 °C higher than the temperature in Moscow.

Work out the temperature in Minsk.

..... °C [1]

14 The mass, correct to the nearest gram, of each of 20 potatoes is shown below.

85	97	125	100	90	102	116	89	96	104
89	107	106	93	84	118	120	98	112	109

(a) Complete the frequency table.
You may use the tally column to help you.

Mass (g)	Tally	Frequency
80 to 89		
90 to 99		
100 to 109		
110 to 119		
120 to 129		

[2]

(b) Write down the modal group.

..... [1]

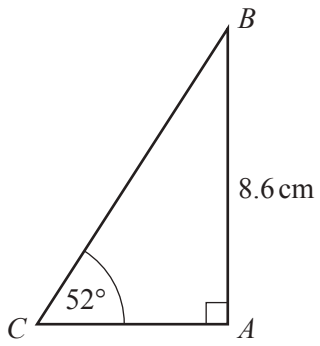
15 Calculate the size of one interior angle of a regular 12-sided polygon.

..... [3]

16 Work out $3\frac{1}{7} - 1\frac{1}{4}$, giving your answer as a mixed number in its lowest terms.
Do not use a calculator and show all the steps of your working.

..... [3]

17



NOT TO SCALE

ABC is a right-angled triangle.

Use trigonometry to calculate *BC*.

BC = ... cm [3]

18 **(a)** Write 1.8×10^4 as an ordinary number.

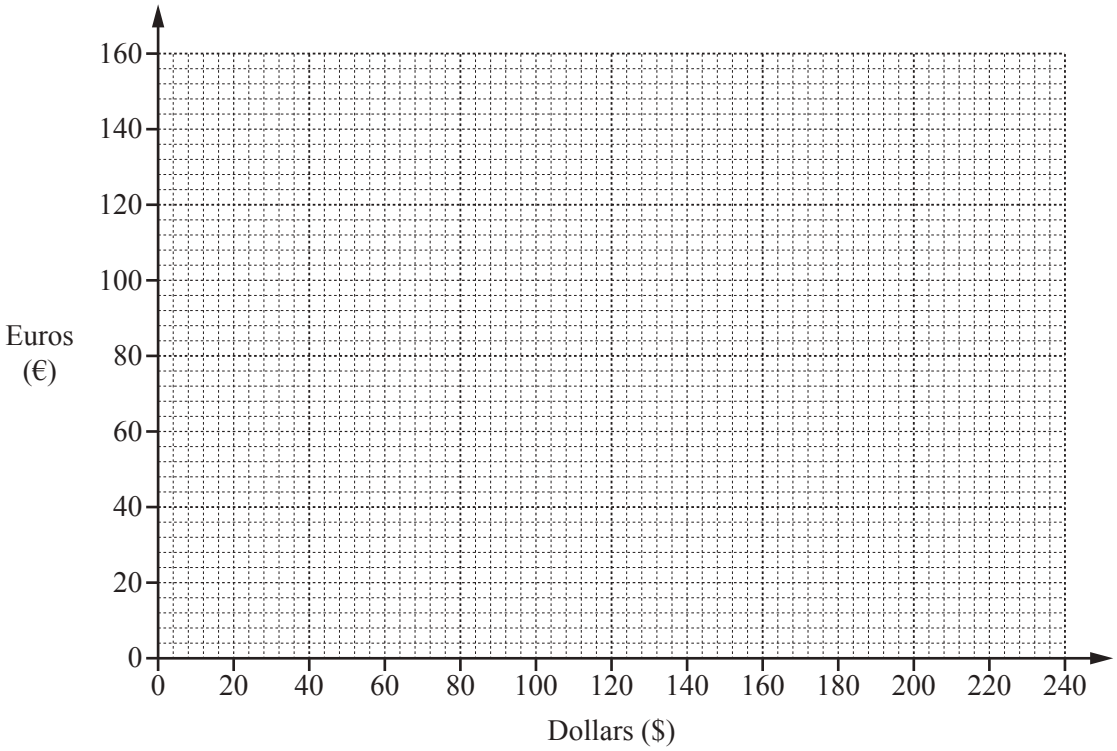
..... [1]

(b) Calculate $(2.9 \times 10^6) - (7.5 \times 10^5)$.
Give your answer in standard form.

..... [2]

19 Alvin changes some money from dollars ($) to euros (€).
When he changes $100 he receives €60.

(a) On the grid, draw a conversion graph using this information.



[2]

(b) Use your graph to change

(i) $140 to euros,

€ ..... [1]

(ii) €20 to dollars.

$ ..... [1]

20 **(a)** These are the first five terms of a sequence.

4 10 16 22 28

(i) Write down the next term.

..... [1]

(ii) Write down the rule for continuing the sequence.

..... [1]

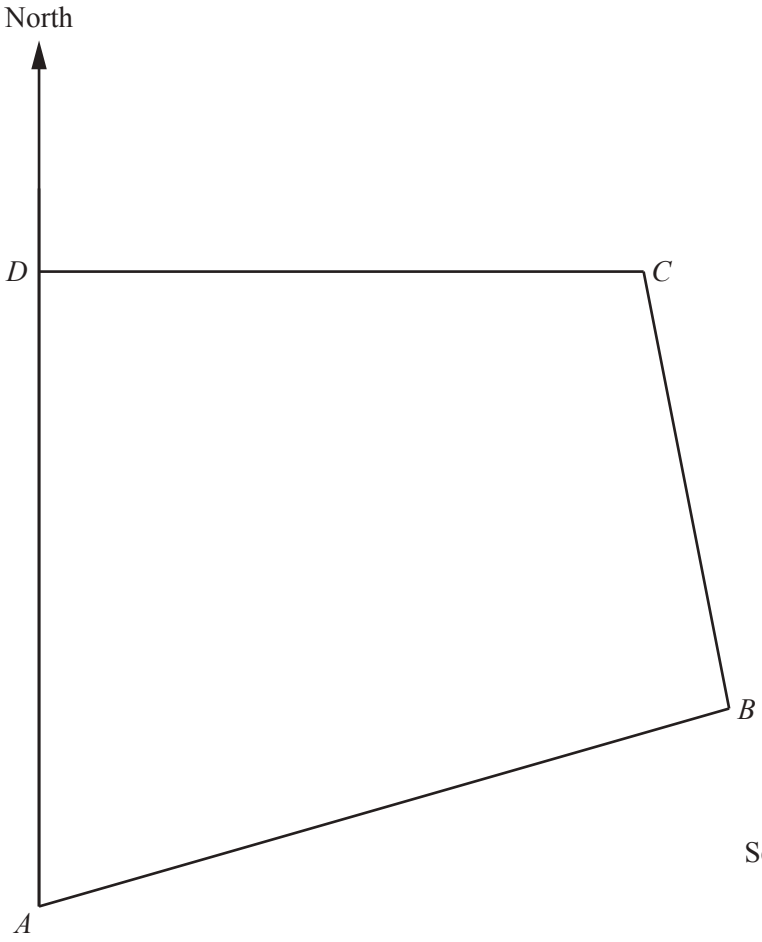
(b) These are the first five terms of a different sequence.

11 14 17 20 23

Find an expression for the nth term of this sequence.

..... [2]

21 The scale drawing shows a park *ABCD*.
The scale is 1 centimetre represents 20 metres.



(a) Find the actual distance *AD*.

..... m [2]

(b) Measure the bearing of *B* from *A*.

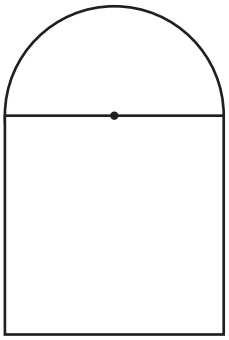
..... [1]

(c) There is a path across the park that is equidistant from *CB* and *CD*.

Using a straight edge and compasses only, construct the position of the path.
Show your construction arcs. [2]

Question 22 is printed on the next page.

22



NOT TO SCALE

The diagram shows a shape made from a square and a semi-circle.

Calculate the area of the shape.
Give the units of your answer.

.... [5]

Cambridge IGCSE

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/21**

Paper 2 (Extended) **October/November 2017**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

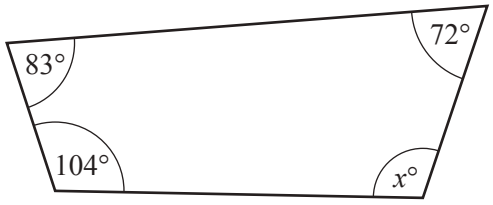
Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

This document consists of **12** printed pages.

CAMBRIDGE International Examinations

1



NOT TO SCALE

The diagram shows a quadrilateral.

Find the value of x.

$x =$ ..... [1]

2 Work out.

$$2^{-4} \times 2^{5}$$

..... [1]

3 **(a)** Use a calculator to work out $\dfrac{5^{0.4} - \sqrt{3}}{0.13 - 0.015}$.

Write down all the digits in your calculator display.

..... [1]

(b) Write your answer to **part (a)** correct to 2 significant figures.

..... [1]

4 Amber's mean mark on five tests is 80.
Her marks on four of these tests are 68, 81, 74 and 89.

Work out her mark on the fifth test.

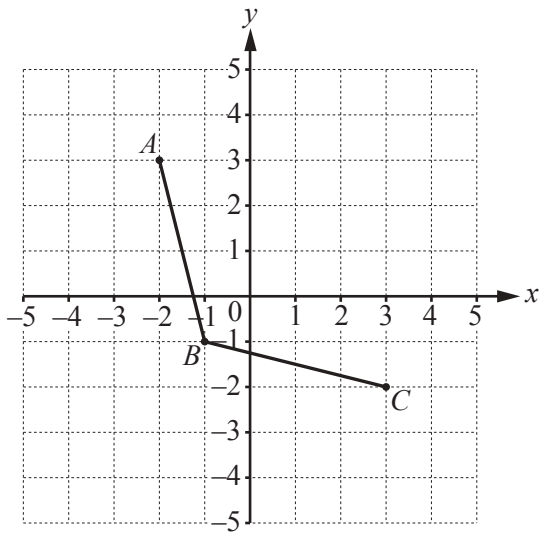
..... [2]

5 Factorise completely.

$$12x^2 + 15xy - 9x$$

..... [2]

6



The diagram shows two sides of a rhombus *ABCD*.

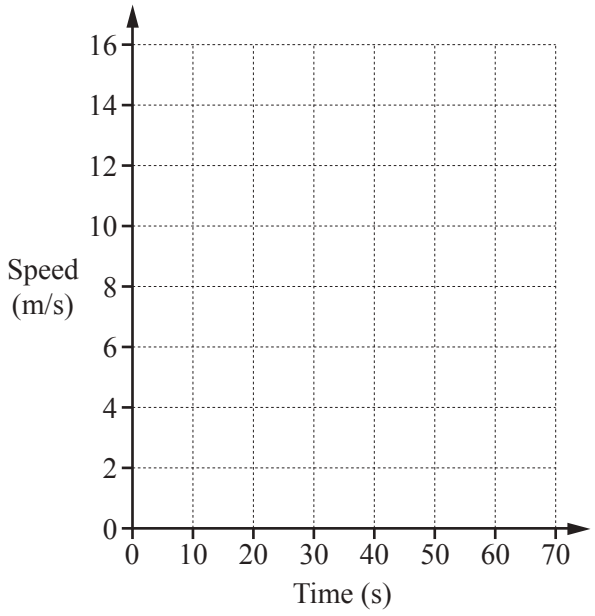
(a) Write down the co-ordinates of *A*.

(..... , ...) [1]

(b) Complete the rhombus *ABCD* on the grid. [1]

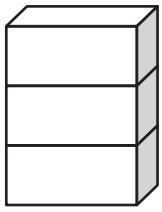
7 Petra begins a journey in her car.
She accelerates from rest at a constant rate of 0.4 m/s^2 for 30 seconds.
She then travels at a constant speed for 40 seconds.

On the grid, draw the speed-time graph for the first 70 seconds of Petra's journey.



[2]

8



NOT TO SCALE

The diagram shows three identical cuboids in a tower.
The height of one cuboid is 6.5 cm, correct to the nearest millimetre.

Work out the upper bound of the height of the tower.

..... cm [2]

9 The value of a motorbike is \$12 400.
Each year, the value of the motorbike decreases exponentially by 15%.

Calculate the value of the motorbike after 3 years.

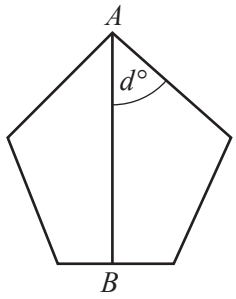
\$..... [2]

10 **Without using a calculator**, work out $1\frac{2}{3} - \frac{11}{15}$.
Write down all the steps of your working and give your answer as a fraction in its lowest terms.

..... [3]

11 The diagram shows a regular pentagon.
AB is a line of symmetry.

Work out the value of *d*.



NOT TO SCALE

d = ... [3]

12 $\sqrt{5}$ $\quad -7 \quad$ 343 $\quad -11 \quad$ 0.4 $\quad$ 2.5 $\quad \frac{1}{3}$

From this list of numbers, write down

(a) a cube number,

..... [1]

(b) the smallest number,

..... [1]

(c) a natural number.

..... [1]

13 Simplify.

(a) $(m^5)^2$

..... [1]

(b) $4x^3y \times 5x^2y$

..... [2]

14 **(a)** D is the point (2, –5) and $\overrightarrow{DE} = \begin{pmatrix} 7 \\ 1 \end{pmatrix}$.

Find the co-ordinates of the point E.

(..... , ...) [1]

(b) $\mathbf{v} = \begin{pmatrix} t \\ 12 \end{pmatrix}$ and $|\mathbf{v}| = 13$.

Work out the value of t, where t is negative.

$t =$ ..... [2]

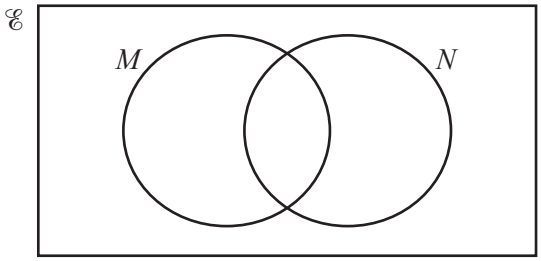
15 **(a)** $Q = \{1, 2, 3, 4, 5, 6\}$

Write down a set P where $P \subset Q$.

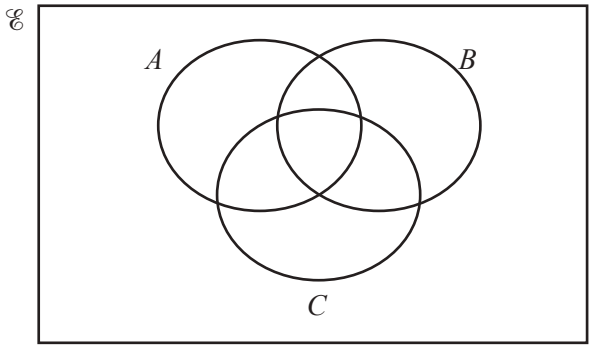
$P =$ ..... [1]

(b) Shade these regions in the Venn diagrams.

$M \cup N'$

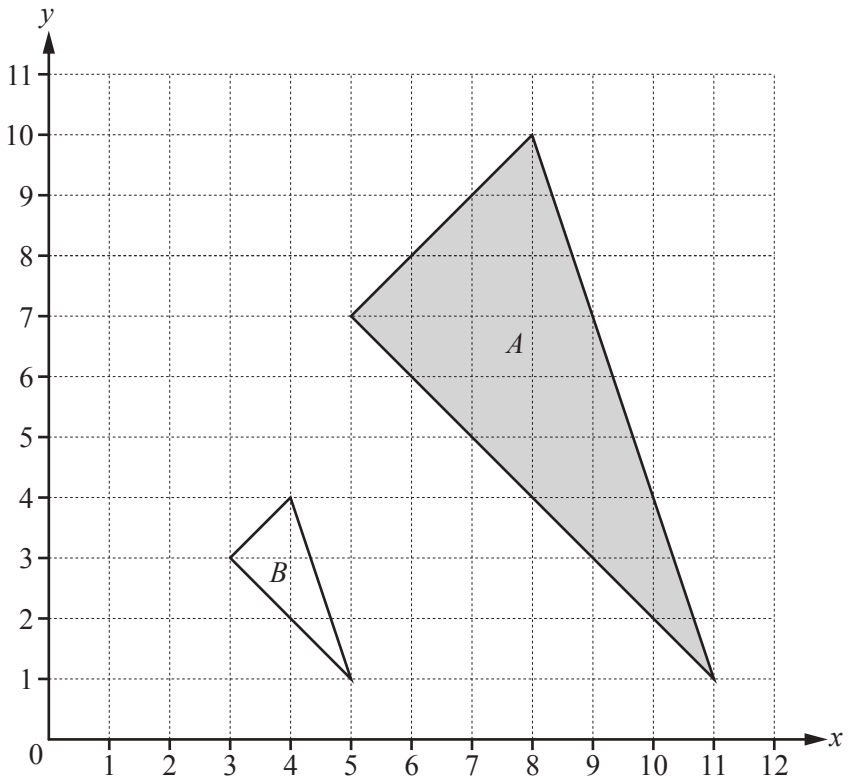


$(A \cup B) \cap C'$



[2]

16



Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

17 y is inversely proportional to $(x+1)^2$.
$y = 50$ when $x = 0.2$.

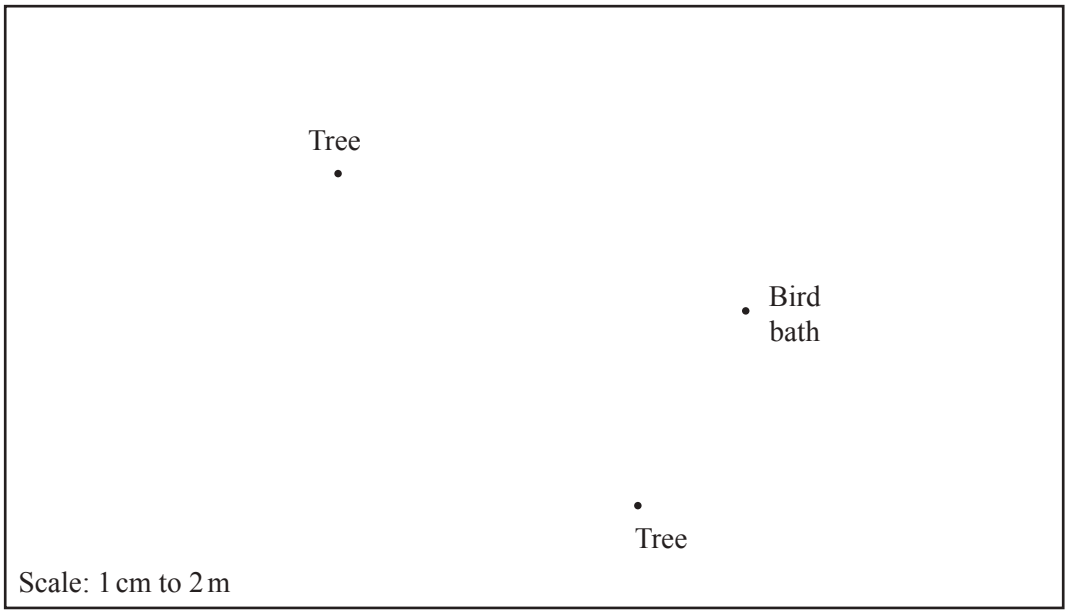
(a) Write y in terms of x.

$y =$ ..... [2]

(b) Find the value of y when $x = 0.5$.

$y =$ ..... [1]

18 The diagram shows a scale drawing of Tariq's garden.
The scale is 1 centimetre represents 2 metres.



Tariq puts a statue in the garden.
The statue is equidistant from the two trees and 10 m from the bird bath.

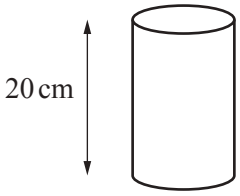
Find, by construction, the point where Tariq puts the statue.
Label the point *S*. [4]

19 Write as a single fraction in its simplest form.

$$\frac{5}{x-3}+\frac{3}{x+7}+\frac{1}{2}$$

..... [4]

20 (a)



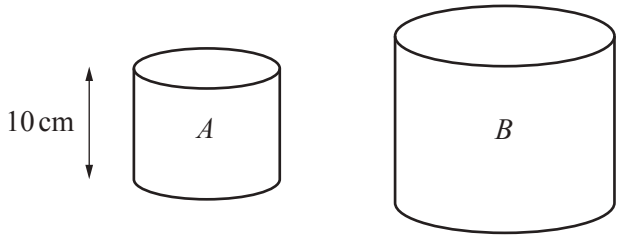
NOT TO SCALE

A cylinder has height 20 cm.
The area of the circular cross section is 74 cm^2.

Work out the volume of this cylinder.

..... cm^3 [1]

(b) Cylinder *A* is mathematically similar to cylinder *B*.



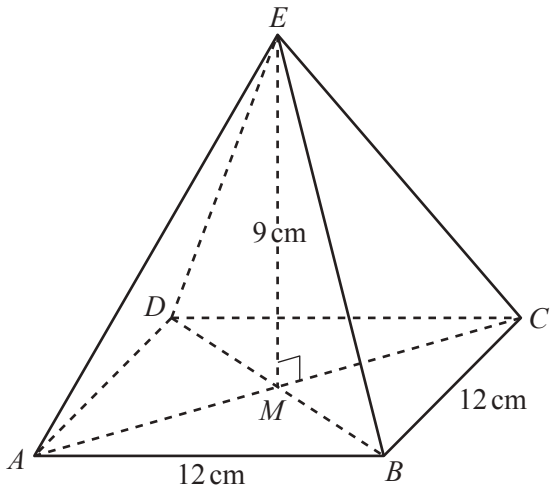
NOT TO SCALE

The height of cylinder *A* is 10 cm and its surface area is 440 cm^2.
The surface area of cylinder *B* is 3960 cm^2.

Calculate the height of cylinder *B*.

..... cm [3]

21



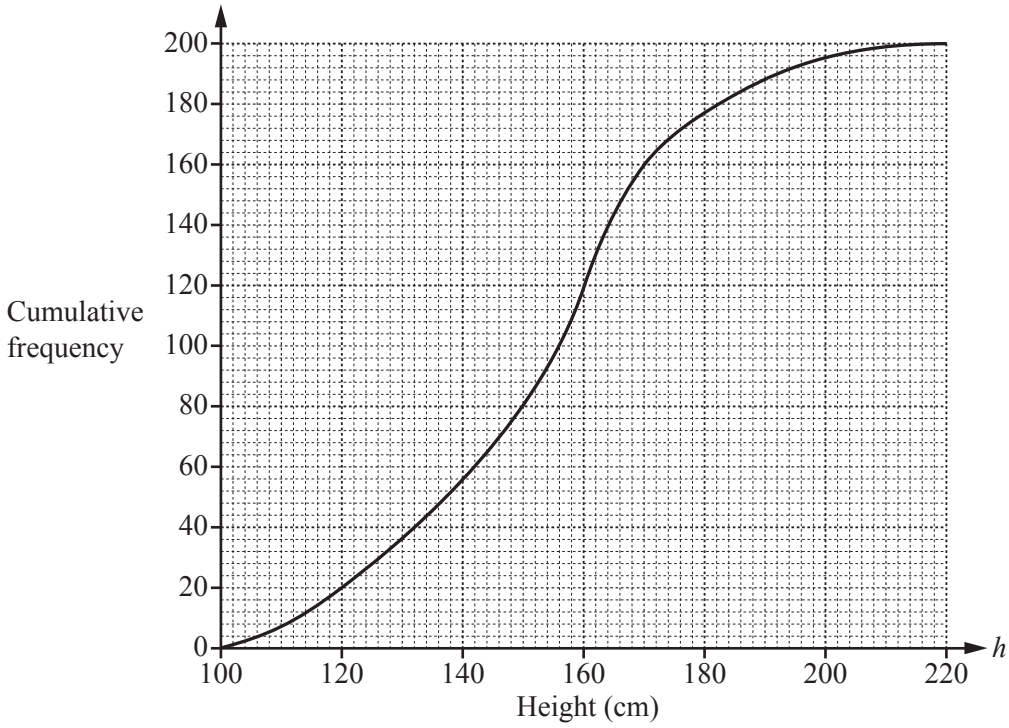
NOT TO SCALE

The diagram shows a square-based pyramid $ABCDE$.
The diagonals of the square meet at M.
E is vertically above M.
$AB = BC = 12$ cm and $EM = 9$ cm.

Calculate the angle between the edge EC and the base, $ABCD$, of the pyramid.

..... [4]

22 Simon records the heights, h cm, of 200 sunflowers in his garden.
The cumulative frequency diagram shows this information.



(a) Find the number of these sunflowers that have a height of more than 160 cm.

..... [2]

(b) Sue records the heights, h cm, of 200 sunflowers in her garden.
The cumulative frequency table shows this information.

Height (h cm)	Cumulative frequency
$h \leqslant 100$	0
$h \leqslant 110$	20
$h \leqslant 120$	48
$h \leqslant 130$	100
$h \leqslant 140$	140
$h \leqslant 150$	172
$h \leqslant 160$	188
$h \leqslant 170$	200

On the grid above, draw another cumulative frequency diagram to show this information. [3]

(c) Work out the difference between the median heights of Simon's sunflowers and Sue's sunflowers.

..... cm [2]

Question 23 is printed on the next page.

23 In one week, Neha spends x hours cooking and y hours cleaning.
The time she spends cleaning is at least equal to the time she spends cooking.
This can be written as $y \geqslant x$.

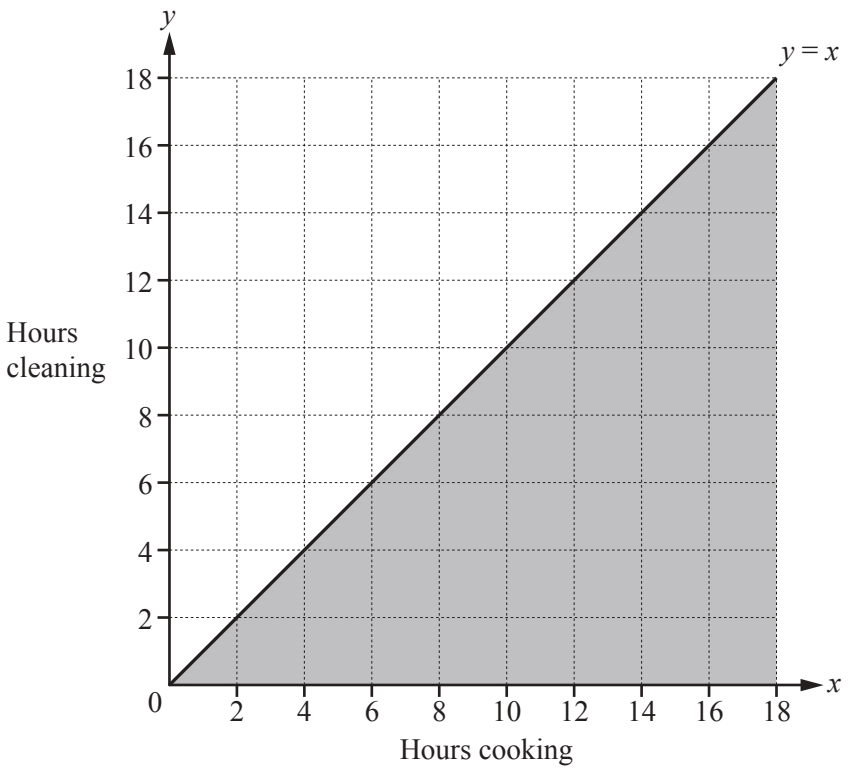
She spends no more than 16 hours in total cooking and cleaning.
She spends at least 4 hours cooking.

(a) Write down two more inequalities in x and/or y to show this information.

.....

..... [2]

(b) Complete the diagram to show the three inequalities.
Shade the **unwanted** regions.



[3]

(c) Neha receives \$10 for each hour she spends cooking and \$8 for each hour she spends cleaning.

Work out the largest amount she could receive.

\$..... [2]

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/22**

Paper 2 (Extended) **October/November 2017**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

1 One day, at noon, in Maseru, the temperature was 17 °C.
At midnight the temperature was 20 °C lower.

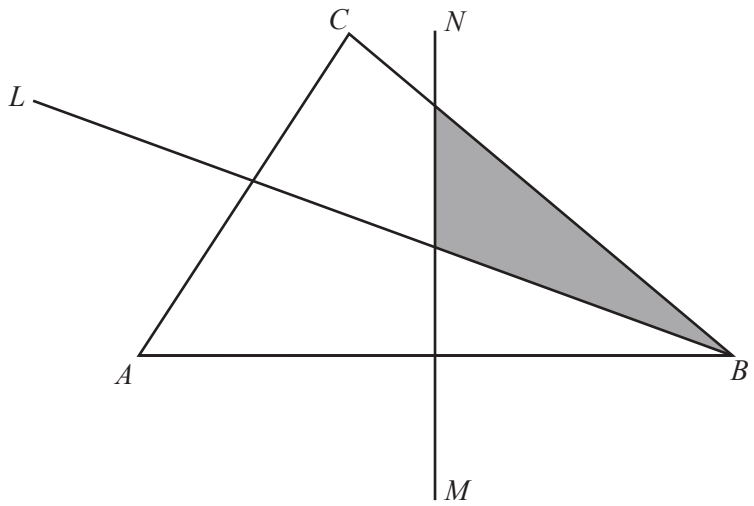
Work out the temperature at midnight.

..... °C [1]

2 Write 5.17×10^{-3} as an ordinary number.

..... [1]

3



In the diagram, *BL* is the bisector of angle *ABC* and *MN* is the perpendicular bisector of *AB*.

Complete the statement.

The shaded region contains the points, inside triangle *ABC*, that are

- nearer to *B* than to *A*

and

- nearer to ..... than to ..... [1]

4 **(a)** 1 and 12 are factors of 12.

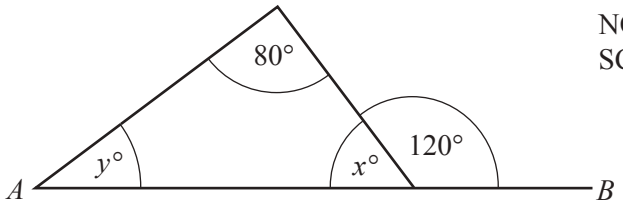
Write down all the other factors of 12.

..... [1]

(b) Write down the multiples of 9 between 20 and 40.

..... [1]

5



NOT TO SCALE

In the diagram, AB is a straight line.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [2]

6 Write 55 g as a percentage of 2.2 kg.

..... % [2]

7 The area of a triangle is 528 cm^2.
The length of its base is 33 cm.

Calculate the perpendicular height of the triangle.

..... cm [2]

8 Amar cycles at a speed of 18 km/h.
It takes him 55 minutes to cycle between two villages.

Calculate the distance between the two villages.

..... km [2]

9 Work out, giving your answer in standard form.

$$1.2 \times 10^{40} + 1.2 \times 10^{41}$$

..... [2]

10 The sides of a triangle are 5.2 cm, 6.3 cm and 9.4 cm, each correct to the nearest millimetre.

Calculate the lower bound of the perimeter of the triangle.

..... cm [2]

11 Write the recurring decimal $0.\dot{4}\dot{8}$ as a fraction.
Show all your working.

..... [2]

12 Expand the brackets and simplify.

$$(5-n)(3+n)$$

..... [2]

13 **(a)** Write $\frac{11}{3}$ as a mixed number.

..... [1]

(b) **Without using a calculator**, work out $\frac{1}{4}+\frac{5}{12}$.
Show all the steps of your working and give your answer as a fraction in its lowest terms.

..... [2]

14 Find the integers which satisfy the inequality.

$$-5 < 2n-1 \leqslant 5$$

..... [3]

15 Write as a single fraction in its simplest form.

$$\frac{x+1}{x} - \frac{y-1}{y}$$

..... [3]

16 Here are the first four terms of a sequence.

23 17 11 5

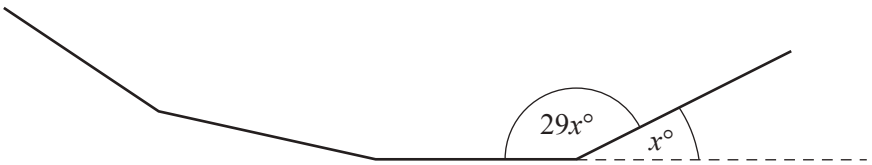
(a) Find the next term.

..... [1]

(b) Find the nth term.

..... [2]

17



The diagram shows part of a regular polygon.
The exterior angle is $x°$.
The interior angle is $29x°$.

Work out the number of sides of this polygon.

..... [3]

18 Solve the simultaneous equations.
You must show all your working.

$$y = \frac{x}{2}$$
$$2x - y = 1$$

$x =$ .....

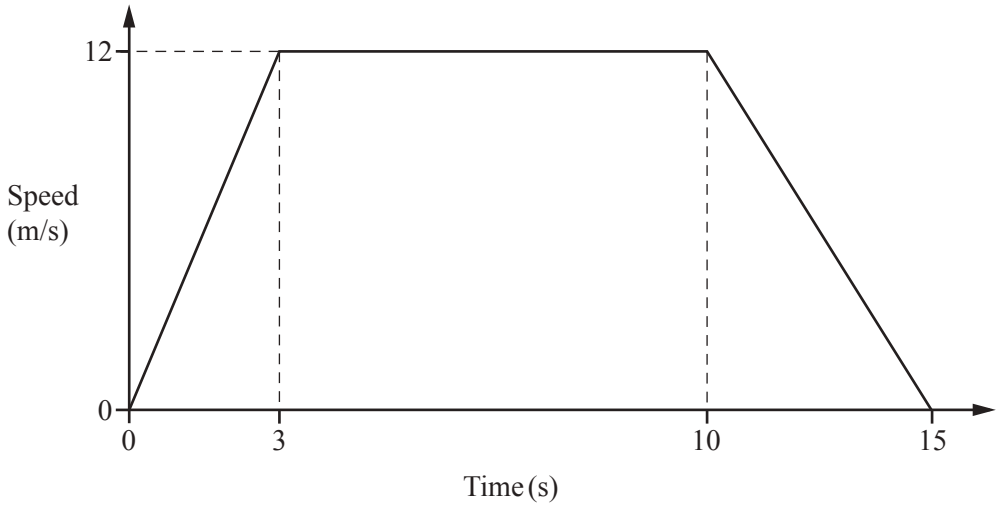
$y =$ ..... [3]

19 Make x the subject of the formula.

$$y = \sqrt{x^2 + 1}$$

$x =$ ..... [3]

20



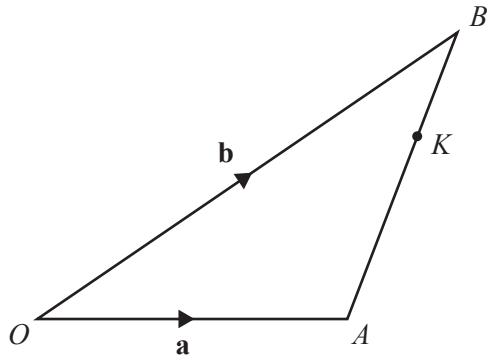
NOT TO SCALE

The diagram shows a speed-time graph.

Calculate the total distance travelled.

..... m [3]

21



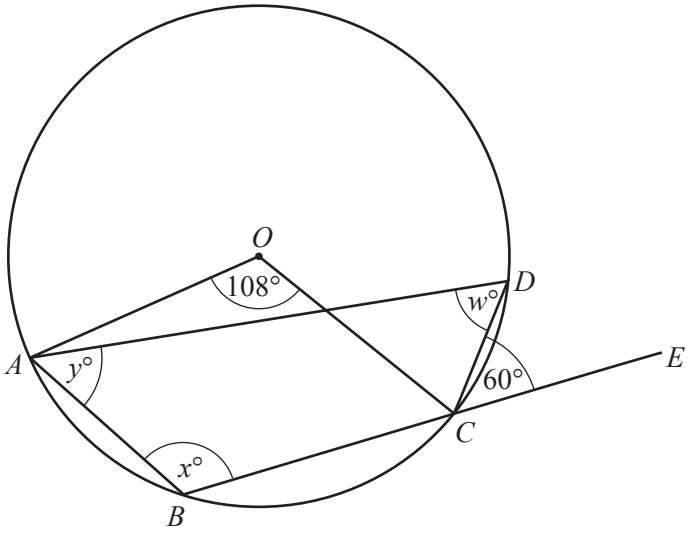
NOT TO SCALE

O is the origin and K is the point on AB so that $AK : KB = 2 : 1$.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

Find the position vector of K.
Give your answer in terms of **a** and **b** in its simplest form.

..... [3]

22



NOT TO SCALE

A, *B*, *C* and *D* are points on the circle, centre *O*.
BCE is a straight line.
Angle *AOC* = 108° and angle *DCE* = 60°.

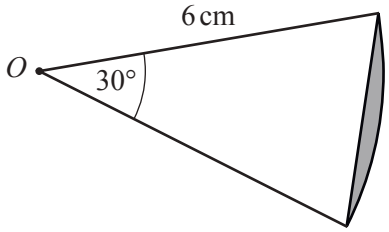
Calculate the values of *w*, *x* and *y*.

w = ...

x = ...

y = ... [3]

23



NOT TO SCALE

The diagram shows a sector of a circle, centre *O* and radius 6 cm.
The sector angle is 30°.
The area of the shaded segment is $(k\pi - c)$ cm^2, where *k* and *c* are integers.

Find the value of *k* and the value of *c*.

k = ...

c = ... [3]

24 Solve the equations.

(a) $7-3n=11n+2$

$n =$ ..... [2]

(b) $\frac{p-3}{5}=3$

$p =$ ..... [2]

25 Factorise completely.

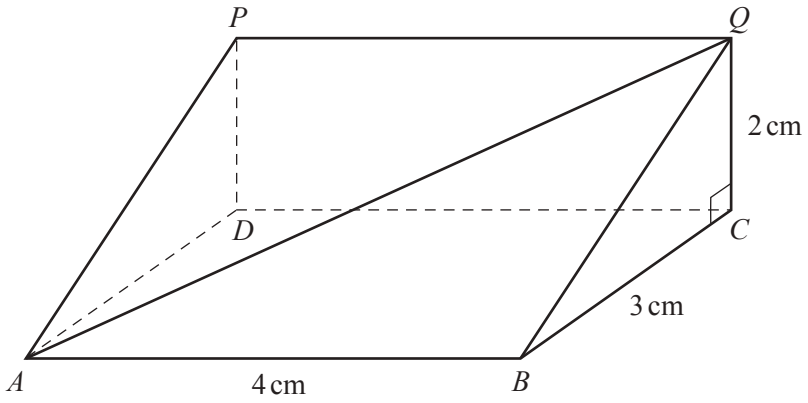
(a) $x^2-x-132$

..... [2]

(b) x^3-4x

..... [2]

26



NOT TO SCALE

The diagram shows a prism of length 4 cm.
The cross section is a right-angled triangle.
$BC = 3$ cm and $CQ = 2$ cm.

Calculate the angle between the line AQ and the base, $ABCD$, of the prism.

..... [4]

27 Simplify.

(a) $81^{\frac{3}{4}}$

..... [1]

(b) $x^{\frac{2}{3}} \div x^{-\frac{4}{3}}$

..... [1]

(c) $\left(\frac{8}{y^6}\right)^{-\frac{1}{3}}$

..... [2]

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0521340676

MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 2017**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
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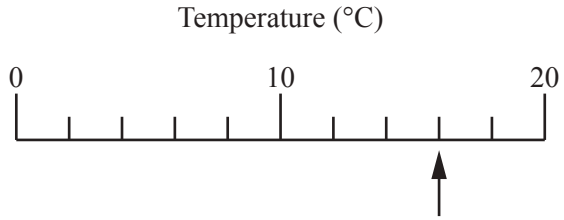
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

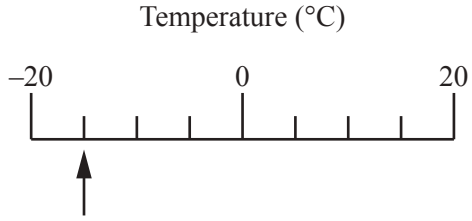
1 **(a)** Write down the temperature shown by each arrow.

(i)



..... °C [1]

(ii)



..... °C [1]

(b) The table shows the daily temperature in Hayville for one week in January.

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Temperature (°C)	–4	2	–1	0	1	–6	–2

(i) Which was the coldest day?

..... [1]

(ii) Find the difference between the temperature on Sunday and the temperature on Monday.

..... °C [1]

(c) In Grassington, the temperature recorded at 07 35 was −3 °C.

(i) The temperature was recorded again $8\frac{1}{2}$ hours later.

At what time was this temperature recorded?

..... [1]

(ii) By this time, the temperature had risen by 7 °C.

Find this temperature.

..... °C [1]

2 Jeff owns a clothes shop.

(a)

Shirt	Tie	Coat
$24	$12.50	$46

A customer buys 3 shirts, 5 ties and 1 coat.

Calculate the total cost.

$ ..... [3]

(b) A jacket has a price of $64.
Jeff increases this price by 8%.

Calculate the new price.

$ ..... [2]

(c) Jeff also increases the price of a dress from $250 to $280.

Calculate the percentage increase in the price of the dress.

.....% [3]

(d) The shop has a rectangular floor measuring 5.5 m by 8.5 m.
The floor covering costs $12 per square metre.

Calculate the cost of the floor covering.

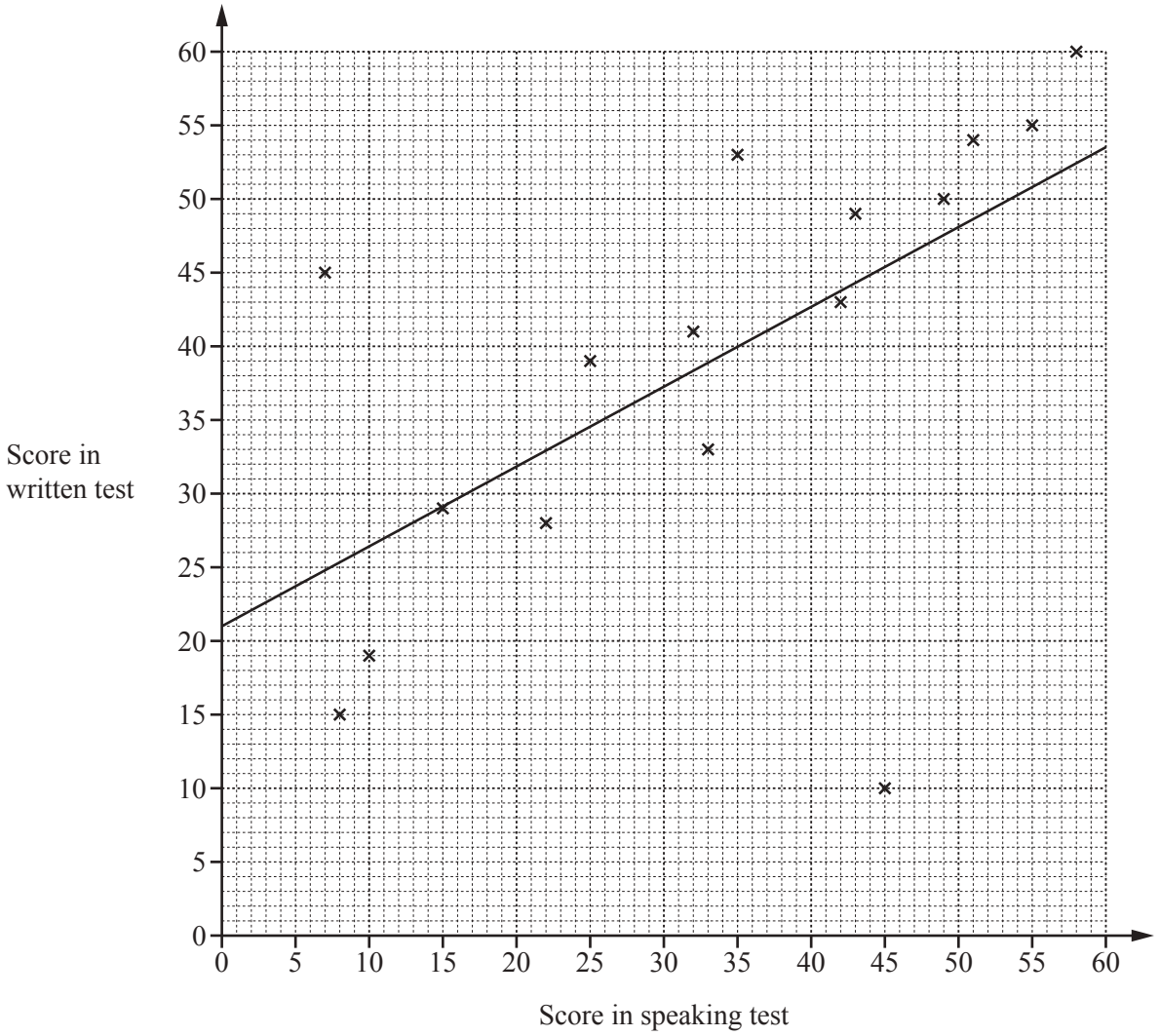
$ ..... [3]

(e) Jeff invests $3600 for 3 years at a rate of 6% per year compound interest.

Work out the value of the investment at the end of the 3 years.

$ ..... [3]

3 **(a)** The scatter diagram shows the scores for each student in class A for the written test and the speaking test in French.
A line of best fit has been drawn.



(i) Each test is marked out of 60.

In which test did the class perform better?
Give a reason for your answer.

..... because .....

..... [1]

(ii) What type of correlation is shown in the scatter diagram?

..... [1]

(iii) One student is much better at speaking French than writing French.

Put a ring around the cross that represents this student. [1]

(iv) One student scored 39 in the speaking test but was absent for the written test.

Use the line of best fit to estimate a score for this student in the written test.

..... [1]

(b) Here are the scores in the written test for class B.

21 14 48 32 8 29 41 39 30 23 17

Find

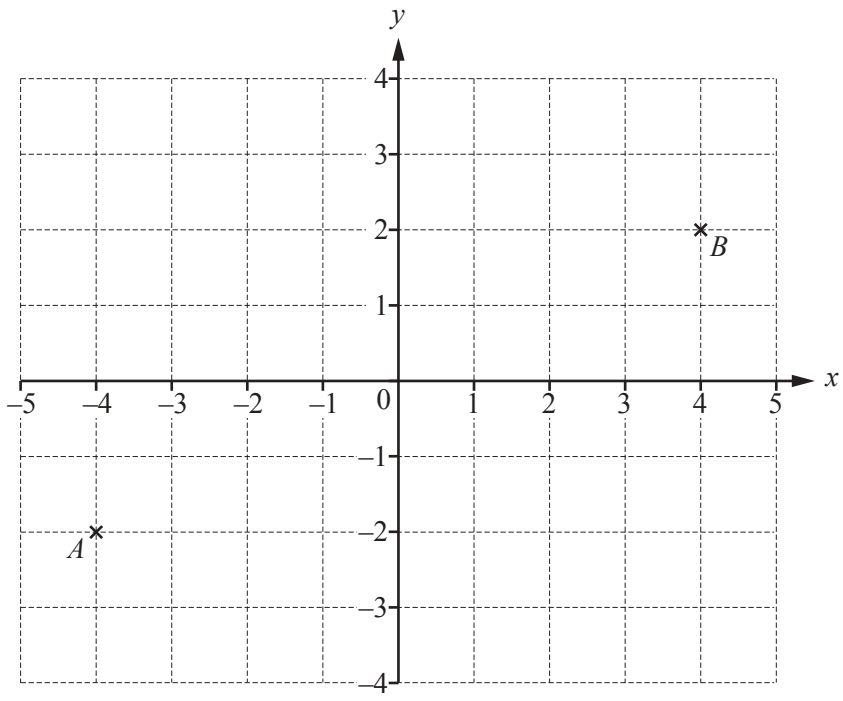
(i) the median,

..... [2]

(ii) the mean.

..... [2]

4 (a)



(i) Plot point C at (–4, 2). [1]

(ii) Write down the mathematical name of the triangle formed by joining the points A, B and C.

..... [1]

(iii) Write down the vector $\overrightarrow{AB}$.

$\overrightarrow{AB} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(iv) (a) Find the gradient of the line AB.

..... [2]

(b) Write down the equation of the line AB.

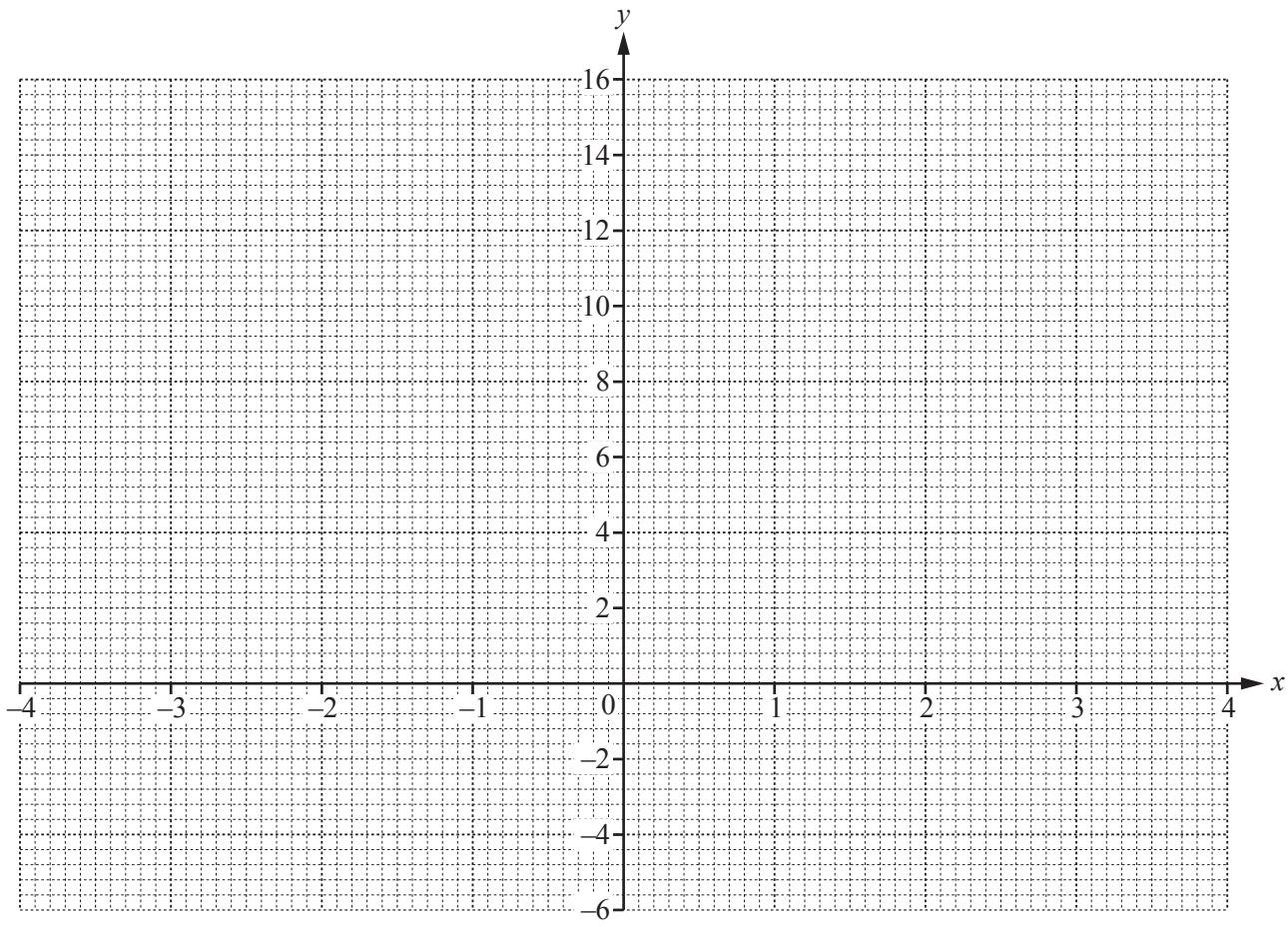
$y =$ ..... [1]

(b) (i) Complete the table of values for $y = x^2 + x - 5$.

x	–4	–3	–2	–1	0	1	2	3	4
y	7		–3			–3		7	

[3]

(ii) On the grid below, draw the graph of $y = x^2 + x - 5$ for $-4 \leqslant x \leqslant 4$.

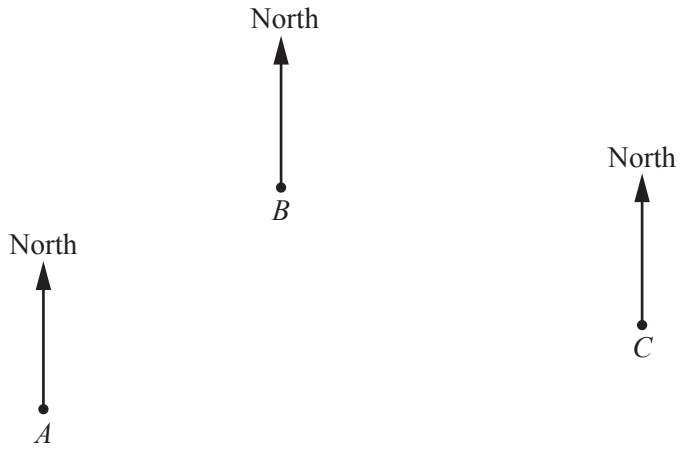


[4]

(iii) Use your graph to solve the equation $x^2 + x - 5 = 0$.

$x =$ ..... or $x =$ ..... [2]

5 The scale drawing shows the positions of three towns A, B and C.
The scale is 1 centimetre represents 12 kilometres.



Scale: 1 cm to 12 km

(a) Find the actual distance between town A and town B.

..... km [2]

(b) Measure the bearing of town B from town A.

..... [1]

(c) Measure the bearing of town B from town C.

..... [1]

(d) Town *D* is 84 km from town *A* and 42 km from town *C*.

(i) **In this part, use a ruler and compasses only and show your construction arcs.**

On the diagram, construct a possible position for town *D*.

[3]

(ii) A plane takes 10 minutes to fly the 84 km from town *A* to town *D*.

Work out the average speed of the plane in kilometres per hour.

..... km/h [2]

(e) The bearing of town *E* from town *A* is 118°.

Work out the bearing of town *A* from town *E*.

..... [2]

6 **(a)** Find

(i) all the factors of 18,

..... [2]

(ii) a multiple of 30,

..... [1]

(iii) $\sqrt{2134.44}$,

..... [1]

(iv) 2.5^3,

..... [1]

(v) $(0.2)^{-1}$.

..... [1]

(b) Write 72 as a product of its prime factors.

..... [2]

(c) Find the lowest common multiple (LCM) of 16 and 30.

..... [2]

(d) Clock A chimes every 6 hours.
Clock B chimes every 9 hours.
Both clocks chime at 2 am.

At what time will the two clocks next chime together?

..... [3]

7 **(a)** Bag *A* contains 20 counters.
6 are red, 9 are blue and the rest are white.
Jared takes one counter at random.

Write down the probability that the counter is

(i) red,

..... [1]

(ii) white,

..... [1]

(iii) yellow.

..... [1]

(b) Bag *B* contains green counters, black counters, purple counters and brown counters.
Louise takes one counter at random.

Colour	Green	Black	Purple	Brown
Probability		0.3	0.24	0.18

Complete the table.

[2]

(c) Bag *C* contains 8 red counters and 12 blue counters only.
Bag *D* contains 6 red counters and 9 blue counters only.
A counter is taken at random from each bag.

Show that the probability of taking a red counter from bag *C* is equal to the probability of taking a red counter from bag *D*.

[3]

8 **(a)** Multiply out the brackets and simplify.

$$5(2x+3)-2(x+4)$$

..... [2]

(b) **(i)** An equilateral triangle has side length $2x$.

Write down an expression, in terms of x, for the perimeter of the triangle.
Give your answer in its simplest form.

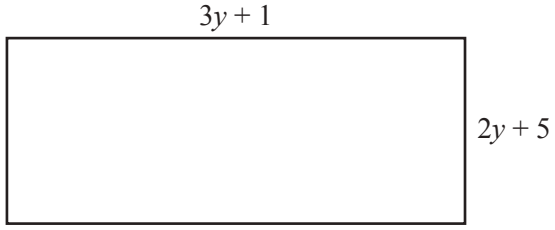
..... [1]

(ii) A square has a perimeter of $20a$.

Write down an expression, in terms of a, for the length of one side of the square.
Give your answer in its simplest form.

..... [1]

(c) The diagram shows a rectangle.



NOT TO SCALE

Find an expression, in terms of y, for the perimeter of the rectangle.
Give your answer in its simplest form.

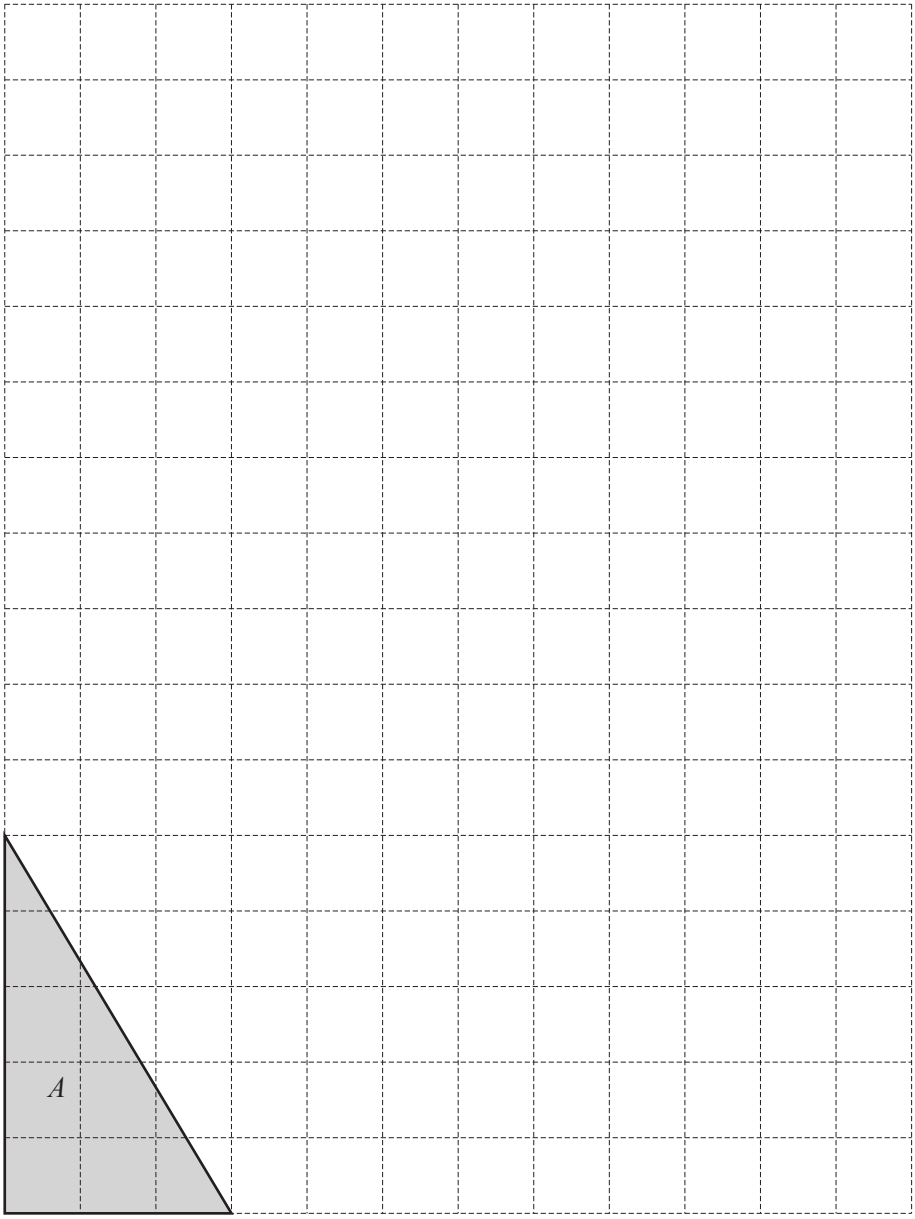
..... [3]

(d) One mint costs m cents.
One toffee costs 6 cents more than one mint.
The cost of 3 mints and 7 toffees is 182 cents.

Write an equation, in terms of m, and solve it to find the cost of one mint.

Cost of one mint = ... cents [5]

9 **(a)** The diagram shows a triangle, A, on a 1 cm^2 grid.

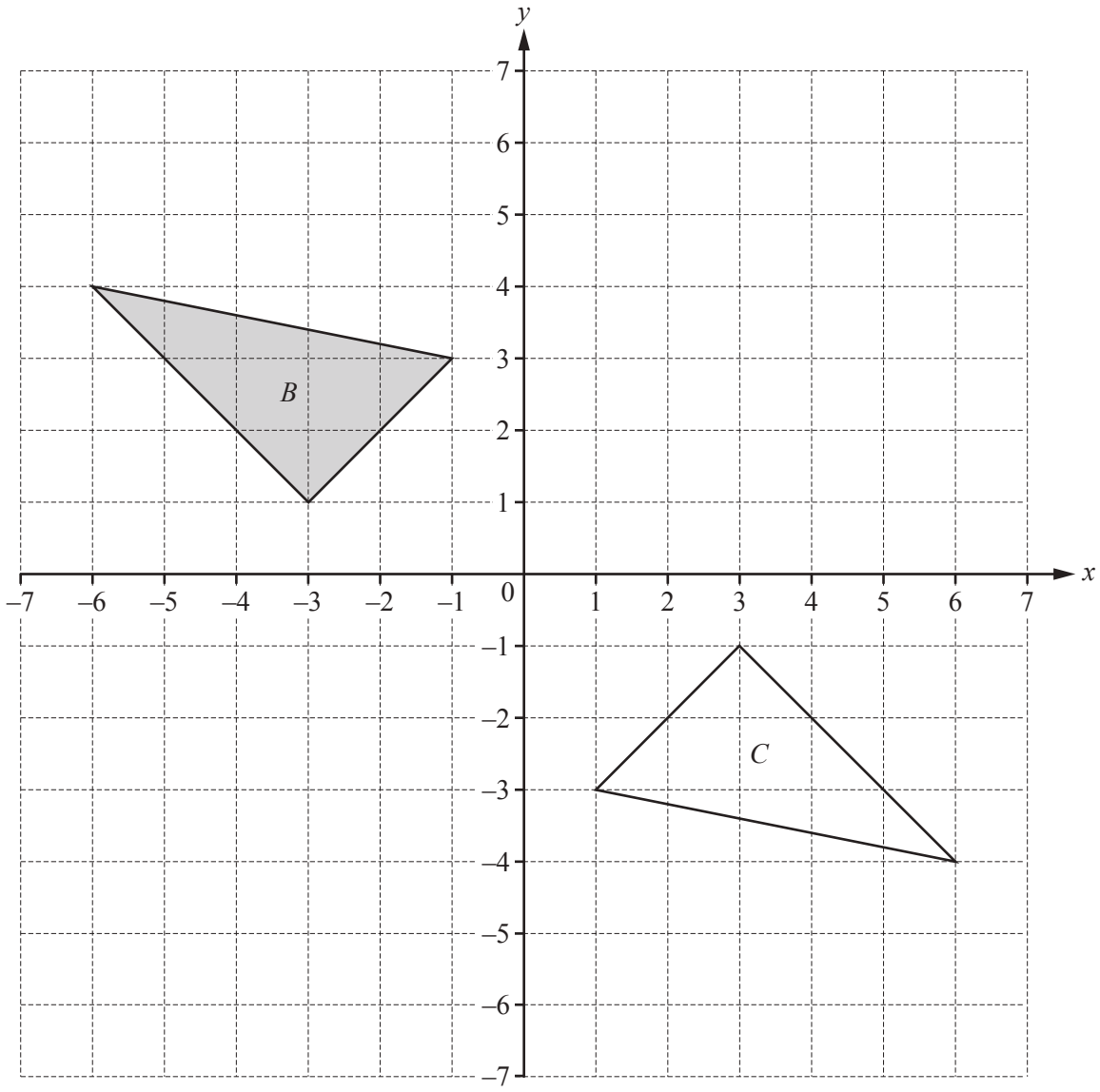


(i) Find the area of triangle A.

.....cm^2 [2]

(ii) On the grid, draw an enlargement of triangle A with scale factor 2. [2]

(b)



(i) Describe fully the **single** transformation that maps triangle B onto triangle C.

.....

..... [3]

(ii) Reflect triangle B in the line $y = -1$. [2]

(iii) Translate triangle B by the vector $\begin{pmatrix} 5 \\ 1 \end{pmatrix}$. [2]

Question 10 is printed on the next page.

10 **(a)** These are the first four terms of a sequence.

$$-2 \qquad 6 \qquad 14 \qquad 22$$

(i) Write down the next term.

..... [1]

(ii) Write down the rule for continuing the sequence.

..... [1]

(iii) Find an expression for the nth term.

..... [2]

(b) The nth term of another sequence is $5(n+1)-6$.

Write down the second term of this sequence.

..... [1]

(c) These are the first four terms of a different sequence.

$$-2 \qquad 1 \qquad 8 \qquad 19$$

Write down the next term of this sequence.

..... [1]

Cambridge IGCSE

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Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8609558632

MATHEMATICS **0580/32**

Paper 3 (Core) **October/November 2017**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

This document consists of **16** printed pages.

CAMBRIDGE International Examinations

1 **(a)** Pablo leaves home at 07 35 and arrives at school at 08 20.

(i) Find how many minutes it takes Pablo to get to school.

.....min [1]

(ii) The first lesson starts at 08 55 and ends 1 hour 15 minutes later.

Find the time the first lesson ends.

..... [1]

(iii) In one school week of 5 days, Pablo goes to and from school on the bus each day.
He buys a 5-day ticket that costs $7.75 .
A 1-day ticket costs $1.66 .

Calculate how much Pablo saves by buying a 5-day ticket.

$..... [2]

(b) Pablo records the time, correct to the nearest minute, each student in his class spent on their homework.

30	42	56	12	15	10	50	8	58	24	34	41	11	36	18
9	21	48	35	42	27	44	52	15	56	19	22	54	41	30

(i) Find the range.

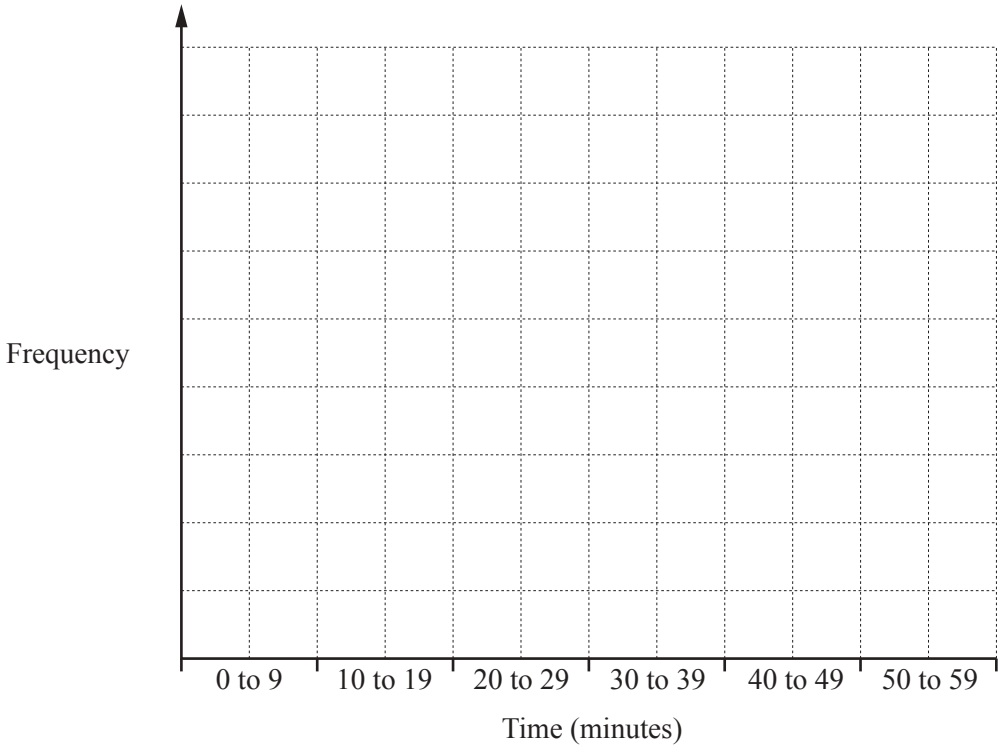
.....min [1]

(ii) Complete the frequency table.
You may use the tally column to help you.

Time (minutes)	Tally	Frequency
0 to 9		
10 to 19		
20 to 29		
30 to 39		
40 to 49		
50 to 59		
	Total	30

[2]

(iii) Draw a bar chart to show this information.
Complete the scale on the frequency axis.



[3]

(iv) Write down the modal class interval.

..... to ..... [1]

2 **(a)** Write the number 8045 in words.

..... [1]

(b) Write down a number between 60 and 70 that is

(i) a square number,

..... [1]

(ii) a prime number,

..... [1]

(iii) a common multiple of 4 and 17.

..... [1]

(c) **(i)** Write 98 as a product of its prime factors.

..... [2]

(ii) Find the highest common factor (HCF) of 98 and 182.

..... [2]

(d) Find the value of

(i) 6^4,

..... [1]

(ii) $\sqrt[3]{24\,389}$,

..... [1]

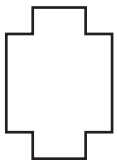
(iii) 14^1,

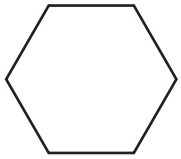
..... [1]

(iv) 5^{-3}.

..... [1]

3 **(a)** Write down the order of rotational symmetry of each shape.

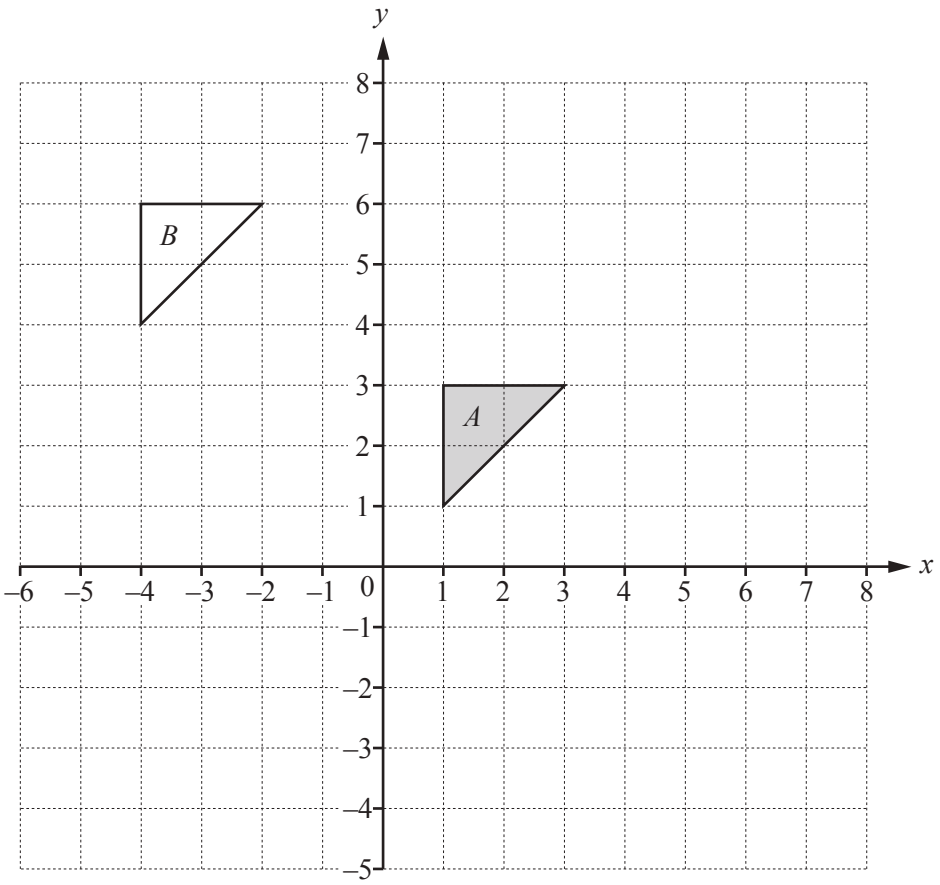




....

[2]

(b)



(i) On the grid, reflect triangle A in the line $x = -1$. [2]

(ii) On the grid, enlarge triangle A by scale factor 2, centre (0, 0). [2]

(iii) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [2]

4 Leo, Kim and Priya own a shop.

(a) **(i)** Pens cost \$1.45 each.
Andre has a \$10 note.

Find the greatest number of pens that he can buy and how much change he receives.

Number of pens = ...

Change = \$ ..... [3]

(ii) The price of a pack of printer paper is \$5.60 .
In a sale this price is reduced by 15%.

Calculate the sale price.

\$ ..... [2]

(b) Each day, Kim records the number of people who buy a pen.
The results for 10 days are shown below.

40 7 19 25 18 19 32 57 12 47

Find the median.

..... [2]

(c) The shop makes a profit of \$7000.
The profit is shared in the ratio Leo : Kim : Priya = 6 : 3 : 5.

Calculate the amount they each receive.

Leo = \$ .....

Kim = \$ .....

Priya = \$ ..... [3]

(d) Leo changed \$1400 into pounds (£).
The exchange rate was £1 = \$1.54 .

Work out how many pounds Leo received.

£..... [2]

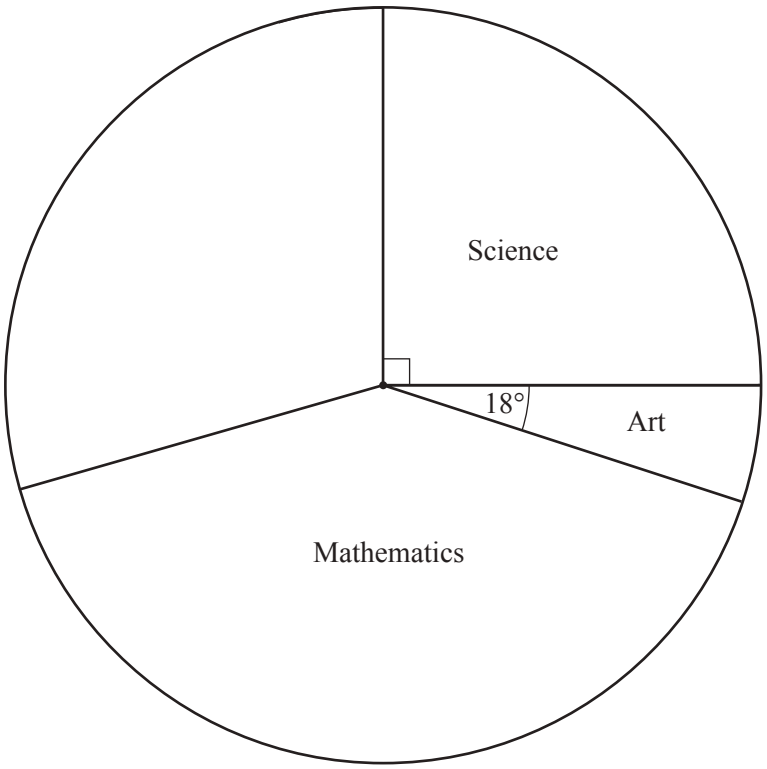
(e) Priya invested \$2000 for 3 years at a rate of 2.6% per year compound interest.

Calculate the value of her investment at the end of the 3 years.

\$..... [3]

[Turn over

5 Nico asked each of 900 students at her school what their favourite subject is.
The students only chose Science, Art, Mathematics, History or Geography.
The pie chart shows some of this information.



(a) Show that 225 students chose Science.

[1]

(b) Find how many students chose Art.

..... [2]

(c) 125 students chose History and 140 chose Geography.

Complete the pie chart to show this information.

[2]

(d) One of the 900 students is selected at random.

(i) Write down the probability that their favourite subject is French.

..... [1]

(ii) Find the probability that their favourite subject is Art.
Give your answer as a fraction in its lowest terms.

..... [2]

(e) The total number of students in the school is 2520.

Estimate how many students you would expect to choose History as their favourite subject.

..... [2]

6 The diagram shows the positions of two towns, *A* and *B*.
The scale is 1 centimetre represents 10 kilometres.

• *B*

Scale: 1 cm to 10 km

(a) (i) Find the actual distance from *A* to *B*.

..... km [2]

(ii) Measure the bearing of *B* from *A*.

..... [1]

(b) (i) Another town, *C*, is 78 km from *A* on a bearing of 103°.

Mark and label the position of town *C* on the diagram. [2]

(ii) Chailai takes 45 minutes to drive the 78 km from town *A* to town *C*.

Calculate her average speed in kilometres per hour.

..... km/h [2]

(c) In this part, use a ruler and compasses only and show your construction arcs.

Mr Lei is moving house.
He wants to live

- nearer to town *B* than town *A*

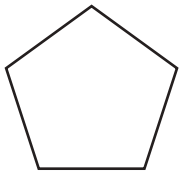
and

- less than 70 km from town *A*.

Construct and shade the region on the diagram in which he wants to live. [5]

7 **(a)** Write down the mathematical name for this polygon.

(i)

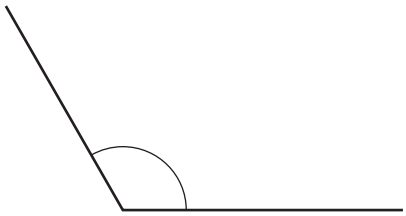


..... [1]

(ii) Write down the mathematical name for this quadrilateral.

..... [1]

(iii) Write down the type of angle shown in this diagram.



..... [1]

(b) A cuboid measures 25 cm by 12 cm by 8 cm.

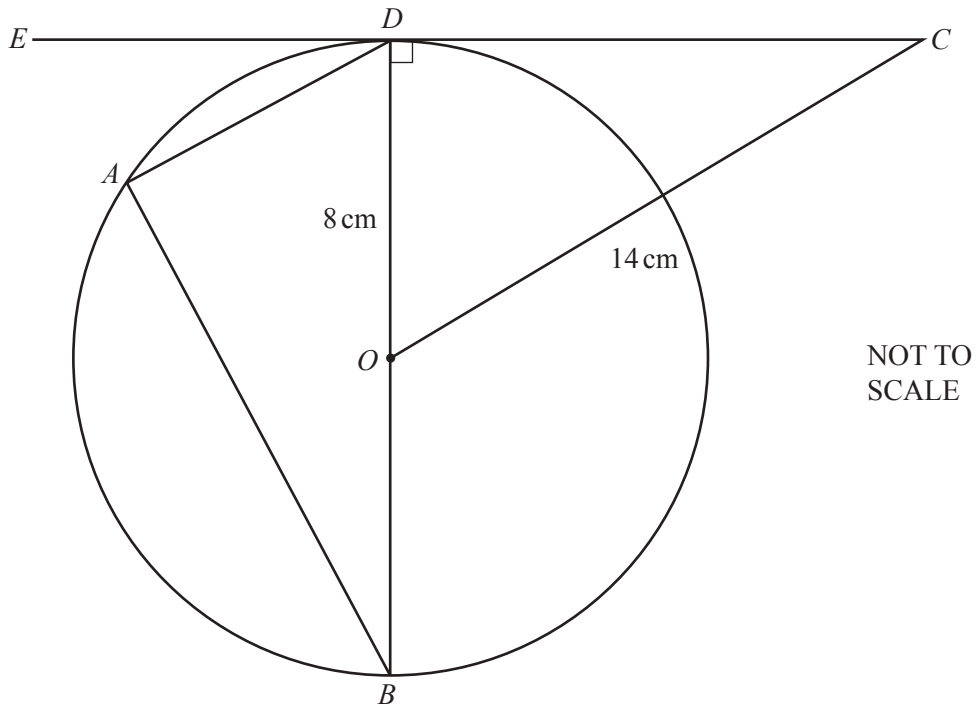
(i) Calculate the volume.

..... cm^3 [2]

(ii) Write this volume in cubic metres.

.....m^3 [1]

(c)



A, *B* and *D* lie on the circle, centre *O*.
EC is a tangent to the circle at *D*.
OD = 8 cm and *OC* = 14 cm.

(i) Write down the mathematical name for the line *OD*.

..... [1]

(ii) Explain why angle *BAD* is 90°.

..... [1]

(iii) Calculate the circumference of the circle.

..... cm [2]

(iv) Calculate *CD*.

CD = ... cm [3]

8 **(a)** Simplify.

(i) $8p + 2r + 4p - 9r$

..... [2]

(ii) $4x^3 \times 6x^2$

..... [1]

(b) Write down an expression, in terms of x and y, for the total cost of x cakes at 90 cents each and y drinks at 75 cents each.

..... cents [2]

(c) Factorise completely.

$12p^2 - 8p$

..... [2]

(d) Solve.

$4(7r - 3) = 128$

$r =$ ..... [3]

(e) Solve the simultaneous equations.
You must show all your working.

$4x + 3y = 43$
$6x + 7y = 92$

$x =$ .....

$y =$ ..... [4]

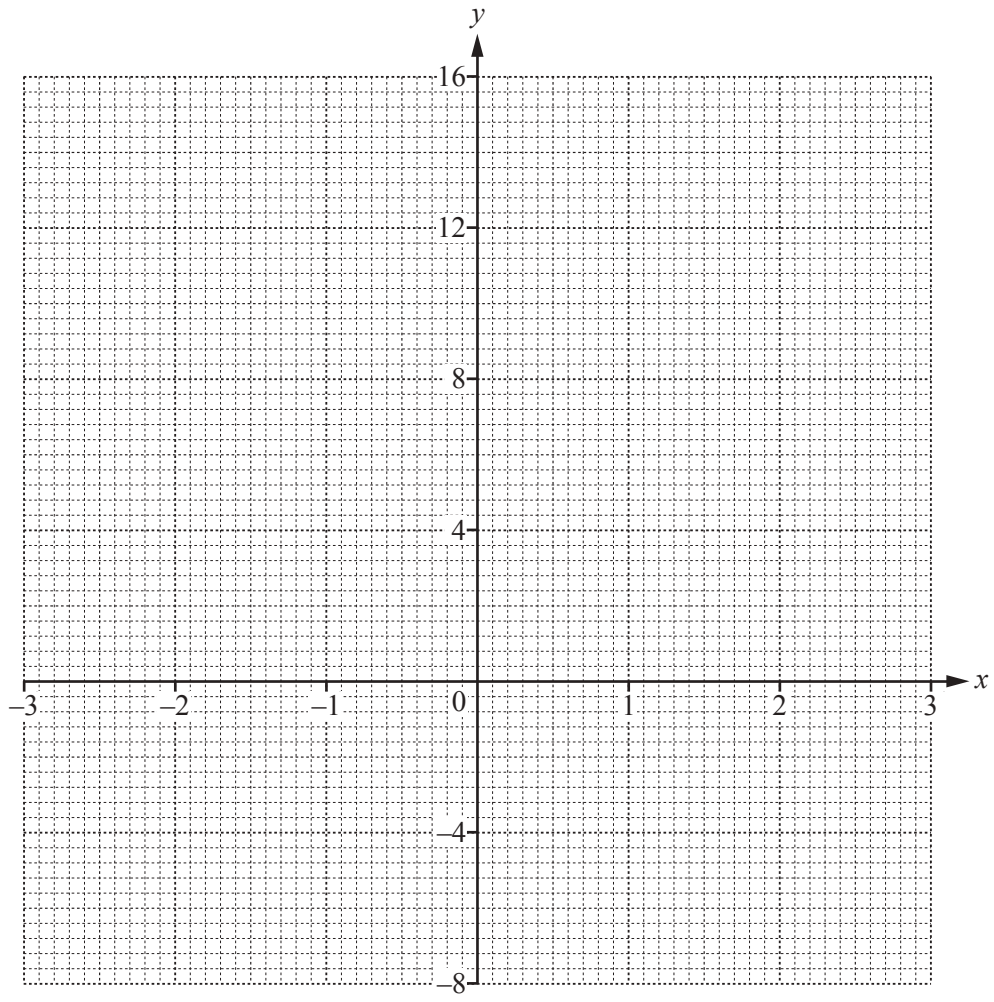
Question 9 is printed on the next page.

9 **(a)** **(i)** Complete the table of values for $y = x^2 + 3x - 4$.

x	−3	−2	−1	0	1	2	3
y	−4	−6		−4	0		

[3]

(ii) On the grid, draw the graph of $y = x^2 + 3x - 4$ for $-3 \leqslant x \leqslant 3$.



[4]

(b) **(i)** On the same grid, draw the line $y = 5$. [1]

(ii) Write down the co-ordinates of the point of intersection of the line $y = 5$ and the graph of $y = x^2 + 3x - 4$ for $-3 \leqslant x \leqslant 3$.

(..... , ...) [1]

Cambridge IGCSE

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/33**

Paper 3 (Core) **October/November 2017**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
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If working is needed for any question it must be shown below that question.
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If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

This document consists of **16** printed pages.

CAMBRIDGE International Examinations

1 **(a)** Martha makes hats.
Each week she makes 160 hats.

(i) Work out how many hats she makes in 5 weeks.

..... [1]

(ii) The hats are made in the ratio

small : medium : large = 2 : 5 : 3.

Work out how many of the 160 hats are large.

..... [2]

(iii) She sells $\frac{3}{8}$ of the 160 hats.

Work out how many hats she sells.

..... [1]

(b) Nina sells T-shirts.
The prices are shown in the table.

Type	Plain	Striped	Logo
Price	$7.50	$9.50	$10.50

(i) Sam buys 3 plain T-shirts and 2 logo T-shirts.

Work out how much she pays altogether.

$ ..... [2]

(ii) One day, Nina reduces all prices by 20%.

Work out the new price of a striped T-shirt.

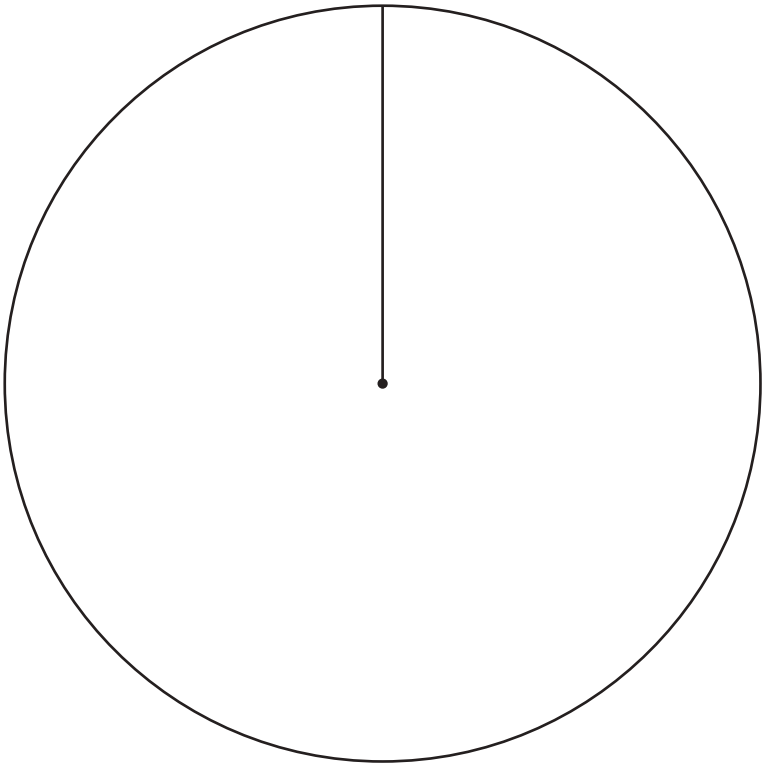
$ ..... [2]

(c) Nina sold 300 T-shirts in September.
She wants to show how many of each type she sold using a pie chart.

Type	Number sold	Pie chart sector angle
Plain	100	120°
Striped	85	
Logo	115	

(i) Complete the table. [2]

(ii) Complete the pie chart.



[2]

(d) Nina paid $22.50 for a dress.
She sold the dress for $31.50.

Work out her percentage profit.

.....% [3]

2 **(a)** Fill in the missing number in each calculation.

(i) $6 + 2 \times \ldots\ldots\ldots = 24$ [1]

(ii) $(10 - \ldots\ldots\ldots) \div 3 = 2$ [1]

(b) Find the value of

(i) $\sqrt{1.96}$,

..... [1]

(ii) 16^3.

..... [1]

(c) Work out $\dfrac{7.82 - 4.15}{5.25 \times 16.4}$.

Give your answer correct to 2 significant figures.

..... [2]

(d) $V = \frac{1}{3}a^2h$

Calculate V when $a = 4.5$ and $h = 9.6$.

$V =$ ..... [2]

(e) Put a ring around the irrational number in the list below.

$\frac{2}{3}$ $\quad$ $\sqrt{5}$ $\quad$ $-\frac{5}{7}$ $\quad$ $\sqrt{36}$ $\quad$ $1\frac{4}{5}$ [1]

(f) Written as a product of its prime factors, $T = 2^2 \times 3 \times 5^2$.

(i) Work out the value of T.

$T =$ ..... [1]

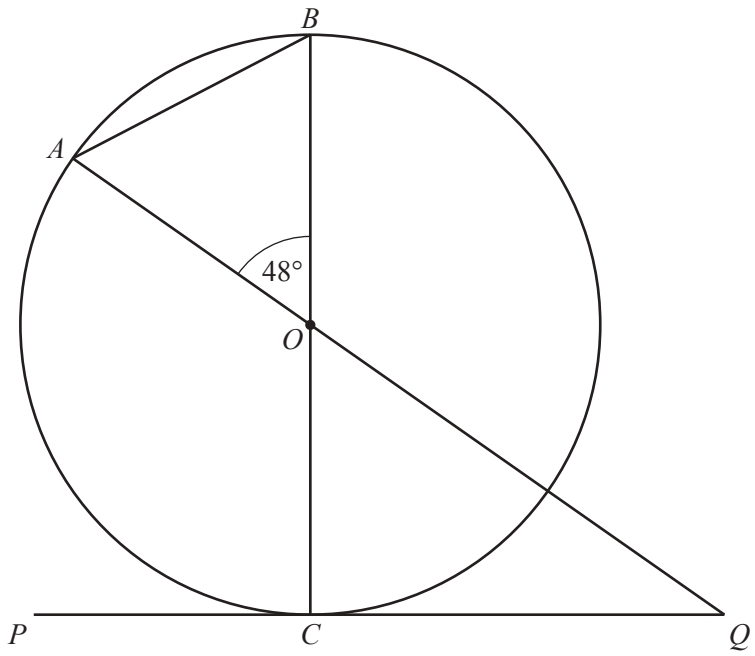
(ii) Write 80 as a product of its prime factors.

..... [2]

(iii) Find the highest common factor (HCF) of T and 80.

..... [2]

3



NOT TO SCALE

A, *B* and *C* are points on the circumference of the circle, centre *O*.
BC is a diameter of the circle.
PQ touches the circle at *C* and *AOQ* is a straight line.

(a) Write down the mathematical name for

(i) line *AB*,

..... [1]

(ii) *PQ*.

.....[1]

(b) Find the size of

(i) angle *COQ*,

Angle *COQ* = ... [1]

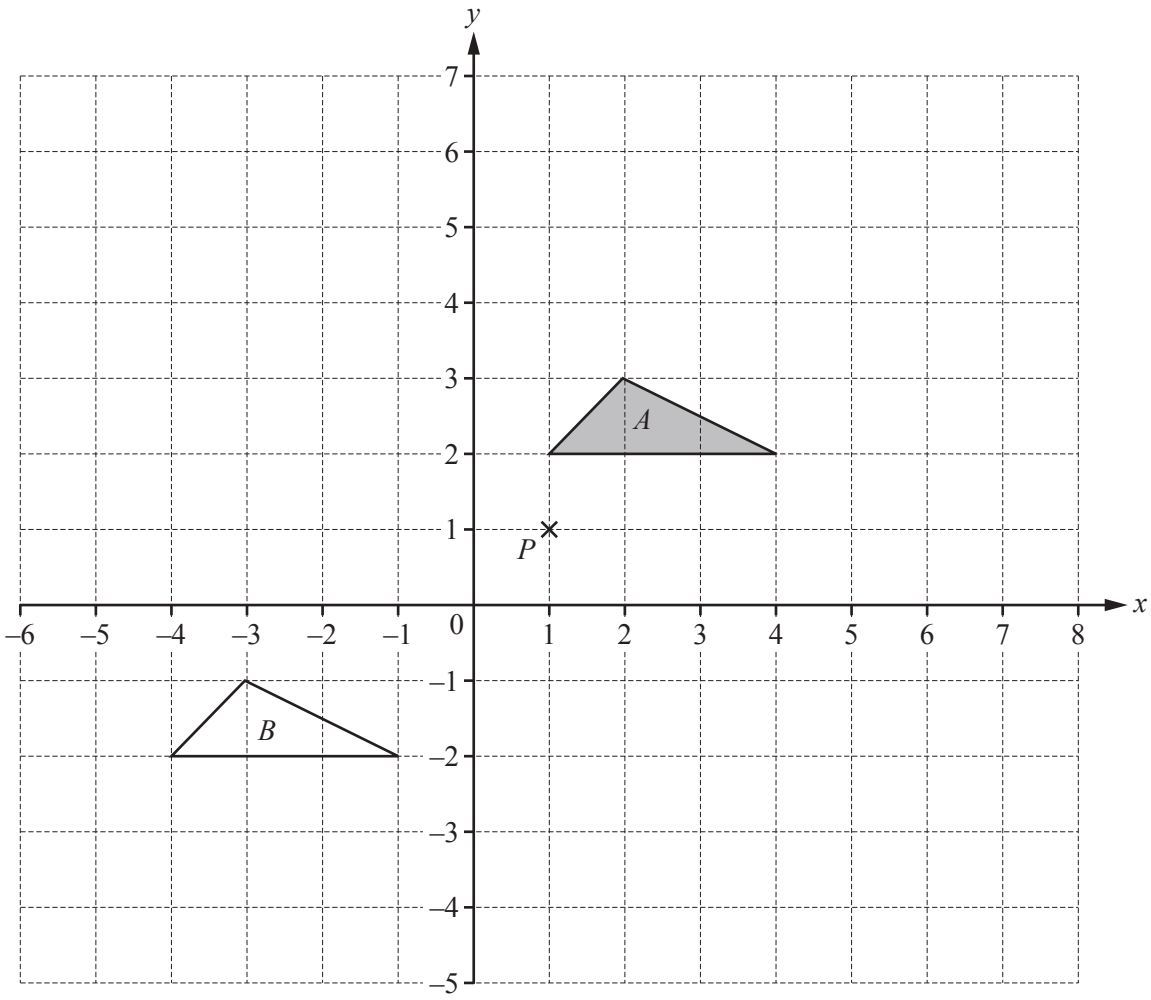
(ii) angle *ABO*,

Angle *ABO* = ... [2]

(iii) angle *OQC*.

Angle *OQC* = ... [2]

4 The diagram shows two triangles A and B and point P on a 1 cm^2 grid.



(a) Write down the mathematical name for triangle A.

..... [1]

(b) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [2]

(c) Rotate triangle A by 90° clockwise about (0, 0). [2]

(d) (i) Work out the area of triangle A.

..... cm^2 [1]

(ii) Enlarge triangle A with scale factor 2 and centre P. [2]

(iii) Complete the statement.

The area of the enlarged triangle is ..... times the area of triangle A. [2]

5 **(a)** A small box contains n biscuits.

(i) A medium box contains 10 more biscuits than the small box.

Write an expression, in terms of n, for the number of biscuits in the medium box.

..... [1]

(ii) A large box contains twice as many biscuits as the **medium** box.

Write an expression, in terms of n, for the number of biscuits in the large box.

..... [1]

(iii) There are 52 biscuits in the large box.

Write down an equation, in terms of n, and solve it.

$n =$ ..... [3]

(iv) Olga buys a small box and a medium box of biscuits.

How many biscuits does she have altogether?

..... [1]

(b) In the large box, 13 of the 52 biscuits are chocolate.
Leo takes a biscuit from the box at random.

(i) Find the probability that Leo's biscuit is chocolate.
Give your answer as a fraction in its lowest terms.

..... [2]

(ii) On the probability scale, draw an arrow to show the probability that Leo's biscuit is **not** chocolate.

[1]

(c) The mass of the large box of biscuits is 450 g.

Work out the total mass of 6 large boxes of biscuits.
Give your answer in kilograms.

..... kg [2]

(d) The mass, m grams, of the small box of biscuits is 120 g, correct to the nearest 10 g.

Complete the statement about the value of m.

..... $\leqslant m <$ .....[2]

6 **(a)** Luca records the total distance, in kilometres, he walks each day for 10 days.
Here are his results.

4.7 2.4 10.3 3.6 2.3 4.3 5.1 2.6 6.9 9.6

(i) Find the median.

..... km [2]

(ii) Find the range.

..... km [1]

(iii) Calculate the mean.

..... km [2]

(b) **(i)** On another day, Luca walks 9 km.
He starts walking at 14 20 and he walks at an average speed of 6 km/h.

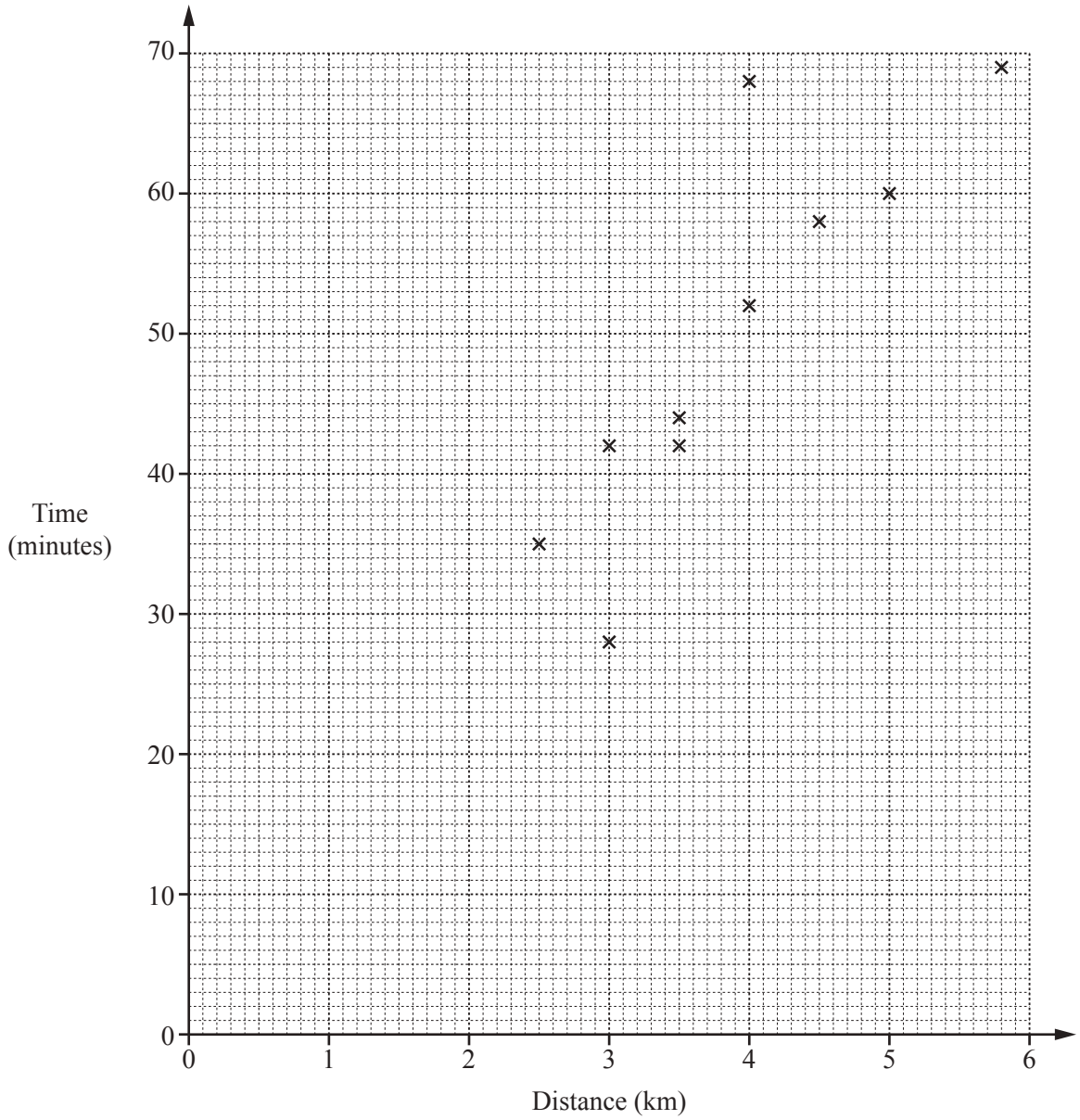
Work out the time he finishes.

..... [2]

(ii) Convert 6 km/h to metres per minute.

.....m/min [2]

(c) For another 10 days, Luca records the distance he walks each day and the time it takes. The scatter diagram shows this information.



(i) What type of correlation is shown on the scatter diagram?

..... [1]

(ii) On one of these days, Luca's average speed was much slower than on all of the other days.

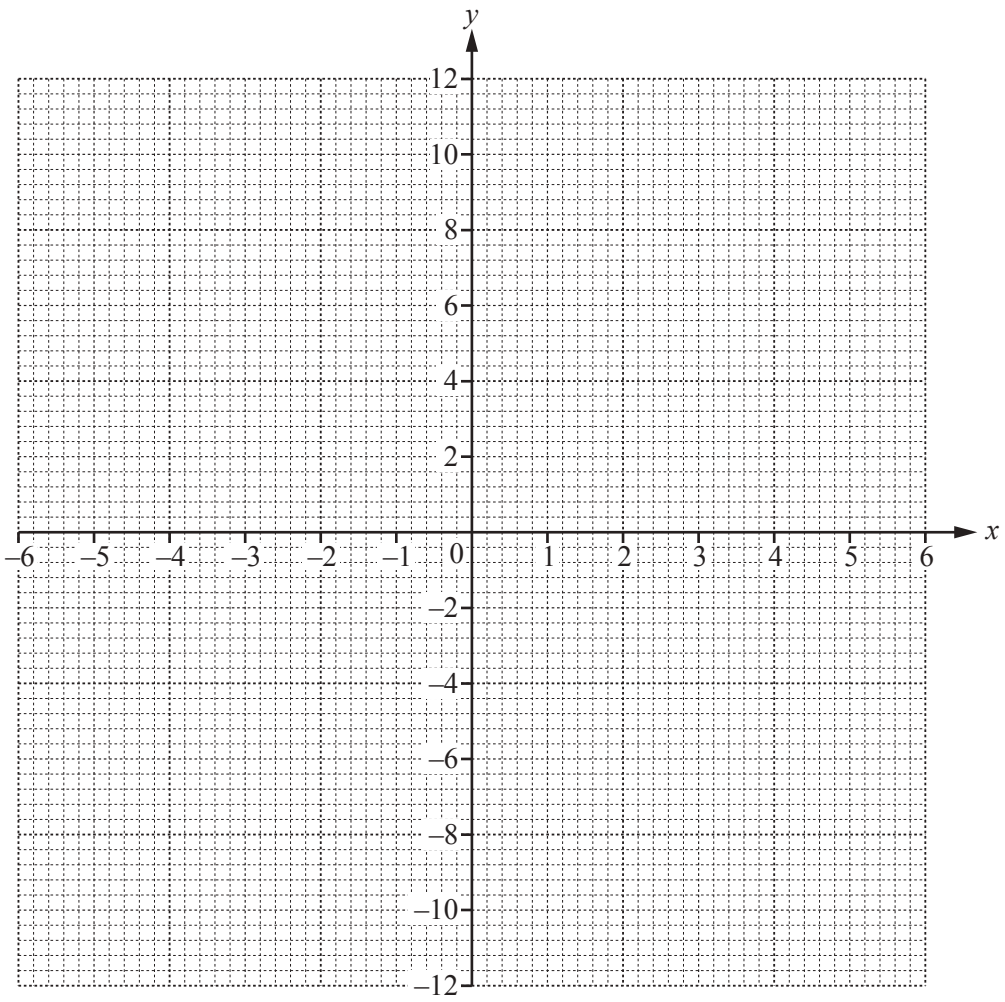
Draw a ring around this point on the scatter diagram. [1]

7 **(a)** **(i)** Complete the table of values for $y = \frac{12}{x}$.

x	–6	–4	–2	–1		1	2	4	6
y	–2			–12		12			2

[2]

(ii) On the grid, draw the graph of $y = \frac{12}{x}$ for $-6 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 6$.



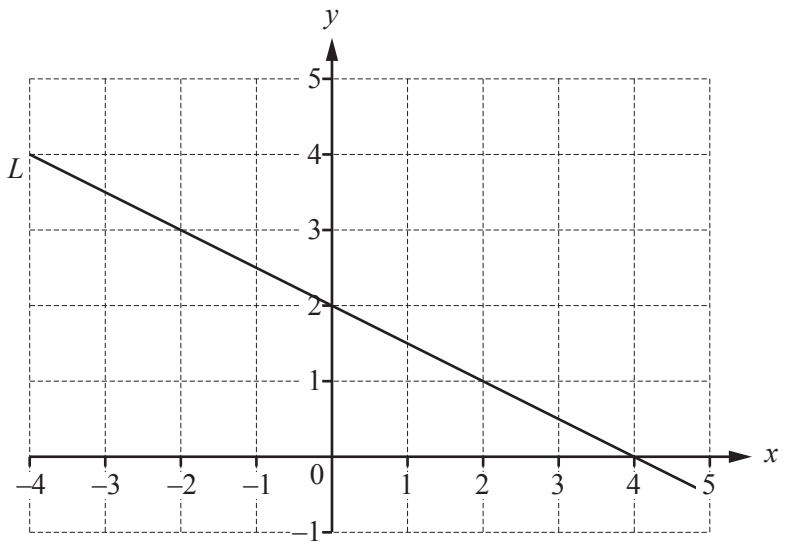
[4]

(iii) On the grid, draw the line $y = -5$. [1]

(iv) Use your graph to solve the equation $\frac{12}{x} = -5$.

$x =$ ..... [1]

(b) Line L is drawn on the grid.



(i) Find the gradient of line L.

..... [2]

(ii) Find the equation of line L in the form $y = mx + c$.

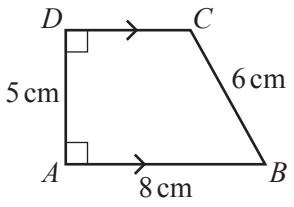
$y =$ ..... [1]

(iii) Line M is parallel to line L.
Line M passes through the point (0, 3).

Write down the equation of line M.

$y =$ ..... [2]

8 **(a)** The diagram shows a trapezium *ABCD*.



NOT TO SCALE

(i) Draw accurately trapezium *ABCD*.
Side *AD* has been drawn for you.

[2]

(ii) Measure the size of the obtuse angle.

..... [1]

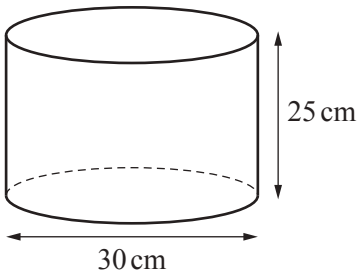
(iii) Measure the length of *CD* in centimetres.

..... cm [1]

(iv) Calculate the area of trapezium *ABCD*.

..... cm^2 [2]

(b)



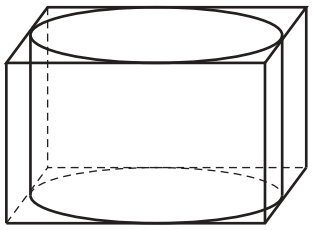
NOT TO SCALE

The diagram shows a cylinder with diameter 30 cm and height 25 cm.

(i) Calculate the volume of the cylinder.

..... cm^3 [3]

(ii) The cylinder is placed inside a cuboid.
The cylinder touches all the faces of the cuboid.



NOT TO SCALE

Calculate the surface area of the cuboid.

..... cm^2 [3]

Question 9 is printed on the next page.

9 **(a)** Factorise.

$y^2 + 8y$

..... [1]

(b) Expand the brackets and simplify.

$3(2x - 1) - 4(x - 5)$

..... [2]

(c) Make p the subject of the formula $k = 5m + 7p$.

$p =$ ..... [2]

(d) Solve the simultaneous equations.
You must show all your working.

$3x + 2y = 6$
$2x - 3y = 17$

$x =$ .....

$y =$ ..... [4]

Cambridge IGCSE

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Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0219091785

MATHEMATICS **0580/41**

Paper 4 (Extended) **October/November 2017**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

This document consists of **19** printed pages and **1** blank page.

1 **(a)** A library has a total of 10 494 fiction and non-fiction books.
The ratio fiction books : non-fiction books = 13 : 5.

Find the number of non-fiction books the library has.

..... [2]

(b) The library has DVDs on crime, adventure and science fiction.
The ratio crime : adventure : science fiction = 11 : 6 : 10.
The library has 384 **more** science fiction DVDs than adventure DVDs.

Calculate the number of crime DVDs the library has.

..... [2]

(c) Every Monday, Sima travels by car to the library.
The distance is 20 km and the journey takes 23 minutes.

(i) Calculate the average speed for the journey in kilometres per hour.

..... km/h [2]

(ii) One Monday, she is delayed and her average speed is reduced to 32 km/h.

Calculate the percentage increase in the journey time.

..... % [5]

(d) In Spain, the price of a book is 11.99 euros.
In the USA, the price of the same book is $12.99 .
The exchange rate is $1 = 0.9276 euros.

Calculate the difference between these prices.
Give your answer in dollars, correct to the nearest cent.

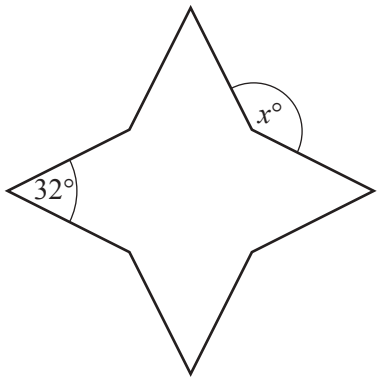
$..... [3]

(e) 7605 books were borrowed from the library in 2016.
This was 22% less than in 2015.

Calculate the number of books borrowed in 2015.

..... [3]

2 (a)



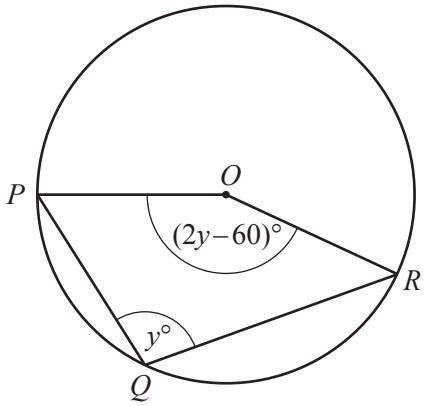
NOT TO SCALE

The diagram shows an octagon.
All of the sides are the same length.
Four of the interior angles are each 32°.
The other four interior angles are equal.

Find the value of x.

$x =$ ..... [4]

(b)



NOT TO SCALE

P, Q and R lie on a circle, centre O.
Angle $PQR = y°$ and angle $POR = (2y - 60)°$.

Find the value of y.

$y =$ ..... [3]

3 **(a)** Solve.

$11x + 15 = 3x - 7$

$x =$ ..... [2]

(b) **(i)** Factorise.

$x^2 + 9x - 22$

..... [2]

(ii) Solve.

$x^2 + 9x - 22 = 0$

$x =$ ..... or $x =$ ..... [1]

(c) Rearrange $y = \dfrac{2(x-a)}{x}$ to make x the subject.

$x =$ ..... [4]

(d) Simplify. $\dfrac{x^2 - 6x}{x^2 - 36}$

..... [3]

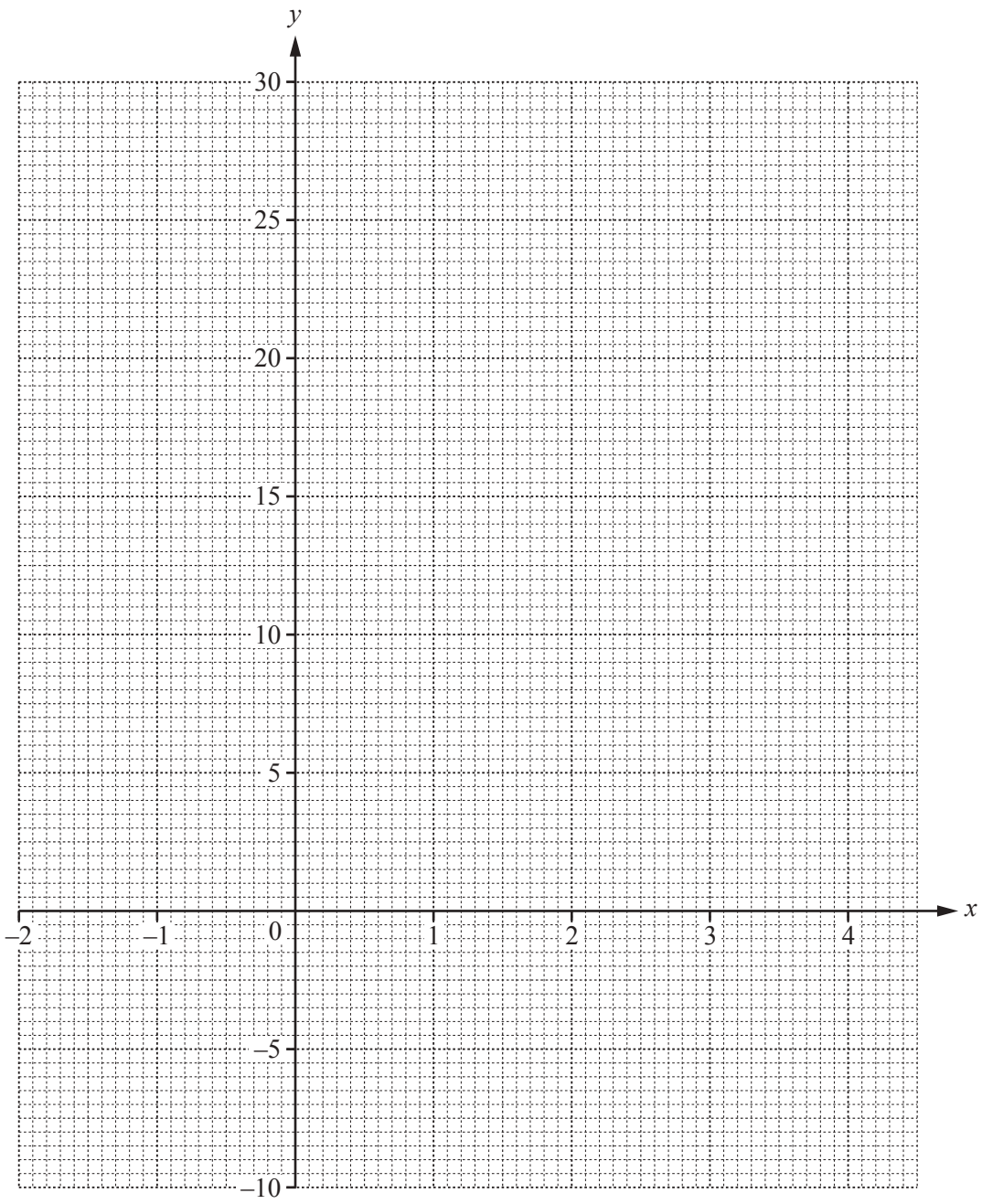
4 $f(x) = x^3 - 4x^2 + 15$

(a) Complete the table of values for $y = f(x)$.

x	–2	–1	–0.5	0	1	2	2.5	3	3.5	4	4.5
y	–9		13.9	15	12		5.6	6	8.9	15	25.1

[2]

(b) On the grid, draw the graph of $y = f(x)$ for $-2 \leqslant x \leqslant 4.5$.



[4]

(c) Use your graph to solve the equation $f(x) = 0$.

$x =$ ..... [1]

(d) By drawing a suitable tangent, estimate the gradient of the graph of $y = f(x)$ when $x = 3.5$.

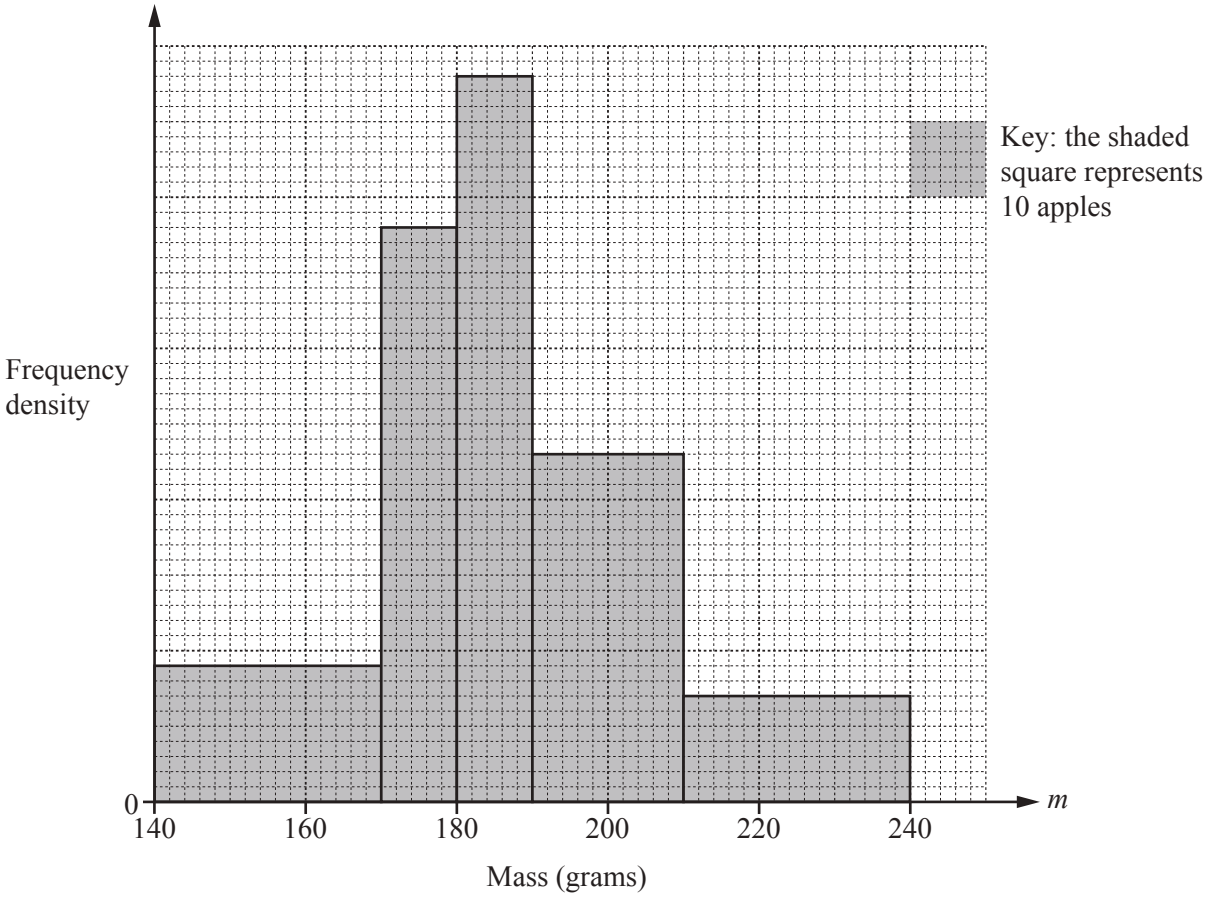
..... [3]

(e) By drawing a suitable straight line on the grid, solve the equation $x^3 - 4x^2 - 2x + 5 = 0$.

$x =$ ..... or $x =$ ..... or $x =$ ..... [4]

[Turn over

5 The histogram shows the distribution of the masses, m grams, of 360 apples.



(a) Use the histogram to complete the frequency table.

Mass (m grams)	Number of apples
$140 < m \leqslant 170$	
$170 < m \leqslant 180$	
$180 < m \leqslant 190$	
$190 < m \leqslant 210$	92
$210 < m \leqslant 240$	42

[3]

(b) Calculate an estimate of the mean mass of the 360 apples.

..... g [4]

6

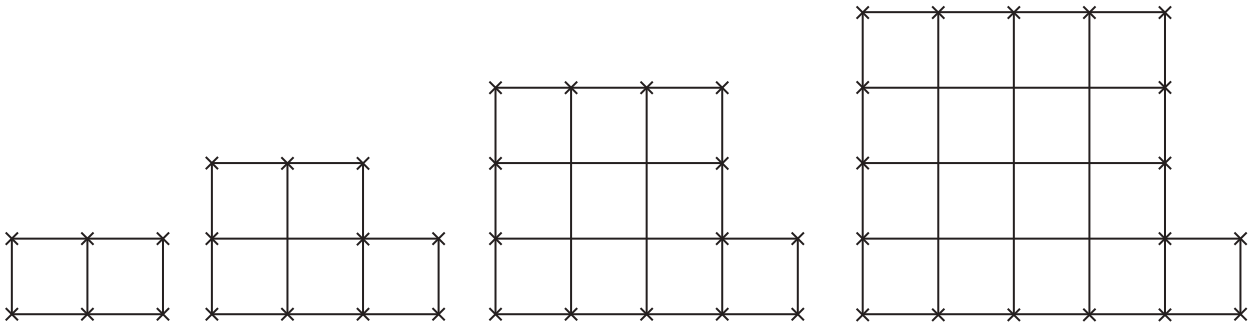


Diagram 1 Diagram 2 Diagram 3 Diagram 4

These are the first four diagrams in a sequence.
Each diagram is made from small squares and crosses.

(a) Complete the table.

Diagram	1	2	3	4	5		*n*
Number of crosses	6	10	14				
Number of small squares	2	5	10				

[6]

(b) Find the number of crosses in Diagram 60.

..... [1]

(c) Which diagram has 226 squares?

Diagram ..... [1]

(d) The side of each small square has length 1 cm.
The number of lines of length 1 cm in Diagram n is $2n^2 + 2n + q$.

Find the value of q.

q = ... [2]

7 $f(x) = 3 - 2x$ $g(x) = \frac{4}{x},\ x \neq 0$ $h(x) = 4^x$

(a) Find f(5).

..... [1]

(b) Find gh(3).

..... [2]

(c) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

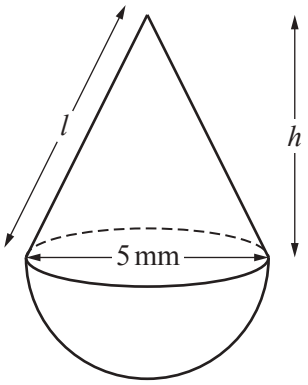
(d) Show that $hf(x) = \frac{64}{16^x}$.

[3]

(e) Find the value of x when $h(x) = g(0.5)$.

$x =$ ..... [2]

8



NOT TO SCALE

The diagram shows a solid made from a hemisphere and a cone.
The base diameter of the cone and the diameter of the hemisphere are each 5 mm.

(a) The total surface area of the solid is $\frac{115\pi}{4}$ mm^2.

Show that the slant height, l, is 6.5 mm.

[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]
[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

[4]

(b) Calculate the height, h, of the cone.

$h =$ ..... mm [3]

(c) Calculate the volume of the solid.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

.....mm^3 [4]

(d) The solid is made from gold.
1 **cubic centimetre** of gold has a mass of 19.3 grams.
The value of 1 gram of gold is \$38.62 .

Calculate the value of the gold used to make the solid.

\$..... [3]

9 **(a)** A bag contains red beads and green beads.
There are 80 beads altogether.
The probability that a bead chosen at random is green is 0.35 .

(i) Find the number of red beads in the bag.

..... [2]

(ii) Marcos chooses a bead at random and replaces it in the bag.
He does this 240 times.

Find the number of times he would expect to choose a green bead.

..... [1]

(b) A different bag contains 2 blue marbles, 3 yellow marbles and 4 white marbles.
Huma chooses a marble at random, notes the colour, then replaces it in the bag.
She does this three times.

Find the probability that

(i) all three marbles are yellow,

..... [2]

(ii) all three marbles are different colours.

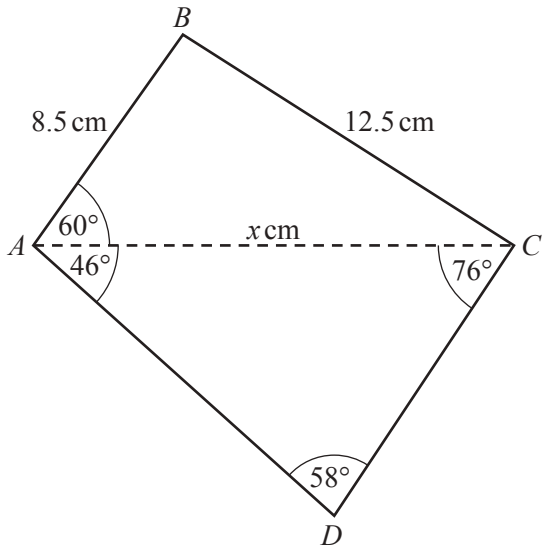
..... [3]

(c) Another bag contains 2 green counters and 3 pink counters.
Teresa chooses three counters at random **without** replacement.

Find the probability that she chooses more pink counters than green counters.

..... [4]

10



NOT TO SCALE

The diagram shows a quadrilateral $ABCD$.

(a) The length of AC is x cm.

Use the cosine rule in triangle ABC to show that $2x^2 - 17x - 168 = 0$.

[4]

(b) Solve the equation $2x^2 - 17x - 168 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [4]

(c) Use the sine rule to calculate the length of CD.

CD = ... cm [3]

(d) Calculate the area of the quadrilateral $ABCD$.

..... cm^2 [3]

11 **(a)** $\mathbf{A} = \begin{pmatrix} 2 & -3 \\ 1 & 4 \end{pmatrix}$

Find

(i) $\mathbf{A}^2$,

$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(ii) $\mathbf{A}^{-1}$, the inverse of $\mathbf{A}$.

$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$.

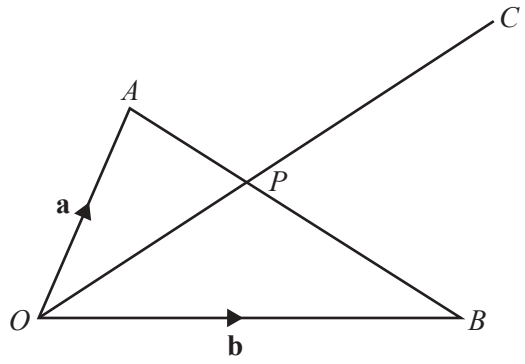
.....

..... [2]

(c) Find the matrix that represents a clockwise rotation of 90º about the origin.

$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(d)



NOT TO SCALE

In the diagram, O is the origin and P lies on AB such that $AP : PB = 3 : 4$.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

(i) Find $\overrightarrow{OP}$, in terms of **a** and **b**, in its simplest form.

$\overrightarrow{OP}$ = ... [3]

(ii) The line OP is extended to C such that $\overrightarrow{OC} = m\overrightarrow{OP}$ and $\overrightarrow{BC} = k\mathbf{a}$.

Find the value of m and the value of k.

m = ...

k = ... [2]

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/42**

Paper 4 (Extended) **October/November 2017**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

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DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

1 **(a)** Alex has \$20 and Bobbie has \$25.

(i) Write down the ratio Alex's money : Bobbie's money in its simplest form.

..... : ..... [1]

(ii) Alex and Bobbie each spend $\frac{1}{5}$ of their money.

Find the ratio Alex's remaining money : Bobbie's remaining money in its simplest form.

..... : ..... [1]

(iii) Alex and Bobbie **then** each spend \$4.

Find the new ratio Alex's remaining money : Bobbie's remaining money in its simplest form.

..... : ..... [2]

(b) **(i)** The population of a town in the year 1990 was 15 600.
The population is now 11 420.

Calculate the percentage decrease in the population.

.....% [3]

(ii) The population of 15 600 was 2.5% less than the population in the year 1980.

Calculate the population in the year 1980.

..... [3]

(c) Chris invests \$200 at a rate of x% per year simple interest.
At the end of 15 years the total interest received is \$48.

Find the value of x.

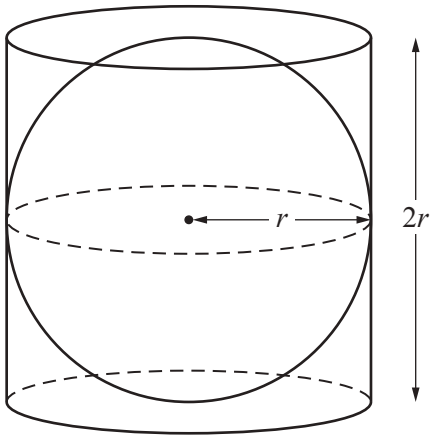
$x =$ ..... [2]

(d) Dani invests \$200 at a rate of y% per year compound interest.
At the end of 10 years the value of her investment is \$256.

Calculate the value of y, correct to 1 decimal place.

$y =$ ..... [3]

2 (a)



NOT TO SCALE

A sphere of radius r is inside a closed cylinder of radius r and height $2r$.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

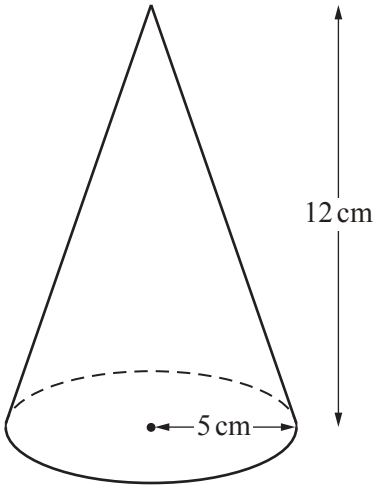
(i) When $r = 8$ cm, calculate the volume inside the cylinder which is **not** occupied by the sphere.

..... cm^3 [3]

(ii) Find r when the volume inside the cylinder **not** occupied by the sphere is $36\,cm^3$.

$r =$ ..... cm [3]

(b)



NOT TO SCALE

The diagram shows a solid cone with radius 5 cm and perpendicular height 12 cm.

(i) The **total** surface area is painted at a cost of \$0.015 per cm^2.

Calculate the cost of painting the cone.

[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]

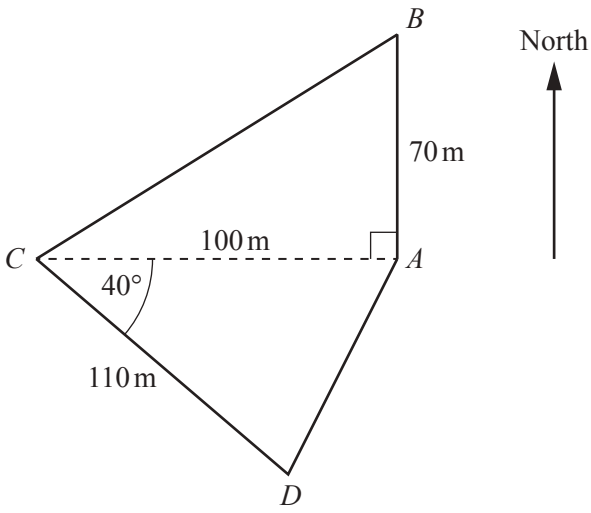
\$ ..... [4]

(ii) The cone is made of metal and is melted down and made into smaller solid cones with radius 1.25 cm and perpendicular height 3 cm.

Calculate the number of smaller cones that can be made.

..... [3]

3



The diagram shows a field *ABCD*.

(a) Calculate the area of the field *ABCD*.

.....m^2 [3]

(b) Calculate the perimeter of the field *ABCD*.

..... m [5]

(c) Calculate the shortest distance from A to CD.

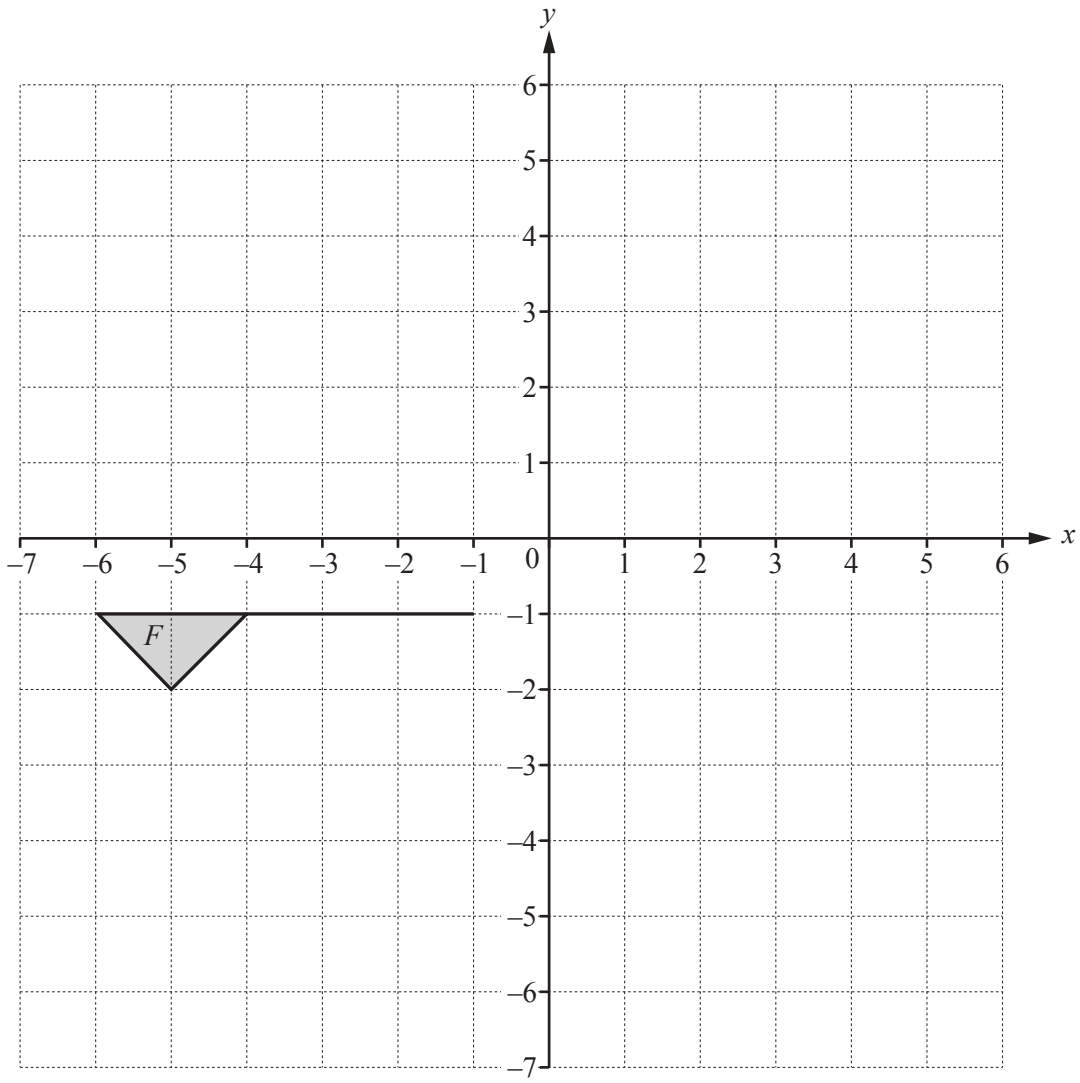
..... m [2]

(d) B is due north of A.

Find the bearing of C from B.

..... [3]

4 (a)



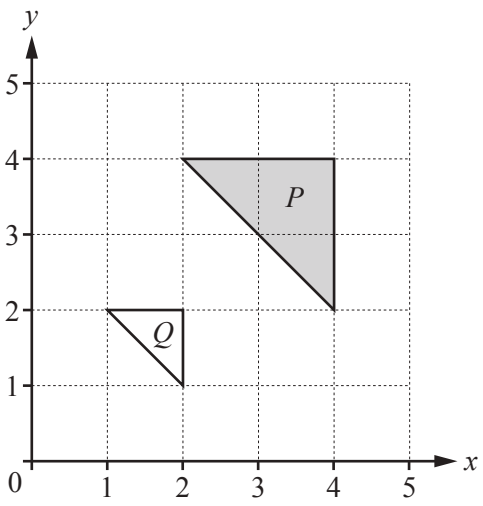
Draw the image of

(i) flag F after translation by the vector $\begin{pmatrix} 6 \\ -2 \end{pmatrix}$, [2]

(ii) flag F after rotation through 180° about (– 2, 0), [2]

(iii) flag F after reflection in the line $y = x$. [2]

(b)



(i) Describe fully the **single** transformation that maps triangle P onto triangle Q.

.....

..... [3]

(ii) Find the matrix that represents this transformation.

$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(c) The point A is translated to the point B by the vector $\begin{pmatrix} 4u \\ 3u \end{pmatrix}$.

$|\overrightarrow{AB}| = 12.5$

Find u.

$u =$ ..... [3]

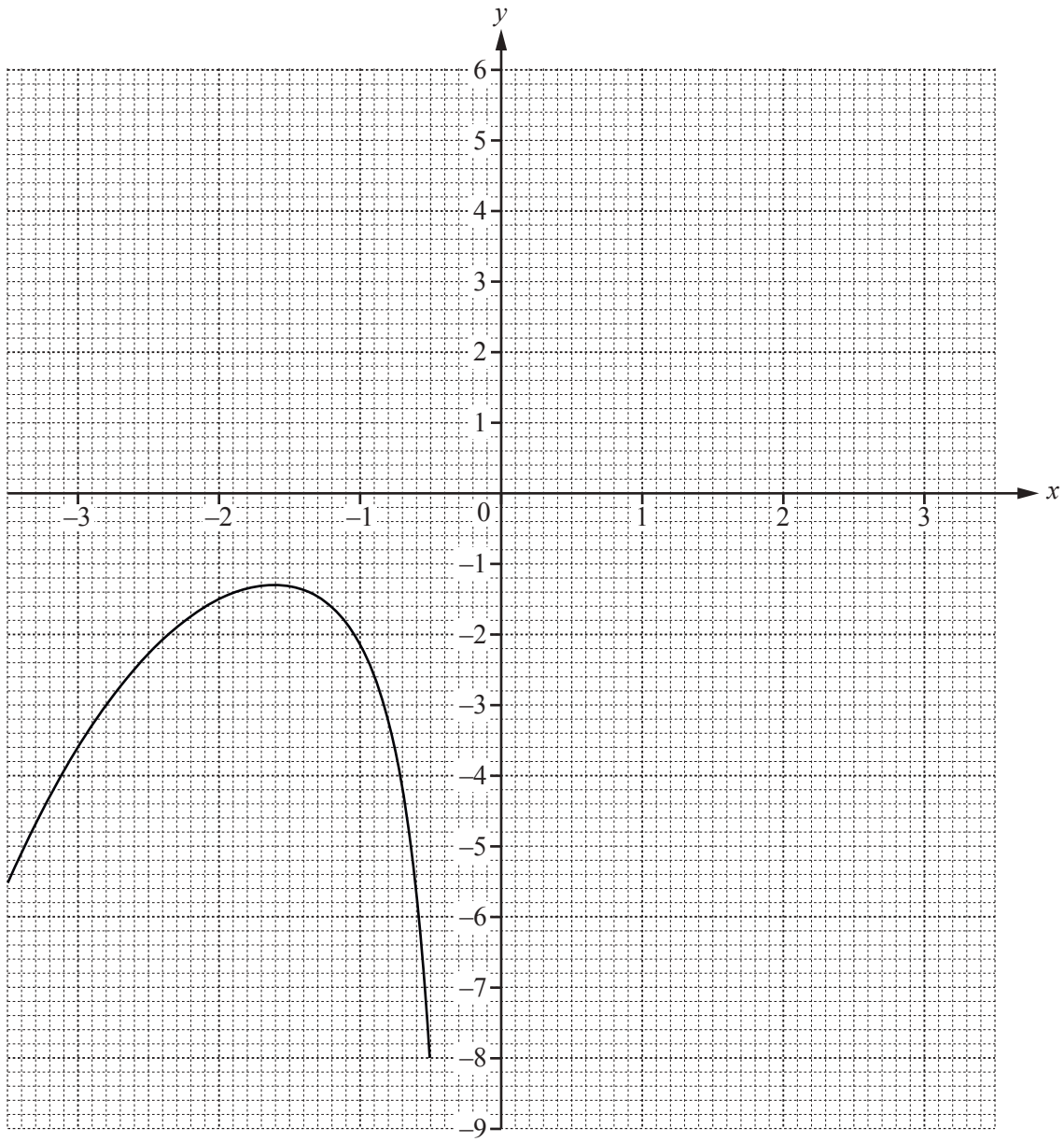
5 $y = \frac{x^3}{8} - \frac{2}{x^2}$, $x \neq 0$

(a) Complete the table of values.

x	0.5	1	1.5	2	2.5	3	3.5
y	−8.0	−1.9	−0.5	0.5	1.6		

[2]

(b)



The graph of $y = \frac{x^3}{8} - \frac{2}{x^2}$ for $-3.5 \leqslant x \leqslant -0.5$ has already been drawn.

On the grid, draw the graph of $y = \frac{x^3}{8} - \frac{2}{x^2}$ for $0.5 \leqslant x \leqslant 3.5$. [4]

(c) Use your graph to solve the equation $\frac{x^3}{8} - \frac{2}{x^2} = 0$.

$x =$ ..... [1]

(d) $\frac{x^3}{8} - \frac{2}{x^2} = k$ and k is an integer.

Write down a value of k when the equation $\frac{x^3}{8} - \frac{2}{x^2} = k$ has

(i) one answer, $k =$ ..... [1]

(ii) three answers. $k =$ ..... [1]

(e) By drawing a suitable tangent, estimate the gradient of the curve where $x = -3$.

..... [3]

(f) **(i)** By drawing a suitable line on the grid, find x when $\frac{x^3}{8} - \frac{2}{x^2} = 6 - x$.

$x =$ ..... [3]

(ii) The equation $\frac{x^3}{8} - \frac{2}{x^2} = 6 - x$ can be written as $x^5 + ax^3 + bx^2 + c = 0$.

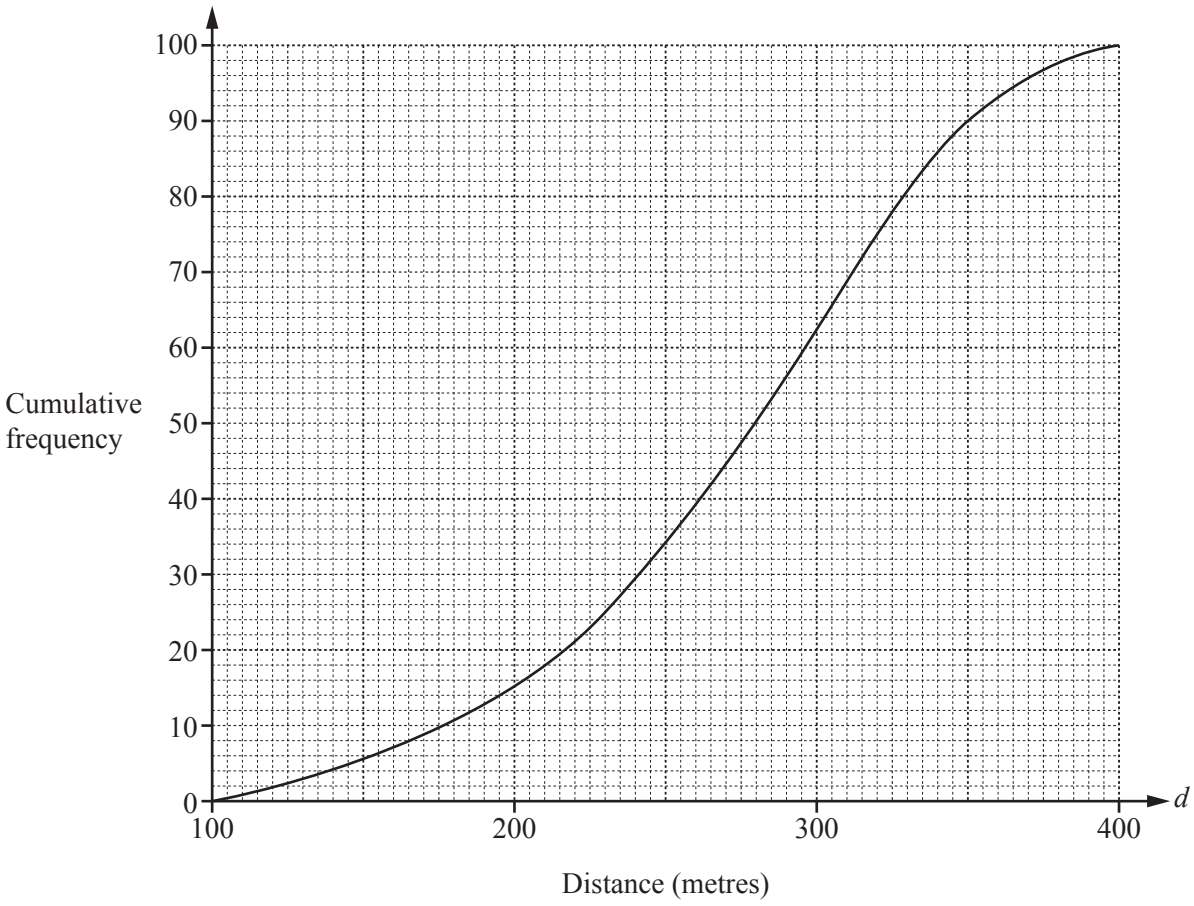
Find the values of a, b and c.

$a =$ .....

$b =$ .....

$c =$ ..... [4]

6 **(a)** There are 100 students in group A.
The teacher records the distance, d metres, each student runs in one minute.
The results are shown in the cumulative frequency diagram.



Find

(i) the median,

..... m [1]

(ii) the upper quartile,

..... m [1]

(iii) the inter-quartile range,

..... m [1]

(iv) the number of students who run more than 350 m.

..... [2]

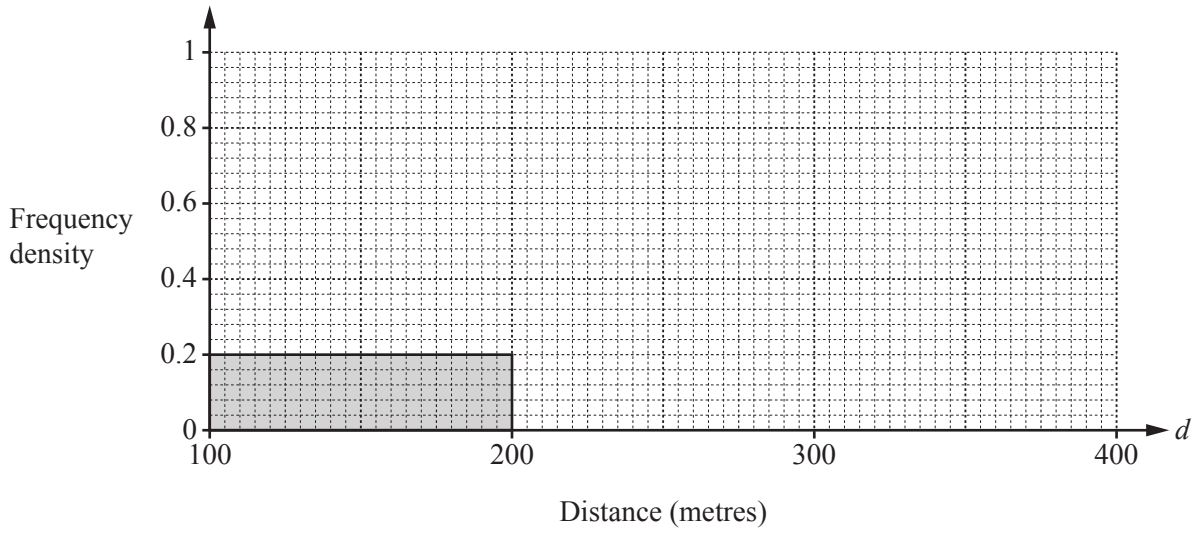
(b) There are 100 students in group *B*.
The teacher records the distance, *d* metres, each of these students runs in one minute.
The results are shown in the frequency table.

Distance (d metres)	$100 < d \leqslant 200$	$200 < d \leqslant 250$	$250 < d \leqslant 280$	$280 < d \leqslant 320$	$320 < d \leqslant 400$
Number of students	20	22	30	16	12

(i) Calculate an estimate of the mean distance for group *B*.

..... m [4]

(ii) Complete the histogram to show the information in the frequency table.



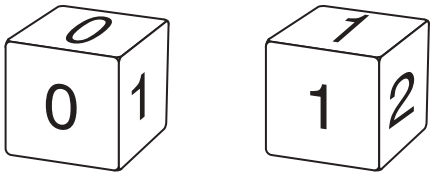
[4]

(c) For the 100 students in group *B*, the median is 258 m.

Complete the statement.

On average, the students in group *A* run ..... than the students in group *B*. [1]

7



A *B*

The diagram shows two fair dice.
The numbers on dice *A* are 0, 0, 1, 1, 1, 3.
The numbers on dice *B* are 1, 1, 2, 2, 2, 3.
When a dice is rolled, the score is the number on the top face.

(a) Dice *A* is rolled once.

Find the probability that the score is not 3.

..... [1]

(b) Dice *A* is rolled twice.

Find the probability that the score is 0 both times.

..... [2]

(c) Dice *A* is rolled 60 times.

Calculate an estimate of the number of times the score is 0.

..... [1]

(d) Dice *A* and dice *B* are each rolled once.
The product of the scores is recorded.

(i) Complete the possibility diagram.

Dice *B* \ Dice *A*	0	0	1	1	1	3
3	0	0				
2	0	0				
2	0	0				
2	0	0				
1	0	0				
1	0	0	1	1	1	3

[2]

(ii) Find the probability that the product of the scores is

(a) 2,

..... [1]

(b) greater than 3.

..... [1]

(e) Eva keeps rolling dice *B* until 1 is scored.

Find the probability that this happens on the 5th roll.

..... [2]

8 **(a)** The cost of 1 apple is a cents.
The cost of 1 pear is p cents.
The total cost of 7 apples and 9 pears is 354 cents.

(i) Write down an equation in terms of a and p.

..... [1]

(ii) The cost of 1 pear is 2 cents more than the cost of 1 apple.

Find the value of a and the value of p.

$a =$ .....

$p =$ ..... [3]

(b) Rowena walks 2 km at an average speed of x km/h.

(i) Write down an expression, in terms of x, for the time taken.

..... h [1]

(ii) Rowena then walks 3 km at an average speed of $(x - 1)$ km/h.
The total time taken to walk the 5 km is 2 hours.

(a) Show that $2x^2 - 7x + 2 = 0$.

[3]

(b) Find the value of x.
Show all your working and give your answer correct to 2 decimal places.

$x =$ ..... [4]

9 $f(x) = 1 - 2x$ $g(x) = x + 4$ $h(x) = x^2 + 1$

(a) Find $f(-1)$.

..... [1]

(b) Solve the equation.

$$2f(x) = g(x)$$

$x =$ ..... [2]

(c) Find $fg(x)$.
Give your answer in its simplest form.

..... [2]

(d) Find $hh(2)$.

..... [2]

(e) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

(f) $\text{hgf}(x) = 4x^2 + px + q$

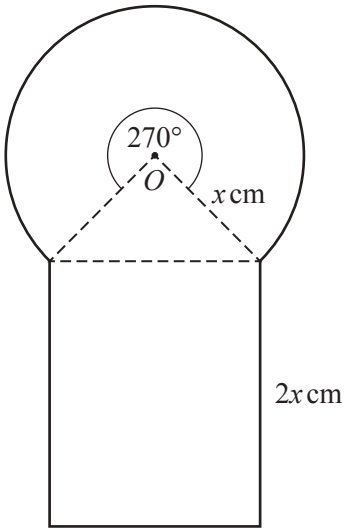
Find the value of p and the value of q.

$p =$ .....

$q =$ ..... [4]

Question 10 is printed on the next page.

10



NOT TO SCALE

The diagram shows a sector of a circle, a triangle and a rectangle.
The sector has centre O, radius x cm and angle 270°.
The rectangle has length $2x$ cm.

The total area of the shape is kx^2 cm^2.

(a) Find the value of k.

$k =$ ..... [5]

(b) Find the value of x when the total area is 110 cm^2.

$x =$ ..... [2]

Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

3615109611

MATHEMATICS **0580/43**

Paper 4 (Extended) **October/November 2017**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

1 **(a)** The angles of a triangle are in the ratio 2 : 3 : 5.

(i) Show that the triangle is right-angled.

[1]

(ii) The length of the hypotenuse of the triangle is 12 cm.

Use trigonometry to calculate the length of the shortest side of this triangle.

..... cm [3]

(b) The sides of a different right-angled triangle are in the ratio 3 : 4 : 5.

(i) The length of the shortest side is 7.8 cm.

Calculate the length of the longest side.

..... cm [2]

(ii) Calculate the smallest angle in this triangle.

..... [3]

2 **(a)** Solve.

$$\frac{x}{7} = 49$$

$x =$ ..... [1]

(b) Simplify.

(i) x^0

..... [1]

(ii) $x^7 \times x^3$

..... [1]

(iii) $\dfrac{(3x^6)^2}{x^{-4}}$

..... [2]

(c) **(i)** Factorise completely.

$$2x^2 - 18$$

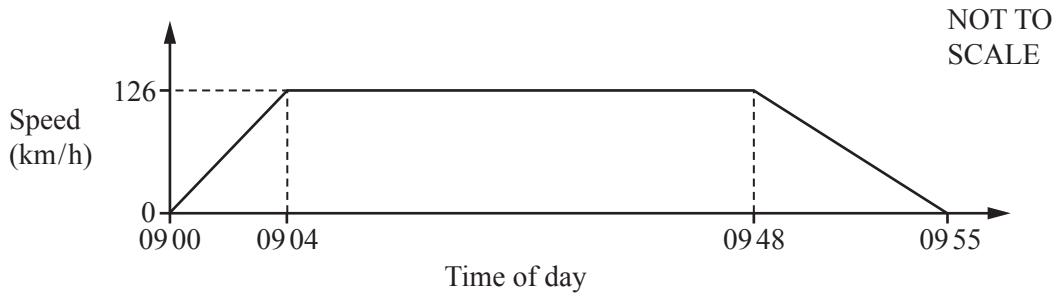
..... [2]

(ii) Simplify.

$$\frac{2x^2 - 18}{x^2 + 7x - 30}$$

..... [3]

3 The graph shows information about the journey of a train between two stations.



(a) **(i)** Work out the acceleration of the train during the first 4 minutes of this journey. Give your answer in km/h^2.

..... km/h^2 [2]

(ii) Calculate the distance, in kilometres, between the two stations.

..... km [4]

(b) (i) Show that 126 km/h is the same speed as 35 m/s.

[1]

(ii) The train has a total length of 220 m.
At 09 30, the train crossed a bridge of length 1400 m.

Calculate the time, in seconds, that the train took to completely cross the bridge.

.....s [3]

(c) On a different journey, the train took 73 minutes, correct to the nearest minute, to travel 215 km, correct to the nearest 5 km.

Calculate the upper bound of the average speed of the train for this journey.
Give your answer in km/h.

..... km/h [4]

4 The table shows information about the time, t minutes, taken for each of 150 girls to complete an essay.

Time (t minutes)	$60 < t \leqslant 65$	$65 < t \leqslant 70$	$70 < t \leqslant 80$	$80 < t \leqslant 100$	$100 < t \leqslant 150$
Frequency	10	26	34	58	22

(a) Write down the interval that contains the median time.

..... $< t \leqslant$ ..... [1]

(b) Calculate an estimate of the mean time.

.....min [4]

(c) Rafay looks at the frequency table.

(i) He says that it is not possible to work out the range of the times.

Explain why he is correct.

.....

..... [1]

(ii) He draws a pie chart to show this information.

Calculate the sector angle for the interval $65 < t \leqslant 70$ minutes.

..... [2]

(d) A girl is chosen at random.

Work out the probability that she took more than 100 minutes to complete the essay.

..... [1]

(e) Two girls are chosen at random.

Work out the probability that, to complete the essay,

(i) they both took 65 minutes or less,

..... [2]

(ii) one took 65 minutes or less and the other took more than 100 minutes.

..... [3]

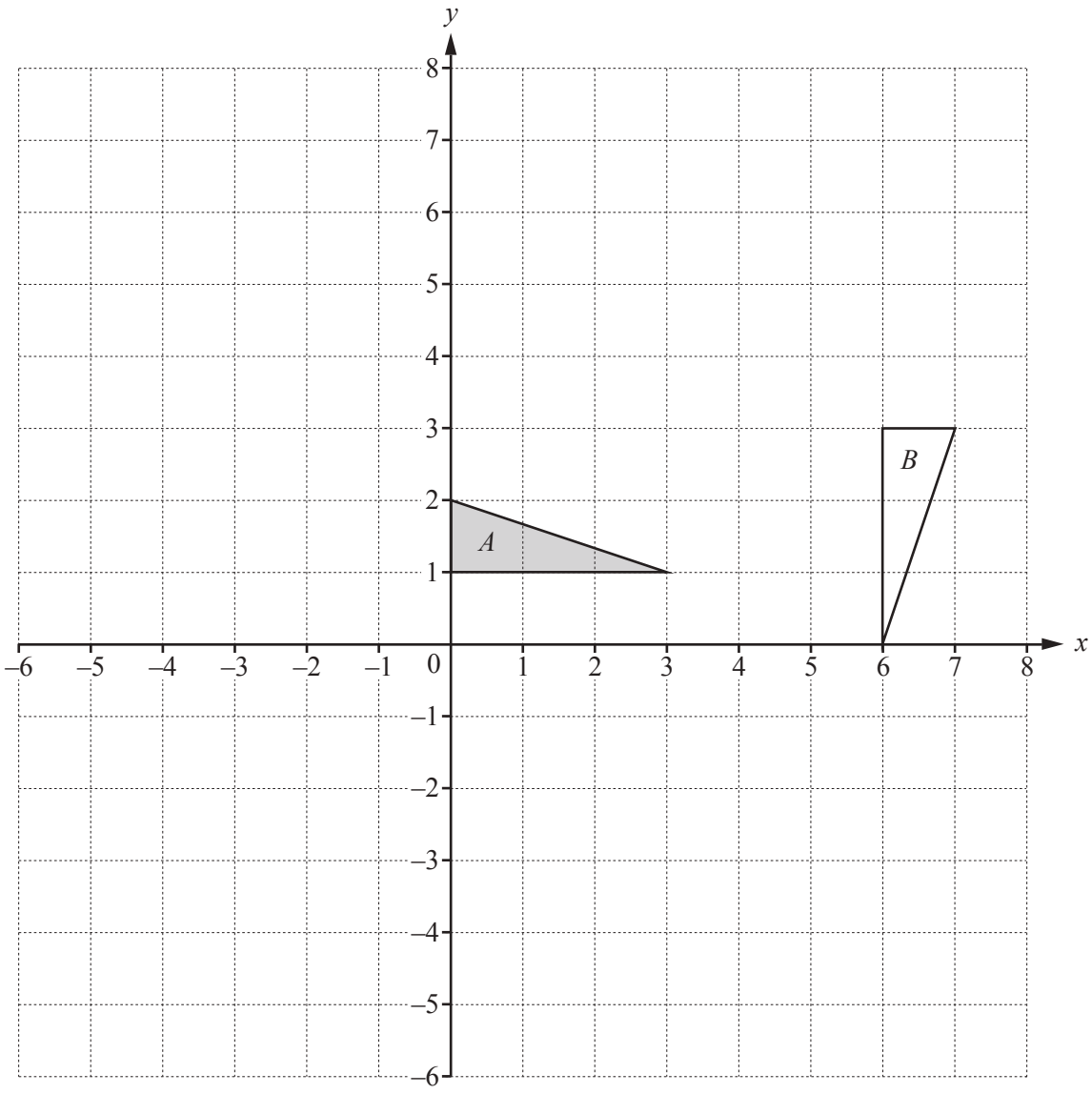
(f) The information in the frequency table is shown in a histogram.
The height of the block for the $60 < t \leqslant 65$ interval is 5 cm.

Complete the table.

Time (t minutes)	$60 < t \leqslant 65$	$65 < t \leqslant 70$	$70 < t \leqslant 80$	$80 < t \leqslant 100$	$100 < t \leqslant 150$
Height of block (cm)	5				

[3]

5



(a) Draw the image of

(i) triangle A after a reflection in the line $x = 0$, [2]

(ii) triangle A after an enlargement, scale factor 2, centre (0, 4), [2]

(iii) triangle A after a translation by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$. [2]

(b) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

(c) $\mathbf{T} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ $\mathbf{U} = \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix}$

Point P has co-ordinates $(1, -4)$.

(i) Find $\mathbf{T}(P)$.

(....., ...) [2]

(ii) Find $\mathbf{TU}(P)$.

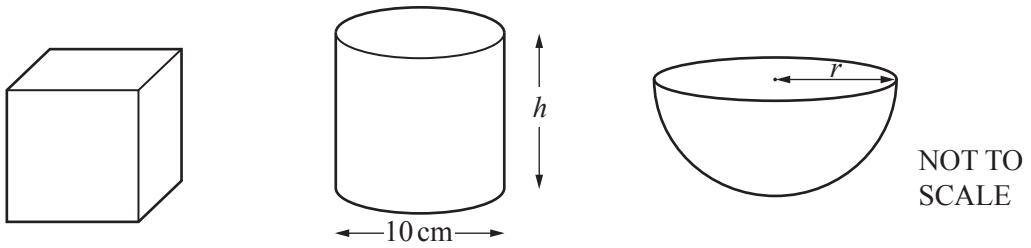
(....., ...) [2]

(iii) Describe the **single** transformation represented by the matrix **T**.

.....

..... [3]

6 (a)



The diagrams show a cube, a cylinder and a hemisphere.
The volume of each of these solids is 2000 cm^3.

(i) Work out the height, h, of the cylinder.

$h =$ ..... cm [2]

(ii) Work out the radius, r, of the hemisphere.

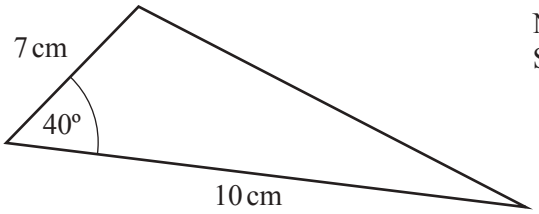
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

$r =$ ..... cm [3]

(iii) Work out the surface area of the cube.

..... cm^2 [3]

(b)



NOT TO SCALE

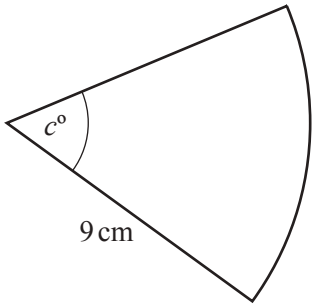
(i) Calculate the area of the triangle.

.....cm^2 [2]

(ii) Calculate the perimeter of the triangle and show that it is 23.5 cm, correct to 1 decimal place. Show all your working.

[5]

(c)



NOT TO SCALE

The perimeter of this sector of a circle is 28.2 cm.

Calculate the value of c.

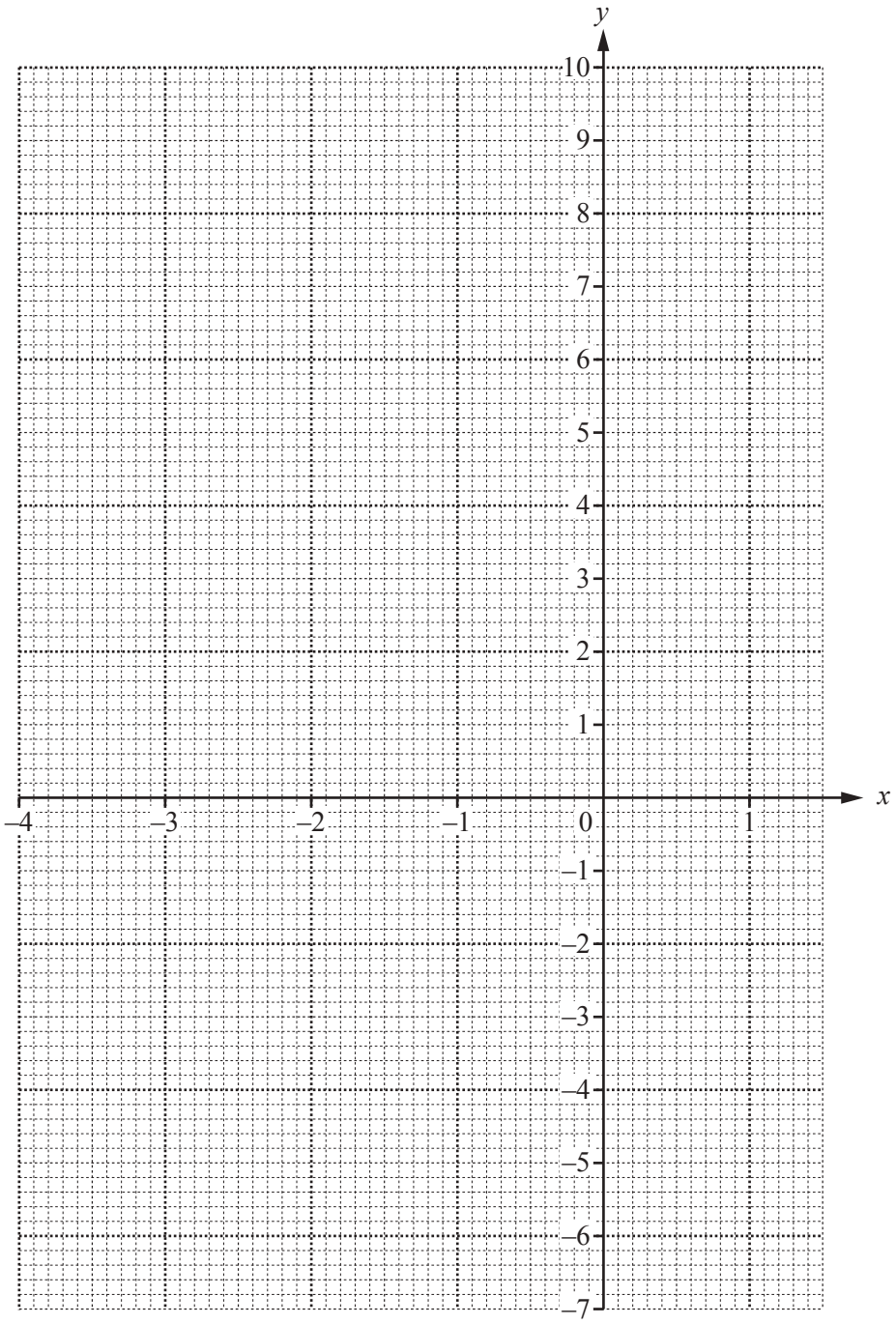
c = ... [3]

7 The table shows some values of $y = 2x^2 + 5x - 3$ for $-4 \leqslant x \leqslant 1.5$.

x	-4	-3	-2	-1	0	1	1.5
y		0	-5		-3	4	

(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = 2x^2 + 5x - 3$ for $-4 \leqslant x \leqslant 1.5$.



[4]

(c) Use your graph to solve the equation $2x^2 + 5x - 3 = 3$.

$x =$ ..... or $x =$ ..... [2]

(d) $y = 2x^2 + 5x - 3$ can be written in the form $y = 2(x + a)^2 + b$.

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [3]

8 Line A has equation $y = 5x - 4$.
Line B has equation $3x + 2y = 18$.

(a) Find the gradient of

(i) line A,

..... [1]

(ii) line B.

..... [1]

(b) Write down the co-ordinates of the point where line A crosses the x-axis.

(....., ...) [2]

(c) Find the equation of the line perpendicular to line A which passes through the point (10, 9).
Give your answer in the form $y = mx + c$.

$y =$ ..... [4]

(d) Work out the co-ordinates of the point of intersection of line A and line B.

(....., ...) [3]

(e) Work out the area enclosed by line A, line B and the y-axis.

..... [3]

9 Luigi and Alfredo run in a 10 km race.
Luigi's average speed was x km/h.
Alfredo's average speed was 0.5 km/h slower than Luigi's average speed.

(a) Luigi took $\frac{10}{x}$ hours to run the race.

Write down an expression, in terms of x, for the time that Alfredo took to run the race.

..... h [1]

(b) Alfredo took 0.25 hours longer than Luigi to run the race.

(i) Show that $2x^2 - x - 40 = 0$.

[4]

(ii) Use the quadratic formula to solve $2x^2 - x - 40 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [4]

(iii) Work out the time that Luigi took to run the 10 km race.
Give your answer in hours and minutes, correct to the nearest minute.

..... h ..... min [3]

Question 10 is printed on the next page.

10 (a) (i) Write 180 as a product of its prime factors.

..... [2]

(ii) Find the lowest common multiple (LCM) of 180 and 54.

..... [2]

(b) An integer, X, written as a product of its prime factors is $a^2 \times 7^{b+2}$.
An integer, Y, written as a product of its prime factors is $a^3 \times 7^2$.

The highest common factor (HCF) of X and Y is 1225.
The lowest common multiple (LCM) of X and Y is 42 875.

Find the value of X and the value of Y.

$X =$ .....

$Y =$ ..... [4]

Cambridge Assessment International Education

Grade thresholds – March 2018

Cambridge IGCSE Mathematics (without Coursework) (0580)

Grade thresholds taken for Syllabus 0580 (Mathematics (without Coursework)) in the March 2018 examination.

		minimum raw mark required for grade:						
	maximum raw mark available	A	B	C	D	E	F	G
Component 12	56	–	–	38	31	24	16	8
Component 22	70	60	53	46	39	32	–	–
Component 32	104	–	–	62	51	40	29	18
Component 42	130	107	85	63	51	40	–	–

Grade A* does not exist at the level of an individual component.

The maximum total mark for this syllabus, after weighting has been applied, is **200** for the 'Extended' option and **160** for the 'Core' option.

The overall thresholds for the different grades were set as follows.

Option	Combination of Components	A*	A	B	C	D	E	F	G
AY	12, 32	–	–	–	100	82	64	45	26
BY	22, 42	185	167	138	109	90	72	–	–

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/12**

Paper 12 (Core) **March 2018**

MARK SCHEME

Maximum Mark: 56

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the March 2018 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1	40	**1**	
2	$54\frac{1}{2}\%$ $\frac{6}{11}$ 0.55	**1**	
3	Positive	**1**	
4	0.65 oe	**1**	
5	5.23×10^{-5}	**1**	
6	6.82 cao	**1**	
7(a)	5	**1**	
7(b)	1	**1**	
8	40 : 80	**2**	**M1** for $\frac{120}{(1+2)}$
9(a)	–5.779266[….]	**1**	
9(b)	–5.7793	**1**	**FT** *their* **(a)**
10(a)	$5+3\times(10-1)=32$	**1**	
10(b)	$3\times2-(4-7)=9$	**1**	
11	26 to 29	**2**	**B1** for $25 \leqslant$ area < 26 or $29 <$ area $\leqslant 30$
12(a)	25	**1**	
12(b)	x^{10}	**1**	
13	140	**2**	**M1** for at least 3 multiples of both 28 and of 35 or 5,7 and 2, 2, 7 seen or $4 \times 5 \times 7$ as final answer OR **B1** for final answer $140k$ $k>1$
14	$3e(2d^2-3e)$ final answer	**2**	**M1** for $3(2d^2e-3e^2)$ or $e(6d^2-9e)$

Question	Answer	Marks	Partial Marks
15	78.25, 78.75	**2**	**B1** for each If 0 scored **SC1** for answers reversed
16	8	**3**	**M2** for $\frac{88-25}{9}$ or **M1** for 88 – 25 soi or a division by 9 If 0 scored, **SC1** for final answer 7
17	92	**3**	**M2** for $[600-](0.18\times600+\frac{2}{3}\times600)$ or **M1** for 108 or 400 seen
18	5384.45	**3**	**M2** for $5000\times(1+\frac{2.5}{100})^3$ oe or **M1** for $5000\times(1+\frac{2.5}{100})^2$ oe
19	common denominator 24	**B1**	accept 24*k*
	$\frac{21}{24}$ and $\frac{4}{24}$ oe	**M1**	
	$1\frac{1}{24}$	**A1**	
20	63 corresponding [angles] 59 angles [in a] triangle [add up to] 180° oe	**4**	**B1** for [*a* =] 63 **B1** for corresponding angles **B1FT** for [*b* =] 59 or *their a* + *their b* = 122 **B1** for angles [in a] triangle [add up to] 180° oe
21(a)	Circle drawn with pair of compasses, radius 3.5 cm	**1**	
21(b)	Ruled chord drawn on their circle	**1**	
21(c)	7π or 2 × 3.5π	**M1**	
	21.991… or 21.994	**A1**	
22	Blue 706 or 706.1 to 706.2	**4**	**M1** for 165 × 76.05 or better **M1** for $\frac{180}{[0].0152}$ **A1** for 11842[……]
23(a)	3.22 or 3.224 to 3.225	**2**	**M1** for $[AC^2=]1.6^2+2.8^2$
23(b)	60.3 or 60.25 to 60.26	**2**	**M1** for tan[=] $\frac{2.8}{1.6}$

Question	Answer	Marks	Partial Marks
24(a)	Correct ruled perpendicular bisector of *AB* with correct pairs of arcs	**2**	**B1** for correct perpendicular bisector without correct arcs or for correct arcs, with no/wrong line
24(b)	Correct ruled bisector of angle *ABC* with 2 correct pairs of arcs	**2**	**B1** for correct angle bisector without correct arcs or for correct arcs, no/wrong line

Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5380478578

MATHEMATICS **0580/12**

Paper 1 (Core) **February/March 2018**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 56.

This document consists of **8** printed pages.

CAMBRIDGE International Examinations

1 Write $\frac{2}{5}$ as a percentage.

.....% [1]

2 Write these numbers in order, starting with the smallest.

$0.55 \qquad \frac{6}{11} \qquad 54\frac{1}{2}\%$

..... < ..... < ..... [1]
smallest

3 "We eat more ice cream as the temperature rises."

What type of correlation is this?

..... [1]

4 The probability that it rains tomorrow is 0.35 .

Work out the probability that it does not rain tomorrow.

..... [1]

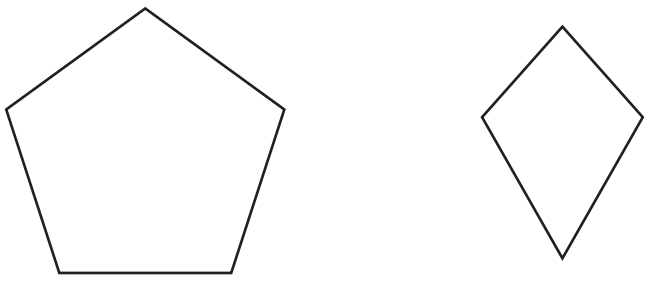
5 Write 0.000 052 3 in standard form.

..... [1]

6 Write 6.8167 correct to 3 significant figures.

..... [1]

7



The diagram shows a regular pentagon and a kite.

Complete the following statements.

(a) The regular pentagon has ..... lines of symmetry. [1]

(b) The kite has rotational symmetry of order ..... . [1]

8 Divide 120 in the ratio 1 : 2.

..... : ..... [2]

9 **(a)** Calculate $\sqrt[3]{-4.3 \times 6.7^2}$ and write down all the figures shown on your calculator.

..... [1]

(b) Write your answer to **part (a)** correct to 4 decimal places.

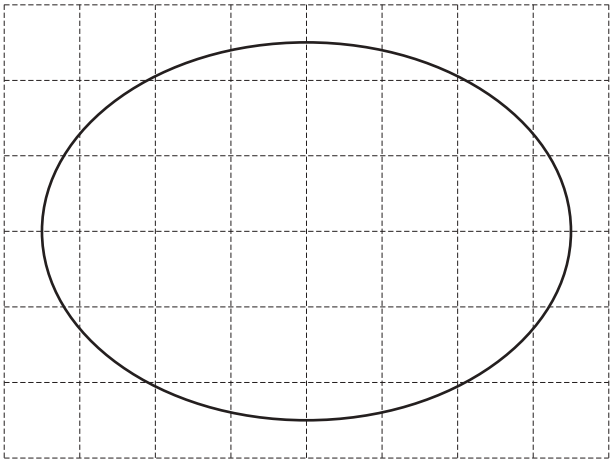
..... [1]

10 Insert one pair of brackets in each of the following to make the statements correct.

(a) $5 + 3 \times 10 - 1 = 32$ [1]

(b) $3 \times 2 - 4 - 7 = 9$ [1]

11



Find an estimate for the area of the shape drawn on this 1 cm^2 grid.

..... cm^2 [2]

12 **(a)** Find the value of $(\sqrt{25})^2$.

..... [1]

(b) Simplify $(x^5)^2$.

..... [1]

13 Find the lowest common multiple (LCM) of 28 and 35.

..... [2]

14 Factorise completely.

$$6d^2e - 9e^2$$

..... [2]

15 The length, l metres, of a garden is 78.5 metres, correct to the nearest half metre.

Complete this statement about the value of l.

..... $\leqslant l <$ ..... [2]

16 Neelum hires a machine to clean carpets.
It costs \$25 to hire the machine for the first day and \$9 for each extra day after the first day.
Neelum pays a total of \$88 to hire the machine.

Work out the **total** number of days she hires the machine for.

..... [3]

17 Dev makes 600 cakes.
18% of the 600 cakes go to a hotel and $\frac{2}{3}$ of the 600 cakes go to a supermarket.

Calculate how many cakes he has left.

..... [3]

18 Tomas borrows \$5000 for 3 years at a rate of 2.5% per year compound interest.
He pays back the whole amount, with interest, at the end of 3 years.

Calculate the total amount of money he pays back at the end of the 3 years.

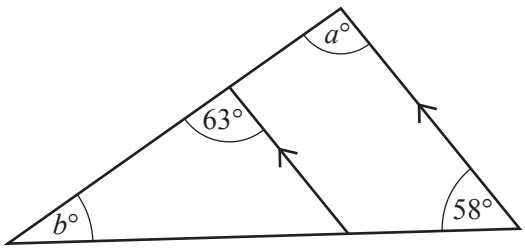
\$..... [3]

19 **Without using your calculator**, work out $\frac{7}{8} + \frac{1}{6}$.

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

20



NOT TO SCALE

Complete the statements.

a = ... because .....

.....

b = ... because .....

..... [4]

21 **(a)** In the space below, draw a circle with diameter 7 cm.

[1]

(b) On your diagram, draw a chord. [1]

(c) Show that the circumference of the circle is 21.99 cm, correct to 2 decimal places.

[2]

22 On the internet, Pranay sees a grey jacket for 165 euros (€) and a blue jacket for $180.

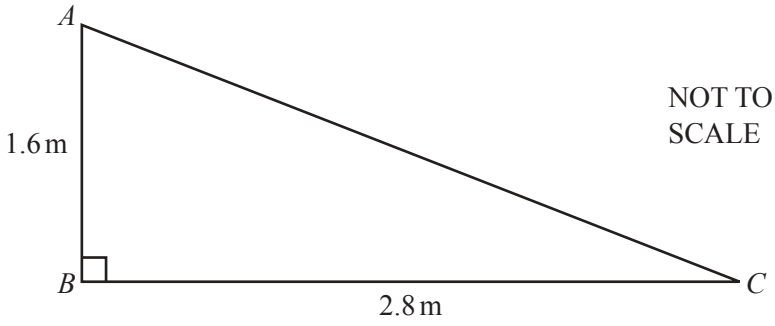
These are the exchange rates.

€1 = 76.05 rupees
1 rupee = $0.0152

Work out which jacket is the cheapest and by how many rupees.

The ..... jacket is cheapest by ..... rupees [4]

23



(a) Calculate AC.

AC = ... m [2]

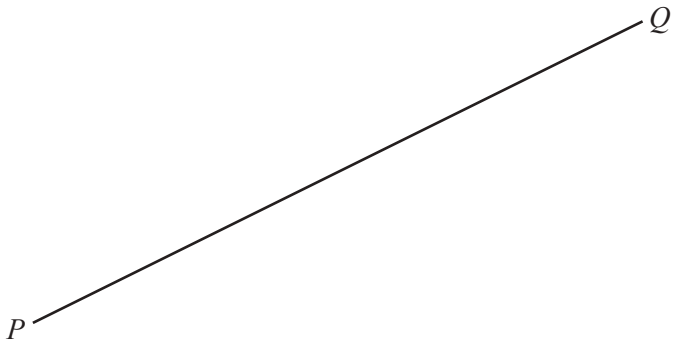
(b) Calculate the size of angle BAC.

Angle BAC = ... [2]

Question 24 is printed on the next page.

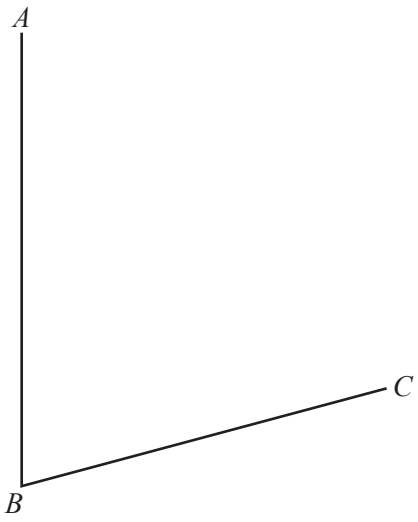
24 In this question, **use a straight edge and compasses only** and show all your construction arcs.

(a) Construct the perpendicular bisector of PQ.



[2]

(b) Construct the bisector of angle ABC.



[2]

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/22**

Paper 22 (Extended) **March 2018**

MARK SCHEME

Maximum Mark: 70

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the March 2018 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1	Positive	**1**	
2	5.23×10^{-5}	**1**	
3	2.29 or 2.292…	**1**	
4	$\frac{8}{9}$ oe, must be fraction	**1**	
5(a)	5	**1**	
5(b)	1	**1**	
6	$5m\left(3k^2 - 4m^3\right)$ final answer	**2**	**B1** for $5\left(3k^2m - 4m^4\right)$ or $m\left(15k^2 - 20m^3\right)$ or for $5m\left(3k^2 - 4m^3\right)$ with one error in a number
7	2**q** + **p**	**2**	**B1** for $CF = 2(\mathbf{q} + \mathbf{p})$ or $BA = \mathbf{q} + \mathbf{p}$ or $DE = \mathbf{q} + \mathbf{p}$ or $DA = 2\mathbf{q}$ or for correct route
8	21400 or 21430 or 21434.[…]	**2**	**M1** for $23000 \times \left(1 - \frac{1.4}{100}\right)^5$ oe
9	–12	**2**	**B1** for 2^3, 2^{-3}, 2^{12} or 2^{-12}
10	12	**3**	**M2** for $9 \times 8 = 6y$ oe OR **M1** for $y = \frac{k}{x}$ oe **M1** for [y =] *their* $\frac{k}{6}$
11	92	**3**	**M2** for $[600-](0.18 \times 600 + \frac{2}{3} \times 600)$ or **M1** for 108 or 400 seen

Question	Answer	Marks	Partial Marks
12	common denominator 24	**B1**	accept 24*k*
	$\frac{21}{24}$ and $\frac{4}{24}$ oe	**M1**	
	$1\frac{1}{24}$	**A1**	
13	correctly eliminating one variable	**M1**	
	[*x* =] 7 [*y* =] – 2	**A2**	**A1** for each If **M0** scored **SC1** for 2 values satisfying one of the original equations or **SC1** if no working shown, but 2 correct answers given
14(a)	similar	**1**	
14(b)	11.61	**3**	**M2** for $8.6 \times \sqrt{\frac{65.61}{36}}$ or **M1** for $\sqrt{\frac{65.61}{36}}$ or $\sqrt{\frac{36}{65.61}}$ or $\left(\frac{8.6}{BX}\right)^2 = \frac{36}{65.61}$ oe
15	63 corresponding [angles] 59 angles [in a] triangle [add up to] 180 oe	**4**	**B1** for [*a* =] 63 **B1** for corresponding angles **B1FT** for [*b* =] 59 or *their a* + *their b* = 122 **B1** for angles [in a] triangle [add up to] 180 oe
16(a)	2.24	**2**	**M1** for $0.5 \times 1.6 \times 2.8$
16(b)	3.22 or 3.224 to 3.225	**2**	**M1** for $[AC^2 =] 1.6^2 + 2.8^2$

Question	Answer	Marks	Partial Marks
17	$\frac{-7 \pm \sqrt{(7)^2 - 4(2)(-3)}}{2 \times 2}$	**B2**	**B1** for $\sqrt{(7)^2 - 4(2)(-3)}$ or better **B1** for $p = -7$ and $r = 2 \times 2$ if in form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$ Completing the square method: **B1** for $(x + 1.75)^2$ oe **B1** for $-1.75 \pm \sqrt{1.5 + 1.75^2}$ oe
	0.39 and – 3.89 final ans cao	**B2**	**B1** for each If **B0**, **SC1** for 0.4 and – 3.9 or 0.386...and – 3.886... or 0.39 and – 3.89 seen in working or – 0.39 and 3.89
18(a)	Correct ruled perpendicular bisector of *AB* with correct pairs of arcs	**2**	**B1** for correct perpendicular bisector without correct arcs or for correct arcs, with no/wrong line
18(b)	Correct ruled bisector of angle *ABC* with 2 correct pairs of arcs	**2**	**B1** for correct angle bisector without correct arcs or for correct arcs, with no/wrong line
19(a)(i)	$\in$	**1**	
19(a)(ii)	$X \cap Y$ oe	**1**	
19(a)(iii)	$\varnothing$	**1**	
19(b)	*u, v, w*	**1**	
19(c)	5	**1**	
20(a)	Rotation [centre] origin oe 90°[anti-clockwise] oe	**3**	**B1** for each
20(b)	Enlargement [centre] (0, 3) [sf] – 2	**3**	**B1** for each
21(a)	2	**2**	**M1** for f(5) or 7– (7 – *x*) or better
21(b)	$30 - 4x$ final answer	**2**	**M1** for $4(7 - x) + 2$ or better or for correct answer then spoilt
21(c)	$15 - 4x^2$ final answer	**2**	**M1** for $15 - (2x)^2$ or better or for correct answer then spoilt

Question	Answer	Marks	Partial Marks
22(a)	$\frac{9}{20}$ oe	**1**	
22(b)(i)	$\frac{6}{20}\times\frac{5}{19}$	**M1**	
	$\frac{30}{380}$ oe	**A1**	
22(b)(ii)	$\frac{258}{380}$ oe	**4**	**M3** for $1-\frac{3}{38}-\frac{5}{20}\times\frac{4}{19}-\frac{9}{20}\times\frac{8}{19}$ oe or **M2** for $\frac{3}{38}+\frac{5}{20}\times\frac{4}{19}+\frac{9}{20}\times\frac{8}{19}$ oe or $\frac{5}{20}\times\frac{9}{19}+\frac{6}{20}\times\frac{9}{19}+\frac{6}{20}\times\frac{5}{19}$ oe or **M1** for one correct product other than $\frac{6}{20}\times\frac{5}{19}$

Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0067995524

MATHEMATICS **0580/22**

Paper 2 (Extended) **February/March 2018**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

1 "We eat more ice cream as the temperature rises."

What type of correlation is this?

..... [1]

2 Write 0.000 052 3 in standard form.

..... [1]

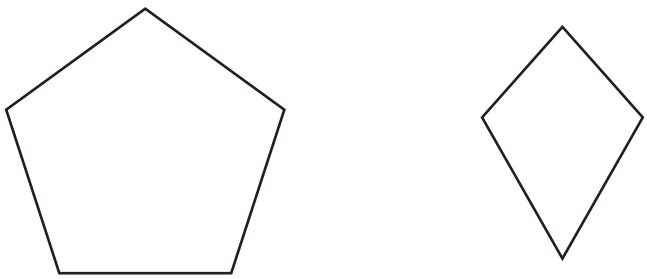
3 Calculate $\sqrt{17.8} - 1.3^{2.5}$.

..... [1]

4 Write the recurring decimal $0.\dot{8}$ as a fraction.

..... [1]

5



The diagram shows a regular pentagon and a kite.

Complete the following statements.

(a) The regular pentagon has ..... lines of symmetry. [1]

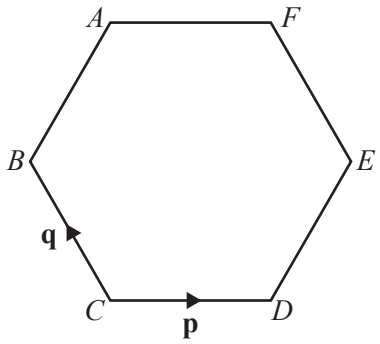
(b) The kite has rotational symmetry of order ..... . [1]

6 Factorise completely.

$$15k^2m - 20m^4$$

..... [2]

7



The diagram shows a regular hexagon $ABCDEF$.
$\overrightarrow{CD} = \mathbf{p}$ and $\overrightarrow{CB} = \mathbf{q}$.

Find $\overrightarrow{CA}$, in terms of **p** and **q**, giving your answer in its simplest form.

$\overrightarrow{CA} =$ ..... [2]

8 Newton has a population of 23 000.
The population decreases exponentially at a rate of 1.4% per year.

Calculate the population of Newton after 5 years.

..... [2]

9 $2^p = \frac{1}{8^4}$

Find the value of p.

$p =$ ..... [2]

10 y is inversely proportional to x.
When $x = 9$, $y = 8$.

Find y when $x = 6$.

$y =$ ..... [3]

11 Dev makes 600 cakes.
18% of the 600 cakes go to a hotel and $\frac{2}{3}$ of the 600 cakes go to a supermarket.

Calculate how many cakes he has left.

..... [3]

12 **Without using your calculator**, work out $\frac{7}{8}+\frac{1}{6}$.

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

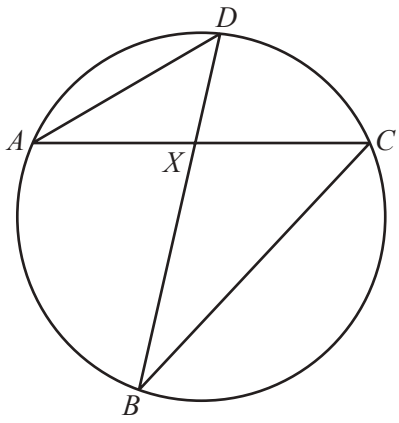
13 Solve the simultaneous equations.
You must show all your working.

$$2x+\frac{1}{2}y=13$$
$$3x+2y=17$$

$x =$ .....

$y =$ ..... [3]

14



NOT TO SCALE

A, B, C and D are points on the circumference of the circle.
AC and BD intersect at X.

(a) Complete the statement.

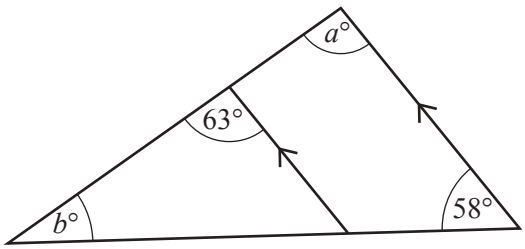
Triangle ADX is ..... to triangle BCX. [1]

(b) The area of triangle ADX is $36\,\text{cm}^2$ and the area of triangle BCX is $65.61\,\text{cm}^2$.
$AX = 8.6\,\text{cm}$ and $DX = 7.2\,\text{cm}$.

Find BX.

$BX =$ ..... cm [3]

15



NOT TO SCALE

Complete the statements.

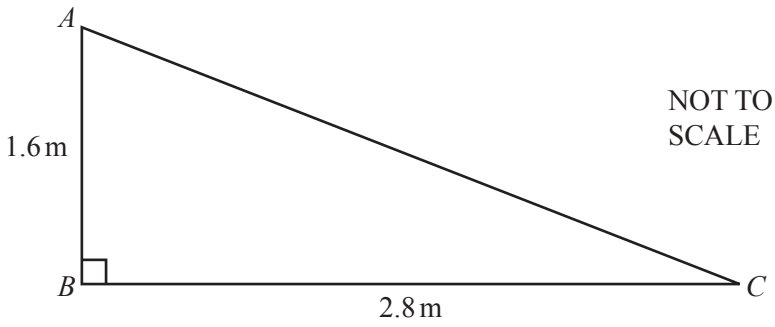
$a =$ ..... because .....

.....

$b =$ ..... because .....

..... [4]

16



(a) Find the area of triangle ABC.

..... m^2 [2]

(b) Calculate AC.

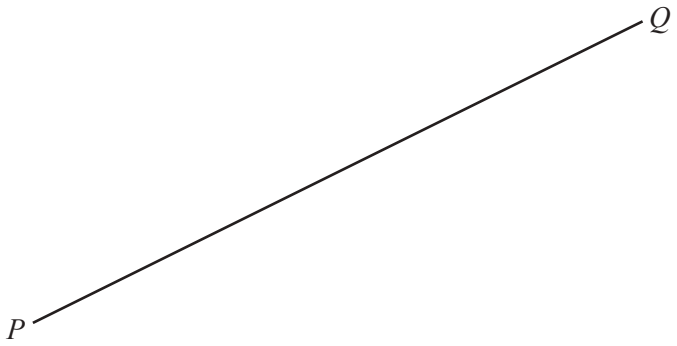
$AC =$ ..... m [2]

17 Solve the equation $2x^2 + 7x - 3 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [4]

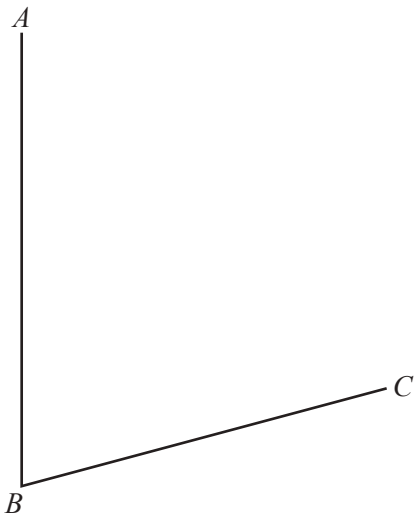
18 In this question, **use a straight edge and compasses only** and show all your construction arcs.

(a) Construct the perpendicular bisector of PQ.



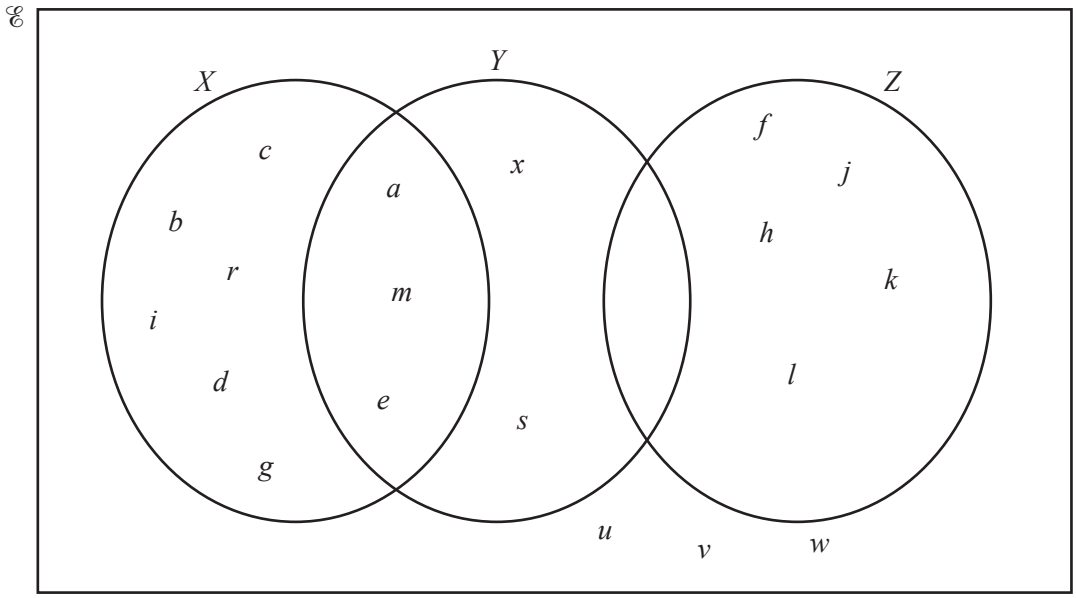
[2]

(b) Construct the bisector of angle ABC.



[2]

19



(a) Use set notation to complete the statements for the Venn diagram above.

(i) c ..... X [1]

(ii) ..... $= \{ a, m, e \}$ [1]

(iii) $Y \cap Z =$ ..... [1]

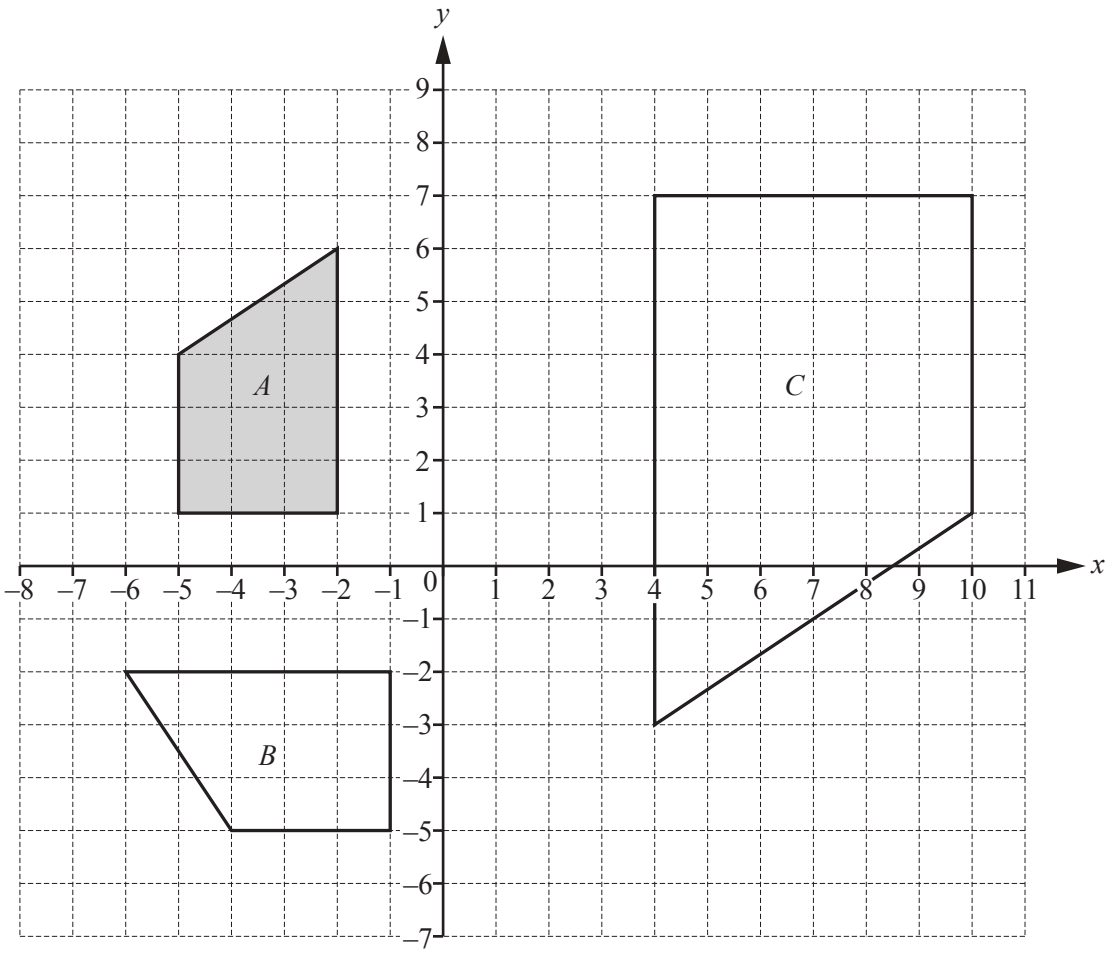
(b) List the elements of $(X \cup Y \cup Z)'$.

..... [1]

(c) Find $\mathrm{n}(X' \cap Z)$.

..... [1]

20



Describe fully the **single** transformation that maps

(a) shape *A* onto shape *B*,

.....

..... [3]

(b) shape *A* onto shape *C*.

.....

..... [3]

21 $f(x) = 7 - x$ $g(x) = 4x + 2$ $h(x) = 15 - x^2$

(a) Find $ff(2)$.

..... [2]

(b) Find $gf(x)$ in its simplest form.

..... [2]

(c) Find $h(2x)$ in its simplest form.

..... [2]

Question 22 is printed on the next page.

22 Samira and Sonia each have a bag containing 20 sweets.
In each bag, there are 5 red, 6 green and 9 yellow sweets.

(a) Samira chooses one sweet at random from her bag.

Write down the probability that she chooses a yellow sweet.

..... [1]

(b) Sonia chooses two sweets at random, without replacement, from her bag.

(i) Show that the probability that she chooses two green sweets is $\frac{3}{38}$.

[2]

(ii) Calculate the probability that the sweets she chooses are **not** both the same colour.

..... [4]

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/32**

Paper 32 (Core) **March 2018**

MARK SCHEME

Maximum Mark: 104

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the March 2018 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

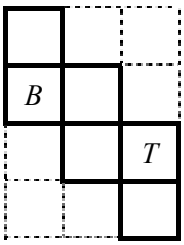
Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	One rectangle is an enlargement of the other oe	**1**	
1(a)(ii)	9	**2**	**M1** for 3^2 or $\frac{1}{3^2}$ or SF is 3 or $\frac{1}{3}$ or 1.5×2.5 and 4.5×7.5 or $\frac{7.5}{2.5}$ or $\frac{4.5}{1.5}$
1(b)(i)	 T in correct square	**1**	
1(b)(ii)	A different correct net drawn	**1**	
1(c)(i)	108	**3**	**M2** for $[2\times](3\times4+3\times6+4\times6)$ oe or **M1** for one of 3×4 , 3×6 , 4×6 evaluated
1(c)(ii)	72	**2**	**M1** for $3\times4\times6$
1(c)(iii)	3 positive numbers (other than 3,4,6) with product 72	**1**	**FT** *their* **(c)(ii)**
2(a)(i)	3043 3061	**2**	**B1** for each
2(a)(ii)	[Column] 7 [Row] 15	**2**	**B1** for each
2(a)(iii)	$20n + 2981$ oe	**2**	**B1** for $20n + k$
2(b)	2 [h] 5 [min]	**2**	**M1** for 100 × 1.25 oe or $1\frac{2}{3}$ ×1.25 oe or 25

Question	Answer	Marks	Partial Marks
2(c)(i)	3	**1**	
2(c)(ii)	7	**1**	
2(c)(iii)	6.84 or 6.836 to 6.837 or $6\frac{41}{49}$	**3**	**M1** for $5\times27+6\times42+7\times63+8\times64$ **M1** dep for $\frac{\textit{their}1340}{196}$
2(c)(iv)	$\frac{132}{196}$ oe	**2**	**M1** for 27+42+63 or 132 or $[1-]\frac{64}{196}$
3(a)(i)	5, 8, 4, 2, 6	**2**	**B1** for one error, or for two errors and total still 25 If 0 scored, **SC1** for all correct tallies if frequency column blank or incorrect
3(a)(ii)	Surfing	**1**	
3(a)(iii)	24	**1**	**FT** *their* frequency for snorkelling ×4
3(b)(i)	3.37pm cao	**1**	
3(b)(ii)	12[h]26[min]	**1**	
3(b)(iii)	12 52[pm]	**1**	
4(a)(i)	4 17 136	**3**	**B2** for two of 4, 17 or 136 in correct place or **M1** for $\frac{120}{15}$ or $\frac{72}{9}$ soi by $8^{[\circ]}$ or $120+72+32+x=360$ oe
4(a)(ii)	32° sector drawn	**1**	
4(b)	36	**1**	
5(a)(i)	Six hundred (and) four thousand, nine hundred (and) twenty five	**1**	Condone Six lakh (and) four thousand, nine hundred (and) twenty five
5(a)(ii)	53 or 59	**1**	
5(a)(iii)	1	**1**	

Question	Answer	Marks	Partial Marks
5(b)(i)	105	**1**	
5(b)(ii)	64	**1**	
5(b)(iii)	1, 3, 5, 9, 15, 45	**2**	**B1** for 4 or 5 correct factors
5(b)(iv)	Any irrational number between 6 and 7 e.g. $\sqrt{37}$ or 2π	**1**	
6(a)(i)	20	**2**	**M1** for $\frac{4}{12}[\times 60]$
6(a)(ii)	28	**1**	
6(a)(iii)	1528 or 3.28pm	**1**	**FT** 1500 + *their* 28 mins
6(b)(i)	3 : 10	**2**	**M1** for 6 and 20 seen If 0 scored, **SC1** for 10 : 3
6(b)(ii)(a)	Straight lines drawn (1500, 0) to (1520, 2) and (1520, 2) to (1528, 4)	**2**	**B1** for line from (1500, 0) to (1520, 2) **B1FT** for line from (*their* 1520, 2) to (*their* 1520 + 8, 4)
6(b)(ii)(b)	14	**1**	**FT** *their* graph
6(b)(ii)(c)	1.25 to 1.5	**1**	**FT** *their* graph
7(a)	4	**1**	
7(b)(i)	Rotation 90 clockwise oe [centre] (0, –2)	**3**	**B1** for each
7(b)(ii)	Translation $\begin{pmatrix}-4\\2\end{pmatrix}$	**2**	**B1** for each
7(b)(iii)	Enlargement [scale factor] 2 [centre] (–2, –7)	**3**	**B1** for each
7(c)	Correct reflection	**2**	**B1** for a correct reflection in $x = k$ or for 6 or more vertices plotted correctly If 0 scored, **SC1** for correct reflection in $y = -1$

Question	Answer	Marks	Partial Marks
8(a)(i)	[1:] 1500 000	**2**	**M1** for 15 000 m seen or [15 ×]1000 × 100
8(a)(ii)	96	**2**	**B1** for 6.4 seen or **M1** for *their* 6.4 × 15
8(a)(iii)	117	**1**	
8(a)(iv)	Correct region shaded	**5**	**B2** for 2 correct arcs drawn, centre *Y* with radius 3 cm and 4 cm or **B1** for 3 cm and 4 cm seen or implied by calculation or for one correct arc drawn **B2** for 2 correct lines drawn or **B1** for 1 correct line drawn **B1** depB1B1 for correct region
8(b)	253	**2**	**M1** for 180 + 73 or 360 – 107 or sketch with alternate angles marked or sketch with 73° and correct bearing marked
9(a)	450	**1**	
9(b)	$10p + 3n = 525$	**2**	**M1** for $10p + 3n$
9(c)	for correctly eliminating one variable	**M1**	**FT**
	[*p*] = 30	**A1**	
	[*n*] = 75	**A1**	If 0 scored, **SC1** for 2 values satisfying one of the original equations or **SC1** for both correct but no working
10(a)	Cala, Elu	**2**	**B1** for one correct and no extras or **B1** for two correct and one extra
10(b)(i)	14	**2**	**M1** for $[s =]\sqrt{19.6 \times 10}$
10(b)(ii)	$[h =]\frac{s^2}{19.6}$	**2**	**M1** for $s^2 = 19.6[\times]h$
11(a)(i)(a)	*C*	**1**	
11(a)(i)(b)	*A*	**1**	
11(a)(i)(c)	*D*	**1**	
11(a)(ii)	10	**2**	**M1** for $-26 = -3x + 4$ or better

Question	Answer	Marks	Partial Marks
11(b)(i)	39, 0, –9	**3**	**B1** for each
11(b)(ii)	Correct smooth curve	**4**	**B3FT** for 8 or 7 correct plots **B2FT** for 5 or 6 correct plots **B1FT** for 3 or 4 correct plots
11(b)(iii)	(j, k) where $4.4 < j < 6$ and $-28 < k < -24$	**1**	

Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/32**

Paper 3 (Core) **February/March 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

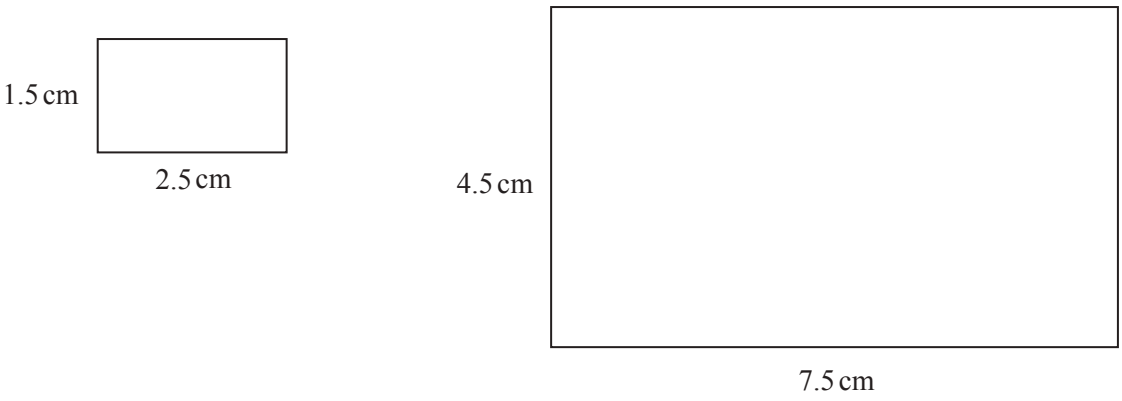
READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

1 **(a)**



(i) Explain why these rectangles are mathematically similar.

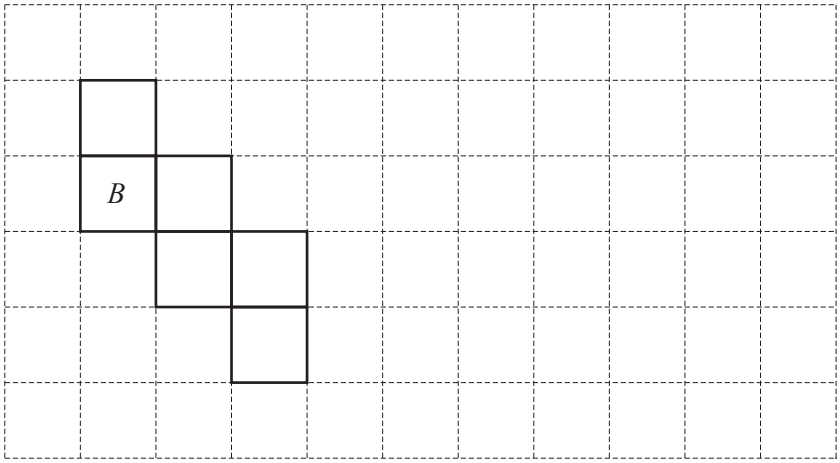
.....

..... [1]

(ii) How many times bigger is the area of the large rectangle than the area of the small rectangle?

..... [2]

(b)



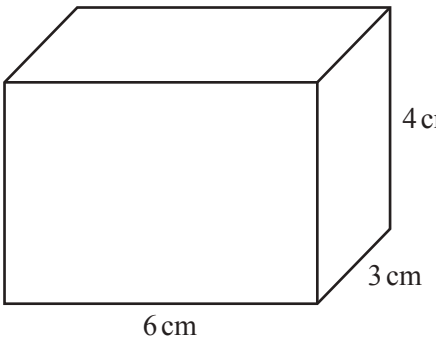
The diagram shows a net of a cube.

(i) The square labelled *B* is the base.

Write the letter *T* in the square that is the top of the cube. [1]

(ii) On the grid, draw a **different** net of this cube. [1]

(c) The diagram shows a cuboid.



NOT TO SCALE

(i) Work out the surface area of this cuboid.

..... cm^2 [3]

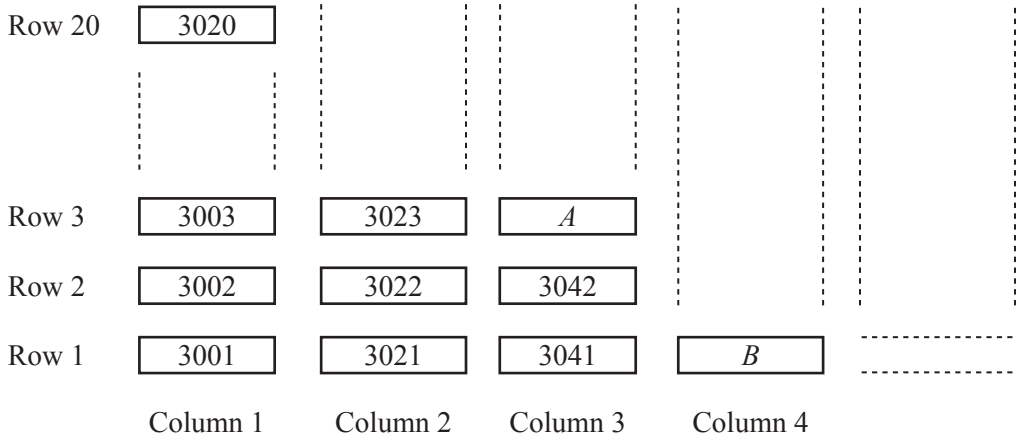
(ii) Work out the volume of this cuboid.

..... cm^3 [2]

(iii) Write down the dimensions of a different cuboid that has the same volume as this cuboid.

..... cm by ..... cm by ..... cm [1]

2 **(a)** Each of 196 candidates has a candidate number from 3001 to 3196.
The candidates sit in numerical order in columns and rows, as shown in the diagram.
There are 20 rows.
The diagram shows part of the plan for where the candidates sit.



(i) The diagram shows where candidates *A* and *B* sit.

Write down their numbers.

A .....

B ..... [2]

(ii) Complete this statement.

Candidate 3135 sits in Column ..... , Row ..... [2]

(iii) Candidate *C* sits in Column *n*, Row 1.

Find an expression, in terms of *n*, for the number of candidate *C*.

..... [2]

(b) The geography examination lasts for 1 hour 40 minutes.
Hari is allowed 25% extra time for his geography examination.

Work out the total time Hari has for this examination.
Give your answer in hours and minutes.

..... h ..... min [2]

(c) The number of examinations that each of the 196 candidates takes is recorded in the table.

Number of examinations	5	6	7	8
Number of candidates	27	42	63	64

(i) Write down the range.

..... [1]

(ii) Find the median.

..... [1]

(iii) Calculate the mean.

..... [3]

(iv) A candidate is selected at random.

Find the probability that the candidate takes fewer than 8 examinations.

..... [2]

3 **(a)** 25 students go on a water sports trip.
The students each choose their favourite water sport.
These are the results.

Rafting	Fishing	Surfing	Snorkelling	Surfing
Snorkelling	Rafting	Kayaking	Rafting	Snorkelling
Fishing	Surfing	Surfing	Kayaking	Surfing
Fishing	Snorkelling	Surfing	Surfing	Rafting
Rafting	Fishing	Snorkelling	Snorkelling	Surfing

(i) Complete the frequency table for the results.
You may use the tally column to help you.

Favourite water sport	Tally	Frequency
Rafting		
Surfing		
Fishing		
Kayaking		
Snorkelling		

[2]

(ii) Write down the mode.

..... [1]

(iii) Work out the percentage of students whose favourite water sport is snorkelling.

..... % [1]

(b) The table shows the times of the high and low tides.

Day	1st high tide	1st low tide	2nd high tide	2nd low tide
Monday	00 30	06 09	13 12	18 35
Tuesday	01 30	07 20	14 22	19 52
Wednesday	02 43	08 36	15 37	21 06
Thursday	03 58	09 41	16 44	22 07
Friday	05 00	10 35	17 37	22 58

(i) Write down the time of the 2nd high tide on Wednesday using the 12-hour clock.

..... [1]

(ii) Work out the time between the two low tides on Thursday.

..... h ..... min [1]

(iii) The surfing activity starts $1\frac{1}{2}$ hours before the high tide on Tuesday afternoon.

Write down the time that the surfing activity starts.

..... [1]

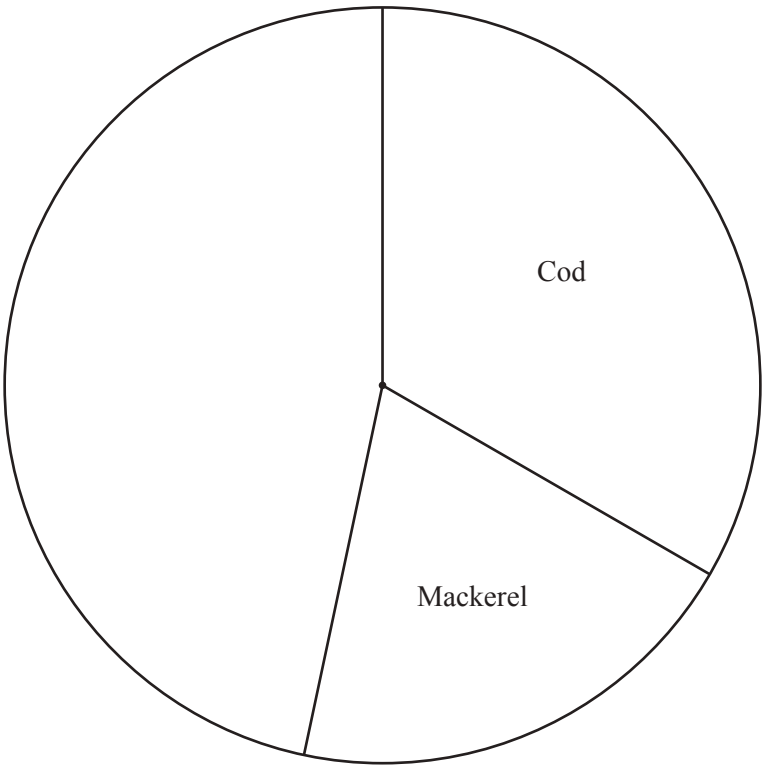
[Turn over

4 **(a)** Some people go fishing and catch four types of fish.
Some information is shown in the table.

Type of fish	Number of fish	Pie chart sector angle
Cod	15	120°
Mackerel	9	72°
Herring		32°
Tuna		

(i) Complete the table. [3]

(ii) Complete the pie chart.



[1]

(b) Records show that $\frac{3}{14}$ of all mullet caught are underweight.
In one day, 168 mullet are caught.

Work out the expected number of mullet that are underweight.

..... [1]

5 **(a)** Write down

(i) the number 604 925 in words,

.....

..... [1]

(ii) a prime number between 50 and 60,

..... [1]

(iii) the value of 999^0.

..... [1]

(b) Find

(i) the smallest multiple of 7 that is greater than 100,

..... [1]

(ii) the largest cube number that is less than 100,

..... [1]

(iii) the six factors of 45,

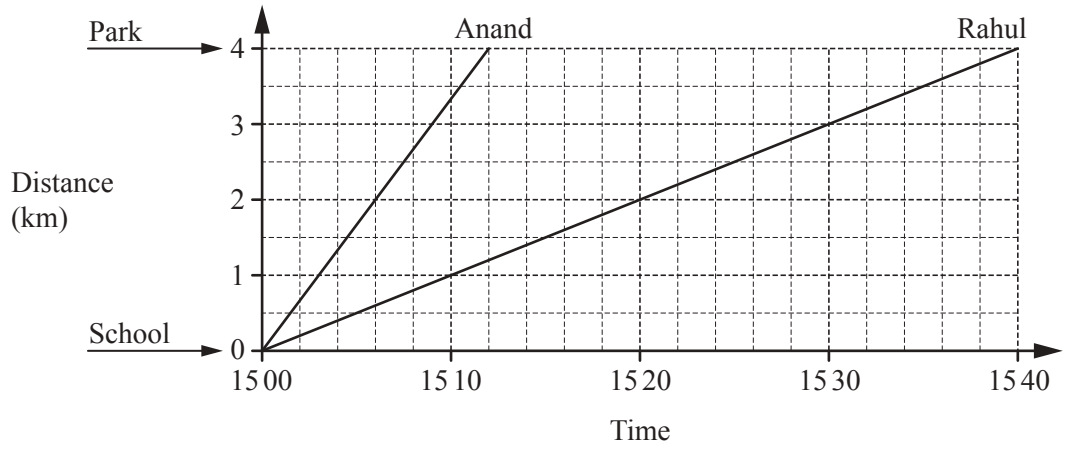
..... , ... , ... , ... , ... , ... [2]

(iv) an irrational number between 6 and 7.

..... [1]

6 Anand, Rahul and Samir go from school to the park each day.

(a) One day, Anand cycles and Rahul walks.
The travel graph shows their journeys.



(i) Work out the speed that Anand cycles.
Give your answer in kilometres per hour.

..... km/h [2]

(ii) Find the number of minutes that Anand arrives at the park before Rahul.

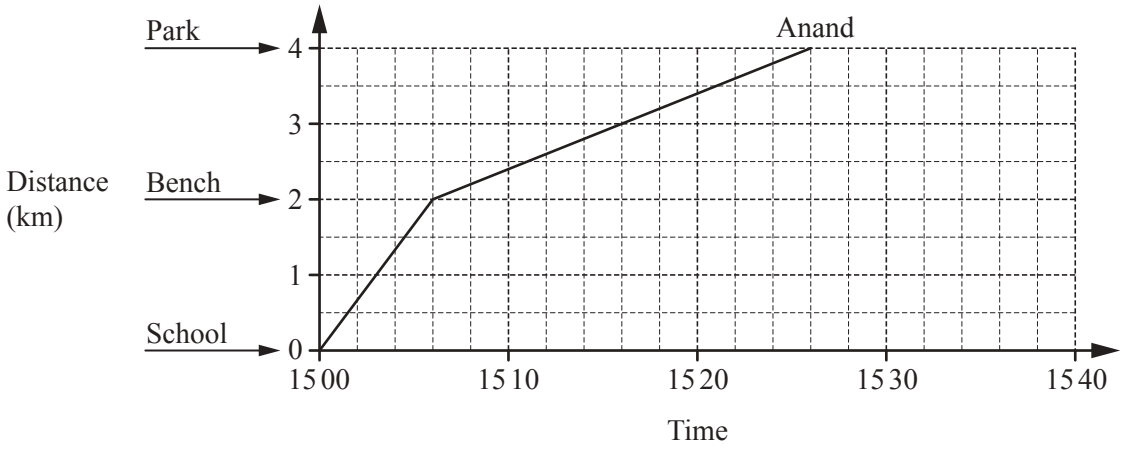
..... min [1]

(iii) Samir cycles at the same speed as Anand.
He arrives at the park at the same time as Rahul.

Find the time that Samir leaves school.

..... [1]

(b) On another day, Anand cycles 2 km to a bench and then walks the rest of the way to the park. The travel graph shows his journey.



(i) Write down the ratio minutes cycling : minutes walking.
Give your answer in its simplest form.

..... : ..... [2]

(ii) Rahul leaves school at the same time as Anand.
Rahul walks 2 km to the bench at a constant speed of 6 km/h.
He then cycles the rest of the way to the park at a constant speed of 15 km/h.

(a) Complete the travel graph for Rahul's journey to the park.

[2]

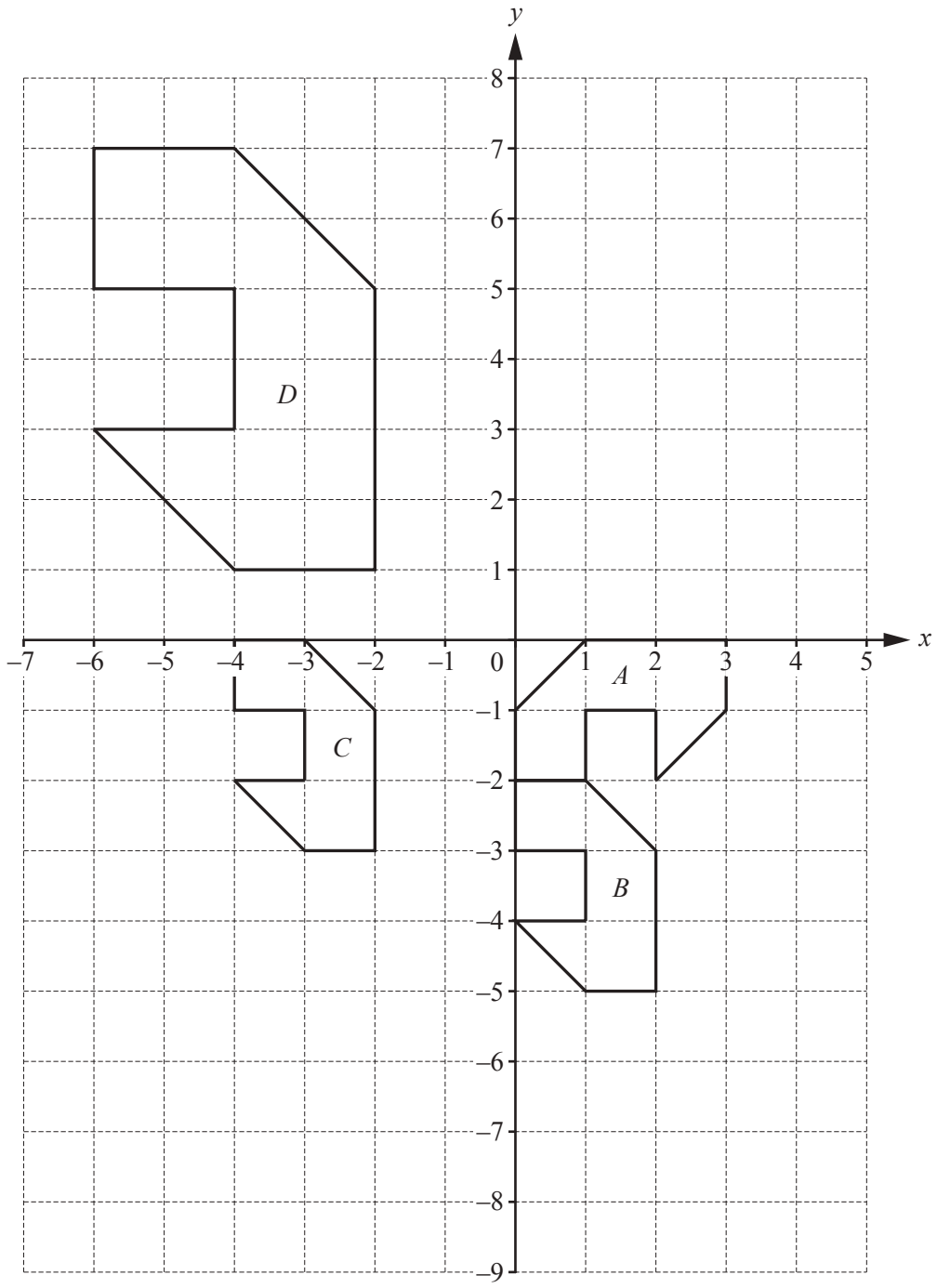
(b) Use your travel graph to find the number of minutes that Anand arrives at the **bench** before Rahul.

..... min [1]

(c) Find the greatest distance between Anand and Rahul as they travel to the park.

..... km [1]

7



The diagram shows four shapes, A, B, C and D, drawn on a 1 cm^2 grid.

(a) Find the area of shape B.

..... cm^2 [1]

(b) Describe fully the **single** transformation that maps

(i) shape *A* onto shape *B*,

.....

..... [3]

(ii) shape *B* onto shape *C*,

.....

..... [2]

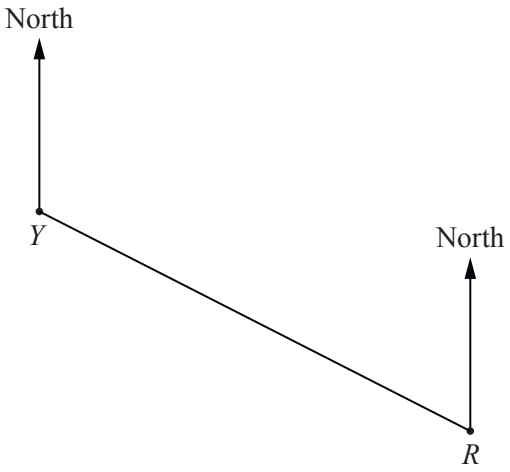
(iii) shape *C* onto shape *D*.

.....

..... [3]

(c) On the grid, draw the image of shape *D* after a reflection in the line $x = -1$. [2]

8 **(a)** The scale drawing shows the positions of two towns, Yatterford (Y) and Rexley (R), on a map.
The scale is 1 centimetre represents 15 kilometres.



Scale: 1 cm to 15 km

(i) Write the scale of the map in the form 1: n.

1 : ..... [2]

(ii) Work out the actual distance of Rexley from Yatterford.

..... km [2]

(iii) Measure the bearing of Rexley from Yatterford.

..... [1]

(iv) A hospital is to be built on an area of land between 45 km and 60 km from Yatterford. The bearing of the hospital from Yatterford is between 250° and 295°.

On the map, construct and shade the region in which the hospital is to be built.

[5]

(b) The bearing of Bartown from Whitestoke is 073°.

Work out the bearing of Whitestoke from Bartown.

..... [2]

[Turn over

9 A shop sells pens and notebooks.
The cost of a pen is p cents and the cost of a notebook is n cents.

(a) On Monday, the shop sells 5 pens and 4 notebooks for 450 cents.

Complete the equation.

$5p + 4n =$ ..... [1]

(b) On Tuesday, the shop sells 10 pens and 3 notebooks for 525 cents.

Write this information as an equation.

..... = ... [2]

(c) Solve your two equations to find the cost of a pen and the cost of a notebook.
You must show all your working.

Cost of a pen = ... cents

Cost of a notebook = ... cents [3]

10 (a) Seven students want to join the school diving club.
Some information about these students is recorded in the table below.

Name	Month and year of birth	Height (metres)	Distance each student can swim (metres)
Arj	November 2004	1.62	200
Biva	October 2006	1.43	500
Cala	February 2006	1.53	1500
Dainy	January 2007	1.56	1000
Elu	December 2005	1.64	600
Ful	August 2006	1.52	1000
Gani	January 2006	1.46	1000

To join the diving club you must be

- at least 12 years old in March 2018

and

- at least 150 centimetres tall

and

- able to swim at least 0.5 kilometres.

Write down the names of the students who can join the club.

..... [2]

(b) The students dive off boards of different heights.
The speed, s m/s, that they enter the water from a board of height h metres, can be found using this formula.

$$s = \sqrt{19.6h}$$

(i) Calculate the value of s when $h = 10$.

$s =$ ..... [2]

(ii) Make h the subject of the formula.

$h =$ ..... [2]

11 **(a)** A, B, C and D are four equations of straight line graphs.

A	$y = -3x + 4$

B	$y = 4x - 3$

C	$y = 3x - 4$

D	$y = -4x - 3$

(i) Write down the letter of the graph that

(a) passes through the point $(1, -1)$,

..... [1]

(b) has a y-intercept of 4,

..... [1]

(c) has a gradient of -4.

..... [1]

(ii) The point $(p, -26)$ lies on the line $y = -3x + 4$.

Work out the value of p.

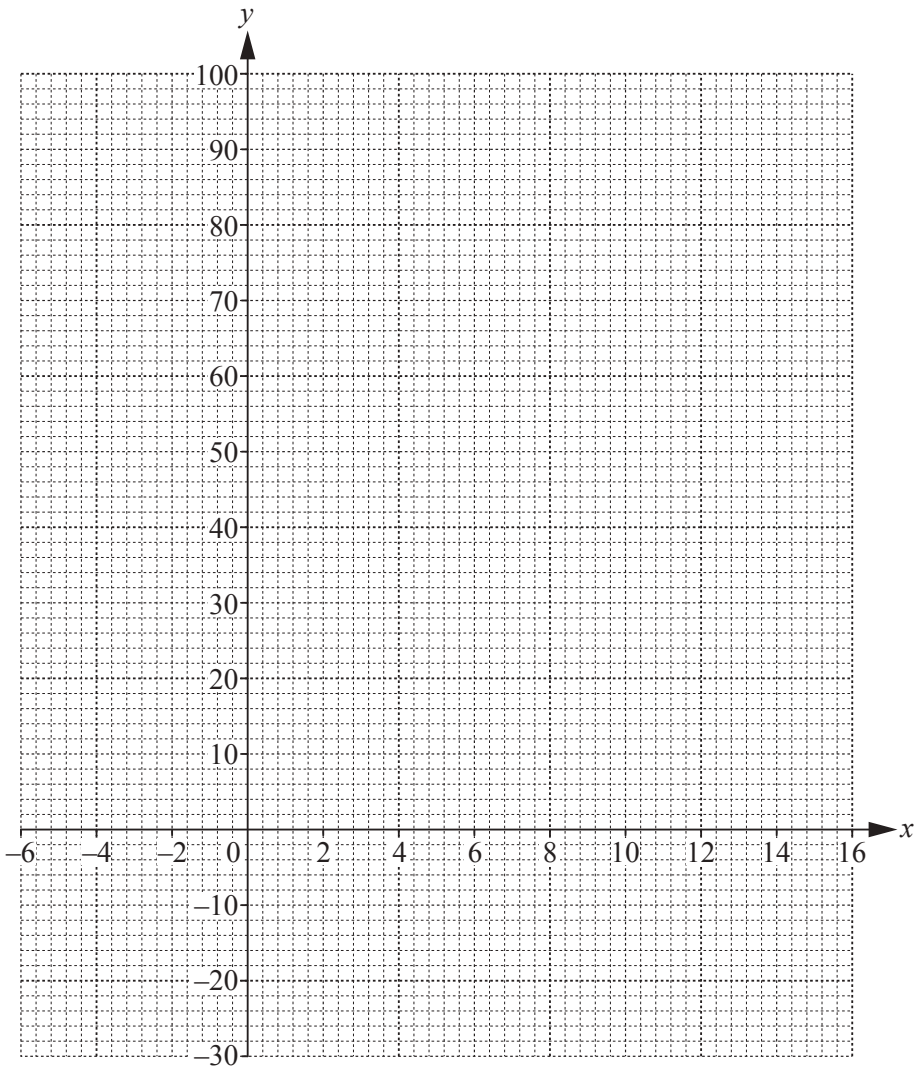
$p =$ ..... [2]

(b) (i) Complete the table of values for $y = x^2 - 10x$.

x	-6	-3	0	3	6	9	12	15
y	96			-21	-24		24	75

[3]

(ii) On the grid, draw the graph of $y = x^2 - 10x$ for $-6 \leqslant x \leqslant 15$.



[4]

(iii) Write down the co-ordinates of the lowest point of the graph.

(..... , ...) [1]

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MATHEMATICS **0580/42**

Paper 42 (Extended) **March 2018**

MARK SCHEME

Maximum Mark: 130

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the March 2018 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	23.27 final answer	**2**	**M1** for 9×2.97 soi
1(a)(ii)	2.75 final answer	**3**	**M2** for $2.97 \div \frac{108}{100}$ oe or **M1** for 108[%] associated with 2.97 oe
1(b)	12.4[0] or 12.41 to 12.42	**2**	**M1** for $35 \div 0.0153$ oe If 0 scored, **SC1** for answer 0.19
1(c)	70 nfww	**3**	**M2** for $(600 + 2.5) \div (9 - 0.5)$ or **B1** for one of $600 + 2.5$ or $9 - 0.5$ seen
2(a)	128	**2**	**M1** for $4 \times \frac{1}{2} \times 8 \times 8$ oe
2(b)(i)	18.3 or 18.26 to 18.29…	**3**	**M2** for $\frac{1}{4}(\pi \times 8^2 - \textit{their}128)$ oe or **M1** for $\pi \times 8^2 - \textit{their}128$ oe or for $\frac{1}{4} \times \pi \times 8^2$ oe OR **SC2dep** for answer 4.56 to 4.57...
2(b)(ii)	23.9 or 23.87 to 23.882	**4**	**M3** for $\frac{90}{360} \times 2 \times \pi \times 8 + \sqrt{8^2 + 8^2}$ oe OR **M1** for $\frac{90}{360} \times 2 \times \pi \times 8$ oe **M1** for $\sqrt{128}$ oe OR **SC3dep** for answer 11.9 or 11.93 to 11.94…
3(a)	0 –0.17 2.4	**3**	**B1** for each
3(b)	Fully correct smooth curve	**4**	**B3FT** for 9 or 10 correct points or **B2FT** for 7 or 8 correct points or **B1FT** for 5 or 6 correct points
3(c)	$x \leqslant 0.17$ to 0.25 and $x \geqslant 2.25$ to 2.3	**3**	**B2** for strict inequalities or one correct or **B1** for 0.17 to 0.25 and 2.25 to 2.3 seen

Question	Answer	Marks	Partial Marks
3(d)(i)	$y = 4 - x$ oe final answer	**2**	**B1** for $4 - x$ or $y = k - x$ or $y = 4 + kx$ oe
3(d)(ii)	correct ruled line	**1**	**FT** if in form $y = mx + c$ oe ($m, c \neq 0$)
	0.125 to 0.2 and 2.15 to 2.2	**2**	**B1** for each
4(a)	$[\pm]\sqrt{k-s}$ final answer	**2**	**M1** for $t^2 = k - s$
4(b)(i)	$(x-5)(x+5)$ final answer	**1**	
4(b)(ii)	$\frac{x-5}{x-7}$ nfww final answer	**3**	**M2** for $(x-7)(x+5)$ or **M1** for $x(x+5) - 7(x+5)$ or $x(x-7) + 5(x-7)$ or $(x + a)(x + b)$ where $a + b = -2$ or $ab = -35$
4(c)	$\frac{4x^2 - 7x - 8}{x(x+1)}$ or $\frac{4x^2 - 7x - 8}{x^2 + x}$ final answer	**3**	**M1** for $(x-8)(x+1) + 3x \times x$ oe isw **B1** for common denominator $x(x+1)$ oe isw
4(d)	3, 4, 5, 6 nfww	**3**	**B2** for 3 correct or 4 correct and 1 extra or **M2** for $n > \frac{18}{8}$ oe and $n \leqslant 6$ or **M1** for $18 < 8n$ [$\leqslant 30 + 3n$] or [$18 - 3n <$] $5n \leqslant 30$ seen
5(a)(i)	1930 or 1940 or 1933.4 to 1935.3	**5**	**B1** for interior angle 120 soi or angle at centre 60 soi or for correct use of Pythagoras' with 7 and 3.5 or with 14 and 7 **M3** for $6 \times \frac{1}{2} \times 7^2 \times \sin 60 \times 15.2$ oe or complete other methods or **M2** for $6 \times \frac{1}{2} \times 7^2 \times \sin 60$ oe OR **M1** for $\frac{1}{2} \times 7^2 \times \sin 60$ oe or other partial area of hexagon **M1dep** for *their* area × 15.2 evaluated

Question	Answer	Marks	Partial Marks
5(a)(ii)	893 or 892.8 to 893.0…	**3**	**M2** for $6 \times 7 \times 15.2 + 2 \times 6 \times \frac{1}{2} \times 7^2 \times \sin 60$ oe or for $6 \times 7 \times 15.2 + 2 \times$ *their* area of hexagon from **(a)** oe or **M1** for [6 ×] 7 × 15.2 oe or 2 × *their* area of hexagon from **(a)** oe
5(b)	2.71 or 2.709 to 2.710	**3**	**M2** for $\sqrt[3]{500 \div \left(6 \times \frac{4}{3}\pi\right)}$ oe or **M1** for $500 = 6 \times \frac{4}{3}\pi r^3$ oe If 0 scored, **SC1** for answer 4.92 or 4.923 to 4.924
6(a)	$y > x$	**1**	
	$x \geqslant 15$	**1**	
	$y < 50$	**1**	
	$x + y \leqslant 70$	**1**	
6(b)	Four correct ruled lines and correct region indicated	**5**	all lines ruled **B1** for $y = x$ broken **B1** for $x = 15$ **B1** for $y = 50$ broken **B1** for $x + y = 70$
6(c)	189	**2**	**M1** for (21, 49) seen or for $2x + 3y$ written for a point (x, y) in *their* region where x and y are integers
7(a)(i)	$\frac{9}{160}$ oe	**1**	
7(a)(ii)	58.125 nfww	**4**	**M1** for mid-points soi **M1** for use of Σfx with x in correct interval including both boundaries **M1** (dep on 2nd M1) for $\Sigma fx \div 160$
7(b)	[3 42] 85 140 151 160	**2**	**B1** for 1 error **FT** other values

Question	Answer	Marks	Partial Marks
7(c)	correct curve	**3**	**B1FT** *their* **(b)** for 6 correct heights **B1** for 6 points at upper ends of intervals on correct vertical line **B1FT dep on at least B1** for increasing curve through *their* 6 points After 0 scored, **SC1** for *their* 5 correct points plotted
7(d)(i)	57 to 59	**1**	
7(d)(ii)	36 to 42	**2**	**B1** for UQ = 76 to 80 or LQ = 38 to 40 soi
7(d)(iii)	92 to 94	**2**	**B1** for 144 seen
7(d)(iv)	130 to 137	**2**	**B1** for 23 to 30 seen
8(a)	356 or 356.2 to 356.3	**4**	**B1** for [Angle *LPM*] = 74 soi **M2** for $\frac{248 \times \sin \textit{their } 74}{\sin 42}$ oe or **M1** for implicit statement
8(b)(i)	320 or 319.9 to 320.2...	**3**	**B1** for angle *PLM* = 64 soi or for angle between *LM* and perpendicular from *M* = 26 soi or [*PM* =] 333.[1…] **M1** for *their* 356 × sin *their* 64 oe or *their* 356 × cos *their* 26 oe
8(b)(ii)	02 57 or 2 57 am	**3**	**B2** for 6 hours 12 mins or 372 mins seen or **M1** for 248 ÷ 40 oe If 0 scored, **SC1** for *their* time in hours converted to hours and minutes
9(a)	7.07 or 7.071...	**2**	**M1** for $(-1)^2 + 7^2$ oe
9(b)	–6	**2**	**M1** for $6 \times m - 5 \times 2m$ [= 24]
9(c)(i)	(10) final answer	**2**	**B1** for answer 10 without brackets
9(c)(ii)	$\begin{pmatrix} 2 \\ 6 \end{pmatrix}$ final answer	**2**	**M1** for $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 6 \end{pmatrix}$
9(c)(iii)	$\begin{pmatrix} 19 & 55 \\ 33 & 96 \end{pmatrix}$ final answer	**2**	**M1** for 2 or 3 correct elements
9(c)(iv)	$\frac{1}{3}\begin{pmatrix} 9 & -5 \\ -3 & 2 \end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix} 9 & -5 \\ -3 & 2 \end{pmatrix}$ soi or det = 3 soi

Question	Answer	Marks	Partial Marks
10(a)	10.8 or 10.81 to 10.82	**3**	**M2** for $\sqrt{(6--3)^2+(-2-4)^2}$ oe or **M1** for $(6--3)^2+(-2-4)^2$ oe
10(b)(i)	(6, 4)	**2**	**B1** for each
10(b)(ii)	2	**2**	**M1** for $\frac{12-(-4)}{10-2}$ oe
10(b)(iii)	$y=-\frac{1}{2}x+4$ oe final answer	**3**	**M1** for gradient = $-\frac{1}{2}$ or $-\frac{1}{\textit{their}}$ **(b)(ii)** **M1** for (2, 3) substituted into *their* $y=mx+c$ or $y-y_1=m(x-x_1)$ oe
11(a)	25 9 16	**3**	**B1** for each
11(b)(i)	$(n-1)^2$ oe	**2**	**B1** for any quadratic of form [1]n^2[+bn+c]
11(b)(ii)	$n+3$ oe	**1**	
11(c)	25	**2**	**M1** for *their* $(n-1)^2=576$
11(d)(i)	n^2-3n-2 final answer	**3**	**M1** for *their*$(n-1)^2$ − *their*$(n+3)$ oe or 2nd diff = 2 soi **B1** for $n^2-n-n+1$ or better or $-n-3$ or for expression of form $n^2-2n-n+k$ or correct expression not in simplest form
11(d)(ii)	808 cao	**2**	**M1** for substituting 30 in *their* **(d)(i)**

Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5874029265

MATHEMATICS **0580/42**

Paper 4 (Extended) **February/March 2018**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

1 **(a)** A shop sells dress fabric for \$2.97 per metre.

(i) A customer buys 9 metres of this fabric.

Calculate the change he receives from \$50.

\$ ..... [2]

(ii) The selling price of \$2.97 per metre is an increase of 8% on the cost price.

Calculate the cost price.

\$ ..... per metre [3]

(b) A dressmaker charges \$35 or 2300 rupees to make a dress.

Calculate the difference in price when the exchange rate is 1 rupee = \$0.0153 .
Give your answer in rupees.

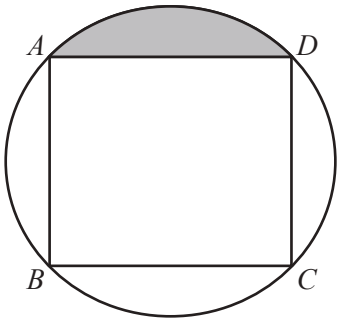
..... rupees [2]

(c) The dressmaker measures a length of fabric as 600 m, correct to the nearest 5 metres.
He cuts this into dress lengths of 9 m, correct to the nearest metre.

Calculate the largest number of complete dress lengths he could cut.

..... [3]

2



NOT TO SCALE

The vertices of a square *ABCD* lie on the circumference of a circle, radius 8 cm.

(a) Calculate the area of the square.

..... cm^2 [2]

(b) **(i)** Calculate the area of the shaded segment.

..... cm^2 [3]

(ii) Calculate the perimeter of the shaded segment.

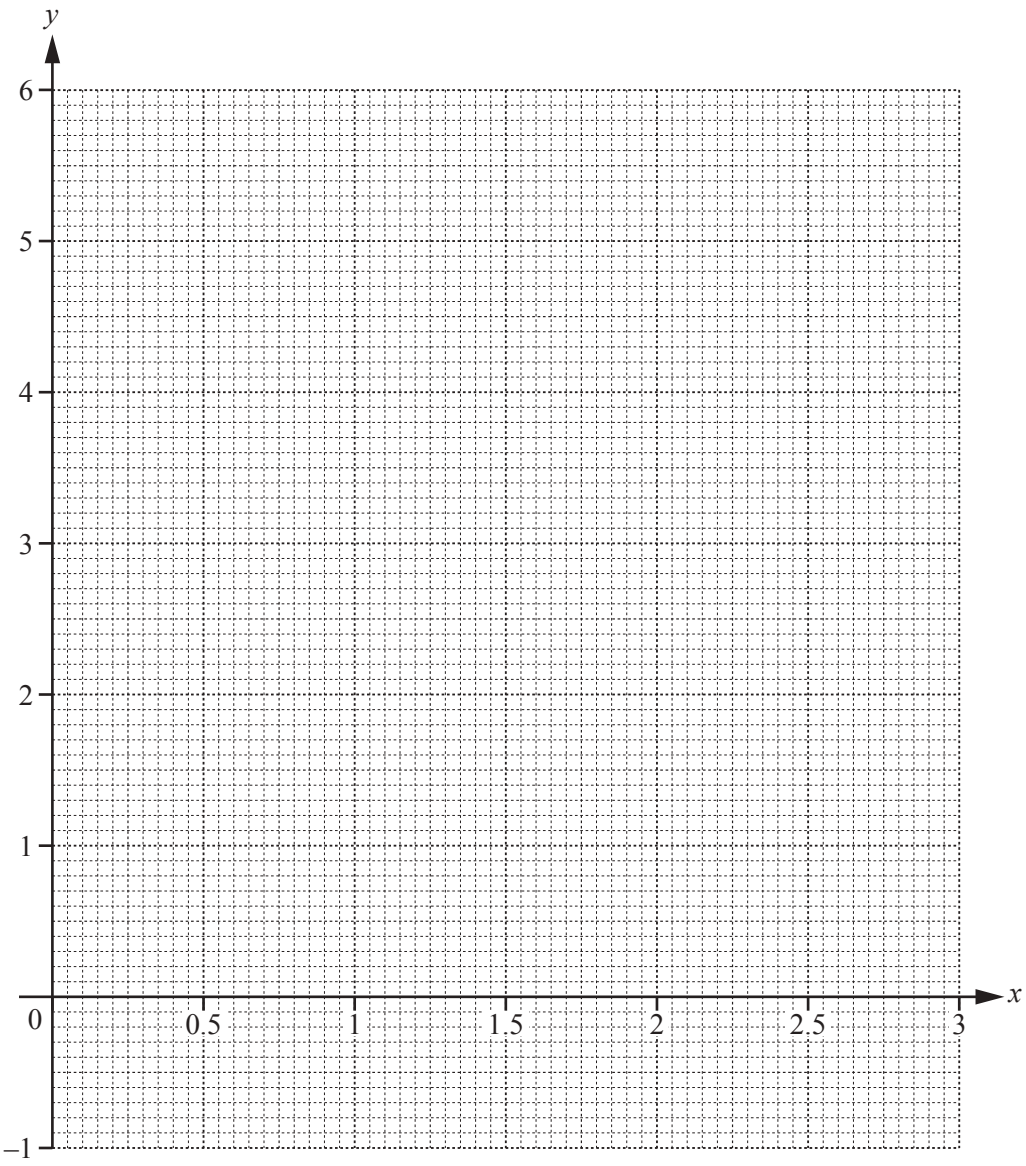
..... cm [4]

3 The table shows some values for $y = 2x + \frac{1}{x} - 3$ for $0.125 \leqslant x \leqslant 3$.

x	0.125	0.25	0.375	0.5	0.75	1	1.5	2	2.5	3
y	5.25	1.5	0.42			0	0.67	1.5		3.33

(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = 2x + \frac{1}{x} - 3$ for $0.125 \leqslant x \leqslant 3$.



[4]

(c) Use your graph to solve $2x + \frac{1}{x} - 3 \geqslant 2$.

.....

..... [3]

(d) The equation $\frac{1}{x} = 7 - 3x$ can be solved using your graph in **part (b)** and a straight line.

(i) Write down the equation of this straight line.

..... [2]

(ii) Draw this straight line and solve the equation $\frac{1}{x} = 7 - 3x$.

$x =$ ..... or $x =$ ..... [3]

4 **(a)** Make t the subject of the formula $s = k - t^2$.

$t =$ ..... [2]

(b) **(i)** Factorise $x^2 - 25$.

..... [1]

(ii) Simplify $\dfrac{x^2 - 25}{x^2 - 2x - 35}$.

..... [3]

(c) Write as a single fraction in its simplest form.

$$\frac{x-8}{x} + \frac{3x}{x+1}$$

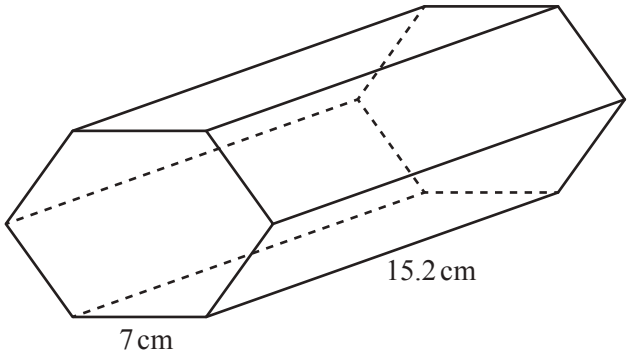
..... [3]

(d) Find the **integer** values of n that satisfy the inequality.

$$18 - 2n < 6n \leqslant 30 + n$$

..... [3]

5 (a)



NOT TO SCALE

The diagram shows a solid prism with length 15.2 cm.
The cross-section of this prism is a **regular** hexagon with side 7 cm.

(i) Calculate the volume of the prism.

..... cm^3 [5]

(ii) Calculate the total surface area of the prism.

..... cm^2 [3]

(b) Another solid metal prism with volume 500 cm^3 is melted and made into 6 identical spheres.

Calculate the radius of each sphere.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... cm [3]

6 Klaus buys x silver balloons and y gold balloons for a party.

He buys
- more gold balloons than silver balloons
- at least 15 silver balloons
- less than 50 gold balloons
- a total of no more than 70 balloons.

(a) Write down four inequalities, in terms of x and/or y, to show this information.

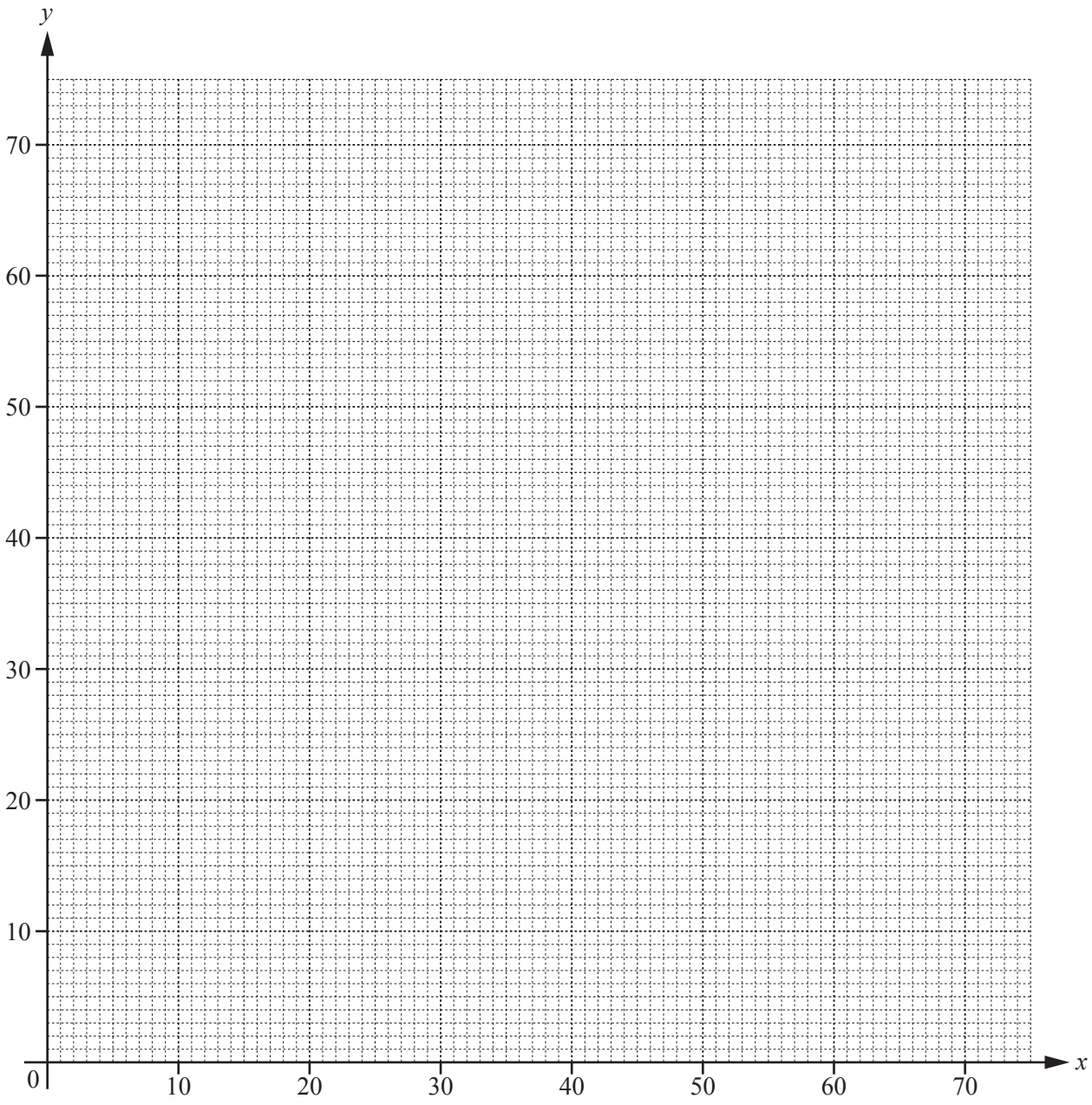
.....

.....

.....

..... [4]

(b) On the grid, show the information from **part (a)** by drawing four straight lines and shading the unwanted regions.



[5]

(c) Silver balloons cost \$2 and gold balloons cost \$3.

Calculate the most that Klaus could spend.

\$ ..... [2]

7 The frequency table shows information about the time, m minutes, that each of 160 people spend in a library.

Time (m minutes)	$0 < m \leqslant 10$	$10 < m \leqslant 40$	$40 < m \leqslant 60$	$60 < m \leqslant 90$	$90 < m \leqslant 100$	$100 < m \leqslant 120$
Frequency	3	39	43	55	11	9

(a) (i) Find the probability that one of these people, chosen at random, spends more than 100 minutes in the library.

..... [1]

(ii) Calculate an estimate of the mean time spent in the library.

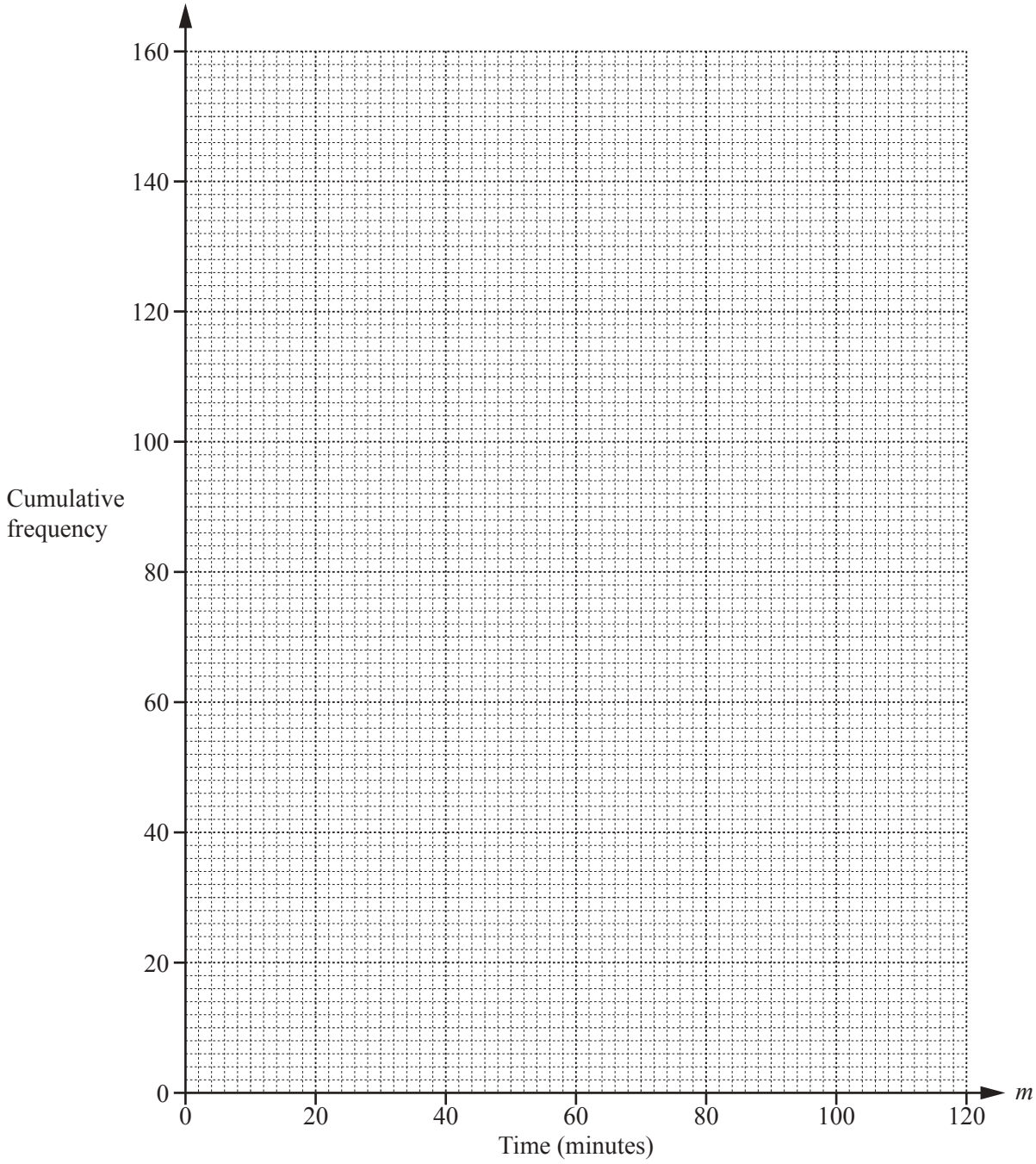
..... min [4]

(b) Complete the cumulative frequency table below.

Time (m minutes)	$m \leqslant 10$	$m \leqslant 40$	$m \leqslant 60$	$m \leqslant 90$	$m \leqslant 100$	$m \leqslant 120$
Cumulative frequency	3	42				

[2]

(c) On the grid opposite, draw the cumulative frequency diagram.



[3]

(d) Use your cumulative frequency diagram to find

(i) the median,

..... min [1]

(ii) the interquartile range,

..... min [2]

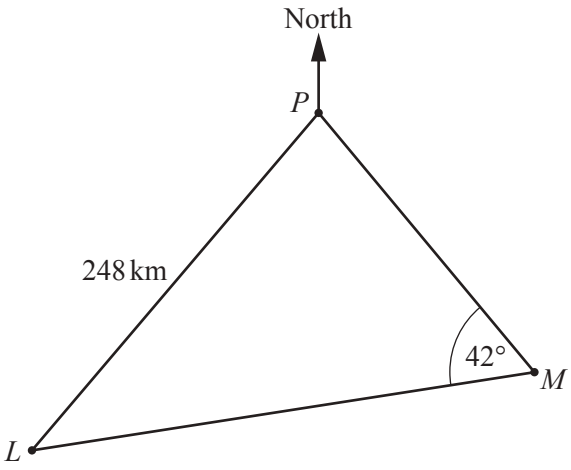
(iii) the 90th percentile,

..... min [2]

(iv) the number of people who spend more than 30 minutes in the library.

..... [2]

8



NOT TO SCALE

The diagram shows two ports, L and P, and a buoy, M.
The bearing of L from P is 201° and $LP = 248$ km.
The bearing of M from P is 127°.
Angle $PML = 42°$.

(a) Use the sine rule to calculate LM.

$LM =$ ..... km [4]

(b) A ship sails directly from L to P.

(i) Calculate the shortest distance from M to LP.

..... km [3]

(ii) The ship leaves L at 2045 and travels at a speed of 40 km/h.

Calculate the time the next day that the ship arrives at P.

..... [3]

9 **(a)** Find the magnitude of the vector $\begin{pmatrix} -1 \\ 7 \end{pmatrix}$.

..... [2]

(b) The determinant of the matrix $\begin{pmatrix} 6 & 2m \\ 5 & m \end{pmatrix}$ is 24.

Find the value of m.

$m =$ ..... [2]

(c) $\mathbf{L} = \begin{pmatrix} 2 & 5 \\ 3 & 9 \end{pmatrix}$ $\mathbf{M} = \begin{pmatrix} -4 \\ 2 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 1 & 7 \end{pmatrix}$

Work out the following.

(i) **NM**

..... [2]

(ii) **LM**

..... [2]

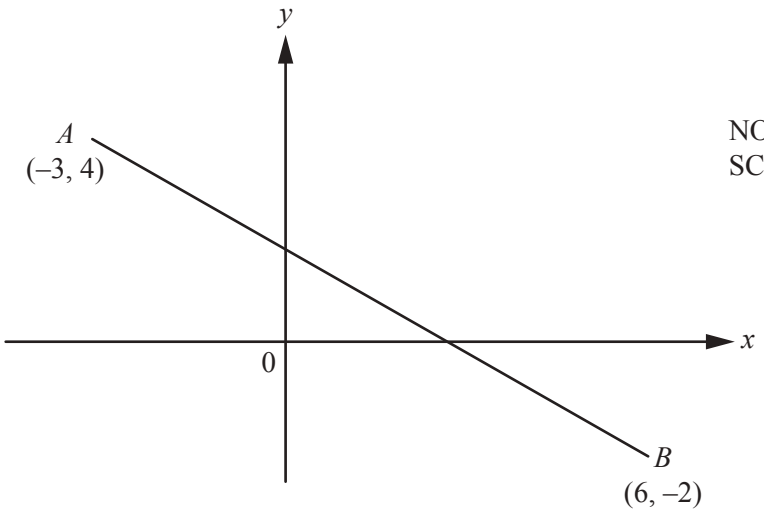
(iii) $\mathbf{L}^2$

..... [2]

(iv) $\mathbf{L}^{-1}$

..... [2]

10 (a)



Calculate the length of AB.

..... [3]

(b) The point P has co-ordinates $(10, 12)$ and the point Q has co-ordinates $(2, -4)$.

Find

(i) the co-ordinates of the mid-point of the line PQ,

(..... , ...) [2]

(ii) the gradient of the line PQ,

..... [2]

(iii) the equation of a line perpendicular to PQ that passes through the point $(2, 3)$.

..... [3]

11 The table shows the first five terms of sequences A, B and C.

Sequence	1st term	2nd term	3rd term	4th term	5th term	6th term
A	0	1	4	9	16	
B	4	5	6	7	8	
C	-4	-4	-2	2	8	

(a) Complete the table. [3]

(b) Find an expression for the nth term of

(i) sequence A,

..... [2]

(ii) sequence B.

..... [1]

(c) Find the value of n when the nth term of sequence A is 576.

$n =$ ..... [2]

(d) **(i)** Find an expression for the nth term of sequence C.
Give your answer in its simplest form.

..... [3]

(ii) Find the value of the 30th term of sequence C.

..... [2]

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Cambridge Assessment International Education

Grade thresholds – June 2018

Cambridge IGCSE™ Mathematics (without Coursework) (0580)

Grade thresholds taken for Syllabus 0580 (Mathematics (without Coursework)) in the June 2018 examination.

		minimum raw mark required for grade:						
	maximum raw mark available	A	B	C	D	E	F	G
Component 11	56	–	–	27	22	17	12	7
Component 12	56	–	–	37	31	26	21	16
Component 13	56	–	–	36	30	25	19	13
Component 21	70	56	48	39	31	22	–	–
Component 22	70	57	47	37	30	23	–	–
Component 23	70	58	50	42	36	30	–	–
Component 31	104	–	–	50	42	34	27	20
Component 32	104	–	–	67	56	44	32	20
Component 33	104	–	–	74	66	57	48	39
Component 41	130	95	78	62	49	37	–	–
Component 42	130	105	82	59	46	33	–	–
Component 43	130	99	83	68	53	39	–	–

Grade A* does not exist at the level of an individual component.

The maximum total mark for this syllabus, after weighting has been applied, is **200** for the 'Extended' options and **160** for the 'Core' options.

The overall thresholds for the different grades were set as follows.

Option	Combination of Components	A*	A	B	C	D	E	F	G
AX	11, 31	–	–	–	77	64	51	39	27
AY	12, 32	–	–	–	104	87	70	53	36
AZ	13, 33	–	–	–	110	96	82	67	52
BX	21, 41	176	151	126	101	80	59	–	–
BY	22, 42	182	162	129	96	76	56	–	–
BZ	23, 43	181	157	133	110	89	69	–	–

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/11**

Paper 1 (Core) **May/June 2018**

MARK SCHEME

Maximum Mark: 56

Published

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- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

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GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

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- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

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GENERIC MARKING PRINCIPLE 6:

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Abbreviations

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dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1	4600	**1**	
2	$\frac{7}{1000}$	**1**	
3	136	**1**	
4	2 7 12 cao	**1**	
5(a)	[0].0027	**1**	
5(b)	3.87×10^{-5}	**1**	
6	66	**2**	**B1** for 84 or −18 seen
7	94	**2**	**B1** for ACB or PAB or $ABC = 43$ or **M1** for $180 - 2 \times 43$ or $\frac{1}{2}x = 90 - 43$
8	1.5 oe	**2**	**M1** for $8x = 7 + 5$ or $x - \frac{5}{8} = \frac{7}{8}$ oe
9(a)	6540	**1**	
9(b)	7.85[0]	**1**	
10	1.715, 1.725	**2**	**B1** for one correct in correct place If zero scored, **SC1** for both correct but reversed or for 171.5 **and** 172.5
11	$7y - 23$ final answer	**2**	**M1** for $12y - 18$ or $-5y - 5$ or **B1** for answer $7y - k$ or $cy - 23 \quad c \neq 0$
12(a)	$\begin{pmatrix} -1 \\ 9 \end{pmatrix}$	**1**	
12(b)	$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	**1**	

Question	Answer	Marks	Partial Marks
13	126	**2**	**M1** for at least 3 multiples of 18 **and** 21 or $3 \times 6 \times 7$ as final answer or 3 [×] 6 **and** 3 [×] 7 in working or **B1** for final answer $126k$, integer $k > 1$
14	45	**2**	**M1** for $\frac{360}{8}$ If zero scored, **SC1** for answer 135
15(a)	6.58331…	**1**	
15(b)	6.5833	**1**	**FT** *their* **(a)** correctly rounded to 4 dp
16	Correct enlargement drawn	**2**	**B1** for correct sf but wrong position
17(a)	$\frac{8}{15}$ oe	**1**	
17(b)	40	**1**	
18(a)	x^{12}	**1**	
18(b)	–2	**1**	
19	π $\sqrt{3}$	**2**	**B1** for each
20(a)	Rectangle	**1**	
20(b)	Two correct properties e.g. 2 pairs of parallel sides Opposite angles are equal Opposite sides are same length Rotational symmetry order 2 Diagonals are not equal	**2**	**B1** for one correct property
21(a)	Cuboid	**1**	
21(b)	24	**2**	**M1** for $2 \times 3 \times 4$
22(a)	$2(5+8w)$	**1**	
22(b)	$4t(3x-2t)$	**2**	**B1** for answer $4(3tx-2t^2)$ or $t(12x-8t)$ $2(6tx-4t^2)$ or $2t(6x-4t)$

Question	Answer	Marks	Partial Marks
23	$\frac{7}{4}$	**M1**	or $\frac{k}{4} \times \frac{6}{35}$ where $k > 4$
	$\frac{3}{10}$ cao	**A2**	**A1** for $\frac{42}{140}$ or $\frac{21}{70}$ or $\frac{6}{20}$
24	for correctly equating one set of coefficients	**M1**	
	for correct method to eliminate one variable	**M1**	
	[x =] 7	**A1**	
	[y =] 8.5	**A1**	If zero scored, **SC1** for 2 values satisfying one of the original equations or **SC1** for both answers correct but no working
25(a)(i)	4	**1**	
25(a)(ii)	3.2	**3**	**M1** for Σfx, allow one error or omission and **M1dep** for $\frac{their 128}{40}$
25(b)	27	**2**	**M1** for $\frac{3}{40}$ or $\frac{360}{40}$

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/12**

Paper 1 (Core) **May/June 2018**

MARK SCHEME

Maximum Mark: 56

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Generic Marking Principles

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GENERIC MARKING PRINCIPLE 1:

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- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

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- marks are not deducted for omissions
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Question	Answer	Marks	Partial Marks
1	2[h] 55[min]	**1**	
2	$8g$	**1**	
3	$7x - 56$ final answer	**1**	
4	21	**1**	
5	24	**2**	**B1** for 17 or 41 identified
6	[a =]15 [b =] −27	**2**	**B1** for each or **SC1** for reversed answers
7	293°	**2**	**M1** for 113 + 180 oe or a sketch with the correct angle identified
8(a)	4	**1**	
8(b)	4	**1**	
9	$\frac{2}{55}$ $\frac{1}{27}$ 0.038 5^{-2}	**2**	**M1** for decimals to accuracy minimum 0.04, 0.037, 0.036 or **B1** for 3 in the correct order
10	$2y^2(2x - 3y)$ final answer	**2**	**B1** for $2y(2xy - 3y^2)$ or $2(2xy^2 - 3y^3)$ or $y(4xy - 6y^2)$ or $y^2(4x - 6y)$
11(a)	1.36×10^6 oe	**1**	
11(b)	5.21×10^{-3} oe	**1**	
12	$\begin{pmatrix}-16\\-11\end{pmatrix}$	**2**	**B1** for [3**b** =] $\begin{pmatrix}-21\\-9\end{pmatrix}$ or $\begin{pmatrix}-16\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-11\end{pmatrix}$
13	[y =] $\frac{5x+7}{2}$ oe	**2**	**M1** for $2y = 5x + 7$ or $-2y = -5x - 7$ or $\frac{5}{2}x - y + \frac{7}{2} = 0$
14	257	**2**	**B1** for 257.4

Question	Answer	Marks	Partial Marks
15(a)	[w =] 7	**1**	
15(b)	[12x =] 36	**1**	
16	51.3 or 51.31 to 51.32	**2**	**M1** for cos [x =] $\frac{5}{8}$
17	62	**3**	**M1** for [height =] 21 ÷ 7 **M1** for 2(1 × *their*3 + *their*3 × 7 + 1 × 7) oe
18	26.2 or 26.16(.....)	**3**	**M2** for $\sqrt{35.1^2 - 23.4^2}$ or better or **M1** for $35.1^2 = 23.4^2 + BC^2$ or better
19	1410 or 1413 or 1413.1[0 .....]	**3**	**M2** for $1200\left(1+\frac{5.6}{100}\right)^3$ oe or **M1** for $1200\left(1+\frac{5.6}{100}\right)^2$ oe
20(a)	448 or 447.85 to 447.95	**2**	**M1** for $\pi \times 3.6^2 \times 11$
20(b)	[0].448 or [0].44785 to [0].44795	**1**	**FT** *their* **(a)** ÷ 1000
21	13.4[0]	**3**	**M2** for (167.9 – 20.5) ÷ 11 or **M1** for 167.9[0] – 20.5[0]
22(a)	Friday	**1**	
22(b)	74	**2**	**M1** for (67 + 75 + 53 + 68 + 94 + 87) ÷ 6
22(c)	41	**1**	
23(a)	140 000	**1**	
23(b)	Points correctly plotted at (40, 80) and (80, 150)	**1**	
23(c)	Correct ruled line of best fit	**1**	
23(d)	80 000 to 110 000	**1**	**FT** their straight line provided it has positive gradient
24(a)	$\frac{8}{12}$ and $\frac{1}{12}$ oe	**M1**	For correct fractions with a common denominator 12k
	$\frac{7}{12}$ cao	**A1**	

Question	Answer	Marks	Partial Marks
24(b)	$\frac{24}{7}$ or $\frac{61}{14}$	**B1**	or equivalent improper fractions
	$\frac{\textit{their}24}{7} \times \frac{14}{\textit{their}61}$ oe	**M1**	or $\frac{\textit{their}48}{14} \div \frac{\textit{their}61}{14}$ oe common denominator
	$\frac{48}{61}$ cao	**A1**	

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/13**

Paper 1 (Core) **May/June 2018**

MARK SCHEME

Maximum Mark: 56

Published

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Question	Answer	Marks	Partial Marks
1	$\frac{3}{4}$	**1**	
2	$w(1 + w^2)$ final answer	**1**	
3	6.15 or 6.153 to 6.154 or $6\frac{2}{13}$	**1**	
4	12	**1**	
5	[0].0625 or $\frac{1}{16}$	**1**	
6(a)	acute	**1**	
6(b)	diameter	**1**	
7	[0].24 $\frac{1}{4}$ 26[%] $\frac{4}{15}$	**2**	**B1** for three in the correct order or **M1** for .266/.27 .26 .25 seen
8	3, 4, 6, 9, 12, 18	**2**	**B1** for list with one or two errors or omissions or for a complete list of products
9	25.3[0]	**2**	**M1** for $22 \times \frac{15}{100}$ oe or better
10(a)	210 000 cao	**1**	
10(b)	4120 cao	**1**	
11	750	**2**	**M1** for $2500 \div (7 + 3)$ [× 3]
12	162	**2**	**M1** for 225×0.72 oe
13(a)	[0].004 82 cao	**1**	
13(b)	5.2×10^7	**1**	

Question	Answer	Marks	Partial Marks
14	-11	**2**	**M1** for $1-p=3\times4$ or better or $-\frac{p}{3}=4-\frac{1}{3}$ or better
15	6.15 6.25	**2**	**B1** for each or **SC1** both correct but reversed
16	9.18 or 9.177…	**2**	**M1** for sin 35 = $\frac{x}{16}$ or better
17	304	**3**	**M2** for [2 ×]((10 × 4) + (10 × 8) + (4 × 8)) or **M1** for one of 10 × 4 or 10 × 8 or 4 × 8
18	$\frac{6}{5}$	**B1**	accept equivalent fractions e.g. $\frac{18}{15}$
	$\frac{2}{3}\times$ *their* $\frac{5}{6}$	**M1**	or $\frac{10}{15}\div\frac{18}{15}$ oe
	$\frac{5}{9}$ cao	**A1**	
19(a)(i)	$\begin{pmatrix}7\\5\end{pmatrix}$	**1**	
19(a)(ii)	$\begin{pmatrix}-20\\8\end{pmatrix}$	**1**	
19(b)	3, −1	**1**	
20(a)	5	**1**	
20(b)	$y = 8x + 6$	**2**	**M1** for $y = 8x + k$, $k \neq 3$ or 6 or $y = mx + 6$, $m \neq 0$ or 8 or for answer of $8x + 6$
21(a)	5680	**1**	
21(b)(i)	[0]68	**1**	
21(b)(ii)	46	**2**	**B1** for 9.2 [cm]
22(a)	29.4	**2**	**M1** for 8.4 × 3.5
22(b)	168	**2**	**M1** for 12 × (10 +18) ÷ 2 oe

Question	Answer	Marks	Partial Marks
23	correctly multiplying both equations to reach the same coefficient for one variable	**M1**	
	correctly adding or subtracting the equations	**M1**	
	[x =] 7	**A1**	
	[y =] −1	**A1**	If zero scored then **SC1** for both answers correct and no supporting working or for two answers that satisfy one of the original equations
24(a)	correct perpendicular bisector with correct arcs	**2**	**B1** for correct perpendicular bisector without any arcs or with incorrect arcs
24(b)	correct angle bisector with correct arcs	**2**	**B1** for correct angle bisector without any arcs or with incorrect arcs
24(c)	correct region shaded	**1**	Dep on **B1**, **B1**

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/21**

Paper 2 (Extended) **May/June 2018**

MARK SCHEME

Maximum Mark: 70

Published

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Question	Answer	Marks	Partial Marks
1	23 or 29	**1**	
2	3.87×10^{-5}	**1**	
3	$\frac{7}{11}$ oe	**1**	
4	66	**2**	**B1** for 84 or −18 seen
5	94	**2**	**B1** for ACB or PAB or $ABC = 43$ or **M1** for $180-2\times43$ or $\frac{1}{2}x = 90-43$
6	81.7 or 81.71 to 81.72…	**2**	**M1** for $\pi\times5.1^2$
7	4.8[0] or 4.802…	**2**	**M1** for $[AC^2 =]\ 2.5^2+4.1^2$
8	$7y-23$ final answer	**2**	**M1** for $12y-18$ or $-5y-5$ or **B1** for answer $7y-k$ or $cy-23\quad c\neq0$
9	–7	**2**	**B1** for 3^{-3} or 3^4 or 3^7 or 3^{-7} seen or **SC1** for final answer 7
10(a)	6.58331…	**1**	
10(b)	6.5833	**1**	**FT** *their* **(a)** correctly rounded to 4 dp
11	$\frac{4}{7}$ oe exact answer	**2**	**B1** for 4 or $\frac{1}{7}$
12	$n<-4.4$ or $n<-4\frac{2}{5}$ final answer	**2**	**M1** for $8n-3n<-5-17$ or better or $3n-8n>17+5$ or better

Question	Answer	Marks	Partial Marks
13	$\frac{7}{4}$	**M1**	or $\frac{k}{4} \times \frac{6}{35}$ where $k > 4$
	$\frac{3}{10}$ cao	**A2**	**A1** for $\frac{42}{140}$ or $\frac{21}{70}$ or $\frac{6}{20}$
14	19.3 or 19.26 to 19.27 nfww	**3**	**M2** for $[\sin =]5.9 \times \frac{\sin 84.6}{17.8}$ or **M1** for $\frac{5.9}{\sin B} = \frac{17.8}{\sin 84.6}$ oe
15	9	**3**	**M1** for $y = k(x-1)^2$ **M1** for $[y =]$*their* $k(7-1)^2$ OR **M2** for $\frac{4}{(5-1)^2} = \frac{y}{(7-1)^2}$ oe
16	Shape with vertices at (1, 1), (1, 4), (–1, 2), (–1, 4)	**3**	**M2** for 3 correct vertices on grid or in working or **M1** for correct set-up $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 2 & 1 & 4 & 4 \\ 1 & -1 & -1 & 1 \end{pmatrix}$ or for rotation, 90° [anti-clockwise], centre *O*
17(a)	2200	**3**	**M2** for $\frac{1}{2}(90+130) \times 20$ or $\frac{1}{2}(10 \times 20) + (90 \times 20) + \frac{1}{2}(30 \times 20)$ or **M1** for one area
17(b)	16.9 or 16.92…	**1**	**FT** *their* **(a)** ÷ 130
18(a)	10 nfww	**2**	**B1** for UQ = 30 or LQ = 20 clearly identified
18(b)	4	**2**	**B1** for 116 indicated
19	46.2 or 46.17 to 46.18	**4**	**M2** for $[\cos =]\frac{16^2 + 19^2 - 14^2}{2 \times 16 \times 19}$ or **M1** for $14^2 = 19^2 + 16^2 - 2 \times 19 \times 16\cos M$ **A1** for 0.692… or $\frac{421}{608}$

Question	Answer	Marks	Partial Marks
20(a)	$\frac{8}{15}$ oe	**1**	
20(b)	$\frac{168}{210}$ oe	**3**	**M2** for $1-\frac{7}{15}\times\frac{6}{14}$ oe or $3(\frac{7\times8}{15\times14})$ oe or **M1** for $\frac{7}{15}\times\frac{6}{14}$ or $\frac{7}{15}\times\frac{8}{14}$ or $\frac{8}{15}\times\frac{7}{14}$ oe
21	$y \geqslant 1.5$ oe $y \geqslant \frac{3}{4}x$ oe $y < -\frac{1}{2}x + 3$ oe	**4**	**SC3** for $y > 1.5$ oe and $y > \frac{3}{4}x$ oe and $y \leqslant -\frac{1}{2}x + 3$ oe or **B3** for any two correct inequalities or **B1** for $y \geqslant 1.5$ oe and **B2** for $y \geqslant \frac{3}{4}x$ oe **or** $y < -\frac{1}{2}x + 3$ oe or $y = \frac{3}{4}x$ oe **and** $y = -\frac{1}{2}x + 3$ oe or with incorrect inequality signs or **B1** for $y = \frac{3}{4}x$ oe OR $y = -\frac{1}{2}x + 3$ oe or with incorrect inequality signs
22(a)	-17	**2**	**M1** for $f(11)$ seen or $5 - 2(5 - 2x)$ or better
22(b)(i)	$4x^2 + 8$ oe	**1**	
22(b)(ii)	$\frac{5-x}{2}$ oe final answer	**2**	**M1** for $x = 5 - 2y$ or $2x = 5 - y$ or $y - 5 = -2x$ or $\frac{y}{2} = \frac{5}{2} - x$

Question	Answer	Marks	Partial Marks
23(a)(i)	4	**1**	
23(a)(ii)	3.2	**3**	**M1** for Σfx, allow one error or omission and **M1dep** for $\frac{their\ 128}{40}$
23(b)	27	**2**	**M1** for $\frac{3}{40}$ or $\frac{360}{40}$
24(a)	78.7 or 78.69…	**3**	**M2** for tan = $\frac{5}{2-1}$ oe or **M1** for use of tangent oe
24(b)	$[y =] -\frac{1}{3}x + 12$ final answer	**3**	**M1** for gradient = $-\frac{1}{3}$ **M1** for substituting (6, 10) into *y = their mx + c*

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/22**

Paper 2 (Extended) **May/June 2018**

MARK SCHEME

Maximum Mark: 70

Published

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dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1	2 [h] 55 [min]	**1**	
2	$7x - 56$ final answer	**1**	
3	[a =] 15 [b =] –27	**2**	**B1** for each or **SC1** for reversed answers
4(a)	[w =] 7	**1**	
4(b)	[$12x$ =] 36	**1**	
5	24	**2**	**B1** for 17 or 41 identified
6	$\frac{8}{12}$ and $\frac{1}{12}$ oe	**M1**	For correct fractions with a common denominator $12k$
	$\frac{7}{12}$ cao	**A1**	
7	320	**2**	**M1** for 180 + 140 oe
8(a)	1.36×10^6 oe	**1**	
8(b)	5.21×10^{-3} oe	**1**	
9	Correct perpendicular bisector of AB with 2 pairs of correct arcs	**2**	**B1** for correct perpendicular bisector of AB with no or wrong arcs or for 2 pairs of correct arcs
10	$(x + 2)(y + 3)$ final answer	**2**	**B1** for $y(x + 2) + 3(x + 2)$ or $x(y + 3) + 2(y + 3)$
11	80	**2**	**M1** for $\left(\frac{12}{3}\right)^2$ or $\left(\frac{3}{12}\right)^2$ oe or $\frac{3^2}{5} = \frac{12^2}{A}$ oe
12	7 cao nfww	**2**	**B1** for 31 + 0.5 or 5 – 0.5 or 31.5 or 4.5 seen
13	15 and 22	**2**	**M1** for 1.5×10 or 1.1×20
14	62	**3**	**M1** for [height =] $21 \div 7$ **M1** for $2(1 \times$ *their*$3 +$ *their*$3 \times 7 + 1 \times 7)$ oe

Question	Answer	Marks	Partial Marks
15	628 or 628.3 to 628.4 cm^3	**3**	**B2** for 628 or 628.3 to 628.4 or **M1** for $5^2 \times 8 \times \pi$ **B1** for cm^3
16	7.5 nfww	**3**	**M2** for $[OB^2 =] \left(\frac{12}{2}\right)^2 + 4.5^2$ oe or **B1** for recognition of right angle
17	30	**3**	**M2** for ½ (8 + 2) × v [= 150] oe or **M1** for ½ × 6 × v or 2 × v oe
18(a)	$d = 4.9t^2$	**2**	**M1** for $d = kt^2$
18(b)	19.6	**1**	**FT** *their* 4.9 × 4
19	$y > 2$ oe final answer $y \geqslant 3 - x$ oe final answer	**3**	**B1** for $y > 2$ oe final answer **B2** for $y \geqslant 3 - x$ oe final answer or **B1** for $y = 3 - x$ oe soi or **SC2** for $y \geqslant 2$ oe **and** $y > 3 - x$ oe final answer
20(a)	$\mathbf{C}^2$	**2**	**B1** for any correct matrix calculation evaluated
20(b)	–9	**1**	
20(c)	The determinant is 0 oe	**1**	e.g. it is singular.
21(a)	140 000	**1**	
21(b)	Points correctly plotted at (40, 80) and (80, 150)	**1**	
21(c)	Correct ruled line of best fit	**1**	
21(d)	80 000 to 110 000	**1**	**FT** their straight line provided it has positive gradient
22(a)	6**a** – 2**b** or 2(3**a** – **b**)	**2**	**M1** for 4**a** + **b** – (–2**a** + 3**b**) or better
22(b)	5**a** – **b**	**2**	**M1** for a correct route e.g. $\overrightarrow{OD} + \overrightarrow{DE}$, 4**a** + **b** + **a** – 2**b**, $\overrightarrow{OE}$
23(a)	5	**3**	**M2** for $20 - x + x + 8 - x = 23$ or better or **B1** for identifying the correct region $A \cup B$
23(b)	$\frac{7}{30}$ oe	**2**	**B1** for $\frac{7}{c}$ or $\frac{k}{30}$

Question	Answer	Marks	Partial Marks
24(a)	$\frac{4}{5}$ oe	**2**	**M1** for $\frac{2}{3} \times p = \frac{8}{15}$ or better
24(b)	$\frac{1}{15}$ oe	**3**	**3FT** $(1 - \textit{their}\ \frac{4}{5}) \times \frac{1}{3}$ correctly evaluated **M2** for $(1 - \textit{their}\ \frac{4}{5}) \times (1 - \frac{2}{3})$ oe or **M1** for $1 - \textit{their}\ \frac{4}{5}$ or $1 - \frac{2}{3}$
25(a)	$[y =] -\frac{2}{5}x + 3$ or $[y =] -0.4x + 3$ final answer	**4**	**B2** for [gradient of perpendicular =] $-\frac{2}{5}$ oe or **M1** for [gradient =] $\frac{24-9}{22-16}$ or $-\frac{22-16}{24-9}$ **M1** for substituting (5, 1) into *y = their mx + c*
25(b)	(20, 19)	**2**	**M1** for $\frac{2}{3}(22-16)+16$ or $\frac{2}{3}(24-9)+9$ oe or **SC1** for answer (18, 14)

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/23**

Paper 2 (Extended) **May/June 2018**

MARK SCHEME

Maximum Mark: 70

Published

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Question	Answer	Marks	Partial Marks
1	-5	**1**	
2	$w(1+w^2)$ final answer	**1**	
3	6.15 or 6.153 to 6.154 or $6\frac{2}{13}$	**1**	
4	3, 4, 6, 9, 12, 18	**2**	**B1** for list with one or two errors or omissions or for a complete list of products
5	25.3[0]	**2**	**M1** for $22 \times \frac{15}{100}$ oe or better
6(a)	210 000 cao	**1**	
6(b)	4120 cao	**1**	
7	162	**2**	**M1** for 225×0.72 oe
8(a)	[0].004 82 cao	**1**	
8(b)	5.2×10^7	**1**	
9	-11	**2**	**M1** for $1-p=3\times4$ or better or $-\frac{p}{3}=4-\frac{1}{3}$ or better
10	$(a+2b)(2-x)$ final answer	**2**	**M1** for $2(a+2b)-x(a+2b)$ or $a(2-x)+2b(2-x)$ or $-a(x-2)-2b(x-2)$
11	$[\pm]\sqrt{\frac{A}{2\pi+y}}$ final answer	**2**	**M1** for $\frac{A}{2\pi+y}=x^2$ **M1** for correctly square rooting their expression in x^2 If zero scored **SC1** for $\frac{[\pm\ ]\sqrt{A}}{2\pi+y}$
12	8	**2**	**M1** for Venn diagram with 1 correct region or for a correct method e.g. $5+13-x+x+10-x=20$ oe or better

Question	Answer	Marks	Partial Marks
13	$\frac{1}{3-x}$ nfww final answer	**2**	**B1** for $(3-x)(3+x)$ or $-(x-3)(x+3)$
14	$\frac{2}{3}\mathbf{p}+\frac{1}{3}\mathbf{q}$	**2**	**M1** for correct route e.g. $\overrightarrow{OT}$ or $\overrightarrow{OQ}+\overrightarrow{QT}$ or for $\overrightarrow{QT}=\frac{2}{3}(-\mathbf{q}+\mathbf{p})$ oe or for $\overrightarrow{PT}=\frac{1}{3}(-\mathbf{p}+\mathbf{q})$ oe
15	$\frac{6}{5}$	**B1**	accept equivalent fractions e.g. $\frac{18}{15}$
	$\frac{2}{3}\times \textit{their}\ \frac{5}{6}$	**M1**	or $\frac{10}{15}\div\frac{18}{15}$ oe
	$\frac{5}{9}$ cao	**A1**	
16(a)	50 cao nfww	**2**	**B1** 12.5 seen or **M1** for 12 + 0.5 or better
16(b)	12.3	**1**	
17(a)	27	**1**	
17(b)	$3t^9$ final answer	**2**	**B1** for kt^9 or for $3t^k$ $(k \neq 0)$
18	$6p^2+5p-6$ final answer	**3**	**B2** for $6p^2+9p-4p-6$ or **B1** for three correct terms
19	150	**3**	**M1** for $y = k(x-1)^2$ **M1** for $[y =]$ *their* $k\times(6-1)^2$ oe OR **M2** for $\frac{y}{24}=\frac{(6-1)^2}{(3-1)^2}$
20	$[w =]$ 95 $[x =]$ 85 $[y =]$ 48	**3**	**B1** for each If **B0** scored for x and for y, **SC1** for *their* x + *their* y = 133
21	$\frac{1}{y(y-1)}$ or $\frac{1}{y^2-y}$ final answer	**3**	**B1** for common denominator of $y(y-1)$ or y^2-y **B1** for $y-(y-1)$ or $y-y+1$
22(a)	$15-4n$ final answer	**2**	**B1** for $15-kn$ or $p-4n$ $(k \neq 0)$
22(b)	$3\times 2^{n-1}$ oe final answer	**2**	**B1** for recognition of powers of 2 such as 2^k

Question	Answer	Marks	Partial Marks
23	102.1 or 102.06 to 102.07	**4**	**M2** for $[\cos x =] \frac{11^2 + 5^2 - 13^2}{2 \times 11 \times 5}$ or **M1** for $13^2 = 11^2 + 5^2 - 2 \times 11 \times 5 \cos x$ **A1** for – 0.209…. or $-\frac{23}{110}$
24(a)	25	**2**	**M1** for $\frac{90 \times 1000}{60 \times 60}$ oe
24(b)	1.25	**1**	**FT** $\frac{\textit{their}\textbf{(a)}}{20}$ correctly evaluated
24(c)	1250	**2**	**2FT** for *their* **(a)** × 50 correctly evaluated or **M1** for one area e.g. ½(40 + 60) × 25, 25 × 40, ½ × 25 × 20 ½(40 + 60) × 90, 90 × 40, ½ × 90 × 20 ½(40 + 60) × *their* 25, *their* 25 × 40, ½ × *their* 25 × 20
25(a)	1.8	**2**	**M1** for $\frac{10}{8} = \frac{9}{AP}$ oe
25(b)	10.3 or 10.31 to 10.32	**3**	**M2** for $13 \times \sqrt[3]{\frac{0.25}{0.5}}$ oe or **M1** for $\sqrt[3]{\frac{0.5}{0.25}}$ oe or $\sqrt[3]{\frac{0.25}{0.5}}$ oe or $\frac{0.5}{0.25} = \left(\frac{13}{h}\right)^3$ oe
26(a)	Enlargement [scale factor] 2 [centre] (7, 0)	**3**	**B1** for each
26(b)	Image at (6, 4), (7, 4), (6, 8)	**3**	**B2** for rotation through 90° clockwise but about other point or **B1** for rotation through 90° anticlockwise about any point or for triangle at (6, 4), (7, 4), (6, *k*)

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2018**

MARK SCHEME

Maximum Mark: 104

Published

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Question	Answer	Marks	Partial Marks
1(a)(i)	Tally for 3, 4, 5 increased by two. Tally for 7 increased by one. Frequencies 3, 5, 14, 10, 11, 3, 3, 0, 1	**2**	**M1** for all four tallies correct or **B1** for correct frequency column If 0 scored **SC1** for correct frequency for *their* tallies
1(a)(ii)	8	**1**	
1(a)(iii)	4	**1**	
1(b)(i)	4	**1**	
1(b)(ii)	2 and 3.5 boxes drawn 16, 3 and 9 frequencies	**2**	**B1** **B1**
1(b)(iii)	Comedy	**1**	
1(b)(iv)	5	**1**	**FT** 14 − *their* music frequency
1(b)(v)	$\frac{52}{60}$ or equivalent fraction	**2**	**B1** for $\frac{8}{60}$ oe or 52 or 0.866 to 0.867
2(a)(i)	27360045	**1**	
2(a)(ii)	1, 2, 4, 5, 10, 20	**2**	**B1** for 4 or 5 correct factors
2(a)(iii)	$\frac{7k}{9k}$ where $k \neq 1$	**1**	
2(a)(iv)	31 or 37	**1**	
2(b)(i)	$17 - 3 \times (5 - 3) = 11$	**1**	
2(b)(ii)	$(3 + 2)^2 - 4 = 21$	**1**	
2(c)	17	**1**	

Question	Answer	Marks	Partial Marks
3(a)(i)	48	**3**	**B1** for 240 **M1** for $\frac{[their 240]}{10+2+3}[\times 3]$ soi by 16
3(a)(ii)	128	**2**	**M1** for $\frac{k}{15} \times their\ 240$ oe where $k = 2$, 10 or 8 or for *their* **(a)(i)** $\div 3 \times k$ oe where $k = 2$, 10 or 8
3(b)	84.7[0] or 84.69 to 84.7	**3**	**M2** for $600 \times \left(1+\frac{4.5}{100}\right)^3$ oe or **M1** for $600 \times \left(1+\frac{4.5}{100}\right)^2$ oe
3(c)	223.84	**3**	**M2** for $\frac{600 \times 0.864 - 325}{0.864}$ oe or better or **M1** for 600×0.864 or $\frac{325}{0.864}$
4(a)	Rhombus	**1**	
4(b)(i)	(0, –2)	**1**	
4(b)(ii)	136	**1**	
4(c)(i)	5.4	**1**	
4(c)(ii)	21.5 or 21.6	**1**	**FT** *their* **(c)(i)** × 4
4(d)(i)	Reflection *y*-axis oe	**2**	**B1** for each
4(d)(ii)	Rotation 180 oe (0, 0) oe	**3**	**B1** for each
4(e)	Triangle (1, –2) (1, –4) (6, –2)	**2**	**B1** for $\begin{pmatrix}1\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-2\end{pmatrix}$
5(a)	4 points correctly plotted	**2**	**B1** for 2 or 3 points correctly plotted
5(b)	(40, 18) indicated	**1**	
5(c)	Positive	**1**	
5(d)	Correct ruled line	**1**	
5(e)	76 to 80	**1**	**FT** their ruled line of best fit

Question	Answer	Marks	Partial Marks
6(a)	9	**2**	**M1** for $\left(1-\frac{1}{3}\right)\times 13.5$ oe or for $13.5-\left(\frac{1}{3}\times 13.5\right)$ oe or **B1** for 4.5[0]
6(b)(i)	1 45 pm	**1**	
6(b)(ii)	2 [h] 54 [min]	**1**	
6(b)(iii)	13	**2**	**M1** for 16 39 + 46 – 17 12 oe or **B1** for 17 25 or 33 seen
6(c)	Complete correct method	**M2**	**M2** for 0.62... and 0.58… or 0.59 and 0.57 [c/ml] oe or 1.60…or 1.61 and 1.70… and 1.75… [ml/c] oe or **M1** for one correct calculation or correct value
	Extra large	**A1**	
6(d)	19 47	**3**	**M1** for $\frac{76}{48}$ soi or for 18 12 + *their* time **A1** for 1 [h] 35 [min] or 95 [min] seen
7(a)	3300	**2**	**B1** for 11 cm seen
7(b)	117	**1**	
7(c)(i)	Correct ruled perpendicular bisector with 2 pairs of arcs	**2**	**B1** for correct bisector drawn without arcs or for two pairs of correct arcs
7(c)(ii)	*C* marked correctly	**2**	**M1** for clear attempt at a line south from *A*
7(d)	*D* marked correctly twice with correct arc(s) and line seen	**4**	**B1** for line indicating correct bearing of 320 measured **B2** for an arc radius 5.5, centre *A*, [meeting their bearing line at least once], or **B1** for an arc any radius, centre *A*, with *D* marked on it [meeting their bearing line at least once], or **B1** for a complete circle centre *A* of any radius, or **M1** for 1650 ÷ 300 If 0 scored **SC2** for *D* marked correctly within tolerance at least once with incorrect/no arc(s) and incorrect/no line seen

Question	Answer	Marks	Partial Marks
8(a)	Caroline cycles past Rob oe	**1**	
8(b)	9.6	**2**	**M1** for $\frac{8}{50}[\times 60]$
8(c)	Ruled line from (07 25, 0) to (08 45, 8)	**1**	
8(d)	08 00	**1**	
8(e)	Caroline William Rob	**1**	**FT** from William's straight line, provided it reaches at 8 km
9(a)(i)	Diameter	**1**	
9(a)(ii)	Chord	**1**	
9(b)	Angle [in] semi-circle [is 90]	**1**	
9(c)(i)	67.4 or 67.38…..	**2**	**M1** for $\cos[A=]\frac{20}{52}$ or better
9(c)(ii)	$\left[(BC)^2\right]=\sqrt{52^2-20^2}$	**M2**	**M1** for $20^2+(BC)^2=52^2$
9(c)(iii)	480	**2**	**M1** for $0.5\times 20\times 48$ or better
9(c)(iv)	582 or 581.8 to 582.0	**3**	**M1** for $\left[\frac{1}{2}\times\right]\pi\times\left(\frac{52}{2}\right)^2$ or better **M1** for *their* 338π – *their* **(c)(iii)**
10(a)(i)	– 4	**1**	
10(a)(ii)	$2x+k \quad k\neq 3$	**1**	
10(a)(iii)	(0, –5)	**1**	
10(a)(iv)	2.5	**2**	**M1** for $7=4k-3$ or better
10(b)(i)	1, –5, –3, 1, 7	**3**	**B2** for 4 correct **B1** for 3 correct
10(b)(ii)	Correct smooth curve	**4**	**B3FT** for 8 or 7 correct plots or **B2FT** for 5 or 6 correct plots or **B1FT** for 3 or 4 correct plots
10(b)(iii)	$(0.5, h)$ where $-5.5 \leqslant h < -5$	**1**	
10(b)(iv)(a)	Correct line of symmetry drawn	**1**	
10(b)(iv)(b)	$x=0.5$ oe	**1**	

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/32**

Paper 3 (Core) **May/June 2018**

MARK SCHEME

Maximum Mark: 104

Published

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Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	138	**1**	
1(a)(ii)	128	**1**	
1(b)(i)	135	**1**	
1(b)(ii)	121	**1**	
1(b)(iii)	134	**1**	
1(b)(iv)	125	**1**	
1(c)	24	**2**	**B1** for numerator of −24 or denominator of −1 or answer of –24
1(d)	$\frac{20\times\sqrt{9}}{30\div 6}$	**M1**	**M1** for all correct roundings
	12	**A1**	If 0 scored **SC1** for 3 correct roundings or 20.[0] and 9.0[0] and 30.[0] and 6.0[0]
2(a)	Trapezium	**1**	
2(b)	Enlargement [Scale factor] $\frac{1}{3}$ oe [Centre] (−5, −5)	**3**	**B1** for each
2(c)	$\frac{1}{9}$	**3**	**B2** for $\left(\frac{1}{3}\right)^2$ or **B1** for [shaded area] 13.5 or [area of A] 1.5 seen **M1** for $\frac{1.5}{their 13.5}$ oe
2(d)(i)	Image at (−6, 6),(−5, 6),(−5, 5), (−7, 5)	**2**	**B1** for image of A at $\begin{pmatrix}-4\\k\end{pmatrix}$ or $\begin{pmatrix}k\\7\end{pmatrix}$
2(d)(ii)	Image at (1, 1), (1, 2), (3, 2), (2, 1)	**2**	**B1** for 180° rotation with incorrect centre

Question	Answer	Marks	Partial Marks
2(d)(iii)	Image at (5, −2), (5, −1), (6, −1), (7, −2)	**2**	**B1** for reflection in $y = 2$ or in $x = k$
3(a)	7 : 4 : 5	**2**	**B1** for any correct ratio other than 21 : 12 : 15, not in simplest form
3(b)(i)	$\frac{7}{16}$ oe $\times 1248$	**B1**	
3(b)(ii)	[Mustapha] 312 [Joshua] 390	**2**	**B1** for each or **M1** for $\frac{1248}{21+12+15} \times k$ where $k = 12$ or 15 or $\frac{1248}{their7 + their4 + their5} \times k$ oe where $k = their\ 4$ or $their\ 5$
3(c)	2912	**2**	**M1** for 1248 ÷ 3 [× 7]
3(d)	13 500 – 0.16 × 13 500 − 500 or 0.84 × 13 500 − 500	**M2**	**M1** for 0.16 × 13 500 or 0.84 × 13 500 seen
3(e)(i)	3 × 12 × 340	**B1**	
3(e)(ii)	12.9 or 12.91 to 12.92	**3**	**M2** for $\frac{12240 - 10840}{10840}[\times 100]$ or $\frac{12240}{10840} \times 100[-100]$ or $\left(\frac{12240}{10840} - 1\right)[\times 100]$ or **M1** for 12240 – 10840 or $\frac{12240}{10840}$ oe
4(a)	−6 4 4 0	**2**	**B1** for 2 or 3 correct
4(b)	Correct smooth curve	**4**	**B3FT** for 7 or 8 correct plots or **B2FT** for 5 or 6 correct plots or **B1FT** for 3 or 4 correct plots
4(c)	$x = 2.5$ cao	**1**	
4(d)(i)	−2 1 5.5	**2**	**B1** for 2 correct
4(d)(ii)	Correct continuous ruled line from $x = -1$ to $x = 6$	**2**	**B1FT** for 2 or 3 correct plots
4(d)(iii)	[x =] −0.6 to −0.4 and 3.9 to 4.1	**2**	**B1FT** for each

Question	Answer	Marks	Partial Marks
5(a)	250	**2**	**B1** for 5 [cm] oe
5(b)	Correct point *E* joined to *A* and *D* with ruled lines and with arcs	**3**	**B2** for correct point *E* with arcs without lines or correct ruled shape without arcs or **B1** for drawing *AE* = 11 cm or drawing *DE* = 12 cm or correct point *E* without arcs and lines
5(c)(i)	Correct ruled bisector of angle *ABC* which reaches *DE* with two correct pairs of arcs	**B2**	**B1** for a correct ruled angle bisector with no/wrong arcs or two correct pairs of arcs
5(c)(ii)	Correct ruled perpendicular bisector of side *CD* which reaches *AE* with two correct pairs of arcs	**B2**	**B1** for a correct ruled perpendicular bisector with no/wrong arcs or two correct pairs of arcs
5(d)(i)	Constructed circle, centre 7 cm from *B* along bisector of *ABC*, with radius 3 cm	**3**	**3FT** along *their* **(c)(i)** **B1** for a circle, centre 7 cm from *B*, any radius **M1** for a circle, radius 3 cm seen anywhere
5(d)(ii)	942 or 943 or 942.4 to 942.6	**2**	**M1** for $(2 \times 150)\pi$ or 300π soi
6(a)	<table><tr><td></td><td>F</td><td>G</td><td>S</td><td>I</td><td>J</td><td>Tot</td></tr><tr><td>B</td><td></td><td>21</td><td></td><td></td><td>8</td><td></td></tr><tr><td>G</td><td>30</td><td></td><td></td><td>11</td><td></td><td>139</td></tr><tr><td>Tot</td><td>57</td><td></td><td>102</td><td></td><td>20</td><td></td></tr></table>	**3**	**B2** for 6 or 7 correct or **B1** for 3, 4 or 5 correct
6(b)(i)	$\frac{54}{\textit{their}139}$ oe isw	**1**	**FT** *their* table
6(b)(ii)	$\frac{46}{123}$ oe isw	**1**	
6(b)(iii)	$\frac{209}{262}$ oe isw	**1**	
6(c)(i)	[Chemistry] 80° [Physics] 155°	**2**	**B1** for each or if 0 scored **M1** for 125 ÷ 25 or 360 ÷ 72 or 5 If 0 scored **SC1** for the two angles adding to 235°

Question	Answer	Marks	Partial Marks
6(c)(ii)	Two correct lines on the pie chart	**2**	**2FT** only if **(c)(i)** angles total 235° **B1** for a correct sector of 125° or 80° or 155°
7(a)	10 10	**1**	
7(b)(i)	22.4	**1**	
7(b)(ii)	6.2	**2**	**2FT** *their* **(b)(i)** × 1000 ÷ (60 × 60) oe rounded to 1dp or **M1** for *their* **(b)(i)** × 1000 ÷ (60 × 60) oe or 5600 ÷ (15 × 60) oe
7(c)	Two correct ruled lines	**2**	**B1FT** for a line (09 55, 0) to (*their* **7(a)**, 5.6) **B1FT** for horizontal line (*their* **7(a)**, 5.6) to (*their* **7(a)** + 23, 5.6)
7(d)(i)	12	**2**	**M1** for 5.6 ÷ 28 [× 60]
7(d)(ii)	Correct line	**1**	**FT** line from (10 07, 0) to (10 07 + *their* **(d)(i)**, *their* 5.6)
7(e)(i)	Correct line	**1**	**FT** line from (*their* **7(a)** + 23, 5.6) to (10 54, 0)
7(e)(ii)	16	**2**	**2FT** 5.6 ÷ (*their* time in minutes) × 60 **M1** for 5.6 ÷ 21 [× 60] soi or for 5.6 ÷ (*their* time in minutes)[× 60]
8(a)(i)	116	**1**	
8(a)(ii)	32	**1**	**FT** (180 – *their* **(a)(i)**) ÷ 2
8(b)(i)	Pentagon	**1**	
8(b)(ii)	Angle [between] tangent [and] radius	**1**	
8(b)(iii)	108 Angles [on a straight] line [add up to] 180	**2**	**B1** for angle **B1** for reason
8(b)(iv)	72	**1**	

Question	Answer	Marks	Partial Marks
8(b)(v)	135	**4**	**B3FT** for (540 – (90 + *their* **(b)(iii)** + *their* **(b)(iv)**)) ÷ 2 oe OR **B2** for 540 or **M1** for (5 – 2) × 180 oe **M1** for (*P* – (90 + *their* **(b)(iii)** + *their* **(b)(iv)**)) ÷ 2 oe where *P* is any value >270
9(a)	20 nfww	**3**	**B2** for $6x - 4x = 28 + 12$ or better or **B1** for $6x - 12$ or $4x + 28$ or **B1FT** for correct $ax = b$ after incorrect expansions first step
9(b)(i)	$3a + 8b = 93$	**2**	**B1** for $3a + 8b$
9(b)(ii)	For correctly eliminating one variable	**M1**	For correct method to equate coefficients and eliminate one variable
	[*a* =] 7	**A1**	
	[*b* =] 9	**A1**	If 0 scored **SC1** for 2 values satisfying one of the original equations **SC1** if no working shown, but 2 correct answers given

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/33**

Paper 3 (Core) **May/June 2018**

MARK SCHEME

Maximum Mark: 104

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	Fri[day]	**1**	
1(a)(ii)	7	**1**	
1(a)(iii)	–5	**1**	
1(b)(i)	10 cao	**3**	**M2** for $\frac{6.5\times60}{39}$ oe or **M1** for distance ÷ speed
1(b)(ii)	1149	**4**	**M2** for (6.5 × 1000) ÷ (π × 1.8) oe or **M1** for π × 1.8 oe **A1** for 1149.3 to 1149.5 **B1** for *their* answer to at least 1dp truncated to the integer
1(c)	13 10	**3**	**M2** for [LCM=] 2 × 3 × 3 × 5 or 90 or **M1** for [30=] 2 × 3 × 5 or [45=] 3 × 3 × 5 OR **M2** for listing times or multiples to at least 13 10 or 90 or **M1** for adding times i.e. one correct addition e.g. 12 10
1(d)(i)	47	**1**	
1(d)(ii)	10 21	**1**	
1(e)	8	**2**	**M1** for 437 ÷ 62 oe implied by 7.04… or 7.05
2(a)	[star] 6 correct lines only	**2**	**B1** for 3 correct lines
	[rectangle] 2 correct lines only	**2**	**B1** for only 1 correct line or 2 correct lines and 1 wrong
2(b)	[x =] 66 [y =] 114	**2**	**B1** for one correct angle or for both angles adding to 180

Question	Answer	Marks	Partial Marks
2(c)	144	**3**	**M1** for 360 ÷ 10 soi by 36 **M1** for [y =] 180 – *their* 36 If 0 scored **SC2** for a correct interior angle of a regular polygon (greater than 90), providing not from wrong working
2(d)	[j =] 53 [k =] 37	**3**	**B2** for one correct angle or **B1** for 90 seen, marked on drawing in the correct place or for both angles adding to 90
2(e)	72	**3**	**M1** for (18 × 35) ÷ 2 implied by 315 **M1** for (18 × 27) ÷ 2 implied by 243
3(a)	51.5	**3**	**M2** for 4 × 8 + 9.5 + 10 oe or **B1** for two from 8 or 32, 9.5 and 10
3(b)	13.4[0]	**3**	**M2** for 4.2[0] + 2 × 2.8[0] + 2 × 1.8[0] oe or **M1** for two correct categories
3(c)	2.2[0]	**2**	**M1** for 6 × 1.3[0] implied by 7.8[0]
3(d)	27053	**1**	
3(e)	13.7 or 13.70 to 13.71	**3**	**M2** for $\frac{14100-12400}{12400}$[× 100] or $\frac{14100}{12400}\times 100$ [–100] or $\left(\frac{14100}{12400}-1\right)$[×100] or **M1** for 14100 – 12400 or $\frac{14100}{12400}$ oe
3(f)	2 9 1 5 6 4	**3**	**B1** for each pair of 29, 15 and 64
4(a)(i)	6	**1**	
4(a)(ii)	8.5	**2**	**M1** for $8x - 6x = 2 + 15$ or better
4(b)	$5(x - 3)$ final answer	**1**	
4(c)	$5x - 4y$ final answer	**2**	**B1** for $5x + ky$ or $kx - 4y$ (k could be 0)
4(d)	61	**2**	**B1** for 55 or 6 or **M1** for 5 × 11 – 2 × –3
4(e)	$p=\frac{H+3}{7}$ oe final answer	**2**	**M1** for correct first step
4(f)(i)	7	**1**	
4(f)(ii)	–10	**1**	

Question	Answer	Marks	Partial Marks
5(a)(i)	1	**1**	
5(a)(ii)	7	**1**	
5(a)(iii)	4 nfww	**2**	**M1** for 1 1 2 3 5 … or … 3 5 6 7 8 or 3 and 5 selected
5(b)(i)	50	**1**	
5(b)(ii)	3.28	**3**	**M1** for [0 × 5] + 1 × 7 + 2 × 8 + 3 × 10 + 4 × 6 + 5 × 4 + 6 × 5 + 7 × 3 + 8 × 2 oe implied by 164 **M1dep** for *their* 164 ÷ *their***(b)(i)**
5(c)(i)	23 38 114	**3**	**B1** for each or if 0 scored **M1** for 123 ÷ 41 or 54 ÷ 18 or 3
5(c)(ii)	correct line	**1**	
6(a)	–1 … –2 … –6 … 6 … 2 … 1	**3**	**B2** for 4 or 5 correct or **B1** for 2 or 3 correct
6(b)	correct smooth curves	**4**	**B3FT** for 9 or 10 points plotted correctly **B2FT** for 7 or 8 points plotted correctly **B1FT** for 5 or 6 points plotted correctly **FT** *their* table
6(c)	correct continuous ruled line	**1**	
6(d)	–1.2 oe	**1**	or **FT** *their* line and *their* graph
7(a)	Enlargement [centre] (3, –1) [s.f.] 2	**3**	**B1** for each
7(b)	Rotation [centre] (0, 0) oe 180° oe	**3**	**B1** for each
7(c)(i)	Correct translation points (–4, 3), (–1, 3), (–3, 7)	**2**	**B1** for a correct horizontal or vertical movement i.e. by $\begin{pmatrix}-6\\k\end{pmatrix}$ or $\begin{pmatrix}k\\5\end{pmatrix}$
7(c)(ii)	Correct reflection points (2, –4), (5, –4), (3, –8)	**2**	**B1** for a correct reflection in $y = k$
8(a)(i)	$\frac{6}{14}$ oe isw	**1**	
8(a)(ii)	$\frac{11}{14}$ oe isw	**1**	

Question	Answer	Marks	Partial Marks
8(a)(iii)	0 isw	**1**	
8(b)(i)	[0].18 oe	**2**	**M1** for [1 –] (0.46 + 0.22 + 0.14) oe
8(b)(ii)	Brown	**1**	
8(b)(iii)	7	**1**	
9(a)(i)	36	**1**	
9(a)(ii)	add 7 oe	**1**	
9(a)(iii)	$7n + 1$ oe final answer	**2**	**B1** for $7n + c$ or $kn + 1$ ($k \neq 0$) or $7n + 1$ or $8 + (n – 1)7$ spoilt
9(b)	11 14 19	**2**	**B1** for 2 correct If 0 scored **SC1** for 10, 11, 14
9(c)	n^3	**1**	

Cambridge Assessment International Education
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MATHEMATICS **0580/41**

Paper 4 (Extended) **May/June 2018**

MARK SCHEME

Maximum Mark: 130

Published

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- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

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Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)	$\frac{9}{9+7+4}\times 680$	**1**	
1(b)	238 136	**3**	**B2** for 238 or 136 or **M1** for $\frac{7}{9+7+4}\times 680$ oe or $\frac{4}{9+7+4}\times 680$ oe seen
1(c)	272	**2**	**M1** for 306 ÷ 1.125
1(d)	1.37	**3**	**M2** for $(17.56-5\times 2.69)\div 3$ or **M1** for $17.56-5\times 2.69$ or **B1** for 13.45 [cost of apples]
1(e)	40.8[0]	**3**	**3FT** for 0.3 × *their* 136 from part **(b)** or **M2** for *their* $136(\frac{1}{2}+\frac{1}{5})$ or better or **M1** for *their* $136\times\frac{1}{2}$ or *their* $136\times\frac{1}{5}$ or **B1** for 68 or 27.2 or $\frac{3}{10}$ or 0.3 seen
2(a)(i)	9	**1**	
2(a)(ii)	*ABCD* completed accurately with arcs	**2**	**M1** for intersecting arcs radius *their* 9 cm or for *ABCD* completed accurately with no arcs
2(b)	Correct ruled perpendicular bisector of *AB* with 2 correct pairs of arcs Correct ruled bisector of angle *ABC* with 2 correct pairs of arcs Lines intersecting	**4**	**B2** for correct ruled perpendicular bisector of *AB* with 2 correct pairs of arcs or **B1** for correct perpendicular bisector without/wrong arcs and **B2** for correct ruled bisector of angle *ABC* with 2 correct pairs of arcs or **B1** for correct bisector of angle *ABC* without/wrong arcs If lines do not intersect, max **B3**

Question	Answer	Marks	Partial Marks
3(a)	6.06 or 6.060 to 6.061	**3**	**M2** for $\frac{82500-77500}{82500}[\times 100]$ oe or **M1** for $\frac{77500}{82500}[\times 100]$ soi
3(b)	13 674 cao	**3**	**M1** for $12000\left(1+\frac{2.2}{100}\right)^6$ **A1** for 13673.7...
4(a)(i)	Translation $\begin{pmatrix}-8\\2\end{pmatrix}$ oe	**2**	**B1** for each
4(a)(ii)	Enlargement [sf =] $\frac{1}{2}$ oe $(-4, 0)$	**3**	**B1** for each
4(a)(iii)	Rotation 90° clockwise oe $(1, -1)$	**3**	**B1** for each
4(b)	Triangle with (1, –1), (5, –1), (1,7)	**2**	**B1** for correct size and orientation in wrong position or for 3 correct points not joined
5(a)(i)	$(2n+m)(m-3)$ final answer	**2**	**M1** for $m(2n+m)-3(2n+m)$ or $2n(m-3)+m(m-3)$
5(a)(ii)	$(2y-9)(2y+9)$ final answer	**1**	
5(a)(iii)	$(t-4)(t-2)$ final answer	**2**	**B1** for $(t-4)(t-2)$ seen and spoiled or **M1** for $t(t-2)-4(t-2)$ or $t(t-4)-2(t-4)$ or $(t+a)(t+b)$ where $a+b=-6$ or $ab=+8$
5(b)	$[x=]\frac{2m}{k+1}$	**4**	**M1** for $xk=2m-x$ or $k=\frac{2m}{x}-1$ **M1** for $xk+x=2m$ or $k+1=\frac{2m}{x}$ **M1** for $x(k+1)=2m$

Question	Answer	Marks	Partial Marks
5(c)	correctly eliminating one variable	**M1**	
	[x =] 6	**A1**	
	[y =] –2	**A1**	If 0 scored **SC1** for 2 values satisfying one of the original equations or **SC1** if no working shown, but 2 correct answers given
5(d)(i)	$3m-4(m+4)=6m(m+4)$	**M1**	or $\frac{3m-4(m+4)}{m(m+4)}[=6]$ oe
	$3m-4m-16=6m^2+24m$	**M1**	removes brackets correctly
	$6m^2+25m+16=0$	**A1**	with no errors or omissions
5(d)(ii)	$\frac{-25\pm\sqrt{(25)^2-4(6)(16)}}{2\times6}$ or $\frac{-25}{12}\pm\sqrt{\left(\frac{25}{12}\right)^2-\frac{16}{6}}$	**2**	**B1** for $\sqrt{(25)^2-4(6)(16)}$ or better or **B1** for $\left(m+\frac{25}{12}\right)^2$ and if in form $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ **B1** for p = –25 and r = 2(6)
	–0.79 and –3.38 final ans cao	**2**	**B1** for each **SC1** for –0.8 and –3.4 or for –0.78 and –3.37 or –0.789... and –3.377... or 0.79 and 3.38 or –0.79 and –3.38 seen in working
6(a)	4.79 or 4.788 to 4.789	**3**	**M2** for $\sqrt[3]{\frac{230\times3}{2\times\pi}}$ oe or **M1** for $230=\frac{2}{3}\times\pi\times r^3$ oe If 0 scored **SC1** for answer 3.8[0…]
6(b)(i)	8.7[0] or 8.702 to 8.704	**3**	**M2** for $(300-230)\div(1.6^2\pi)$ or **M1** for $\pi\times1.6^2\times h$
6(b)(ii)	6.4	**3**	**M2** for $1.6\times\sqrt[3]{\frac{19200}{300}}$ oe or **M1** for sf $\sqrt[3]{\frac{19200}{300}}$ or $\sqrt[3]{\frac{300}{19200}}$ oe or for $\left(\frac{1.6}{r}\right)^3=\frac{300}{19200}$

Question	Answer	Marks	Partial Marks
7(a)	$x = 0$	**1**	
7(b)	Tangent ruled at $x = 0.5$	**B1**	No daylight between tangent and curve at point of contact
	–9 to –6.5	**2**	**dep** on ruled tangent or close attempt at tangent at $x = 0.5$ **M1** for rise/run also dep on tangent or close attempt at tangent at $x = 0.5$
7(c)(i)	0 2.4 or better 4	**3**	**B1** for each
7(c)(ii)	Correct smooth curve	**4**	**B3FT** for 6 or 7 correct plots or **B2 FT** for 4 or 5 correct plots or **B1 FT** for 2 or 3 correct plots **FT** *their* table
7(d)	$x^3 + 3x + 4 = 10 - 8x^2$ and correctly completed	**1**	
7(e)	line $y = -2x + 2$ drawn and –0.45 to –0.35 nfww	**3**	**B2** for ruled $y = -2x + 2$ or **B1** for $-2x + 2$ seen or for line $y = -2x + c$ drawn or for $y = cx + 2$ ($c \neq 0$) drawn and **B1** for –0.45 to – 0.35 nfww
8(a)	18	**3**	**B2** for 20 nfww or **M1** for $8x + x = 180$ or better
8(b)	32	**3**	**B1** for angle $DBC = 58$ **B1** for angle $BCD = 90$
8(c)(i)	24	**2**	**B1** for angle $PRQ = 24$
8(c)(ii)	29.4 or 29.40 to 29.41	**3**	**M2** for $\frac{360-48}{360} \times 2 \times \pi \times 5.4$ or **B2** for answer (minor arc) 4.52 or 4.523 to 4.524… or **M1** for $\frac{48}{360} \times 2 \times \pi \times 5.4$
9(a)	$\frac{5}{8}$ $\frac{3}{8}$ $\frac{1}{6}$ $\frac{5}{6}$ $\frac{7}{10}$ $\frac{3}{10}$	**3**	**B1** for each pair

Question	Answer	Marks	Partial Marks
9(b)	$\frac{5}{48}$ oe	**2**	**M1FT** for *their* $\frac{5}{8} \times$ *their* $\frac{1}{6}$
9(c)	$\frac{304}{480}$ oe	**3**	**M2** for *their* $\frac{5}{8} \times$ *their* $\frac{5}{6}$ + *their* $\frac{3}{8} \times$ *their* $\frac{3}{10}$ oe or **M1** for *their* $\frac{5}{8} \times$ *their* $\frac{5}{6}$ or *their* $\frac{3}{8} \times$ *their* $\frac{3}{10}$
10(a)	75	**3**	**M2** for 79.5 ÷ 1.06 oe or **M1** for 79.5 associated with 106 [%]
10(b)	962.5 cao	**2**	**B1** for 35 or 27.5 seen
10(c)(i)	16	**1**	
10(c)(ii)	50	**1**	
10(c)(iii)	$\frac{4}{50}$ oe	**2**	**FT** *their* **(c)(ii)** for 1 or 2 marks **B1** for $\frac{4}{k}$, $k > 4$ or $\frac{k}{their 50}$, $k < 50$
10(c)(iv)	19	**1**	
11(a)(i)	12.6 or 12.64 to 12.65	**3**	**M2** for $12^2 + (-4)^2$ OR **B1** for $\begin{pmatrix} 12 \\ -4 \end{pmatrix}$ **M1** for $(their 12)^2 + (their - 4)^2$
11(a)(ii)	$\begin{pmatrix} -11 \\ 13 \end{pmatrix}$	**2**	**B1** for $\begin{pmatrix} -11 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 13 \end{pmatrix}$ or for $[\overrightarrow{BA} =] \begin{pmatrix} -8 \\ 7 \end{pmatrix}$
11(b)	$\frac{1}{2}$**(b − a)** oe	**2**	**M1** for correct route or correct unsimplified answer or **B1** for $\overrightarrow{QS}$ = **b** − **a** oe
11(c)(i)	$\begin{pmatrix} 9 & 50 \\ 10 & 69 \end{pmatrix}$	**2**	**B1** for 2 correct elements
11(c)(ii)	$\frac{1}{11}\begin{pmatrix} 8 & -5 \\ -1 & 2 \end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix} 8 & -5 \\ -1 & 2 \end{pmatrix}$ or $\frac{1}{11}\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ or det = 11 soi

Question	Answer	Marks	Partial Marks
12(a)	18 28	**2**	**B1** for each
12(b)	$3n + 3$ oe	**2**	**B1** for $3n + k$ oe or $cn + 3$ oe $c \neq 0$
12(c)	45	**2**	**M1** for identifying 7th pattern or **M1** for *their* $(3n + 3) = 24$
12(d)	$[a =]\frac{3}{2}$ oe $[b =]\frac{13}{3}$ oe	**6**	**M1** for any correct substitution e.g. $\frac{1}{6}(2)^3 + 2^2a + 2b$ **A1** for one of e.g. $\frac{1}{6} + a + b = 6$ oe $\frac{8}{6} + 4a + 2b = 16$ oe $\frac{27}{6} + 9a + 3b = 31$ oe $\frac{64}{6} + 16a + 4b = 52$ oe **A1** for another of the above **M1** for correctly eliminating one variable from *their* equations **A1** for $a = \frac{3}{2}$ **A1** for $b = \frac{13}{3}$ oe

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2018**

MARK SCHEME

Maximum Mark: 130

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	85	**1**	
1(a)(ii)	455	**2**	**M1** for 260 ÷ 20 × 35 oe
1(a)(iii)	61	**3**	**B2** for 61.5… seen or **M1** for 2000 ÷ 650 soi or for $\frac{x}{2000}=\frac{20}{650}$ oe or other attempt at scaling up with 650 or for 650 ÷ 20 oe
1(b)(i)	40	**3**	**M2** for $\frac{1.89-1.35}{1.35}$ [× 100] oe or $\frac{1.89}{1.35}\times 100$ oe or **M1** for oe $\frac{1.89}{1.35}$[×100] soi
1(b)(ii)	1.75 nfww	**3**	**M2** for $1.89 \div \left(\frac{100+8}{100}\right)$ or better or **M1** for 1.89 associated with 108 [%]
1(c)	10.1 or 10.06…	**3**	**M2** for $\sqrt[3]{\frac{20.8}{15.6}}$ oe or **M1** for $15.6\times k^3 = 20.8$ oe
1(d)(i)	14:15	**3**	**B2** for correct unsimplified 3 term ratio A: B: C or correct unsimplified two term ratio A : C or **M1** for attempt to find common multiple of 4 and 10 or other common value for B or for 7 × $\frac{4}{10}$ oe or 3 × $\frac{10}{4}$ oe

Question	Answer	Marks	Partial Marks
1(d)(ii)	147	**3**	**M2** for $\frac{45}{15}(14+20\,[+15])$ oe or $45 \div 3 \times 4 + (45 \div 3 \times 4) \div 10 \times 7\,[+45]$ or **M1** for $45 \div 3$ oe or $45 \div$ *their* **(d)(i)** value for C shown
2(a)(i)	$20\,[< t \leqslant]\,25$	**1**	
2(a)(ii)	$25\,[< t \leqslant]\,30$	**1**	
2(a)(iii)	28.3 or 28.33..	**4**	**M1** for 22.5, 27.5, 32.5, 37.5, 42.5 soi **M1** for $\sum fx$ where x is in the correct interval including boundaries **M1**dep for $\sum fx \div 120$ or $\sum fx \div (44 + 32 + 28 + 12 + 4)$
2(a)(iv)	$\frac{4}{120}$ oe isw	**1**	
2(b)(i)	76, 104, 116, 120	**2**	**B1** for one error FT other values or for 3 correct
2(b)(ii)	Correct curve	**3**	**B1** for correct horizontal placement for 6 plots **B1FT** for correct vertical placement for 6 plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points If 0 scored **SC1FT** for 5 out of 6 points correctly plotted
2(b)(iii)	27 to 27.5	**1**	
2(b)(iv)	8.5 to 9.5	**2**	**B1** for [UQ=] 32 to 32.5 or [LQ=] 23 to 23.5
2(b)(v)	8, 9, 10, 11 or 12	**2**	**B1** for 108 to 112 seen or **B1FT** *their* graph reading at 37 mins seen
3(a)(i)	Image at (3, – 3), (7, – 3), (7, – 5)	**2**	**B1** for reflection in any $x = k$ or if 3 correct points not joined
3(a)(ii)	Image at (– 5, 1), (– 1, 1), (– 5, – 1)	**2**	**B1** for translation by $\begin{pmatrix}-2\\k\end{pmatrix}$ or $\begin{pmatrix}k\\4\end{pmatrix}$ or if 3 correct points not joined

Question	Answer	Marks	Partial Marks
3(a)(iii)	Image at (6, 3), (6, 4), (4, 3)	**3**	**B2** for correct size and orientation but wrong position or if 3 correct points not joined **B1** for enlargement SF ½ with centre (3, 1)
3(b)	Rotation 90° [anticlockwise]oe (– 6, – 2)	**3**	**B1** for each
3(c)	Reflection $y = -x$ oe	**2**	**B1** for each
4(a)(i)	$243p^{10}$ final answer	**2**	**B1** for answer $243p^{k}$ or kp^{10} $(k \neq 0)$
4(a)(ii)	$9xy^{4}$ final answer	**2**	**B1** for answer with two correct elements in correct form of expression
4(a)(iii)	$\frac{m^2}{25}$ final answer	**1**	
4(b)	10	**4**	**B2** for $x = 8$ or for [length of rectangle =] 31 or **M1** for $5x - 9 = 3x + 7$ oe or better **M1** for $\frac{310}{(3 \times their x + 7)}$ or $\frac{310}{(5 \times their x - 9)}$ <u>Alt method using simultaneous eqns</u> **M1** for $5xw - 9w = 310$ **and** $3xw + 7w = 310$ **M1** for equating coefficients of xw **M1** for subtraction to eliminate term in xw
5(a)	$8^2 + 7^2 - 2 \times 7 \times 8 \times \cos 78$ oe	**M2**	**M1** for correct implicit version
	9.471.. to 9.472	**A2**	**A1** for 89.7…
5(b)	46.3 or 46.29 to 46.30…	**3**	**M2** for $[\sin OAC =]\frac{7 \sin 78}{9.47}$ or **M1** for $\frac{\sin OAC}{7} = \frac{\sin 78}{9.47}$

Question	Answer	Marks	Partial Marks
5(c)	29.5 – (7 + 8 + 9.47)	**M1**	
	$\frac{360\times(29.5-(7+8+9.47))}{2\times\pi\times7}$	**M3**	**M2** for $\frac{x}{360}\times2\times\pi\times7$ = *their* arc length oe or **M1** for $\frac{x}{360}\times2\times\pi\times7$ oe
	41.15 to 41.171..	**B1**	
5(d)	45[.0] or 44.98 to 45.01 nfww	**4**	**M3** for ½ × 8 × 7 × sin 78 oe + $\frac{41.2}{360}\times\pi\times7^2$ oe OR **M1** for ½ × 8 × 7 × sin 78 oe or ½ × 8 × 9.47 × sin *their* **(b)** oe **M1** for $\frac{41.2}{360}\times\pi\times7^2$ oe
6(a)	– 2[.0], – 0.2, 2.5	**3**	**B1** for each
6(b)	Fully correct curve	**5**	**B4** for correct curve, but branches joined or **B3FT** for 9 or 10 correct plots or **B2FT** for 7 or 8 correct plots or **B1FT** for 5 or 6 correct plots and **B1 indep** two separate branches not touching or cutting *y*-axis
6(c)(i)	Correct tangent and 3 ⩽ grad ⩽ 5	**3**	**B2** for close attempt at tangent to curve at $x = -2$ **and** answer in range OR **B1** for ruled tangent at $x = -2$, no daylight at $x = -2$ and **M1dep** (dep on **B1** or close attempt at tangent) [at $x = -2$] for $\frac{rise}{run}$
6(c)(ii)	[*y* =] *their***(c)(i)** *x* + *their y*-intercept final answer	**2**	**Strict FT** *their y*-intercept for *their* line **M1** for *y* = *their***(c)(i)** *x* + *any value* or '*c*' oe seen or for *y* = *any value*(non-zero) *x* or '*mx*' + *their y*-intercept seen oe
6(d)(i)	1.05 to 1.25	**1**	
6(d)(ii)	– 2.3 to – 2.2 – 0.4 to – 0.3 0.3 to 0.4	**3**	**B1** for each After 0 scored **B1** for *y* = –4 ruled

Question	Answer	Marks	Partial Marks
6(e)	[a =] 2 [b =] 24 [n =] 5	**3**	**B2** for 2 correct or for $2x^5 + 24x^2$ [–3 = 0] or **B1** for 1 correct or for $\frac{2x^5 - 3 + 4(6x^2)}{6x^2}$ [= 0] oe If 0 scored **SC1** for $2x^5$ seen in final line of algebra
7(a)	$x^2 + (2x – 3)^2 = 6^2$ oe or $x^2 + 4x^2 – 6x – 6x + 9 = 36$	**M1**	
	$4x^2 – 6x – 6x + 9$ or better	**B1**	
	$5x^2 – 12x – 27 = 0$	**A1**	Dep on **M1B1** with no errors or omissions
7(b)	$\frac{-(-12) \pm \sqrt{(-12)^2 - 4(5)(-27)}}{2 \times 5}$ or better or $\frac{12}{10} \pm \sqrt{\left(\frac{12}{10}\right)^2 + \frac{27}{5}}$	**B2**	**B1** for $\sqrt{(-12)^2 - 4(5)(-27)}$ or for $\left(x - \frac{12}{10}\right)^2$ oe or $\frac{-(-12) + \sqrt{q}}{2 \times 5}$ oe or $\frac{-(-12) - \sqrt{q}}{2 \times 5}$ oe or both
	– 1.42, 3.82 final answers	**B2**	**B1** for each If **B0**, **SC1** for answers – 1.4 or –1.415… to – 1.415 **and** 3.8 or 3.815 to 3.815… or answers –1.41 and 3.81 or – 1.42 **and** 3.82 seen in working or for –3.82 and 1.42 as final ans
7(c)	14.4 or 14.5 or 14.44 to 14.46	**2**	**2FT** for 3 × *their* positive root + 3 evaluated to 3sf or better **M1** for 3 × *their* positive root + 3 oe
7(d)	39.5 or 39.46 to 39.54…	**2**	**M1** for trig statement seen to find either angle sin = $\frac{\textit{their } x}{6}$ oe or sin = $\frac{\textit{their}(2x-3)}{6}$ oe
8(a)(i)	1	**2**	**M1** for h(0) or for 2^{8-3x}
8(a)(ii)	8	**2**	**M1** for g(¼) or for $\frac{10}{2^x + 1}$

Question	Answer	Marks	Partial Marks
8(a)(iii)	$\frac{10-x}{x}$ or $\frac{10}{x}-1$ final answer	**3**	**M2** for $x = \frac{10-y}{y}$ or better or $xy = 10 - x$ or better or $y + 1 = \frac{10}{x}$ or **M1** for $x(y + 1) = 10$ or $y(x + 1) = 10$ or $x = \frac{10}{y+1}$ or $x + 1 = \frac{10}{y}$
8(a)(iv)	5	**1**	
8(b)	$\frac{-3x^2+5x+18}{x+1}$ final answer	**3**	**M1** for $\frac{(8-3x)(x+1)+10}{x+1}$ **B1** for $-3x^2 - 3x + 8x + 8$ [+10]
9(a)(i)(a)	62 and Isosceles [triangle] and Angle at centre is twice angle at circumference oe	**3**	**B2** for 62 and one correct reason or **B1** for 62 with no/wrong reason or for angle *EOD* = 124 soi or for no/wrong angle with correct reason
9(a)(i)(b)	62 and [Angles in] same segment oe or angle at centre is twice angle at circumference oe	**2**	**2FT** *their* **(a)(i)(a)** and correct reason **B1FT** for *their* **(a)(i)(a)** with no/wrong reason or for no/wrong angle with correct reason
9(a)(ii)	8	**3**	**M2** for (180 –109) – 28 – 35 oe or **M1** for [angle *AED* =] 180 – 109 oe
9(b)(i)	24	**3**	x = ext angle **B2** for [x =] 15 isw or **M1** for $x + 11x = 180$ oe or for $\frac{180(n-2)}{[n]} = \frac{360}{[n]} \times 11$
9(b)(ii)	3960	**2**	**FT** (*their* 24 – 2) × 180 dep on **(b)(i)** an integer and > 6 **M1** for (*their* 24 – 2) × 180 oe or *their* 24 × 11 × *their* 15 oe or 11 × 360

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MATHEMATICS **0580/43**

Paper 4 (Extended) **May/June 2018**

MARK SCHEME

Maximum Mark: 130

Published

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Abbreviations
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Partial Marks
1(a)(i)	13.5	**3**	**M2** for $\frac{45.4[0]-40}{40}$ [$\times 100$] or $\frac{45.4[0]}{40} \times 100$ or **M1** for $\frac{45.4[0]}{40}$ [$\times 100$]
1(a)(ii)	35.5[0]	**3**	**M2** for $42.6[0] \div \left(1+\frac{20}{100}\right)$ or better or **M1** for recognising 42.6[0] as 120[%]
1(b)	150 cao	**2**	**M1** for $\frac{500\times 2\times 15}{100}$ oe
1(c)(i)	7800 cao	**3**	**B2** for 7790 or 7785 to 7786 or **M1** for $21000\times\left(1-\frac{18}{100}\right)^5$ oe isw If 0 or 1 scored, **SC1** for *their* 7785… seen and rounded correctly to nearest 100
1(c)(ii)	9[.00…]	**3**	**M2** for $\sqrt[12]{\frac{42190}{15000}}$ or better or **M1** for $15000\left(1+\frac{x}{100}\right)^{12}=[42190]$
2(a)(i)	1, ….., ….., …., 16	**2**	**B1** for each
2(a)(ii)	14, ….., ….., …., – 2	**2**	**B1** for each
2(b)	Fully correct smooth curves	**6**	**B3** for correct curve of $y=2^x$ or **B2FT** for 4 or 5 correct points or **B1FT** for 2 or 3 correct points **B3** for correct curve of $y=14-x^2$ or **B2FT** for 4 or 5 correct points or **B1FT** for 2 or 3 correct points
2(c)(i)	3.5 to 3.7	**1**	
2(c)(ii)	2.65 to 2.8	**1**	

Question	Answer	Marks	Partial Marks
2(d)(i)	Correct line	**1**	Ruled, through (4, 2) and gradient −4
2(d)(ii)	Tangent (2, 10)	**2**	**B1** for each
3(a)(i)	Positive	**1**	Ignore strong, weak, etc.
3(a)(ii)	Correct ruled line	**1**	
3(a)(iii)	2	**1**	
3(b)	[mode =] 0 [median =] 1 [mean =] 1.04 or 1.041 to 1.042	**5**	**B1** **B1** **B3** or **M2** for ([10 × 0] + 8 × 1 + 3 × 2 + 2 × 3 + [0 × 4] + 1 × 5) ÷ 24 oe or **M1** for [10 × 0] + 8 × 1 + 3 × 2 + 2 × 3 + [0 × 4] + 1 × 5 oe
3(c)(i)	60.9 or 60.91... nfww	**4**	**M1** for 49, 57, 71 correct **M1** for use of Σfx with x in the correct interval including both boundaries **M1** (dep on 2nd **M1**) for *their* (78 × 49 + 180 × 57 + 162 × 71) ÷ (78 + 180 + 162)
3(c)(ii)	Correct histogram	**4**	**B1** for correct widths in correct position **B1** height 13 **B1** height 18 **B1** height 9 If 0 scored **B1** for 13, 18 and 9 seen
4(a)(i)	$\frac{8}{20}$ oe	**3**	**M2** for $\frac{2}{5}\times\frac{1}{4}+\frac{3}{5}\times\frac{2}{4}$ or **M1** for one of these products OR **M1** for probability tree identifying all 20 outcomes with the correct 8 identified OR **M1** for completed possibility space / 2-way table identifying the 8 possible outcomes out of 20, oe **SC1** for $\frac{13}{25}$ with replacement

Question	Answer	Marks	Partial Marks
4(a)(ii)	$\frac{9}{25}$ oe	**3**	**M2** for $\frac{2}{5}\times\frac{3}{5}+\frac{3}{5}\times\frac{1}{5}$ oe or **M1** for one of these products OR **M1** for probability tree identifying all 25 outcomes with the correct 9 identified OR **M1** for completed possibility space / 2-way table identifying the 9 possible outcomes out of 25, oe
4(a)(iii)	Jojo and e.g. $\frac{40}{100}>\frac{36}{100}$	**1**	**1FT** *their* **(i)** and **(ii)** dep on being in range 0 to 1
4(b)	$\frac{24}{60}$ oe	**3**	**M2** for $\frac{2}{5}\times\frac{3}{4}\times\frac{1}{3}+\frac{3}{5}\times\frac{2}{4}\times\frac{1}{3}+\frac{3}{5}\times\frac{2}{4}\times\frac{2}{3}$ oe or **M1** for any one correct product OR **M1** for 4, 5, 4 and 5, 4, 4 and 5, 5, 4 clearly identified on a tree or in a list
5(a)	15.6[0]	**4**	**B3** for $20\,900x = 326\,040$ or better or **M2** for $18\,500x + 2400(x - 2.5[0]) = 320\,040$ or **M1** for $18\,500x$ or $2400(x - 2.5[0])$
5(b)(i)	$(y+12)(y-7)$ final answer	**2**	**B1** for $(y+a)(y+b)$ where $ab = -84$ or $a+b=5$ or $y(y+12)-7(y+12)$ or $y(y-7)+12(y-7)$
5(b)(ii)	38 cao	**3**	**B2** for $y = 7$ or **M1** for $y(y+5) = 84$ oe
5(c)(i)	$168(m-0.75)+207m = 100m(m-0.75)$ oe OR $207 = 100m - 168 - 75 + \frac{126}{m}$	**M2**	May be all over common denominator **M1** for $\frac{168}{m}$ or $\frac{207}{m-0.75}$ used
	at least one interim line leading to $50m^2 - 225m + 63 = 0$	**A1**	No errors or omissions

Question	Answer	Marks	Partial Marks
5(c)(ii)	$(10m-3)(5m-21)$ OR $m=\frac{-(-225)\pm\sqrt{(-225)^2-4(50)(63)}}{2(50)}$ oe OR $m=\frac{225}{100}\pm\sqrt{\left(\frac{225}{100}\right)^2-\frac{63}{50}}$ oe	**B2**	**M1** for $(10m+a)(5m+b)$ where $ab=63$ or $5a+10b=-225$ or $10m(5m-21)-3(5m-21)$ or $5m(10m-3)-21(10m-3)$ OR **M1** for $\sqrt{(-225)^2-4(50)(63)}$ or for $p=-(-225)$, $r=2(50)$ if in form $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$ OR **M1** for $\left(m-\frac{225}{100}\right)^2$ oe
	4.2[0] cao	**B1**	
6(a)(i)	116.6 or 116.56 to 116.57	**4**	**M1** for $\sin[EAD]=\frac{6}{12}$ oe **M1** for $\tan[BAC]=\frac{6}{12}$ oe **B1** for [angle DAC] = 60
6(a)(ii)	13.4 or 13.41 to 13.42	**2**	**M1** for 12^2+6^2
6(a)(iii)	10.4 or 10.39…	**3**	**M2** for $\sqrt{12^2-6^2}$ or **M1** for $AE^2+6^2=12^2$
6(a)(iv)	130 or 129.5… to 129.6	**4**	**M1** for $0.5\times6\times theirAE$ oe **M1** for $0.5\times12\times12\times\sin60$ oe **M1** for $0.5\times6\times12$ oe
6(b)(i)	3	**1**	
6(b)(ii)	51.3 or 51.30 to 51.34…	**4**	**M3** for tan = $\frac{8}{\sqrt{4^2+5^2}}$ or sin = $\frac{8}{\sqrt{4^2+5^2+8^2}}$ oe or **M2** for $\sqrt{4^2+5^2}$ or $\sqrt{4^2+5^2+8^2}$ or **M1** for angle ARB clearly indicated
7(a)	204 or 203.5 to 203.6… nfww	**4**	**M2** for $\pi\times1.5^2\times8\times60\times60$ or **M1** for $\pi\times1.5^2$ **M1** for dividing *their* volume by 1000 If 0 scored **SC1** for an answer figs 204 or figs 2035 to 2036 without working
7(b)(i)	$\pi\times6\times12+\pi\times6^2=108\pi$	**M2**	**M1** for $\pi\times6\times12$

Question	Answer	Marks	Partial Marks
7(b)(ii)	[x =] 5.2[0] or 5.196… [y =] 6	**4**	**B2** or **M1** for $4\pi x^2 = 108\pi$ seen **B2** or **M1** for $\frac{1}{2}(4\pi y^2) + \pi y^2$ or better seen
8(a)(i)	× ✓ ✓ × × ✓	**4**	**B3** for 5 correct **B2** for 4 correct **B1** for 3 correct
8(a)(ii)	$\begin{pmatrix}5\\3\end{pmatrix}$	**1**	Fraction line and/or missing brackets scores 0
8(a)(iii)	$\begin{pmatrix}4 & 8\\1 & 2\end{pmatrix}$	**2**	**B1** for 2 or 3 correct elements (dep on 2 × 2 matrix)
8(a)(iv)	$\frac{1}{2}\begin{pmatrix}3 & -1\\-4 & 2\end{pmatrix}$ oe isw	**2**	**B1** for $k\begin{pmatrix}3 & -1\\-4 & 2\end{pmatrix}$ or determinant = 2 soi
8(b)	Rotation Origin oe 90 [anticlockwise] oe	**3**	**B1** for each
9(a)	$y = -2x + 5$ oe	**3**	**B2** for $-2x + 5$ or **M1** for gradient = $-1 \div \frac{1}{2}$ or better **M1** for substituting (1, 3) into y = (*their m*)$x + c$ oe If 0 scored **SC1** for (1, 3) satisfying their wrong equation ($c \neq 0$) with gradient $\neq \frac{1}{2}$
9(b)(i)	$x \geqslant 2$ oe $y \leqslant 5$ oe $y \geqslant \frac{1}{2}x$ oe	**4**	**SC3** for $x > 2$ and $y < 5$ and $y > \frac{1}{2}x$ OR **B1** for $x \geqslant 2$ **B1** for $y \leqslant 5$ **B2** for $y \geqslant \frac{1}{2}x$ or **M1** for $y \geqslant kx$ ($k > 0$) OR **SC2** for all three boundary lines identified but with incorrect sign(s) If 0 scored **SC1** for one or two correct boundary lines with incorrect sign(s)

Question	Answer	Marks	Partial Marks
9(b)(ii)	(5, 4)	**2**	**M1** for one trial of an integer point inside region or for $3x + 5y = 35$ drawn
10(a)(i)	26	**2**	**M1** for g(5) or for $\left(x^2 + 1\right)^2 + 1$
10(a)(ii)	$x^2 + 4x + 5$	**2**	**M1** for $\left(x + 2\right)^2 + 1$
10(a)(iii)	5	**2**	**M1** for $2x - 3 = 7$
10(a)(iv)	$\frac{x+3}{2}$ oe	**2**	**M1** for $x = 2y - 3$ or $y + 3 = 2x$ or $\frac{y}{2} = x - \frac{3}{2}$ oe
10(b)(i)	[0].70 cao	**2**	**B1** for [0].696 to [0].697
10(b)(ii)	4 cao	**1**	

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CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

4402966707

MATHEMATICS **0580/11**

Paper 1 (Core) **May/June 2018**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 56.

This document consists of **10** printed pages and **2** blank pages.

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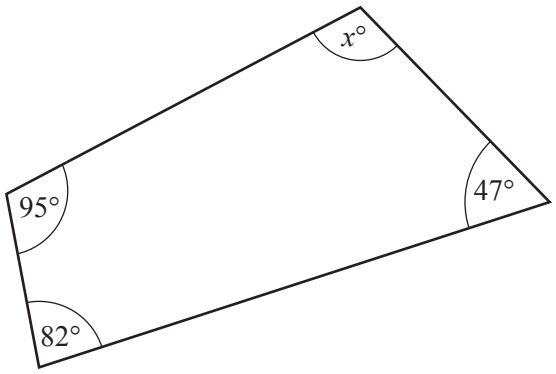
1 Write 4647 correct to the nearest 100.

..... [1]

2 Write 0.007 as a fraction.

..... [1]

3 The diagram shows a quadrilateral.



NOT TO SCALE

Find the value of x.

$x =$ ..... [1]

4 The nth term of a sequence is $5n - 3$.

Write down the first three terms of the sequence.

..... , ... , ... [1]

5 **(a)** Write 0.002 68 correct to 2 significant figures.

..... [1]

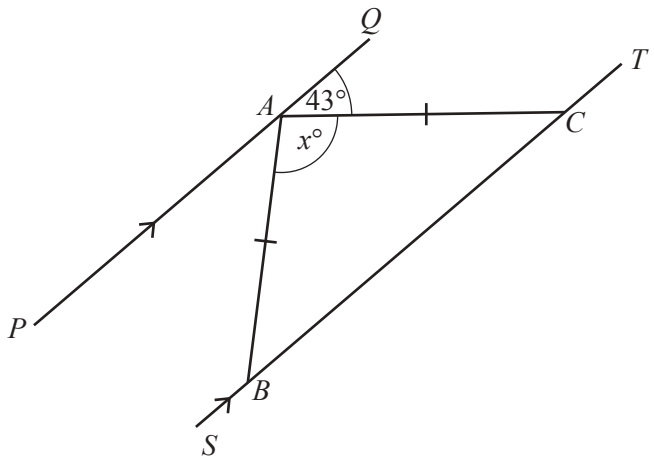
(b) Write 0.000 038 7 in standard form.

..... [1]

6 Find the value of $7x + 3y$ when $x = 12$ and $y = -6$.

..... [2]

7



NOT TO SCALE

The diagram shows two parallel lines PAQ and $SBCT$.
$AB = AC$ and angle $QAC = 43°$.

Find the value of x.

$x =$ ..... [2]

8 Solve the equation $8x - 5 = 7$.

$x =$ ..... [2]

9 **(a)** Change 6.54 kilometres into metres.

..... m [1]

(b) Change 7850 cm^3 into litres.

..... litres [1]

10 The height, h metres, of a boy is 1.72 m, correct to the nearest centimetre.

Complete this statement about the value of h.

..... $\leqslant h <$ ..... [2]

11 Expand and simplify.

$$6(2y - 3) - 5(y + 1)$$

..... [2]

12 $\mathbf{g} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}$ $\mathbf{h} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$

Write as a single vector

(a) $\mathbf{g} + \mathbf{h}$,

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b) $-\mathbf{h}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

13 Work out the lowest common multiple (LCM) of 18 and 21.

..... [2]

14 Work out the size of one exterior angle of a regular octagon.

..... [2]

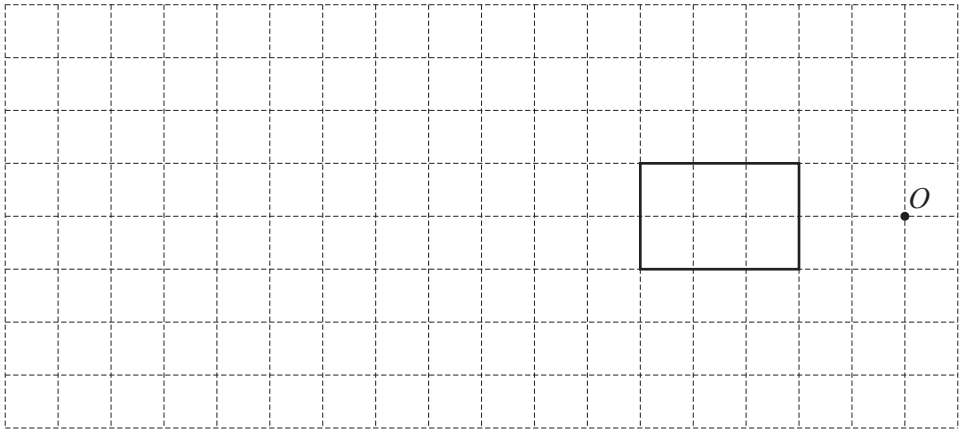
15 **(a)** Calculate $\sqrt{2.38 + 6.4^2}$, writing down your full calculator display.

..... [1]

(b) Write your answer to **part (a)** correct to 4 decimal places.

..... [1]

16 Enlarge the rectangle using a scale factor of 3 and centre of enlargement O.



[2]

17 **(a)** A box contains 3 blue pens, 4 red pens and 8 green pens only.
A pen is chosen at random from the box.

Find the probability that this pen is green.

..... [1]

(b) A cube has only one of its six faces painted yellow.
This cube is rolled 240 times.

Work out the expected number of times that it lands on the yellow face.

..... [1]

18 **(a)** Simplify.

$(x^3)^4$

..... [1]

(b) $4^w = \frac{1}{16}$

Find the value of w.

$w =$ ..... [1]

19 π 3^{-2} $3\frac{4}{7}$ 33.3% $\sqrt{3}$ 0.3 3^{999}

From this list, write down the two numbers that are irrational.

..... , ... [2]

20 **(a)** Here is a description of a quadrilateral.

It has 4 right angles.
It has 2 lines of symmetry.
It has rotational symmetry of order 2.

Write down the mathematical name of this quadrilateral.

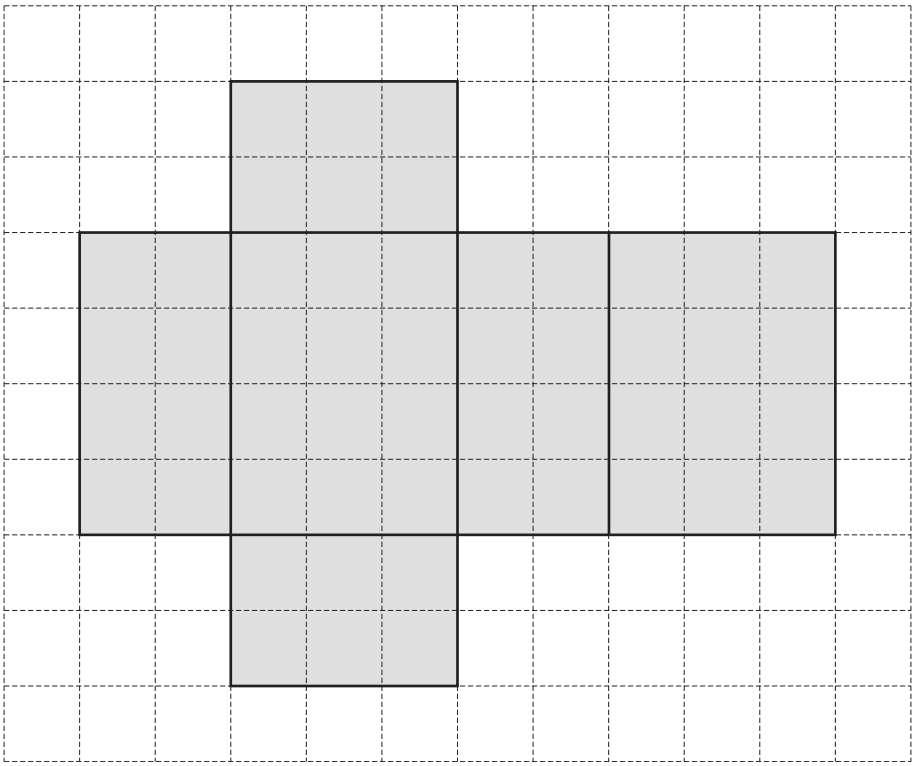
..... [1]

(b) Write down two geometrical properties of a parallelogram.

1. .....

2. ..... [2]

21 The net of a solid is drawn on a 1 cm^2 grid.



(a) Write down the name of the solid made from this net.

..... [1]

(b) Work out the volume of this solid.

..... cm^3 [2]

22 Factorise completely.

(a) $10 + 16w$

..... [1]

(b) $12tx - 8t^2$

..... [2]

23 **Without using your calculator**, work out $1\frac{3}{4} \times \frac{6}{35}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

24 Solve the simultaneous equations.
You must show all your working.

$$3x + 10y = 106$$
$$5x - 4y = 1$$

$x =$ .....

$y =$ ..... [4]

25 40 people were asked how many times they visited the cinema in one month.
The table shows the results.

Number of cinema visits	0	1	2	3	4	5	6	7
Frequency	5	5	6	6	7	3	6	2

(a) **(i)** Find the mode.

..... [1]

(ii) Calculate the mean.

..... [3]

(b) Omar wants to show the information from the table in a pie chart.

Calculate the sector angle for the people who visited the cinema 5 times.

..... [2]

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4720235339

MATHEMATICS **0580/12**

Paper 1 (Core) **May/June 2018**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 56.

1 One morning, Marcia works from 08 20 to 11 15.

Find how long she works for.
Give your answer in hours and minutes.

..... h ..... min [1]

2 Simplify.

$7g - g + 2g$

..... [1]

3 Expand.

$7(x - 8)$

..... [1]

4 Find the value of p when $5^p \div 5^8 = 5^{13}$.

$p =$ ..... [1]

5 22 17 25 41 39 4

Work out the difference between the two prime numbers in the list above.

..... [2]

6 Here is a sequence.

a, 13, 9, 3, –5, –15, b, …

Find the value of a and the value of b.

$a =$ .....

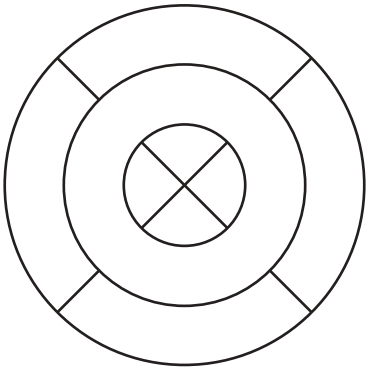
$b =$ ..... [2]

7 The bearing of a lighthouse from a coastguard station is 113°.

Work out the bearing of the coastguard station from the lighthouse.

..... [2]

8



For this diagram, write down

(a) the number of lines of symmetry,

..... [1]

(b) the order of rotational symmetry.

..... [1]

9 Write these numbers in order, starting with the smallest.

5^{-2} $\frac{1}{27}$ $\frac{2}{55}$ 0.038

..... < ..... < ..... < .....[2]
smallest

10 Factorise completely.

$4xy^2 - 6y^3$

..... [2]

11 Here are some numbers written in standard form.

3.4×10^{-1} 1.36×10^{6} 7.9×10^{0} 2.4×10^{5} 5.21×10^{-3} 4.3×10^{-2}

From these numbers, write down

(a) the largest number,

..... [1]

(b) the smallest number.

..... [1]

12 $\mathbf{a} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -7 \\ -3 \end{pmatrix}$

Work out $\mathbf{a} + 3\mathbf{b}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

13 Make y the subject of the equation $5x - 2y + 7 = 0$.

$y =$ ..... [2]

14 Change 600 euros into dinars when the exchange rate is 1 euro = 0.429 dinars.
Give your answer correct to the nearest dinar.

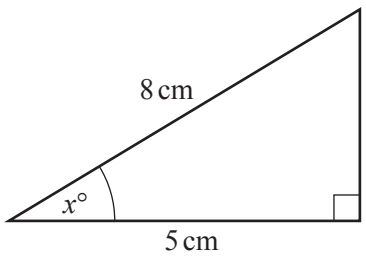
..... dinars [2]

15 Complete these statements.

(a) When $w =$ ..... , $10w = 70$. [1]

(b) When $5x = 15$, $12x =$ ..... [1]

16

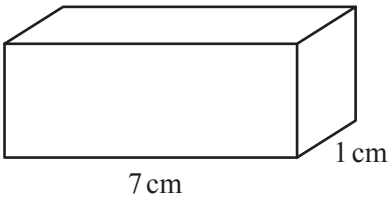


NOT TO SCALE

Use trigonometry to calculate the value of x.

$x =$ ..... [2]

17



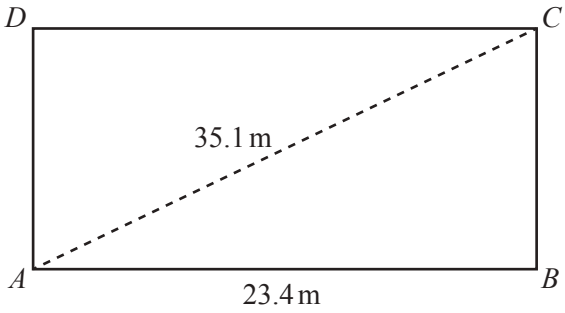
NOT TO SCALE

The diagram shows a solid cuboid with base area $7\,cm^2$.
The volume of this cuboid is $21\,cm^3$.

Work out the total surface area.

..... cm^2 [3]

18



NOT TO SCALE

The diagram shows a rectangular playground $ABCD$.
$AB = 23.4\,m$ and $AC = 35.1\,m$.

Calculate BC.

$BC =$ ..... m [3]

19 Friedrich borrows \$1200 for 3 years at a rate of 5.6% per year compound interest.

Work out the total amount he pays back at the end of the 3 years.

\$ ..... [3]

20 A cylindrical glass has radius 3.6 cm and height 11 cm.
It is filled with water.

(a) Calculate, in cubic centimetres, the volume of water it contains.

..... cm^3 [2]

(b) Write your answer to **part (a)** in litres.

..... litres [1]

21 The cost of hiring a car for 12 days is $167.90.
The cost of hiring this car for the first day is $20.50.

Work out the cost per day for the remaining 11 days.

$ ..... [3]

22

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
67	75	53	68	94	87

The table shows the number of customers in a restaurant on each day it is open during one week.

(a) Write down the day most customers came into the restaurant.

..... [1]

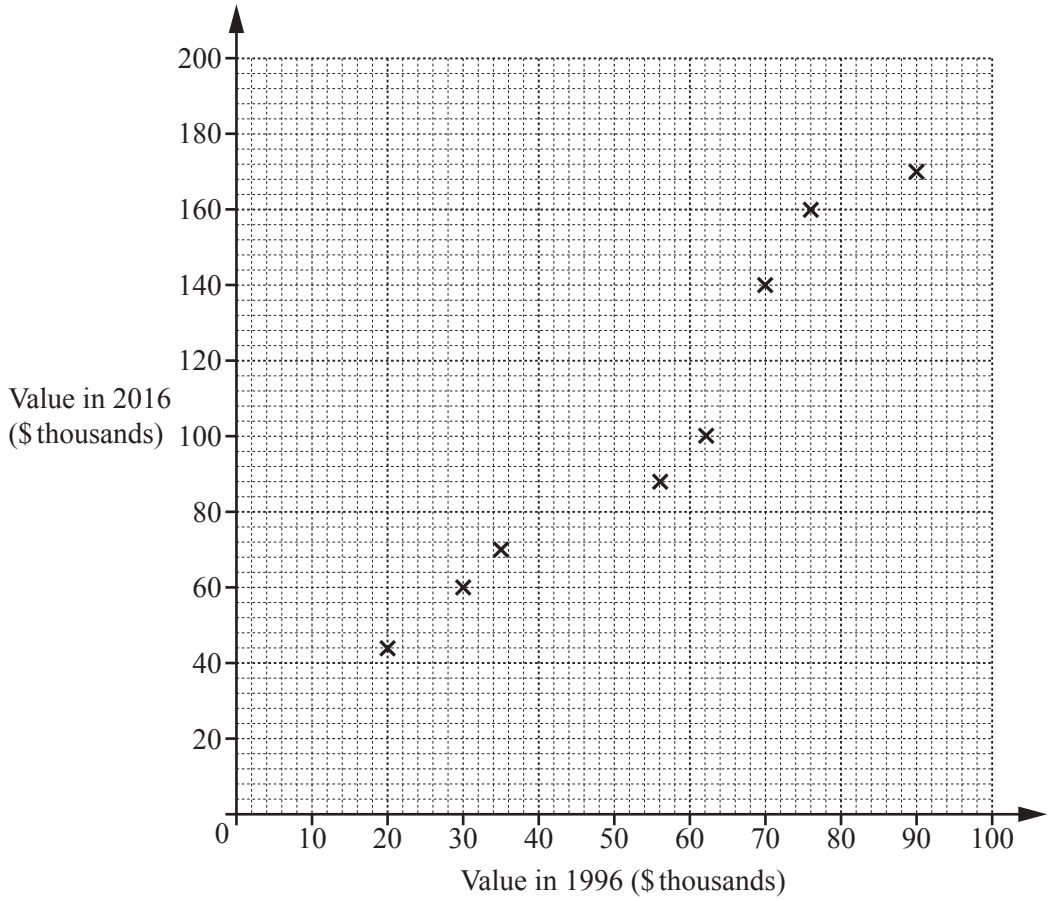
(b) Calculate the mean number of customers per day.

..... [2]

(c) Find the range of the number of customers.

..... [1]

23 The scatter diagram shows the value, in thousands of dollars, of eight houses in 1996 and the value of the same houses in 2016.



(a) One of these eight houses had a value of $70 000 in 1996.

Write down the value of this house in 2016.

$ ..... [1]

(b) The values of two more houses are shown in the table.

Value in 1996 ($ thousands)	40	80
Value in 2016 ($ thousands)	80	150

On the scatter diagram, plot these values. [1]

(c) On the scatter diagram, draw a line of best fit. [1]

(d) Another house had a value of $50 000 in 1996.

Find an estimate of the value of this house in 2016.

$ ..... [1]

Question 24 is printed on the next page.

24 **Without using your calculator**, work out the following.
You must show all your working and give each answer as a fraction in its simplest form.

(a) $\frac{2}{3} - \frac{1}{12}$

..... [2]

(b) $3\frac{3}{7} \div 4\frac{5}{14}$

..... [3]

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8622655651622

MATHEMATICS **0580/13**

Paper 1 (Core) **May/June 2018**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

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This document consists of **12** printed pages.

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1 Write 75% as a fraction in its simplest form.

..... [1]

2 Factorise.

$$w + w^3$$

..... [1]

3 Liz takes 65 seconds to run 400 m.

Calculate her average speed.

..... m/s [1]

4 Calculate.

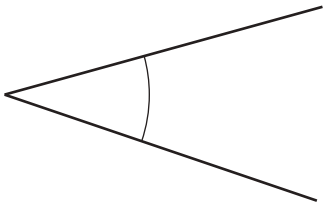
$$\sqrt{\frac{18^2}{0.5 + 1.75}}$$

..... [1]

5 Work out the value of 4^{-2}.

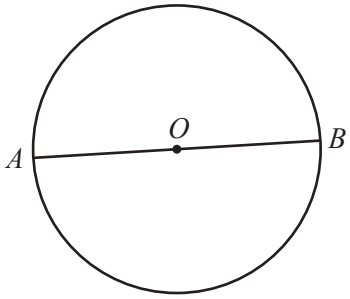
..... [1]

6 **(a)** Write down the mathematical name of the type of angle marked.



..... [1]

(b) A and B are points on the circumference of a circle, centre O.



Write down the mathematical name of the line AB.

..... [1]

7 Write these numbers in order, starting with the smallest.

$\frac{4}{15}$ 26% 0.24 $\frac{1}{4}$

..... < ..... < ..... < ..... [2]
smallest

8 Complete the list of factors of 36.

1, 2, ... , 36 [2]

9 Increase \$22 by 15%.

\$..... [2]

10 **(a)** Write 209 802 correct to the nearest thousand.

..... [1]

(b) Write 4123 correct to 3 significant figures.

..... [1]

11 Jez and Soraya share \$2500 in the ratio Jez : Soraya = 7 : 3.

Work out how much Soraya receives.

\$..... [2]

12 The probability that Kim wins a game is 0.72 .
In one year Kim will play 225 games.

Work out an estimate of the number of games Kim will win.

..... [2]

13 **(a)** Write 4.82×10^{-3} as an ordinary number.

..... [1]

(b) Write 52 million in standard form.

..... [1]

14 Solve.

$$\frac{1-p}{3} = 4$$

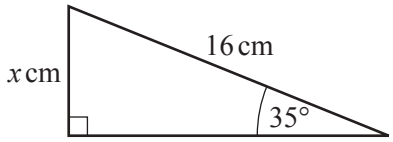
$p =$ ..... [2]

15 The mass, m kilograms, of a package is 6.2 kg, correct to 1 decimal place.

Complete the statement about the value of m.

..... $\leqslant m <$ ..... [2]

16



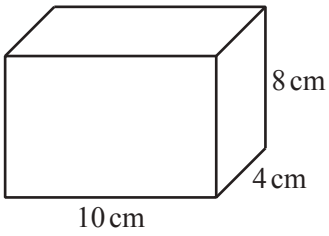
NOT TO SCALE

The diagram shows a right-angled triangle.

Calculate the value of x.

$x =$ ..... [2]

17 The diagram shows a cuboid.



NOT TO SCALE

Work out the surface area of this cuboid.

..... cm^2 [3]

18 **Without using a calculator**, work out $\frac{2}{3} \div 1\frac{1}{5}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

19 **(a)** Work out.

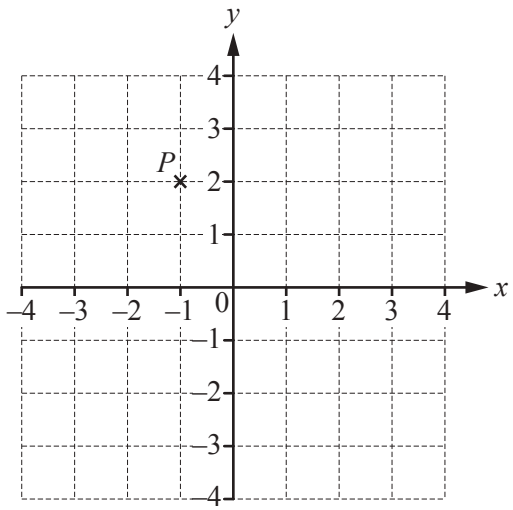
(i) $\begin{pmatrix} 5 \\ -1 \end{pmatrix} + \begin{pmatrix} 2 \\ 6 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(ii) $4\begin{pmatrix} -5 \\ 2 \end{pmatrix}$

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(b)



P is the point $(-1, 2)$ and $\overrightarrow{PQ} = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$.

Find the co-ordinates of Q.

(..... , ...) [1]

20 **(a)** Line L has the equation $y = 5x + 12$.

Write down the gradient of line L.

..... [1]

(b) Another line, M, has the equation $y = 8x + 3$.

Write down the equation of the line parallel to line M that passes through the point (0, 6).

..... [2]

21 **(a)** Change 568 000 cm into metres.

..... m [1]

(b) The scale drawing shows the positions of two towns, *A* and *B*.
The scale is 1 centimetre represents 5 kilometres.

Scale : 1 cm to 5 km

(i) Measure the bearing of town *B* from town *A*.

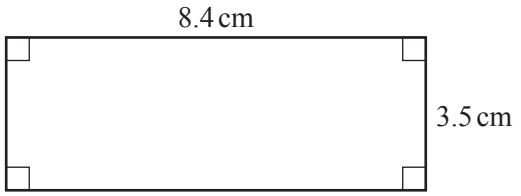
..... [1]

(ii) Find the actual distance, in kilometres, from town *A* to town *B*.

..... km [2]

22 Work out the area of each shape.

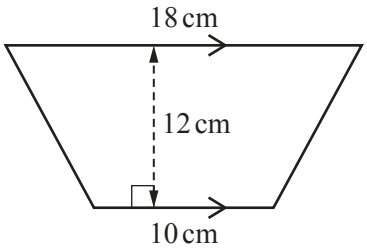
(a)



NOT TO SCALE

..... cm^2 [2]

(b)



NOT TO SCALE

..... cm^2 [2]

23 Solve the simultaneous equations.
You must show all your working.

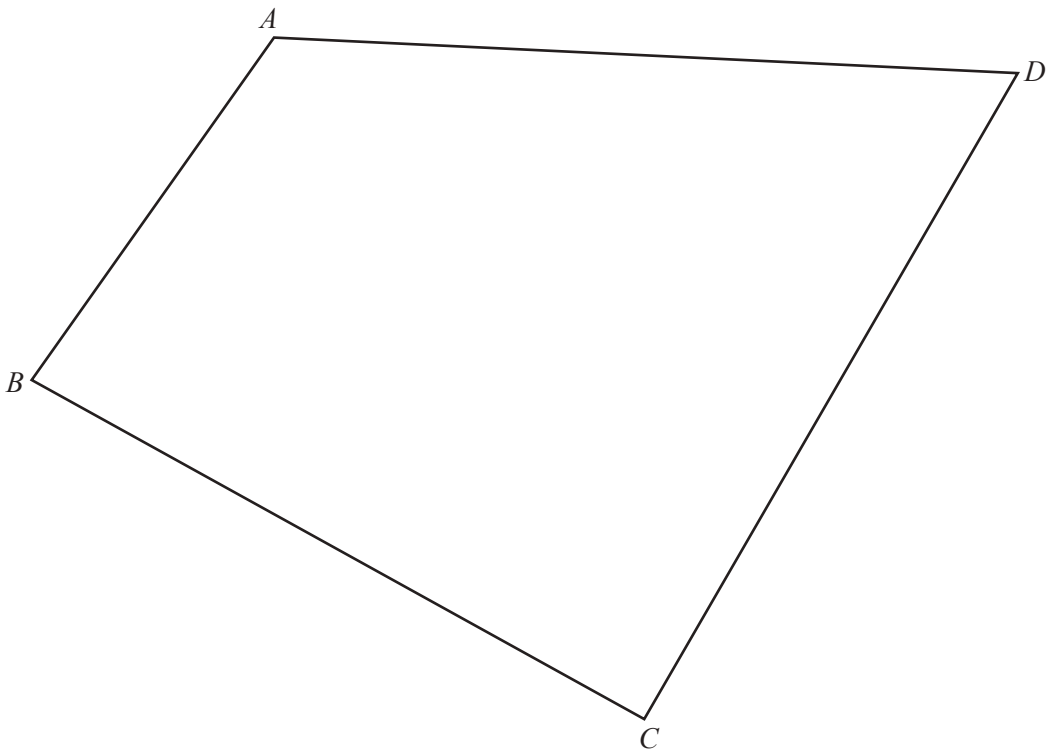
$$3x - 2y = 23$$
$$2x + 5y = 9$$

$x =$ .....

$y =$ ..... [4]

Question 24 is printed on the next page.

24 *ABCD* is a quadrilateral.



(a) **Using a straight edge and compasses only**, construct the perpendicular bisector of *BC*.
Show all your construction arcs. [2]

(b) **Using a straight edge and compasses only**, construct the bisector of angle *BCD*.
Show all your construction arcs. [2]

(c) Shade the region inside *ABCD* that is

- nearer to *B* than to *C*

and

- nearer to *CD* than to *BC*. [1]

Cambridge IGCSE

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/21**

Paper 2 (Extended) **May/June 2018**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

1 Write down a prime number between 20 and 30.

..... [1]

2 Write 0.000 038 7 in standard form.

..... [1]

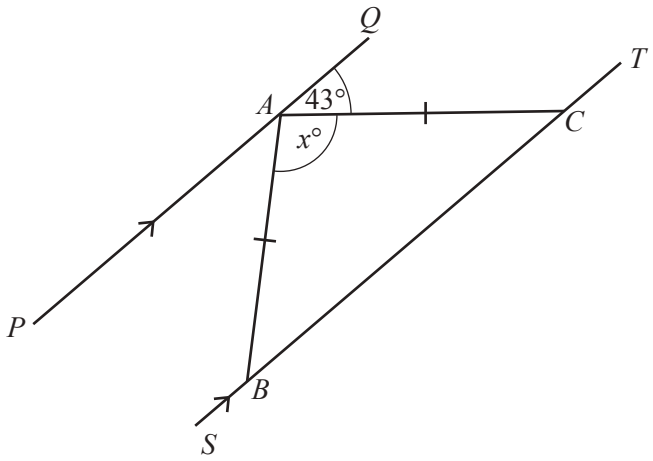
3 Write the recurring decimal $0.\dot{6}\dot{3}$ as a fraction.

..... [1]

4 Find the value of $7x + 3y$ when $x = 12$ and $y = -6$.

..... [2]

5



NOT TO SCALE

The diagram shows two parallel lines PAQ and $SBCT$.
$AB = AC$ and angle $QAC = 43°$.

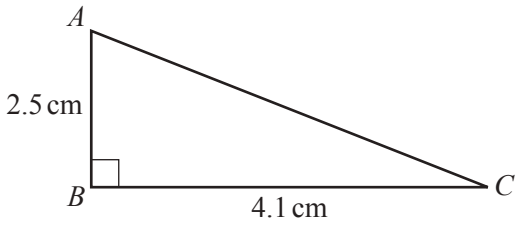
Find the value of x.

$x =$ ..... [2]

6 Calculate the area of a circle with radius 5.1 cm.

.....cm^2 [2]

7



NOT TO SCALE

Calculate the length of AC.

$AC =$ ..... cm [2]

8 Expand and simplify.

$$6(2y - 3) - 5(y + 1)$$

..... [2]

9 $3^{-q} \times \frac{1}{27} = 81$

Find the value of q.

$q =$ ..... [2]

10 **(a)** Calculate $\sqrt{2.38 + 6.4^2}$, writing down your full calculator display.

..... [1]

(b) Write your answer to **part (a)** correct to 4 decimal places.

..... [1]

11 Find the exact value of $8^{\frac{2}{3}} \times 49^{-\frac{1}{2}}$.

..... [2]

12 Solve the inequality.

$$3n - 5 > 17 + 8n$$

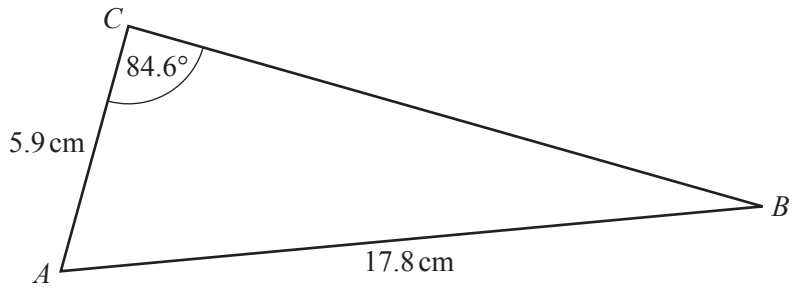
..... [2]

13 **Without using your calculator**, work out $1\frac{3}{4} \times \frac{6}{35}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

14



NOT TO SCALE

Use the sine rule to find angle *ABC*.

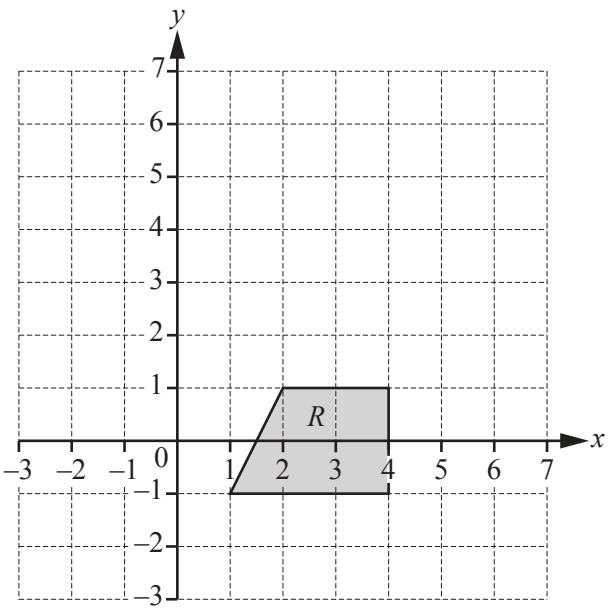
Angle *ABC* = ... [3]

15 y is directly proportional to $(x-1)^2$.
When $x = 5$, $y = 4$.

Find y when $x = 7$.

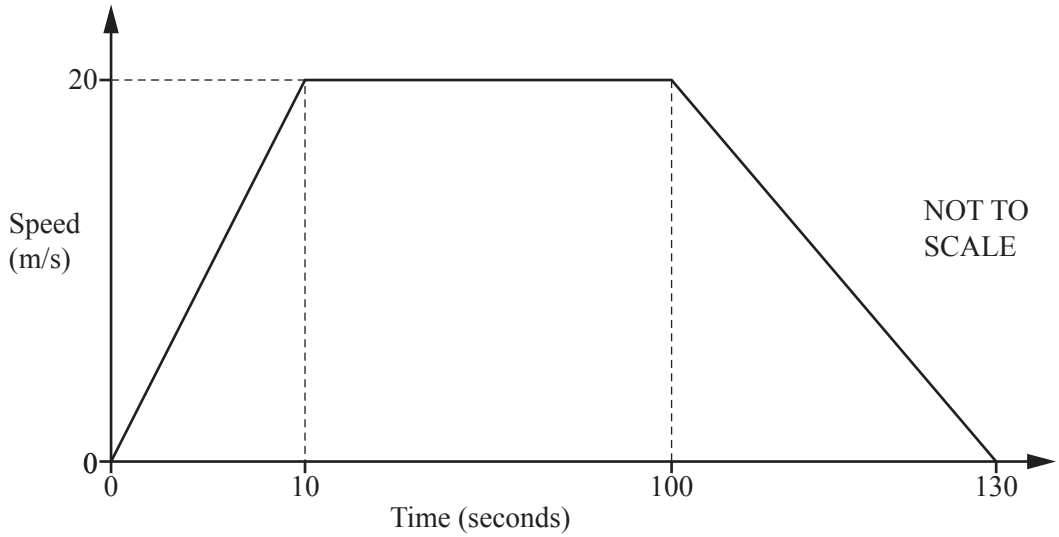
$y =$ ..... [3]

16



On the grid, draw the image of shape R after the transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. [3]

17



The speed−time graph shows information about the journey of a tram between two stations.

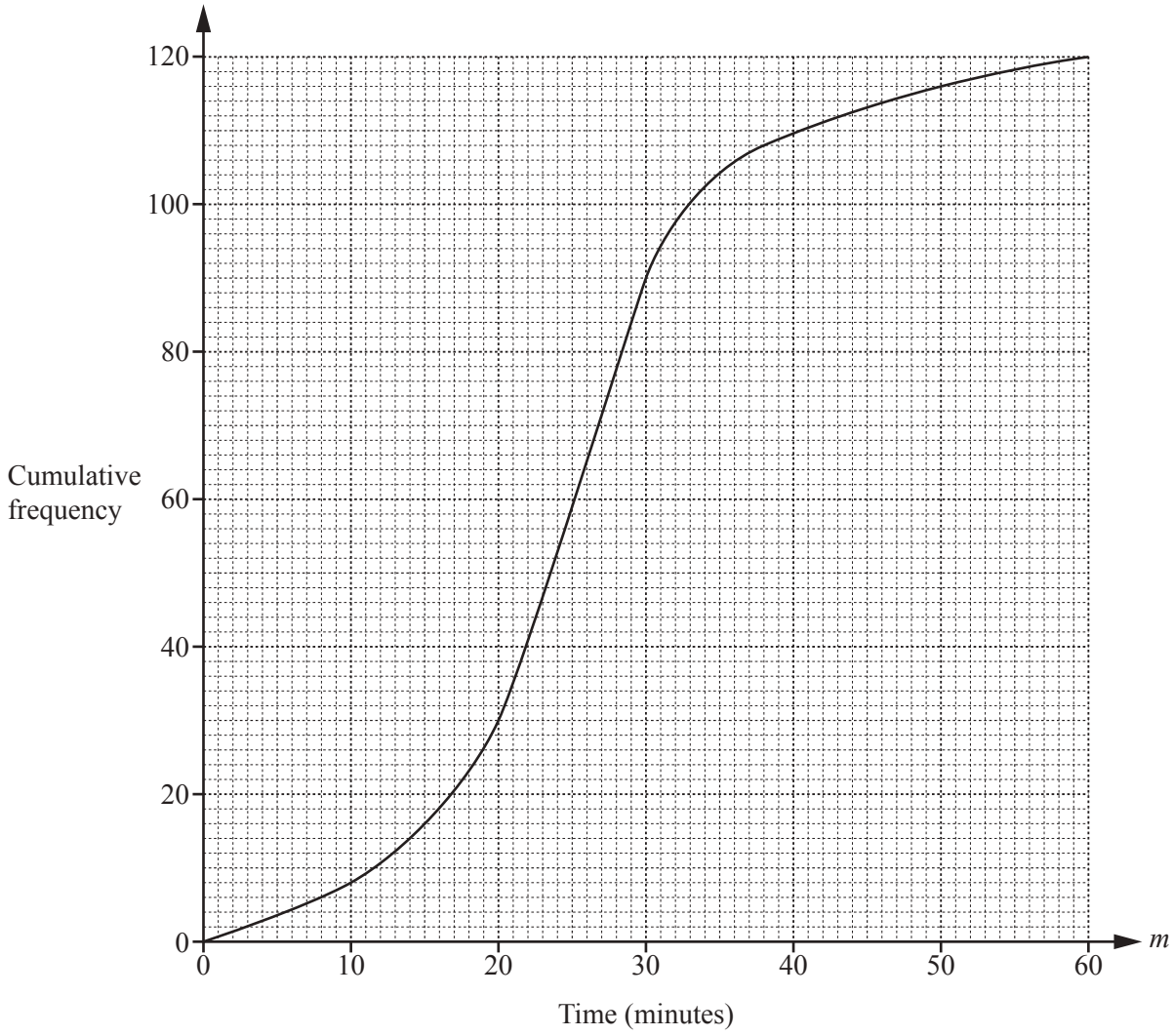
(a) Calculate the distance between the two stations.

..... m [3]

(b) Calculate the average speed of the tram for the whole journey.

..... m/s [1]

18 The cumulative frequency diagram shows information about the time, m minutes, taken by 120 students to complete some homework.



Use the cumulative frequency diagram to find an estimate of

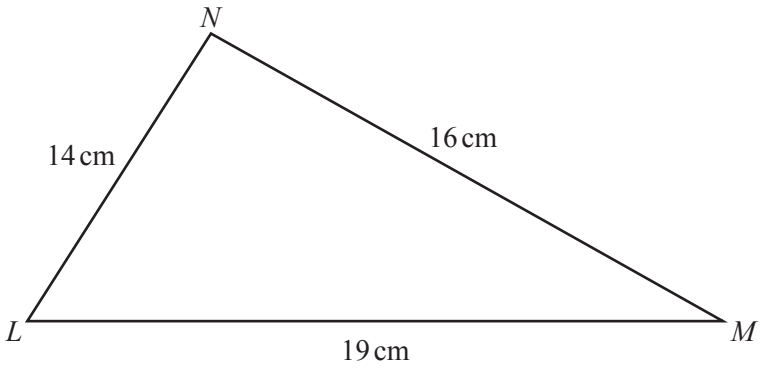
(a) the interquartile range,

.....min [2]

(b) the number of students who took more than 50 minutes to complete the homework.

..... [2]

19



NOT TO SCALE

Calculate angle *LMN*.

Angle *LMN* = ... [4]

20 **(a)** A box contains 3 blue pens, 4 red pens and 8 green pens only.
A pen is chosen at random from the box.

Find the probability that this pen is green.

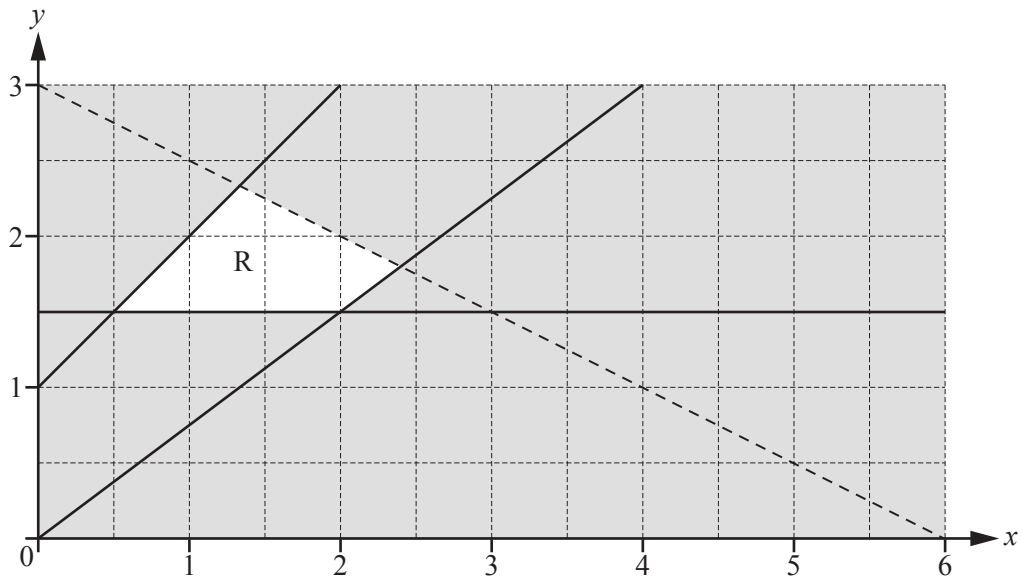
..... [1]

(b) Another box contains 7 black pens and 8 orange pens only.
Two pens are chosen at random from this box without replacement.

Calculate the probability that at least one orange pen is chosen.

..... [3]

21



There are four inequalities that define the region R.
One of these is $y \leqslant x + 1$.

Find the other three inequalities.

.....

.....

..... [4]

22 $f(x) = 5 - 2x$ $g(x) = x^2 + 8$

(a) Calculate $ff(-3)$.

..... [2]

(b) Find

(i) $g(2x)$,

..... [1]

(ii) $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

23 40 people were asked how many times they visited the cinema in one month.
The table shows the results.

Number of cinema visits	0	1	2	3	4	5	6	7
Frequency	5	5	6	6	7	3	6	2

(a) **(i)** Find the mode.

..... [1]

(ii) Calculate the mean.

..... [3]

(b) Omar wants to show the information from the table in a pie chart.

Calculate the sector angle for the people who visited the cinema 5 times.

..... [2]

Question 24 is printed on the next page.

24 **(a)** Point A has co-ordinates (1, 0) and point B has co-ordinates (2, 5).

Calculate the angle between the line AB and the x-axis.

..... [3]

(b) The line PQ has equation $y = 3x - 8$ and point P has co-ordinates (6, 10).

Find the equation of the line that passes through P and is perpendicular to PQ.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1750626544

MATHEMATICS **0580/22**

Paper 2 (Extended) **May/June 2018**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

1 One morning, Marcia works from 08 20 to 11 15.

Find how long she works for.
Give your answer in hours and minutes.

..... h ..... min [1]

2 Expand.

$7(x - 8)$

..... [1]

3 Here is a sequence.

a, 13, 9, 3, –5, –15, b, …

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [2]

4 Complete these statements.

(a) When $w =$ ..... , $10w = 70$. [1]

(b) When $5x = 15$, $12x =$ ..... [1]

5 22 17 25 41 39 4

Work out the difference between the two prime numbers in the list above.

..... [2]

6 **Without using your calculator**, work out $\frac{2}{3} - \frac{1}{12}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [2]

7 A and B are two towns on a map.
The bearing of A from B is 140°.

Work out the bearing of B from A.

..... [2]

8 Here are some numbers written in standard form.

3.4×10^{-1} 1.36×10^{6} 7.9×10^{0} 2.4×10^{5} 5.21×10^{-3} 4.3×10^{-2}

From these numbers, write down

(a) the largest number,

..... [1]

(b) the smallest number.

..... [1]

9 **Using a straight edge and compasses only**, construct the locus of points that are equidistant from A and B.

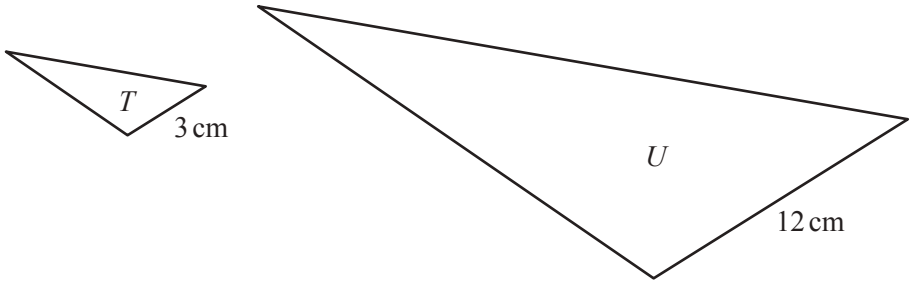
[2]

10 Factorise completely.

$xy + 2y + 3x + 6$

..... [2]

11



NOT TO SCALE

The diagram shows two mathematically similar triangles, T and U.
Two corresponding side lengths are 3 cm and 12 cm.
The area of triangle T is 5 cm^2.

Find the area of triangle U.

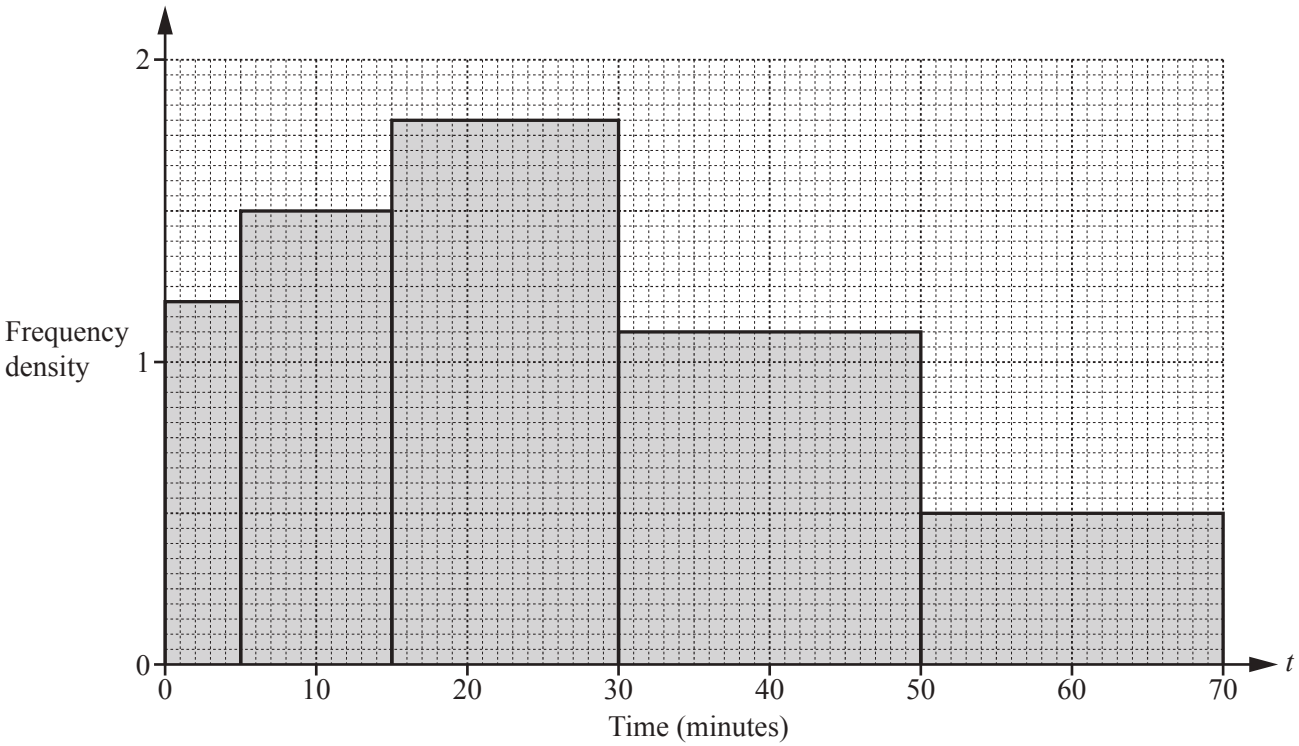
..... cm^2 [2]

12 Anna walks 31 km at a speed of 5 km/h.
Both values are correct to the nearest whole number.

Work out the upper bound of the time taken for Anna's walk.

..... hours [2]

13 The histogram shows information about the time, t minutes, spent in a shop by each of 80 people.

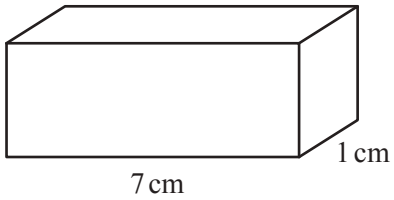


Complete the frequency table.

Time (t minutes)	$0 < t \leqslant 5$	$5 < t \leqslant 15$	$15 < t \leqslant 30$	$30 < t \leqslant 50$	$50 < t \leqslant 70$
Number of people	6		27		10

[2]

14



NOT TO SCALE

The diagram shows a solid cuboid with base area 7 cm^2.
The volume of this cuboid is 21 cm^3.

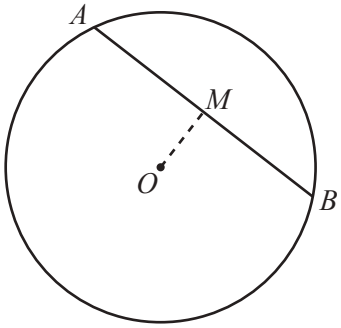
Work out the total surface area.

..... cm^2 [3]

15 Find the volume of a cylinder of radius 5 cm and height 8 cm.
Give the units of your answer.

.... [3]

16



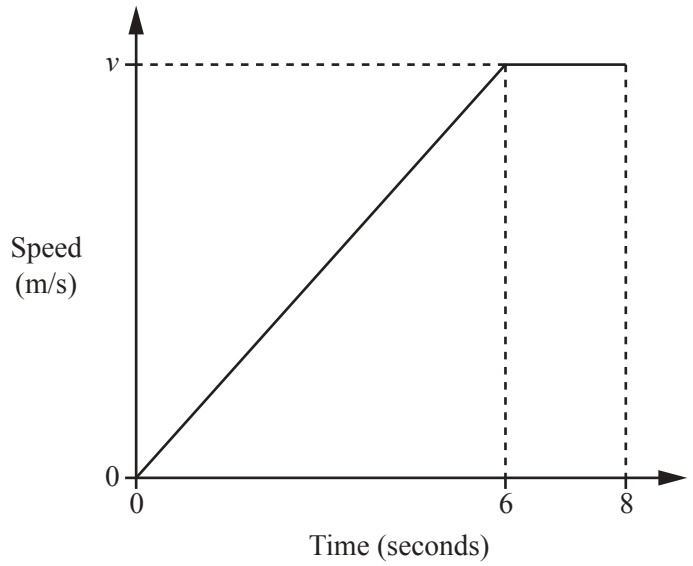
NOT TO SCALE

The diagram shows a circle, centre O.
AB is a chord of length 12 cm.
M is the mid-point of AB and $OM = 4.5$ cm.

Calculate the radius of the circle.

..... cm [3]

17 The diagram shows information about the first 8 seconds of a car journey.



NOT TO SCALE

The car travels with constant acceleration reaching a speed of v m/s after 6 seconds.
The car then travels at a constant speed of v m/s for a further 2 seconds.
The car travels a total distance of 150 metres.

Work out the value of v.

$v =$ ..... [3]

18 A ball falls d metres in t seconds.
d is directly proportional to the square of t.
The ball falls 44.1 m in 3 seconds.

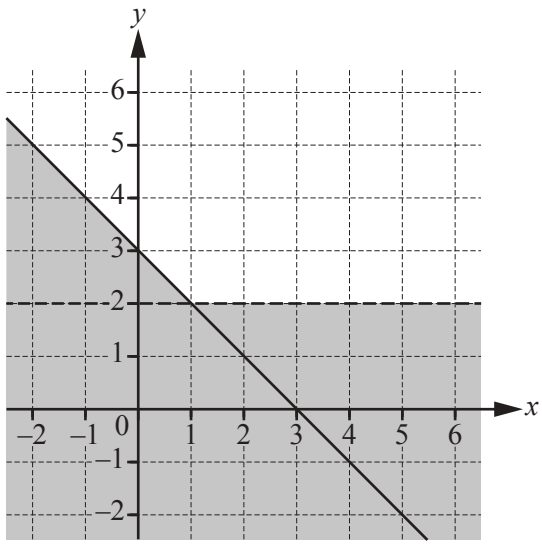
(a) Find a formula for d in terms of t.

$d =$ ..... [2]

(b) Calculate the distance the ball falls in 2 seconds.

..... m [1]

19



Find the two inequalities that define the region on the grid that is **not** shaded.

.....

..... [3]

20 $\mathbf{A} = \begin{pmatrix} 1 & 1 \\ 9 & 9 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 0 & 1 \\ 9 & 8 \end{pmatrix}$ $\mathbf{C} = \begin{pmatrix} 1 & 1 \\ 3 & 3 \end{pmatrix}$ $\mathbf{I} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

(a) Here are four matrix calculations.

AI **IA** $\mathbf{C}^2$ $\mathbf{B} + \mathbf{I}$

Work out which matrix calculation does **not** give the answer $\begin{pmatrix} 1 & 1 \\ 9 & 9 \end{pmatrix}$.

..... [2]

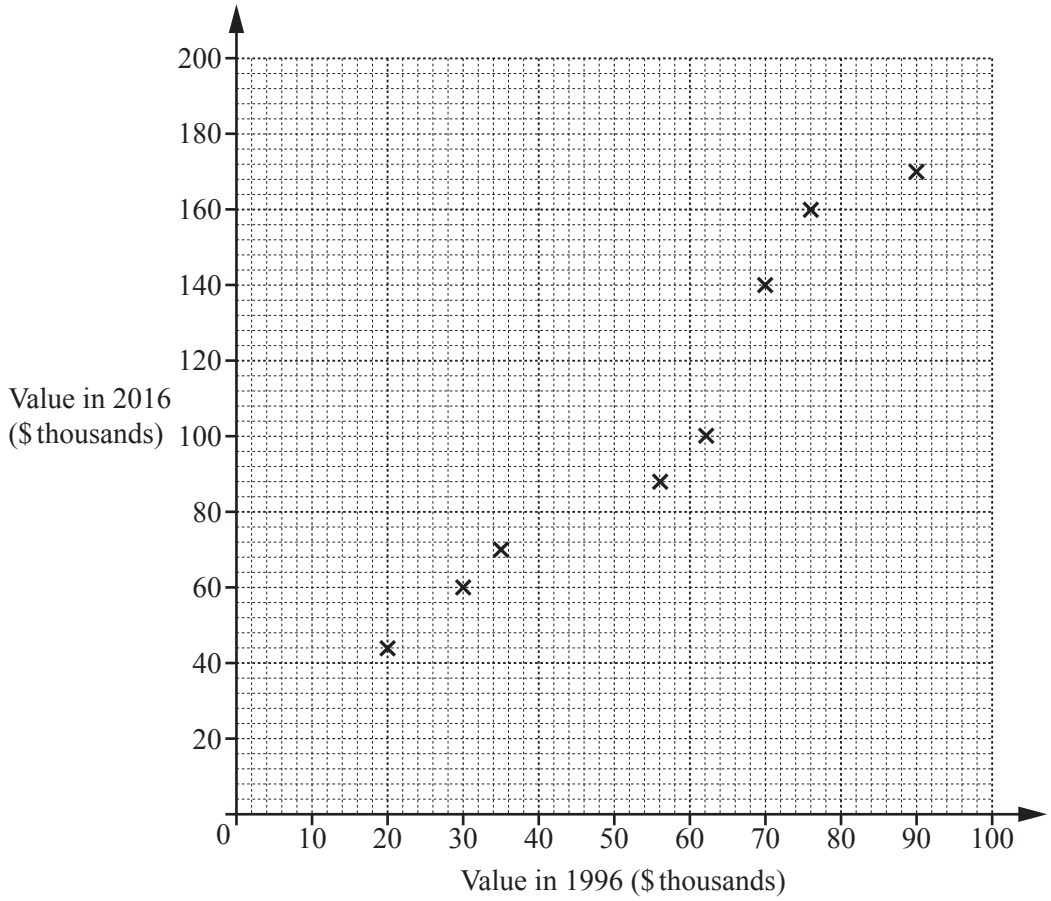
(b) Find $|\mathbf{B}|$.

..... [1]

(c) Explain why matrix **A** has no inverse.

..... [1]

21 The scatter diagram shows the value, in thousands of dollars, of eight houses in 1996 and the value of the same houses in 2016.



(a) One of these eight houses had a value of $70 000 in 1996.

Write down the value of this house in 2016.

$ ..... [1]

(b) The values of two more houses are shown in the table.

Value in 1996 ($ thousands)	40	80
Value in 2016 ($ thousands)	80	150

On the scatter diagram, plot these values. [1]

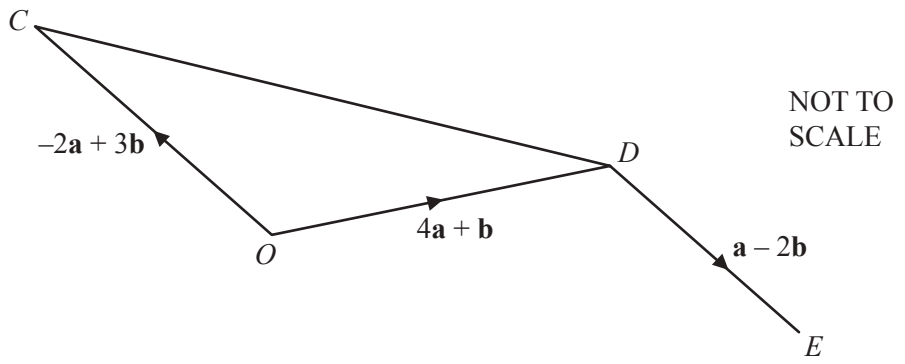
(c) On the scatter diagram, draw a line of best fit. [1]

(d) Another house had a value of $50 000 in 1996.

Find an estimate of the value of this house in 2016.

$ ..... [1]

22



In the diagram, O is the origin, $\overrightarrow{OC} = -2\mathbf{a} + 3\mathbf{b}$ and $\overrightarrow{OD} = 4\mathbf{a} + \mathbf{b}$.

(a) Find $\overrightarrow{CD}$, in terms of **a** and **b**, in its simplest form.

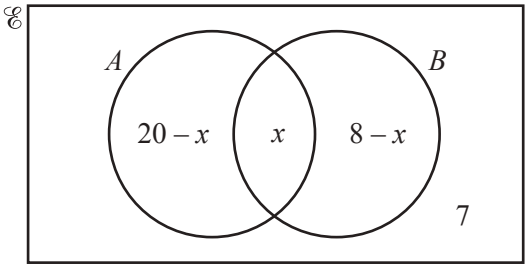
$\overrightarrow{CD} =$ ..... [2]

(b) $\overrightarrow{DE} = \mathbf{a} - 2\mathbf{b}$

Find the position vector of E, in terms of **a** and **b**, in its simplest form.

..... [2]

23 The Venn diagram shows information about the number of elements in sets A, B and $\mathscr{E}$.



(a) $n(A \cup B) = 23$

Find the value of x.

$x =$ ..... [3]

(b) An element is chosen at random from $\mathscr{E}$.

Find the probability that this element is in $(A \cup B)'$.

..... [2]

24 Box A and box B each contain blue and green pens only.
Raphael picks a pen at random from box A and Paulo picks a pen at random from box B.
The probability that Raphael picks a blue pen is $\frac{2}{3}$.
The probability that both Raphael and Paulo pick a blue pen is $\frac{8}{15}$.

(a) Find the probability that Paulo picks a blue pen.

..... [2]

(b) Find the probability that both Raphael and Paulo pick a green pen.

..... [3]

25 P is the point (16, 9) and Q is the point (22, 24).

(a) Find the equation of the line perpendicular to PQ that passes through the point (5, 1).
Give your answer in the form $y = mx + c$.

$y =$ ..... [4]

(b) N is the point on PQ such that $PN = 2NQ$.

Find the co-ordinates of N.

(..... , ...) [2]

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CENTRE NUMBER						CANDIDATE NUMBER				

0985436845

MATHEMATICS **0580/23**

Paper 2 (Extended) **May/June 2018**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

This document consists of **11** printed pages and **1** blank page.

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1 One day in Chamonix the temperature at noon was 6 °C.
At midnight the temperature was 11 °C lower.

Write down the temperature at midnight.

..... °C [1]

2 Factorise.

$w + w^3$

..... [1]

3 Liz takes 65 seconds to run 400 m.

Calculate her average speed.

..... m/s [1]

4 Complete the list of factors of 36.

1, 2, ... , 36 [2]

5 Increase $22 by 15%.

$..... [2]

6 **(a)** Write 209 802 correct to the nearest thousand.

..... [1]

(b) Write 4123 correct to 3 significant figures.

..... [1]

7 The probability that Kim wins a game is 0.72 .
In one year Kim will play 225 games.

Work out an estimate of the number of games Kim will win.

..... [2]

8 **(a)** Write 4.82×10^{-3} as an ordinary number.

..... [1]

(b) Write 52 million in standard form.

..... [1]

9 Solve.

$$\frac{1-p}{3} = 4$$

$p =$ ..... [2]

10 Factorise completely.

$$2a + 4b - ax - 2bx$$

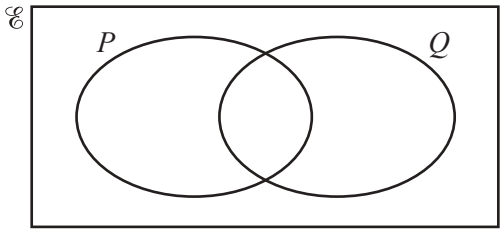
..... [2]

11 $A = (2\pi + y)x^2$

Rearrange the formula to make x the subject.

$x =$ ..... [2]

12



$n(\mathscr{E}) = 20$, $n(P) = 10$, $n(Q) = 13$ and $n(P \cup Q)' = 5$.

Work out $n(P \cap Q)$.
You may use the Venn diagram to help you.

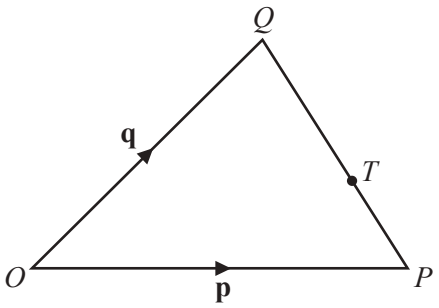
$n(P \cap Q) =$ ..... [2]

13 Simplify.

$$\frac{3+x}{9-x^2}$$

..... [2]

14



NOT TO SCALE

O is the origin, $\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.
$QT : TP = 2 : 1$

Find the position vector of T.
Give your answer in terms of **p** and **q**, in its simplest form.

..... [2]

15 **Without using a calculator**, work out $\frac{2}{3} \div 1\frac{1}{5}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

16 **(a)** The length of the side of a square is 12 cm, correct to the nearest centimetre.

Calculate the upper bound for the perimeter of the square.

..... cm [2]

(b) Jo measures the length of a rope and records her measurement correct to the nearest ten centimetres.
The upper bound for her measurement is 12.35 m.

Write down the measurement she records.

..... m [1]

17 **(a)** Find the value of $\left(\frac{1}{81}\right)^{-\frac{3}{4}}$.

..... [1]

(b) Simplify. $\sqrt[3]{27t^{27}}$

..... [2]

18 Expand the brackets and simplify.

$(2p+3)(3p-2)$

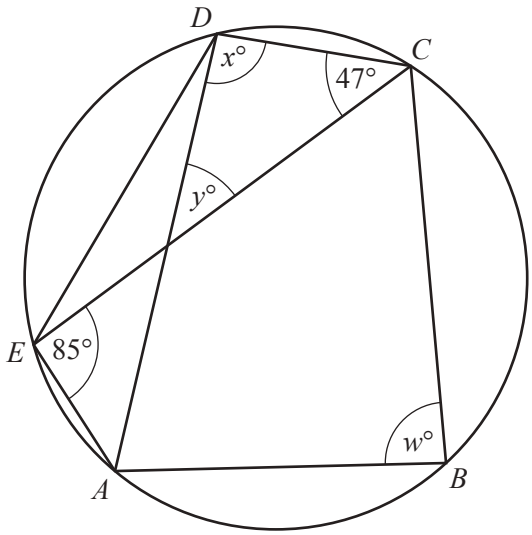
..... [3]

19 y is directly proportional to $(x-1)^2$.
When $x = 3$, $y = 24$.

Find y when $x = 6$.

$y =$ ..... [3]

20



NOT TO SCALE

The points A, B, C, D and E lie on the circumference of the circle.
Angle $DCE = 47°$ and angle $CEA = 85°$.

Find the values of w, x and y.

$w =$ .....

$x =$ .....

$y =$ ..... [3]

21 Write as a single fraction in its simplest form.

$$\frac{1}{y-1} - \frac{1}{y}$$

..... [3]

22 Find an expression for the nth term of each sequence.

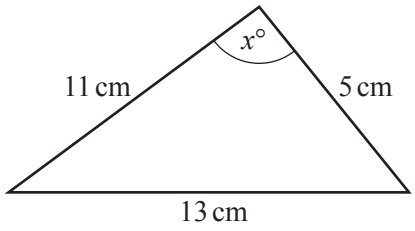
(a) 11, 7, 3, −1, …

..... [2]

(b) 3, 6, 12, 24, …

..... [2]

23

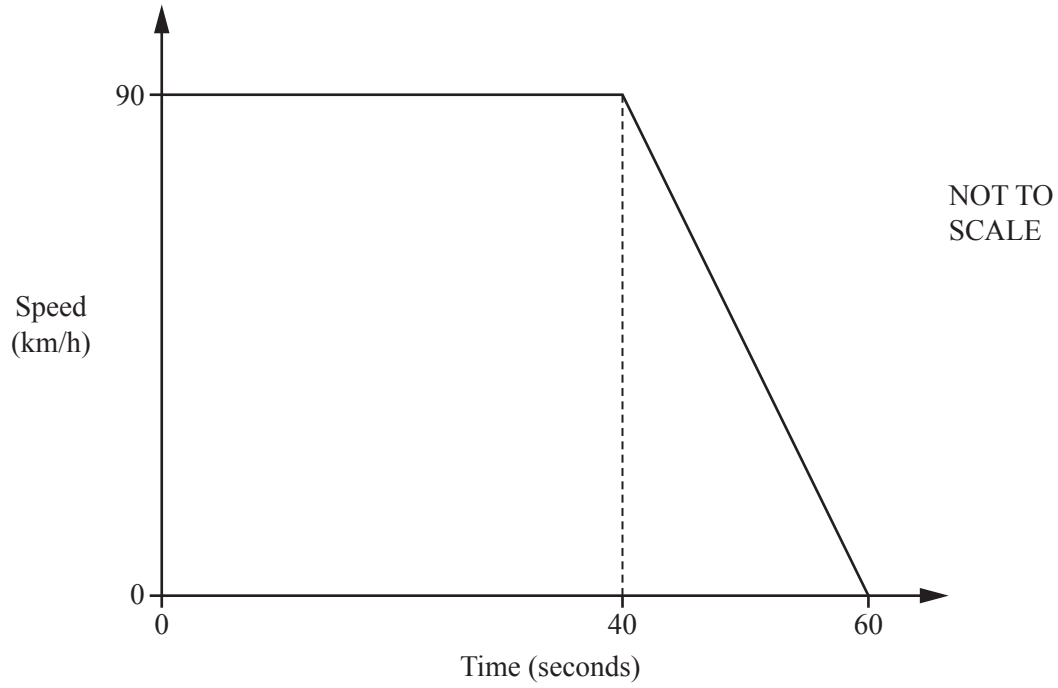


NOT TO SCALE

Calculate the value of x.

$x =$ ..... [4]

24



The diagram shows the speed–time graph for 60 seconds of a car journey.

(a) Change 90 km/h to m/s.

..... m/s [2]

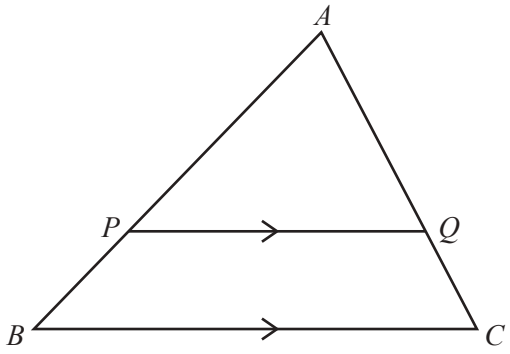
(b) Find the deceleration of the car in m/s^2.

..... m/s^2 [1]

(c) Find the distance travelled, in metres, in the 60 seconds.

..... m [2]

25 (a)



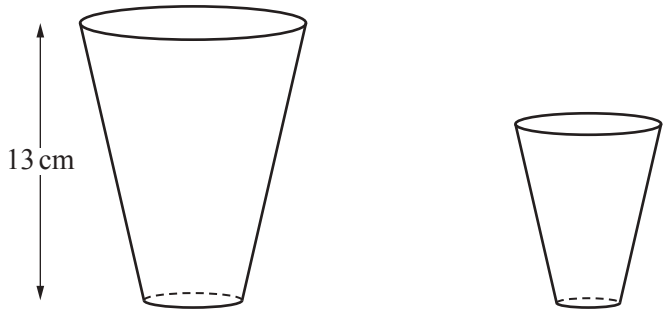
NOT TO SCALE

In the diagram, PQ is parallel to BC.
APB and AQC are straight lines.
$PQ = 8$ cm, $BC = 10$ cm and $AB = 9$ cm.

Calculate PB.

$PB =$ ..... cm [2]

(b)



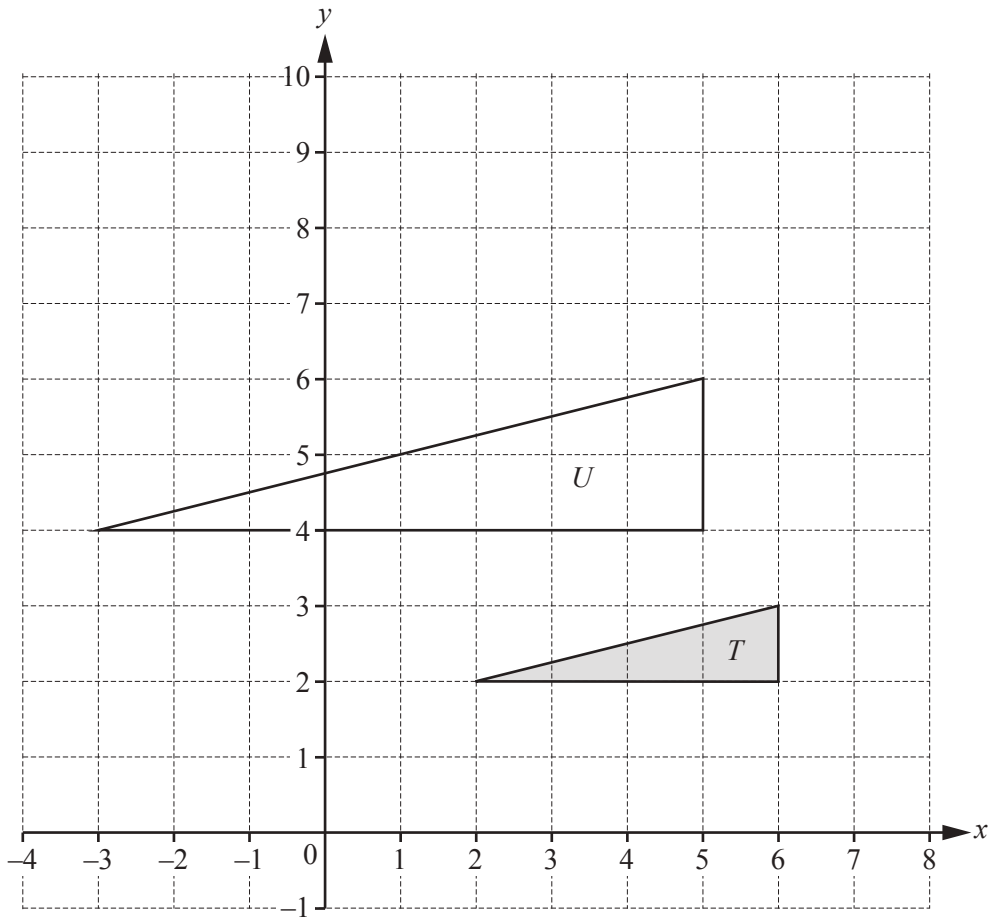
NOT TO SCALE

The diagram shows two glasses which are mathematically similar.
The larger glass has a capacity of 0.5 litres and the smaller glass has a capacity of 0.25 litres.
The height of the larger glass is 13 cm.

Calculate the height of the smaller glass.

..... cm [3]

26



(a) Describe fully the **single** transformation that maps triangle *T* onto triangle *U*.

.....

..... [3]

(b) On the grid, draw the image of triangle *T* after a rotation through 90° clockwise about the point (7, 3). [3]

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Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5063386638

MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

This document consists of **19** printed pages and **1** blank page.

CAMBRIDGE International Examinations

1 Mr Marr asks his mathematics class to complete a statistics project about books.

(a) Olga counts the number of letters in each of the last 50 words in the book she is reading.
She has only counted the letters in 43 words so far.
Her results for these 43 words are shown in the table below.

Number of letters in each word	Tally	Frequency
1	|||	
2	𝍸	
3	𝍸 𝍸 ||	
4	𝍸 |||	
5	𝍸 ||||	
6	|||	
7	||	
8		
9	|	

The last seven words in the book that Olga needs to add to the table are

..... and they all lived happily ever after.

(i) Complete the tally and frequency columns in the table. [2]

(ii) Find the range.

..... [1]

(iii) Find the median.

..... [1]

(b) Billie asks 60 students in his school what their favourite type of book is.
He has started to draw a pictogram to show his results.

Type of book		Frequency
Comedy		
Science fiction		10
Poetry		
Music		
Romance		8
Detective		14

Key:  represents ..... books.

The science fiction row in the pictogram is complete.

(i) Complete the key. [1]

(ii) Complete the pictogram. [2]

(iii) Write down the mode.

..... [1]

(iv) Work out how many more students choose detective books than music books.

..... [1]

(v) Work out the fraction of students who did **not** choose romance books.

..... [2]

2 **(a)** Write down

(i) the number twenty seven million, three hundred and sixty thousand and forty five in figures,

..... [1]

(ii) the six factors of 20,

....., ..., ..., ..., ..., ... [2]

(iii) a fraction that is equivalent to $\frac{7}{9}$,

..... [1]

(iv) a prime number between 30 and 40.

..... [1]

(b) For each statement, insert one pair of brackets to make it correct.

(i) $17 - 3 \times 5 - 3 = 11$ [1]

(ii) $3 + 2^2 - 4 = 21$ [1]

(c) Find $\sqrt[3]{4913}$.

..... [1]

3 Three boys each have $600.

(a) Victor spends 40% of his $600.
He spends the money in the ratio clothes : books : music = 10 : 2 : 3.

(i) Work out how much he spends on music.

$ ..... [3]

(ii) Work out how much more he spends on clothes than books.

$..... [2]

(b) Walter invests his $600 for 3 years at a rate of 4.5% per year compound interest.

Calculate the interest Walter receives at the end of the 3 years.

$..... [3]

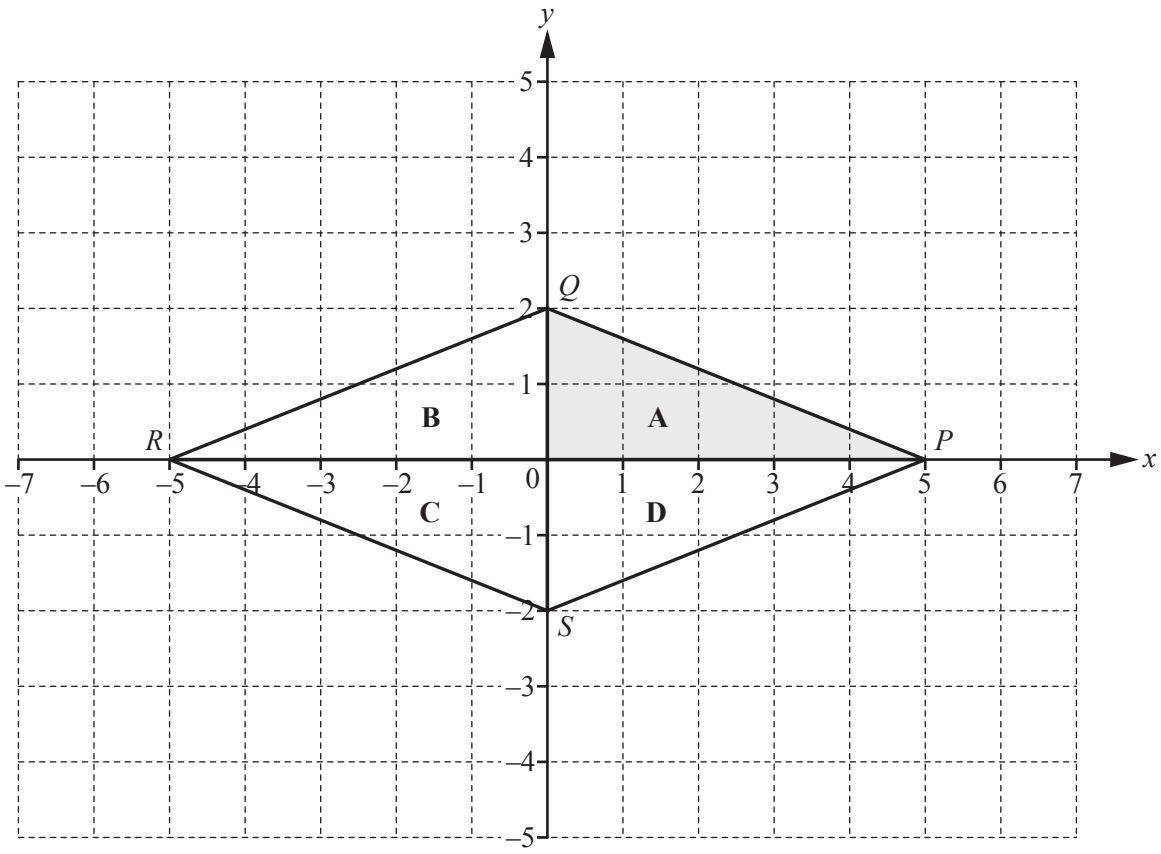
(c) Xavier goes on holiday to Europe and changes his $600 into euros (€).
He spends €325 whilst he is on holiday.
When he gets home he changes the euros he has left back into dollars.

The exchange rate is $1 = €0.864 .

Work out how many dollars he has left after his holiday.
Give your answer correct to the nearest cent.

$ ..... [3]

4



The diagram shows a quadrilateral *PQRS* which is made from four congruent triangles **A**, **B**, **C** and **D**.

(a) Write down the mathematical name for the quadrilateral *PQRS*.

..... [1]

(b) **(i)** Write down the co-ordinates of *S*.

(..... , ...) [1]

(ii) Measure the obtuse angle *PSR*.

..... [1]

(c) **(i)** Measure the length of the line *PQ*.

..... cm [1]

(ii) Work out the perimeter of the quadrilateral *PQRS*.

..... cm [1]

(d) Describe fully the **single** transformation that maps

(i) triangle **A** onto triangle **B**,

.....

..... [2]

(ii) triangle **A** onto triangle **C**.

.....

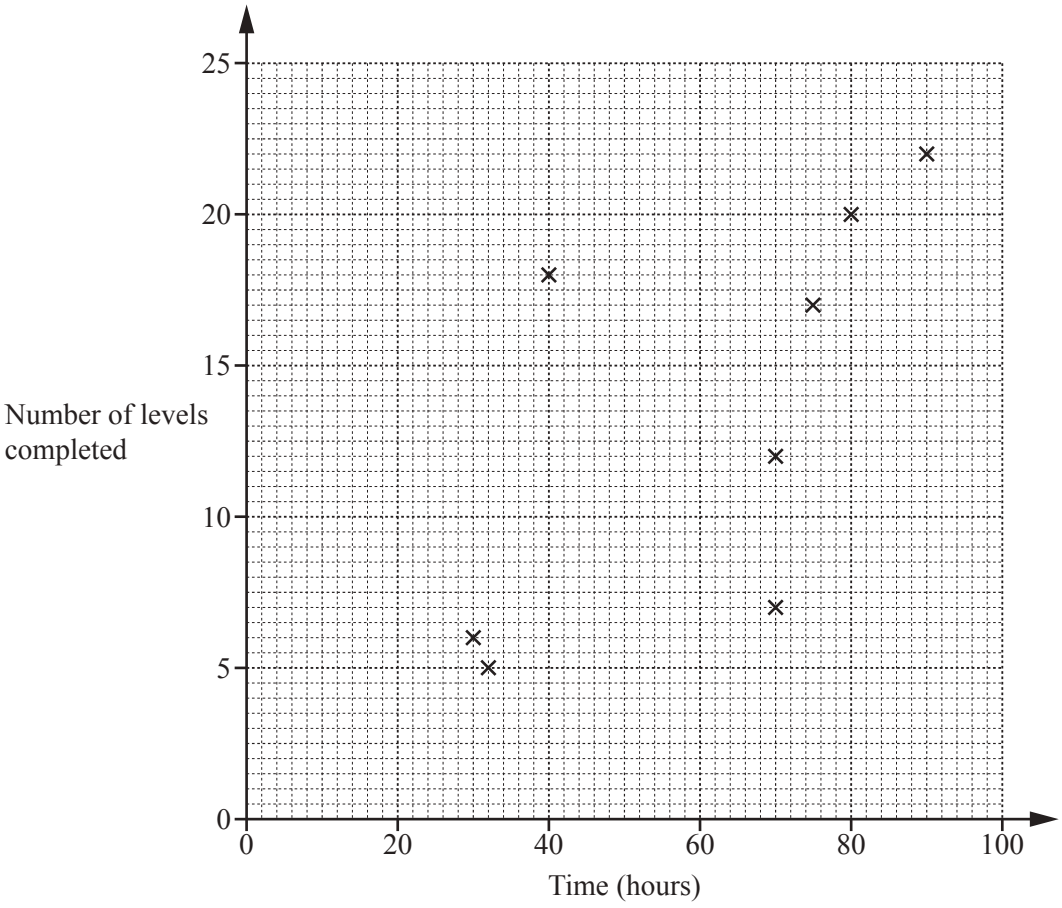
..... [3]

(e) On the grid, draw the image of triangle **D** after a translation by the vector $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$. [2]

5 Lucy asked 12 people how many hours they each spent playing a computer game and the number of levels they each completed in one month.

The results are shown in the table.

Time spent playing (hours)	90	32	70	75	30	70	40	80	40	65	50	32
Number of levels completed	22	5	12	17	6	7	18	20	8	15	11	9



(a) Complete the scatter diagram.
The first eight points have been plotted for you. [2]

(b) One person completes more levels per hour than any of the others.

On the scatter diagram, put a ring around the point for this person. [1]

(c) What type of correlation does this scatter diagram show?

..... [1]

(d) On the scatter diagram, draw a line of best fit. [1]

(e) Another person, Monika, completed 19 levels but forgot to record the time spent playing.

Use your line of best fit to estimate the number of hours that Monika spent playing.

..... hours [1]

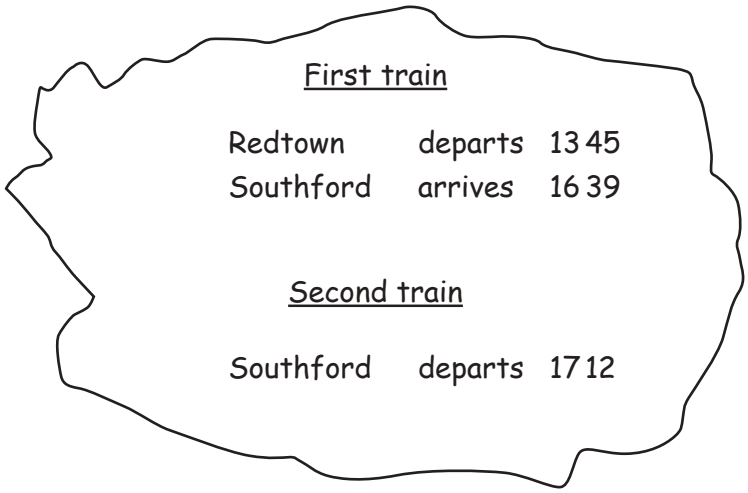
6 Georgiana is travelling by train from Redtown to Teignley.

(a) The price of a ticket is $13.50 .
Georgiana's ticket price is reduced by one-third because she is a student.

Work out how much she pays for her ticket.

$ ..... [2]

(b) Georgiana travels on two trains.
The first train goes from Redtown to Southford.
The second train goes from Southford to Teignley.
She has written down some information about the times of her trains.



(i) Write 13 45 using the 12-hour clock.

..... [1]

(ii) Work out how long the first train should take to travel from Redtown to Southford.
Give your answer in hours and minutes.

..... h ..... min [1]

(iii) The first train arrives at Southford 46 minutes late.

By how many minutes has Georgiana missed her second train?

..... min [2]

(c) While Georgiana waits for the next train, she buys a cup of hot chocolate.

NOT TO SCALE

Work out which cup of hot chocolate is the best value.
Show all your working.

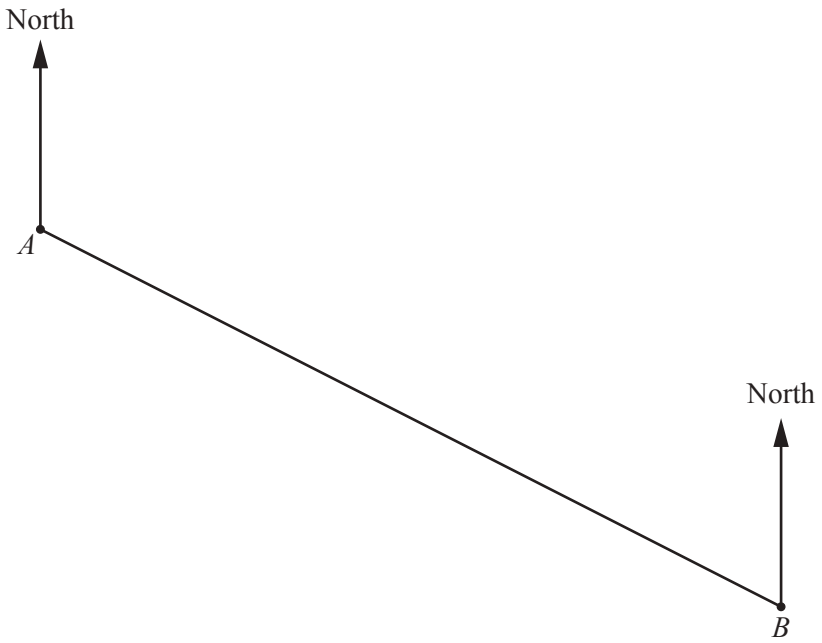
..... [3]

(d) The next train from Southford to Teignley is at 18 12.
The journey is 76 km and the train travels at an average speed of 48 km/h.

Work out the time that the train arrives in Teignley.

..... [3]

7 The scale drawing shows the positions of Annika's house, A, and Bernhard's house, B, on a map.
The scale is 1 centimetre represents 300 metres.



Scale: 1 cm to 300 m

(a) Work out the actual distance, in metres, between Annika's house and Bernhard's house.

..... m [2]

(b) Measure the bearing of Bernhard's house from Annika's house.

..... [1]

(c) **(i)** **Using a straight edge and compasses only**, construct the perpendicular bisector of AB.
Show all your construction arcs. [2]

(ii) Cordelia's house is

- the same distance from Annika's house and Bernhard's house

and

- due south of Annika's house.

Mark on the map the position of Cordelia's house.
Label this point C. [2]

(d) Dougie's house is

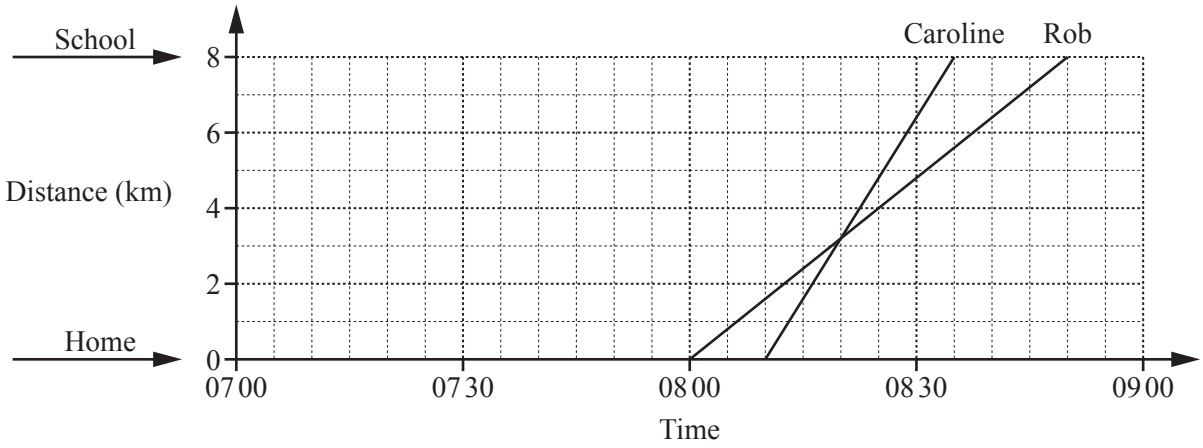
- on a bearing of 320° from Bernhard's house

and

- 1650 m from Annika's house.

Mark on the map the two possible positions of Dougie's house.
Label each of these points D. [4]

8 Three children from the same family travel from their home to the same school.
Caroline cycles to school.
Rob runs to school.
William walks to school.



The travel graph shows the journeys to school for Caroline and Rob.
Rob leaves home before Caroline.

(a) Explain what is happening when the two lines intersect on the travel graph.

.....

..... [1]

(b) Work out Rob's speed in km/h.

..... km/h [2]

(c) William leaves home at 0725.
He walks to school at a constant speed of 6 km/h.

On the grid, draw William's journey. [1]

(d) At what time is the distance between Rob and William greatest?

..... [1]

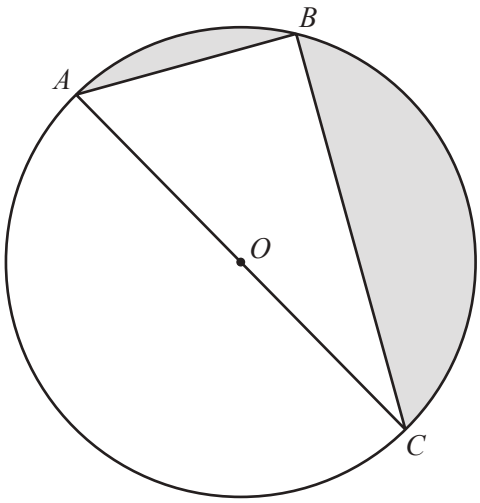
(e) Complete this list of names in the order they arrive at school.

First .....

Second .....

Third ..... [1]

9



NOT TO SCALE

A, B and C are points on the circumference of a circle, centre O.

(a) Write down the mathematical name for

(i) the straight line AC,

..... [1]

(ii) the straight line AB.

..... [1]

(b) Give a geometrical reason why angle $ABC = 90°$.

..... [1]

(c) $AB = 20\,\text{cm}$ and $AC = 52\,\text{cm}$.

(i) Use trigonometry to calculate angle BAC.

Angle $BAC =$ ..... [2]

(ii) Show that $BC = 48\,\text{cm}$.

[2]

(iii) Work out the area of triangle ABC.

..... cm^2 [2]

(iv) Work out the total shaded area.

..... cm^2 [3]

10 (a) (i) Write down the gradient of the line $y = -4x + 7$.

..... [1]

(ii) Write down the equation of a line parallel to $y = 2x + 3$.

$y =$ ..... [1]

(iii) Write down the co-ordinates of the point where the graph of $y = 6x - 5$ crosses the y-axis.

(..... , ...) [1]

(iv) The point $(k, 7)$ lies on the line $y = 4x - 3$.

Find the value of k.

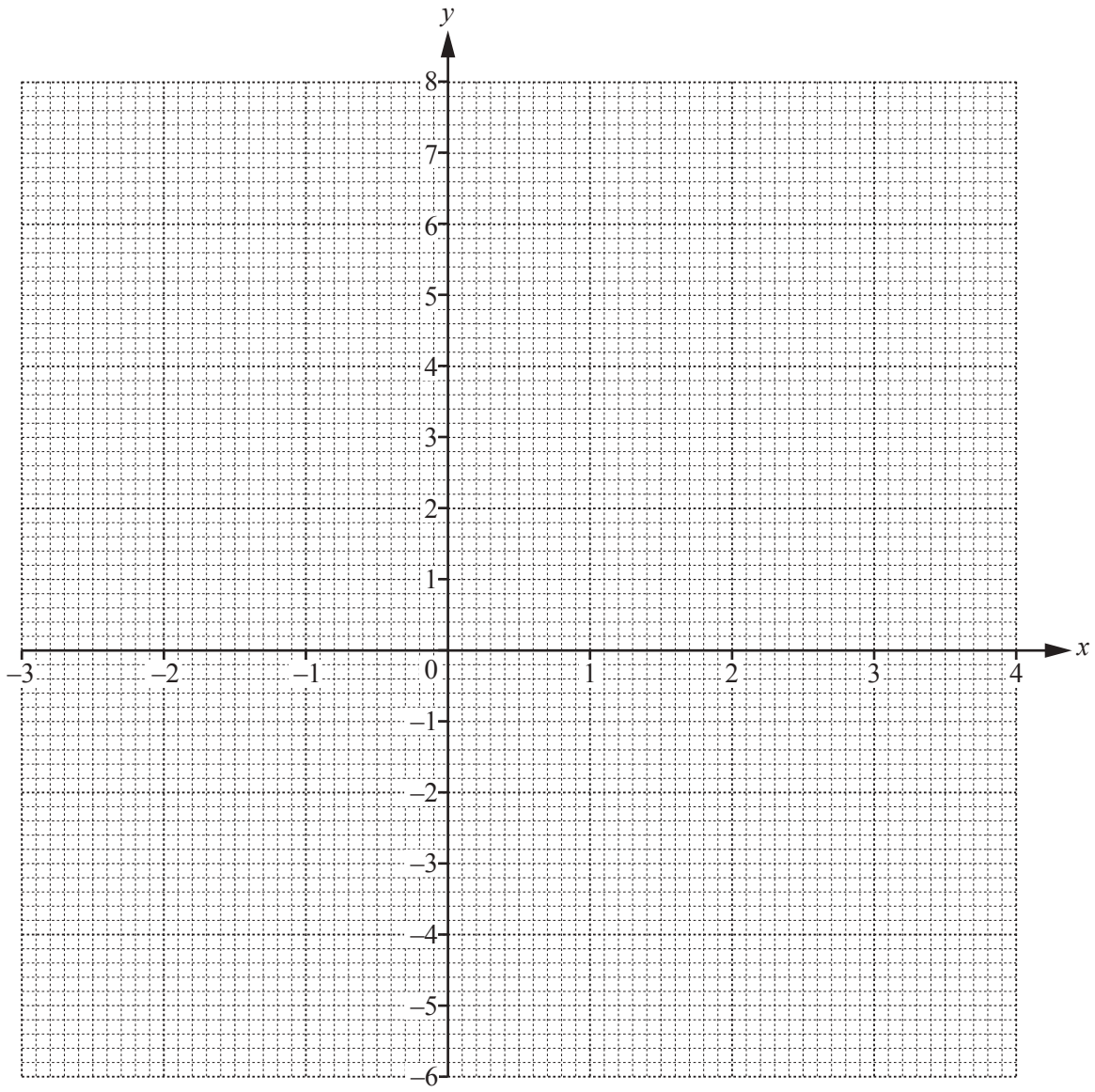
$k =$ ..... [2]

(b) (i) Complete the table of values for $y = x^2 - x - 5$.

x	-3	-2	-1	0	1	2	3	4
y	7		-3		-5			

[3]

(ii) On the grid, draw the graph of $y = x^2 - x - 5$ for $-3 \leqslant x \leqslant 4$.



[4]

(iii) Write down the co-ordinates of the lowest point on the graph.

(..... , ...) [1]

(iv) **(a)** On the grid, draw the line of symmetry of the graph. [1]

(b) Write down the equation of this line.

..... [1]

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Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/32**

Paper 3 (Core) **May/June 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

1 **(a)** Find the value of

(i) the square root of 19 044,

..... [1]

(ii) 2^7.

..... [1]

(b) n is an integer and $120 < n < 140$.

Find the value of n when it is

(i) a multiple of 45,

$n =$ ..... [1]

(ii) a square number,

$n =$ ..... [1]

(iii) a factor of 402,

$n =$ ..... [1]

(iv) a cube number.

$n =$ ..... [1]

(c) Work out the value of $\dfrac{21 - 15 \times 3}{18 \div 6 - 4}$.

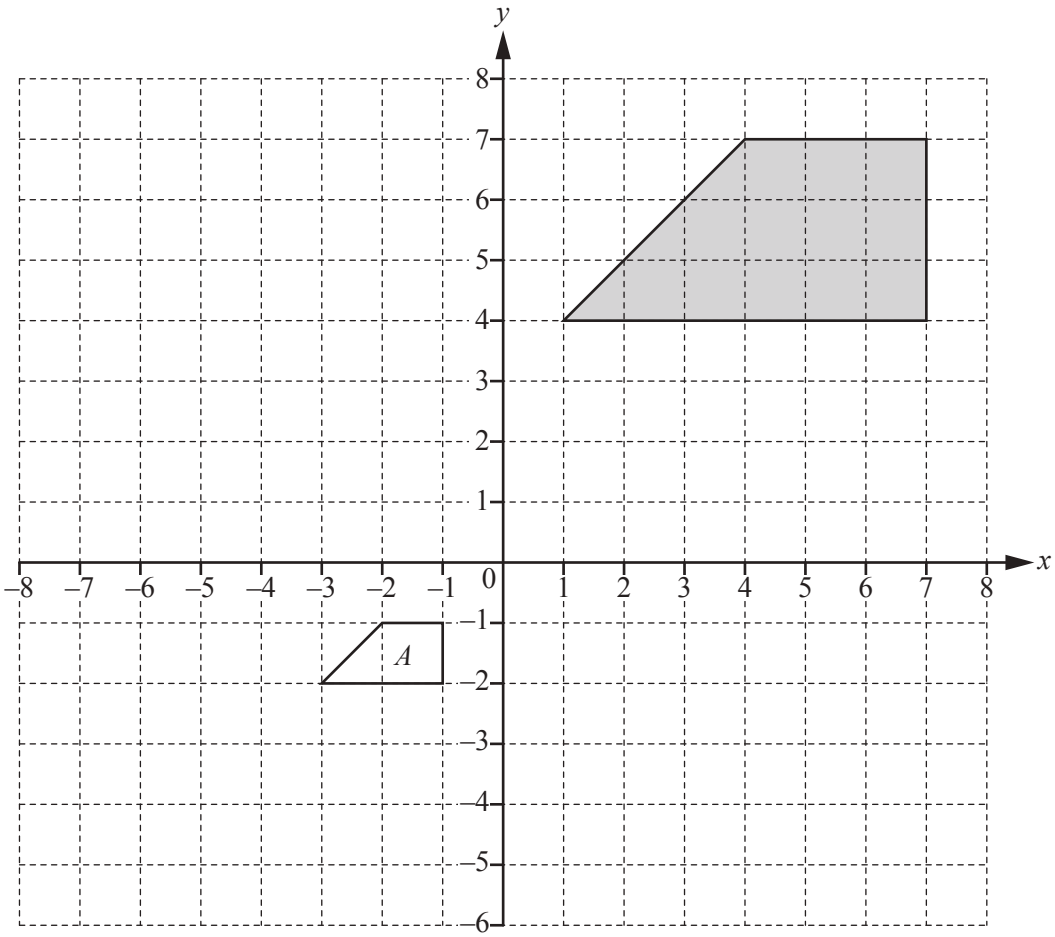
..... [2]

(d) Estimate the value of $\dfrac{19.2 \times \sqrt{8.64}}{31.6 \div 6.32}$ by rounding each number in the calculation to 1 significant figure.

Show all your working by filling in the calculation below.

$$\frac{\ldots\ldots \times \sqrt{\ldots\ldots}}{\ldots\ldots \div \ldots\ldots} = \ldots\ldots$$ [2]

2



(a) Write down the mathematical name of the shaded quadrilateral shown on the grid.

..... [1]

(b) Describe fully the **single** transformation that maps the shaded quadrilateral onto quadrilateral *A*.

.....

..... [3]

(c) Complete this statement with a fraction in its simplest form.

The area of quadrilateral *A* is ..... of the area of the shaded quadrilateral. [3]

(d) On the grid, draw the image of

(i) shape *A* after a translation by the vector $\begin{pmatrix} -4 \\ 7 \end{pmatrix}$, [2]

(ii) shape *A* after a rotation of 180° about the origin, [2]

(iii) shape *A* after a reflection in the line $x = 2$. [2]

3 A car company has three sales people, Anna, Mustapha and Joshua.

(a) During March, Anna sold 21 cars, Mustapha sold 12 cars and Joshua sold 15 cars.

Write down and simplify the ratio of the number of cars they sold during March.

Anna : Mustapha : Joshua = ... : ..... : ..... [2]

(b) Each month, they receive a bonus which is proportional to the number of cars they sell.
The total bonus in March is $1248.

(i) Show that Anna receives a bonus of $546.

[1]

(ii) Calculate the bonuses received by Mustapha and Joshua.

Mustapha $ .....

Joshua $ ..... [2]

(c) The total bonus of $1248 is $\frac{3}{7}$ of the total profit in March.

Calculate the total profit in March.

$ ..... [2]

(d) Ella wants to buy a car with a price of $13 500.
The company reduces this price by 16%.
Ella then pays a deposit of $500.

Show that the amount left for her to pay is $10 840.

[2]

(e) Ella borrows $10 840 from a bank.
She pays this back over 3 years at a rate of $340 per month.

(i) Show that the total amount she pays back during the 3 years is $12 240.

[1]

(ii) Calculate the percentage increase from $10 840 to $12 240.

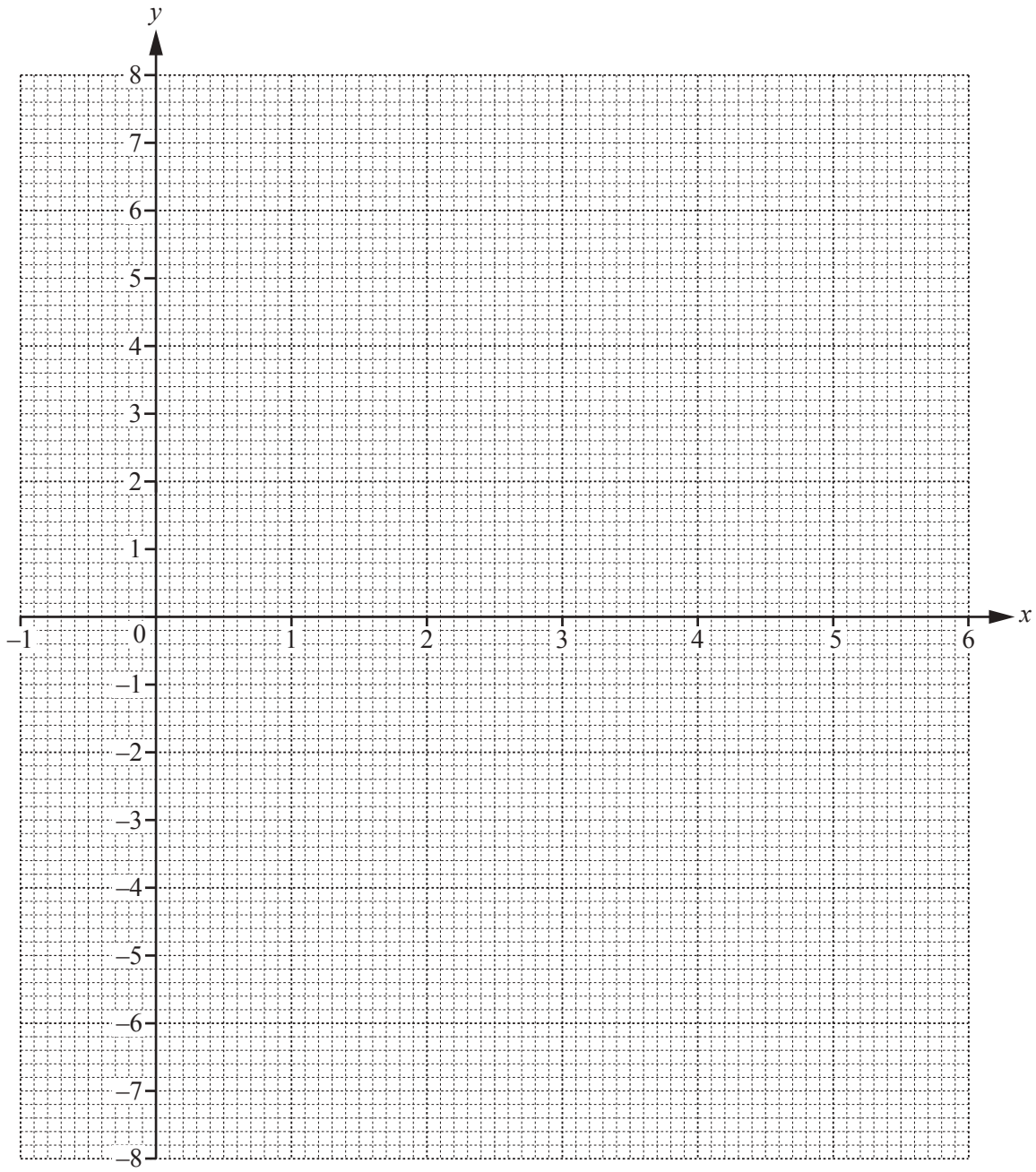
.....% [3]

4 **(a)** Complete the table of values for $y = 5x - x^2$.

x	−1	0	1	2	3	4	5	6
y		0		6	6			−6

[2]

(b) On the grid, draw the graph of $y = 5x - x^2$ for $-1 \leqslant x \leqslant 6$.



[4]

(c) Write down the equation of the line of symmetry of the graph.

..... [1]

(d) **(i)** Complete the table of values for $y = 1.5x - 2$.

x	0	2	5
y			

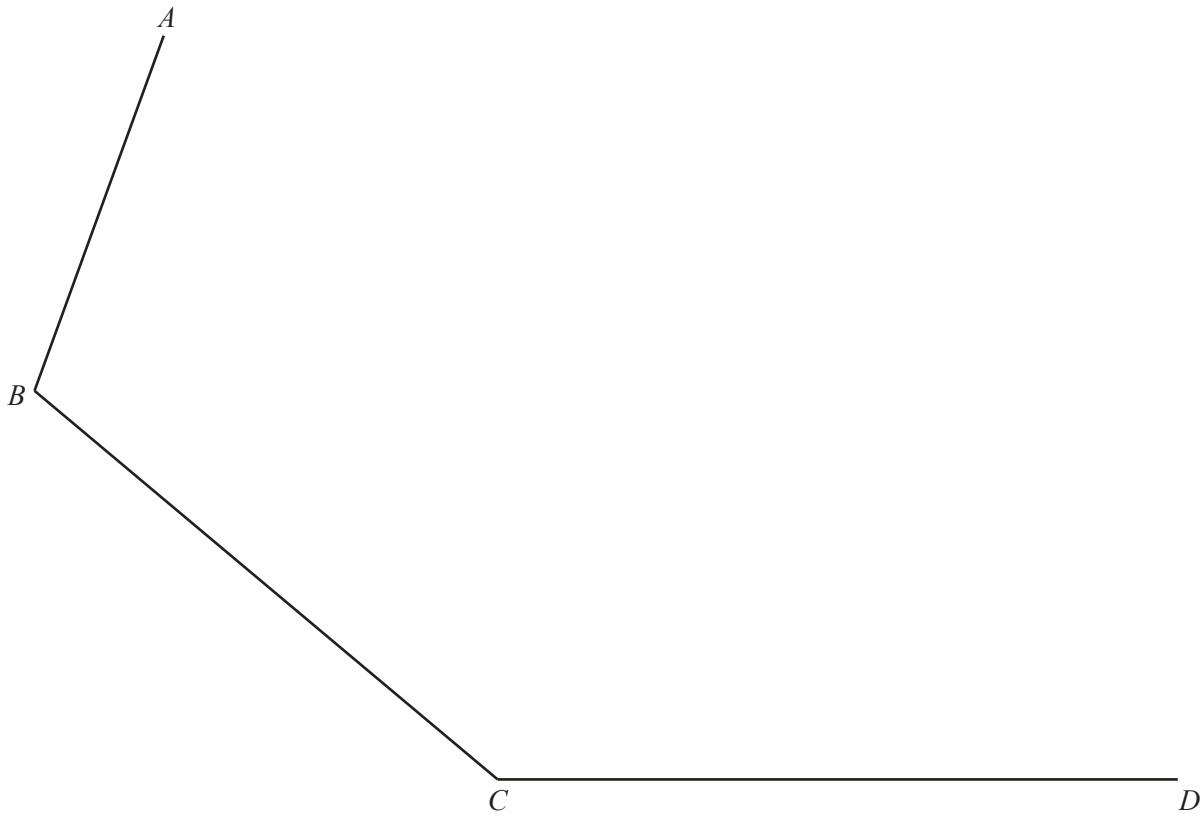
[2]

(ii) On the grid, draw the graph of $y = 1.5x - 2$ for $-1 \leqslant x \leqslant 6$. [2]

(iii) Use your graphs to write down the solutions to the equation $1.5x - 2 = 5x - x^2$.

$x =$ ..... or $x =$ ..... [2]

5 The scale drawing represents three sides, *AB*, *BC* and *CD*, of a wildlife park.
The scale is 1 centimetre represents 50 metres.



Scale: 1 cm to 50 m

(a) Find the actual distance AB in metres.

..... m [2]

(b) Point E is 550 metres from A and 600 metres from D.

Use a ruler and compasses only to find the point E and draw the lines AE and DE. [3]

(c) Two straight paths cross the wildlife park, $ABCDE$.

Using a straight edge and compasses only, construct

(i) the path that bisects angle ABC, [2]

(ii) the path that is equidistant from point C and point D. [2]

(d) The path from B crosses over a circular lake with radius 150 m.
The centre of the lake is on this path and is 350 m from B.

(i) On the scale drawing, construct the lake. [3]

(ii) Calculate the actual circumference of the lake in metres.

..... m [2]

[Turn over

6 The 262 students at a college each study one of the languages shown in the table.

	French	German	Spanish	Italian	Japanese	Total
Boys	27		48	19		123
Girls		32	54		12	
Total		53		30		262

(a) Complete the table. [3]

(b) Find the probability that

(i) a girl, chosen at random, studies Spanish,

..... [1]

(ii) a boy, chosen at random, studies French or Italian,

..... [1]

(iii) a student, chosen at random, does not study German.

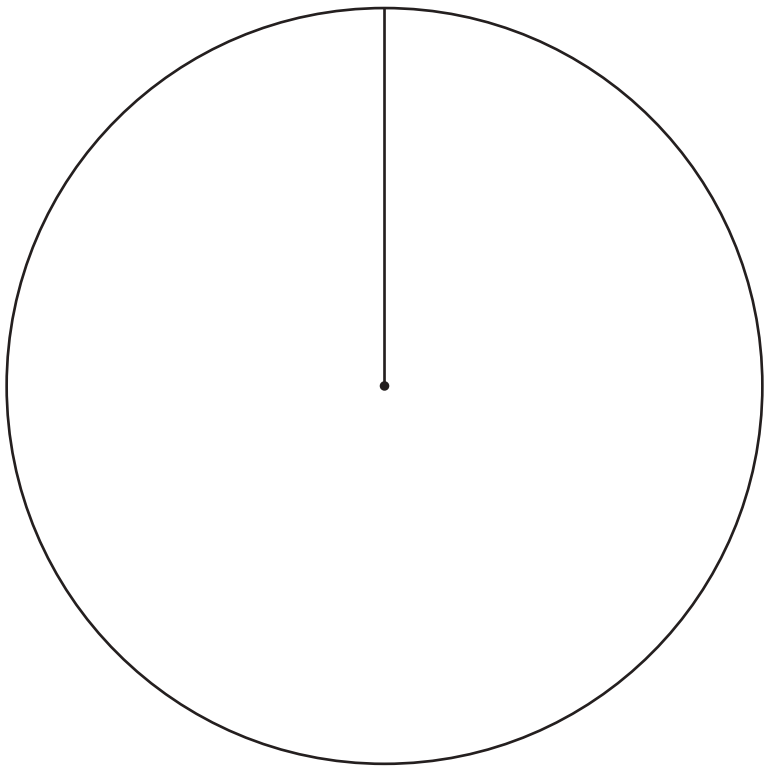
..... [1]

(c) 72 students each study one of the sciences shown in the table.
The results are to be shown in a pie chart.

Science	Number of students	Pie chart sector angle
Biology	25	125°
Chemistry	16	
Physics	31	

(i) Complete the table. [2]

(ii) Complete the pie chart.



[2]

7 Louise leaves home at 09 55 and cycles the 5.6 km to the supermarket at a constant speed.
She takes 15 minutes to complete the journey.

(a) Write down the time she arrives at the supermarket.

..... [1]

(b) Calculate Louise's average speed from her home to the supermarket

(i) in kilometres per hour,

.....km/h [1]

(ii) in metres per second, giving your answer correct to 1 decimal place.

..... m/s [2]

(c) Louise stays at the supermarket for 23 minutes.

On the grid opposite, draw the travel graph of her journey from home and her stay at the supermarket. [2]

(d) Louise's mother leaves home at 10 07 to meet Louise at the supermarket.
She cycles at a constant speed of 28 km/h.

(i) Work out how long she takes for the 5.6 km journey.
Give your answer in minutes.

.....min [2]

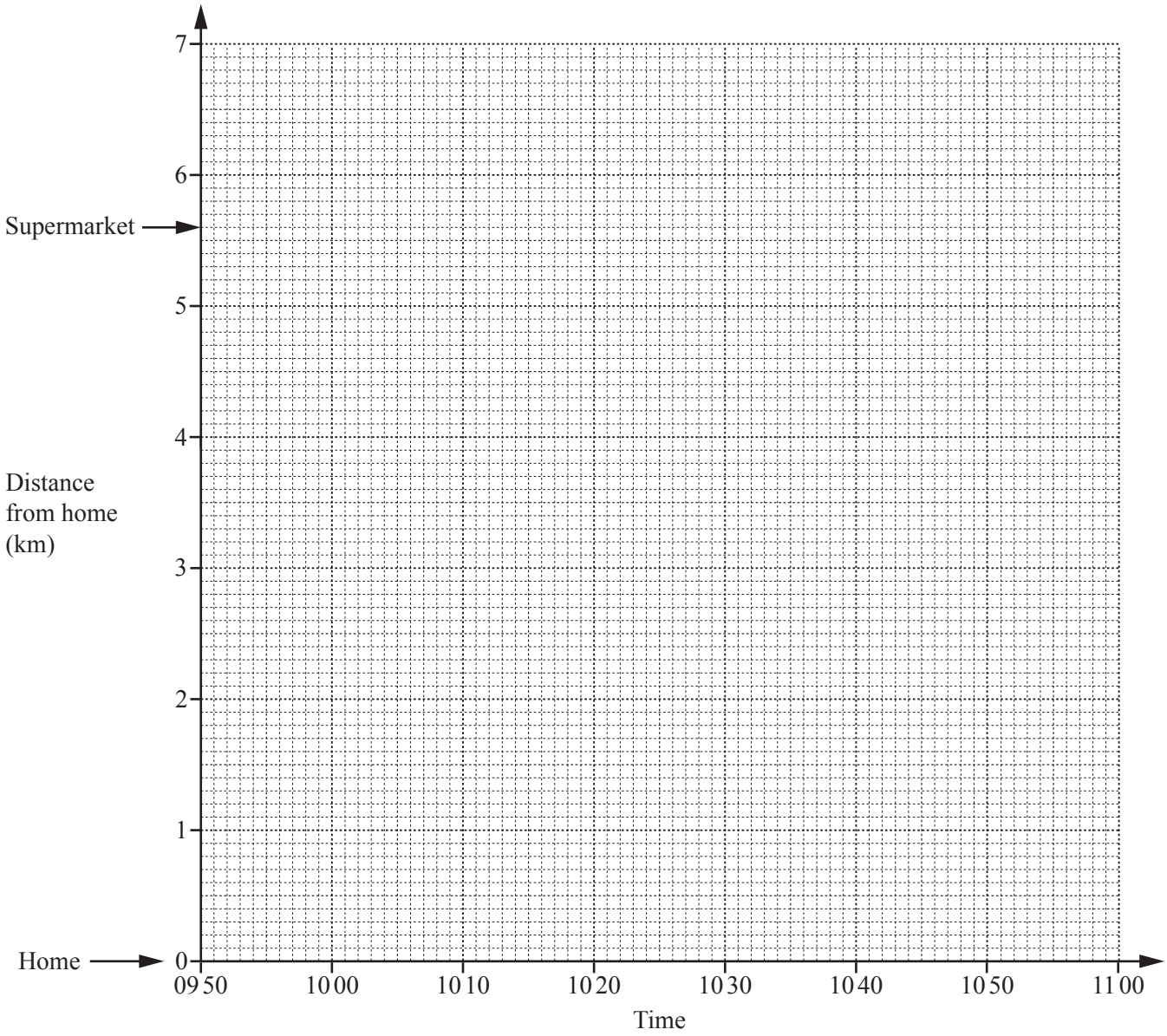
(ii) On the grid, show her mother's journey. [1]

(e) They cycle home together at a constant speed and arrive at 10 54.

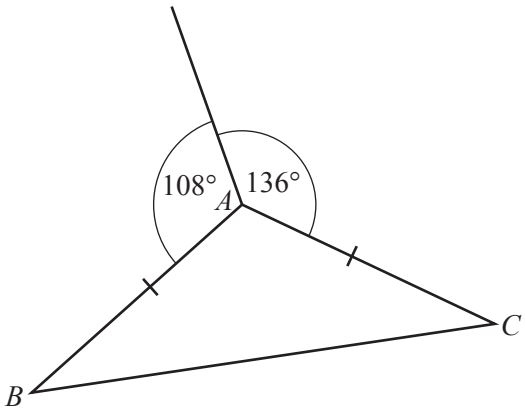
(i) On the grid, show their journey home. [1]

(ii) Calculate, in km/h, their constant speed on the journey home.

.....km/h [2]


7
6
Supermarket
5
4
Distance from home (km)
3
2
1
Home
0
09 50
10 00
10 10
10 20
10 30
10 40
10 50
11 00
Time

8 (a)



NOT TO SCALE

In the diagram, $AB = AC$.

Find

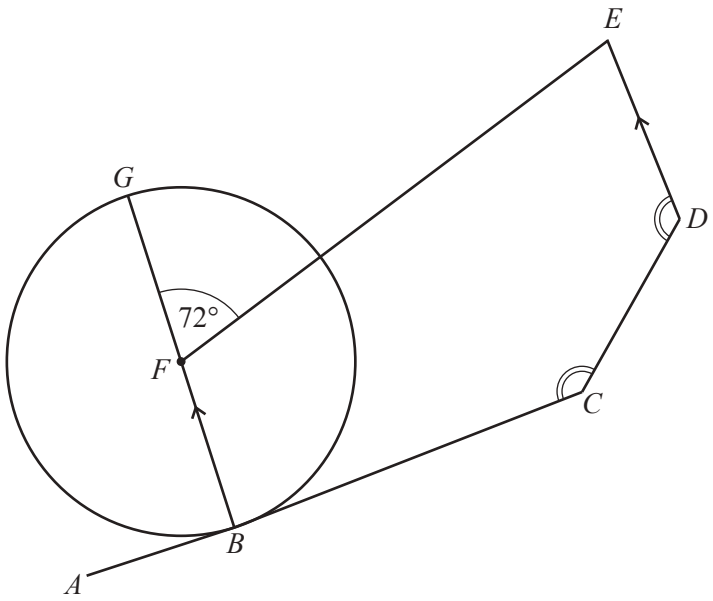
(i) angle BAC,

Angle BAC = ... [1]

(ii) angle ABC.

Angle ABC = ... [1]

(b)



NOT TO SCALE

The diagram shows a circle, centre F and diameter BG.
AC is a tangent to the circle at B.
BF is parallel to DE, angle $GFE = 72°$ and angle BCD = angle CDE.

(i) Write down the mathematical name of the polygon $BCDEF$.

..... [1]

(ii) Explain why angle FBC is a right angle.

..... [1]

(iii) Find angle BFE, giving a reason for your answer.

Angle BFE =..... because .....

..... [2]

(iv) Find angle FED.

Angle FED = ... [1]

(v) Calculate angle BCD.

Angle BCD = ... [4]

Question 9 is printed on the next page.

9 **(a)** Solve the equation $3(2x - 4) = 4(x + 7)$.

$x =$ ..... [3]

(b) Beindu goes to the market to buy apples and bananas.
She can buy

- 7 apples and 4 bananas for 85 cents

or

- 3 apples and 8 bananas for 93 cents.

Apples cost a cents each and bananas cost b cents each.

(i) This information can be used to write down two equations.
One of these is $7a + 4b = 85$.

Write down the other equation.

..... = ... [2]

(ii) Solve these two simultaneous equations.
You must show all your working.

$a =$ .....

$b =$ ..... [3]

Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2802287503

MATHEMATICS **0580/33**

Paper 3 (Core) **May/June 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

This document consists of **15** printed pages and **1** blank page.

CAMBRIDGE International Examinations

1 **(a)** The table shows the temperature at Lexford Station at 10 00 each day for a week.

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Temperature (°C)	−3	4	−1	0	−5	2	1

(i) Write down the day which had the coldest temperature.

..... [1]

(ii) Work out the difference in the temperature between Monday and Tuesday.

..... °C [1]

(iii) The temperature falls 6°C from 10 00 to midnight on Sunday.

Work out the temperature at midnight.

..... °C [1]

(b) The distance between Lexford Station and Crowton Station is 6.5 km.

(i) A train travels between these stations at an average speed of 39 km/h.

Work out how long, in minutes, it takes the train to travel between these stations.

..... min [3]

(ii) Each wheel on the train has a diameter of 1.8 m.

Work out the number of complete turns each wheel makes in travelling the 6.5 km.

..... [4]

(c) A northbound train leaves Lexford Station every 30 minutes.
A bus leaves Lexford Station every 45 minutes.

At 11 40 a northbound train and a bus leave the station together.

Find the next time when this happens.

..... [3]

(d) Here is part of a timetable for trains going east to west from Lexford Station.

Lexford	09 14	09 47	10 21	11 15	11 48
Crowton	09 26	09 59	10 33	11 27	12 00
Doniton Halt	09 42	10 15	10 49	11 43	12 16
Mosshead	10 01	10 34	11 08	12 02	12 35

(i) Work out the number of minutes the 09 14 train takes to travel from Lexford to Mosshead.

..... min [1]

(ii) Freda must arrive at Mosshead by 11 30.

Write down the latest time she can catch a train from Lexford.

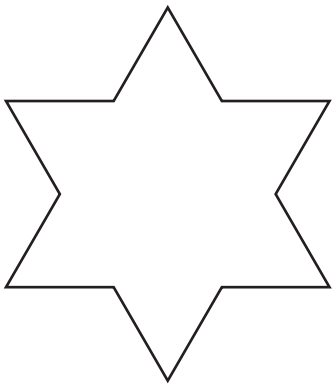
..... [1]

(e) 437 people go on a coach trip.
Each coach seats 62 people.

How many coaches are needed?

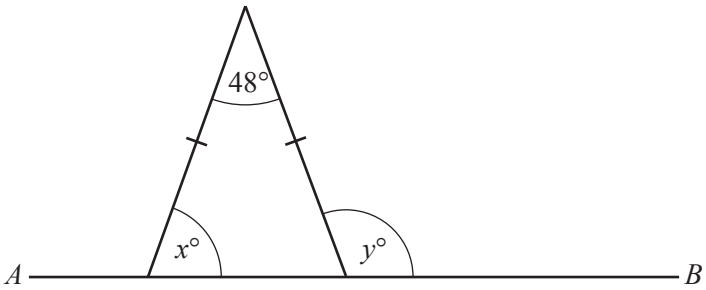
..... [2]

2 **(a)** Draw all the lines of symmetry on each shape.



[4]

(b) The diagram shows an isosceles triangle and a straight line AB.



NOT TO SCALE

Find the value of x and the value of y.

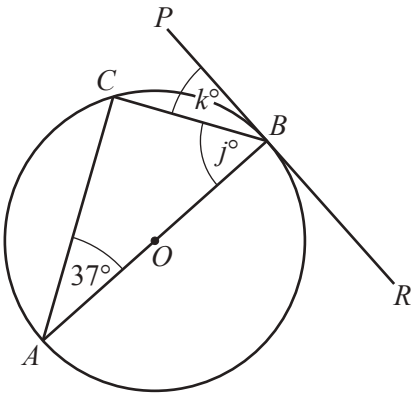
$x =$ .....

$y =$ ..... [2]

(c) Find the size of one interior angle of a regular decagon.

..... [3]

(d)



NOT TO SCALE

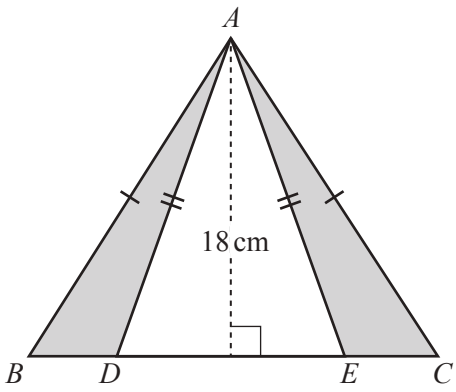
The points A, B and C lie on the circumference of a circle, centre O.
PBR is a tangent to the circle and angle $BAC = 37°$.

Find the value of j and the value of k.

$j =$ .....

$k =$ ..... [3]

(e)



NOT TO SCALE

ABC and ADE are isosceles triangles, each with perpendicular height 18 cm.
$BC = 35$ cm and $DE = 27$ cm.

Find the total area of the two shaded parts of the diagram.

..... cm^2 [3]

3 **(a)** A museum's opening times are shown in this table.

Day	Opening times
Monday to Thursday	09 00 to 17 00
Friday	08 30 to 18 00
Saturday	09 00 to 19 00
Sunday	Closed

Work out how many hours in a week the museum is open for.

..... hours [3]

(b) The table shows the cost of tickets for the museum.

	Cost
Adult	$4.20
Senior (aged over 60)	$2.80
Child (aged 5 to 15)	$1.80
Child (aged under 5)	Free

The Reeve family visit the museum.
Mrs Reeve is aged 36, her father is 67, her mother is 65, and her three children are 2, 7 and 12.

Work out the total cost for these six people to visit the museum.

$..... [3]

(c) Mrs Reeve buys 6 ice creams.
Each ice cream costs $1.30 .

How much change does she receive from $10?

$..... [2]

(d) Last year, the museum had twenty seven thousand and fifty three visitors.

Write this number in figures.

..... [1]

(e) In 2015, there were 12 400 visitors to the museum.
In 2016, there were 14 100 visitors to the museum.

Calculate the percentage increase in the number of visitors from 2015 to 2016.

..... % [3]

(f) The door to the museum has an 8-digit code to unlock it.

- The next odd number after 35 gives digits 1 and 2.
- The next prime number after 23 gives digits 3 and 4.
- The square root of 225 gives digits 5 and 6.
- The value of 2^6 gives digits 7 and 8.

Use this information to complete the door code.
Digits 1 and 2 have been completed for you.

Digit	1	2	3	4	5	6	7	8
Code	3	7						

[3]

4 **(a)** Solve these equations.

(i) $3x = 18$

$x =$ ..... [1]

(ii) $8x - 15 = 6x + 2$

$x =$ ..... [2]

(b) Factorise.

$5x - 15$

..... [1]

(c) Simplify.

$2x - 6y + 3x + 2y$

..... [2]

(d) Find the value of $5u - 2v$ when $u = 11$ and $v = -3$.

..... [2]

(e) Make p the subject of this formula.

$$H = 7p - 3$$

$p =$ ..... [2]

(f) **(i)** Find the value of k when $x^{10} \div x^k = x^3$.

$k =$ ..... [1]

(ii) Find the value of n when $y^{10} \times y^n = 1$.

$n =$ ..... [1]

5 **(a)** Geoff keeps a record of the number of goals scored in the first eight games played by his football team.

3 1 8 5 7 2 1 6

Find

(i) the mode,

..... [1]

(ii) the range,

..... [1]

(iii) the median.

..... [2]

(b) The table shows the number of goals scored by Geoff's team in each game during one season.

Number of goals	0	1	2	3	4	5	6	7	8
Number of games	5	7	8	10	6	4	5	3	2

(i) How many games did the team play?

..... [1]

(ii) Work out the mean number of goals scored per game.

..... [3]

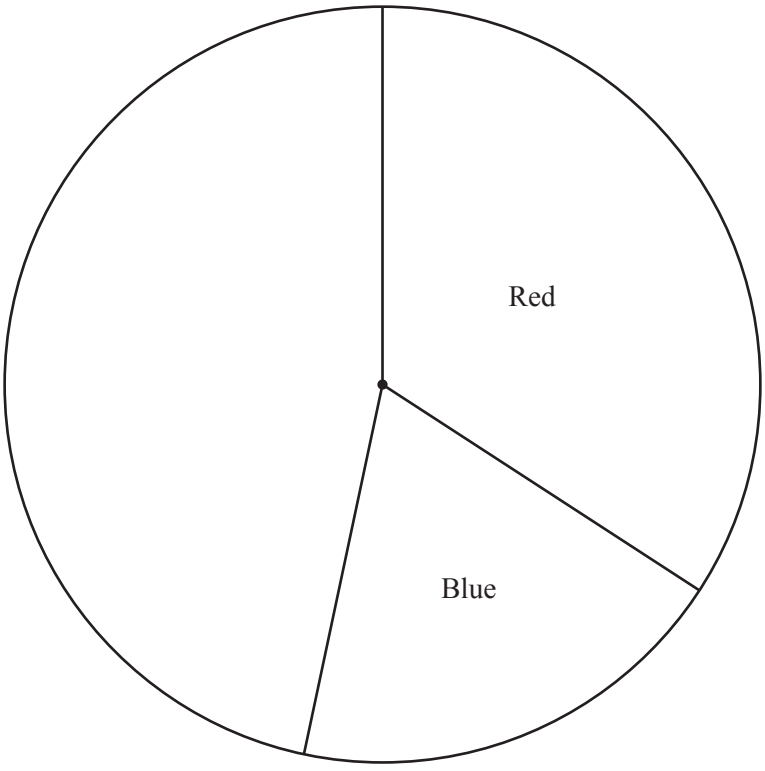
(c) Geoff asks some supporters to choose a new colour for the team's shirts.
The results are to be shown in a pie chart.
The table shows some of this information.

Colour	Frequency	Pie chart sector angle
Red	41	123°
Blue		69°
Green		
Other	18	54°

(i) Complete the table.

[3]

(ii) Complete the pie chart.



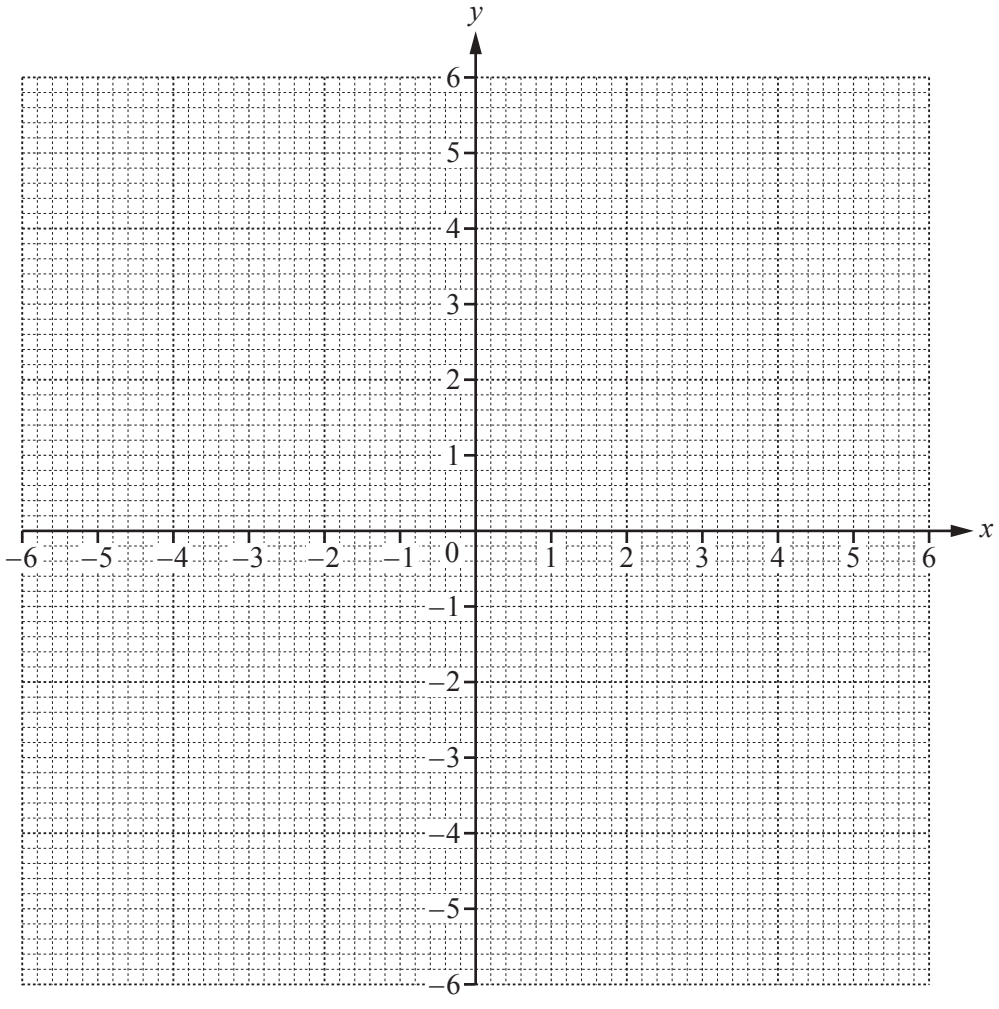
[1]

6 **(a)** Complete the table of values for $y = \frac{6}{x}$, $x \neq 0$.

x	-6	-4	-3	-2	-1		1	2	3	4	6
y		-1.5		-3				3		1.5	

[3]

(b) On the grid, draw the graph of $y = \frac{6}{x}$ for $-6 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 6$.



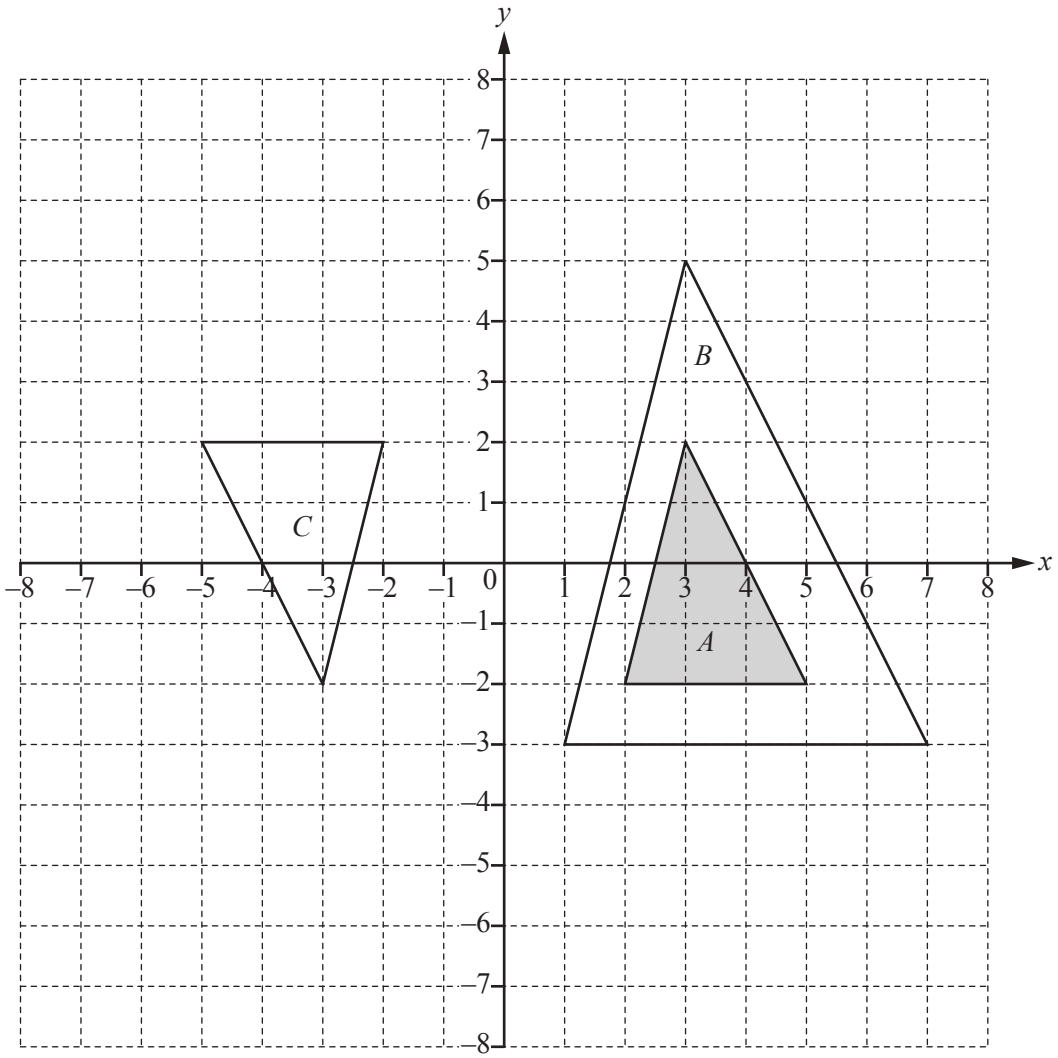
[4]

(c) On the grid, draw the line $y = -5$. [1]

(d) Use your graph to solve the equation $\frac{6}{x} = -5$.

$x =$ ..... [1]

7 The diagram shows three triangles A, B and C.



(a) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

(b) Describe fully the **single** transformation that maps triangle A onto triangle C.

.....

..... [3]

(c) Draw the image of

(i) triangle A after a translation by the vector $\begin{pmatrix} -6 \\ 5 \end{pmatrix}$, [2]

(ii) triangle A after a reflection in the line $y = -3$. [2]

8 **(a)** A bag contains 6 green balls, 5 red balls and 3 blue balls only.
A ball is taken from the bag at random.

Find the probability that the ball is

(i) green,

..... [1]

(ii) green or red,

..... [1]

(iii) yellow.

..... [1]

(b) Another bag contains brown balls, white balls, black balls and purple balls only.
A ball is taken from this bag at random.

Colour	Brown	White	Black	Purple
Probability	0.46	0.22	0.14	

(i) Complete the table.

[2]

(ii) Which colour is the most likely to be taken?

..... [1]

(iii) There are 50 balls in this bag.

Work out the number of black balls.

..... [1]

9 **(a)** These are the first four terms of a sequence.

8 15 22 29

(i) Find the next term of this sequence.

..... [1]

(ii) Describe the rule for continuing this sequence.

..... [1]

(iii) Find an expression for the nth term of this sequence.

..... [2]

(b) Find the first three terms of another sequence whose nth term is $n^2 + 10$.

..... , ... , ... [2]

(c) Write down an expression for the nth term of this sequence.

1 8 27 64

..... [1]

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Cambridge IGCSE

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Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2816863460

MATHEMATICS **0580/41**

Paper 4 (Extended) **May/June 2018**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

1 Adele, Barbara and Collette share \$680 in the ratio 9 : 7 : 4.

(a) Show that Adele receives \$306.

[1]

(b) Calculate the amount that Barbara and Collette each receives.

Barbara \$ .....

Collette \$ ..... [3]

(c) Adele changes her \$306 into euros (€) when the exchange rate is €1 = \$1.125 .

Calculate the number of euros she receives.

€ ..... [2]

(d) Barbara spends a total of \$17.56 on 5 kg of apples and 3 kg of bananas.
Apples cost \$2.69 per kilogram.

Calculate the cost per kilogram of bananas.

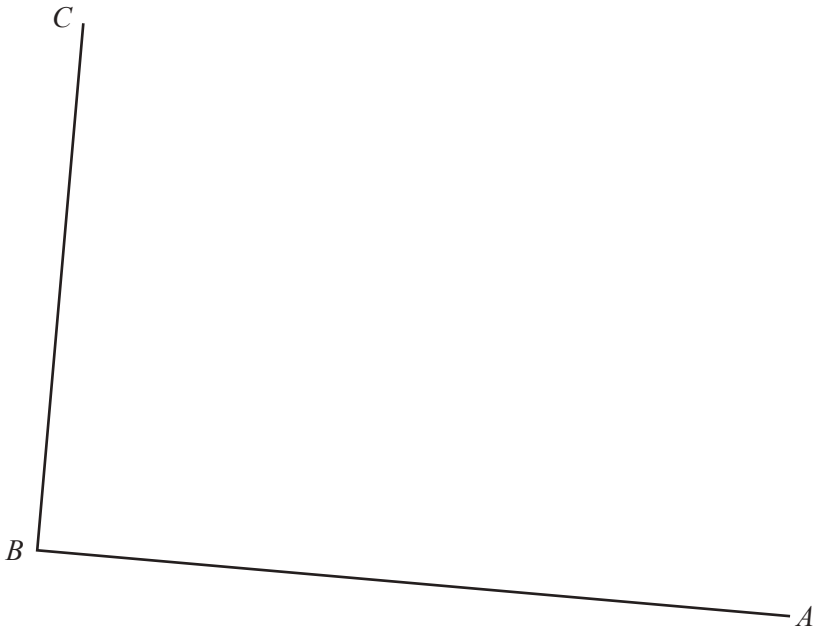
\$ ..... [3]

(e) Collette spends half of her share on clothes and $\frac{1}{5}$ of her share on books.

Calculate the amount she has left.

\$ ..... [3]

2 The scale drawing shows two boundaries, *AB* and *BC*, of a field *ABCD*.
The scale of the drawing is 1 cm represents 8 m.



Scale: 1 cm to 8 m

(a) The boundaries *CD* and *AD* of the field are each 72 m long.

(i) Work out the length of *CD* and *AD* on the scale drawing.

..... cm [1]

(ii) **Using a ruler and compasses only**, complete accurately the scale drawing of the field. [2]

(b) A tree in the field is

- equidistant from *A* and *B*

and

- equidistant from *AB* and *BC*.

On the scale drawing, construct two lines to find the position of the tree.
Use a straight edge and compasses only and leave in your construction arcs. [4]

3 **(a)** The price of a house decreased from \$82 500 to \$77 500.

Calculate the percentage decrease.

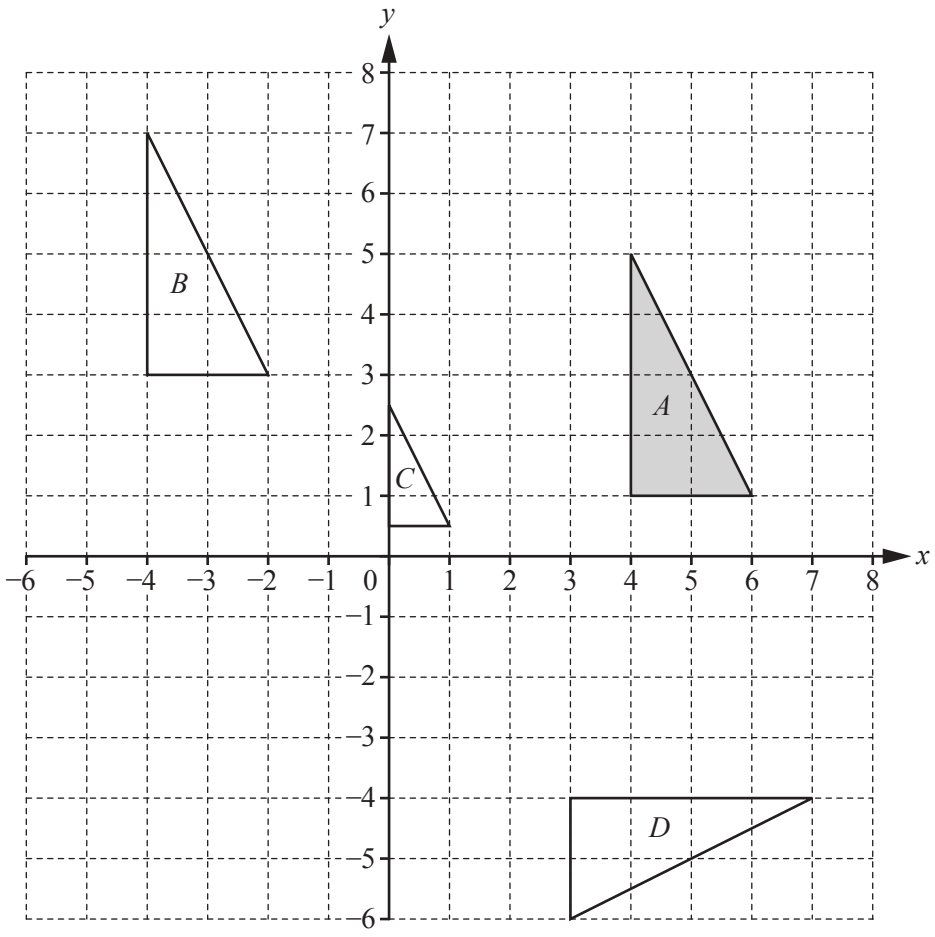
..... % [3]

(b) Roland invests \$12 000 in an account that pays compound interest at a rate of 2.2% per year.

Calculate the value of his investment at the end of 6 years.
Give your answer correct to the nearest dollar.

\$ ..... [3]

4



(a) Describe fully the **single** transformation that maps

(i) triangle A onto triangle B,

.....

..... [2]

(ii) triangle A onto triangle C,

.....

..... [3]

(iii) triangle A onto triangle D.

.....

..... [3]

(b) On the grid, draw the image of triangle A after an enlargement by scale factor 2, centre $(7, 3)$. [2]

5 **(a)** Factorise.

(i) $2mn + m^2 - 6n - 3m$

..... [2]

(ii) $4y^2 - 81$

..... [1]

(iii) $t^2 - 6t + 8$

..... [2]

(b) Rearrange the formula to make x the subject.

$$k = \frac{2m - x}{x}$$

$x =$ ..... [4]

(c) Solve the simultaneous equations.
You must show all your working.

$$\frac{1}{2}x - 3y = 9$$
$$5x + y = 28$$

$x =$ .....

$y =$ ..... [3]

(d) $\dfrac{3}{m+4} - \dfrac{4}{m} = 6$

(i) Show that this equation can be written as $6m^2 + 25m + 16 = 0$.

[3]

(ii) Solve the equation $6m^2 + 25m + 16 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$m =$ ..... or $m =$ ..... [4]

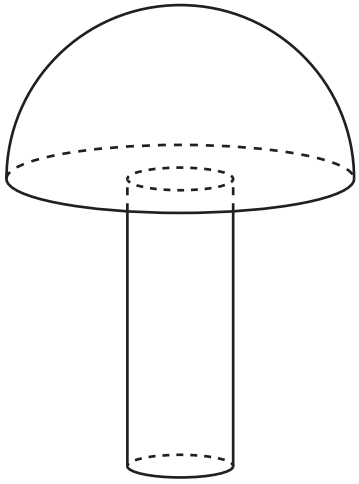
6 A solid hemisphere has volume 230 cm^3.

(a) Calculate the radius of the hemisphere.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... cm [3]

(b) A solid cylinder with radius 1.6 cm is attached to the hemisphere to make a toy.



NOT TO SCALE

The total volume of the toy is 300 cm^3.

(i) Calculate the height of the cylinder.

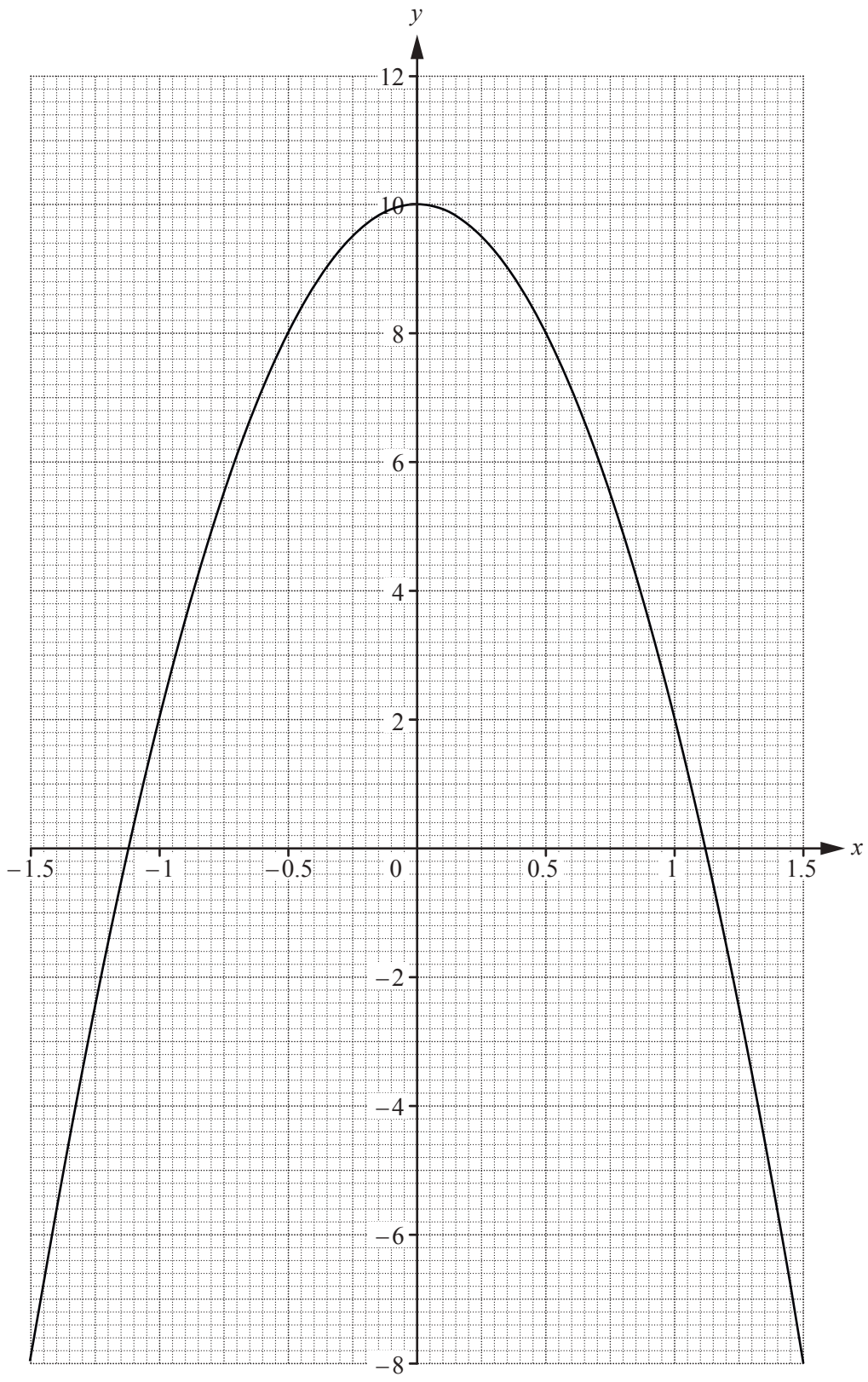
..... cm [3]

(ii) A mathematically similar toy has volume 19 200 cm^3.

Calculate the radius of the cylinder for this toy.

..... cm [3]

7 The graph of $y = 10 - 8x^2$ for $-1.5 \leqslant x \leqslant 1.5$ is drawn on the grid.



(a) Write down the equation of the line of symmetry of the graph.

..... [1]

(b) On the grid opposite, draw the tangent to the curve at the point where $x = 0.5$.
Find the gradient of this tangent.

..... [3]

(c) The table shows some values for $y = x^3 + 3x + 4$.

x	-1.5	-1	-0.5	0	0.5	1	1.5
y	-3.9				5.6	8	11.9

(i) Complete the table. [3]

(ii) On the grid opposite, draw the graph of $y = x^3 + 3x + 4$ for $-1.5 \leqslant x \leqslant 1.5$. [4]

(d) Show that the values of x where the two curves intersect are the solutions to the equation $x^3 + 8x^2 + 3x - 6 = 0$.

[1]

(e) By drawing a suitable straight line, solve the equation $x^3 + 5x + 2 = 0$ for $-1.5 \leqslant x \leqslant 1.5$.

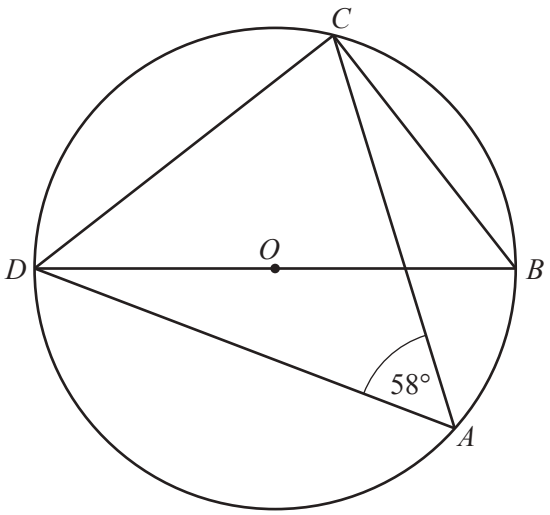
$x =$ ..... [3]

8 **(a)** The exterior angle of a regular polygon is $x°$ and the interior angle is $8x°$.

Calculate the number of sides of the polygon.

..... [3]

(b)



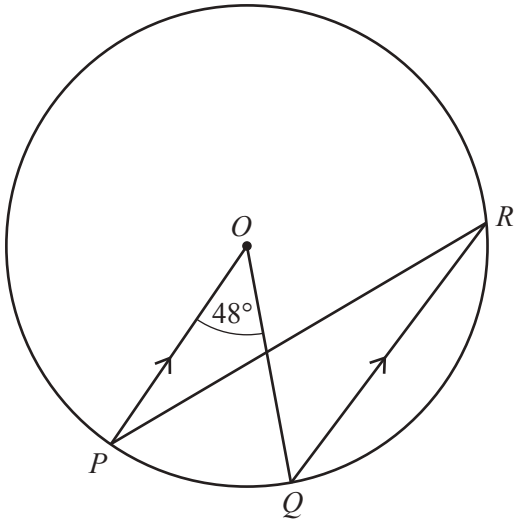
NOT TO SCALE

A, B, C and D are points on the circumference of the circle, centre O.
DOB is a straight line and angle $DAC = 58°$.

Find angle CDB.

Angle CDB = ... [3]

(c)



NOT TO SCALE

P, Q and R are points on the circumference of the circle, centre O.
PO is parallel to QR and angle $POQ = 48°$.

(i) Find angle OPR.

Angle OPR = ... [2]

(ii) The radius of the circle is 5.4 cm.

Calculate the length of the **major** arc PQ.

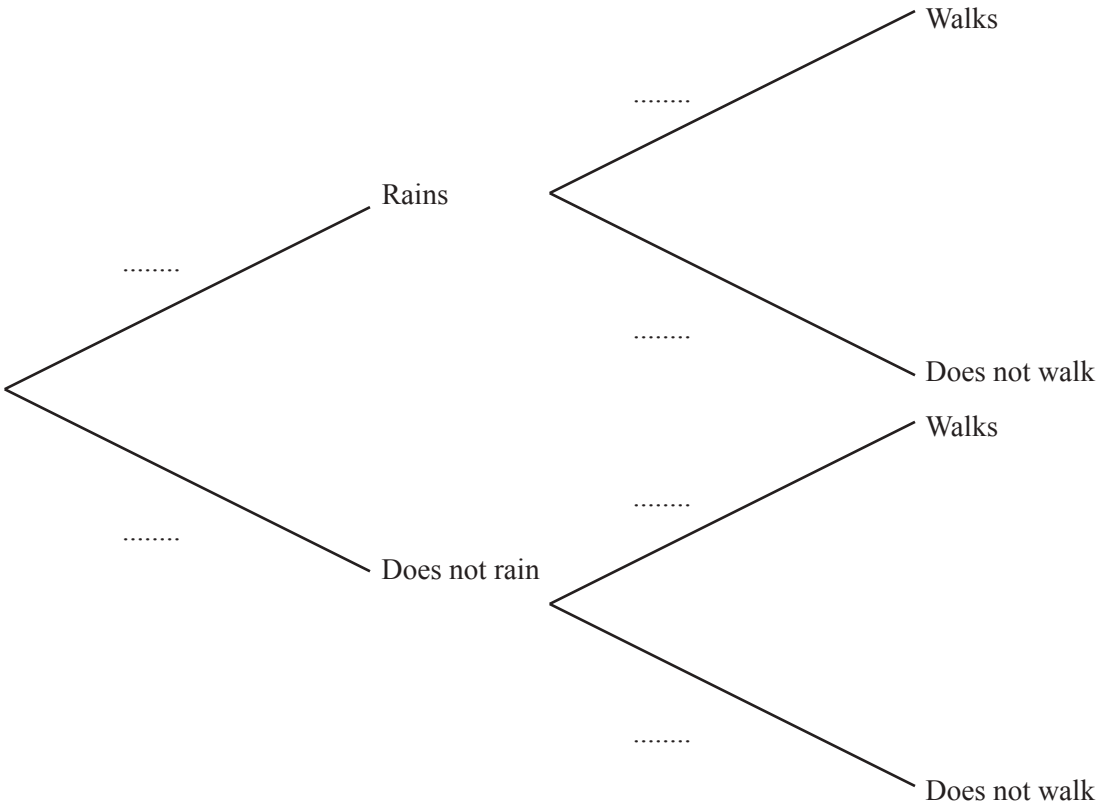
..... cm [3]

9 The probability that it will rain tomorrow is $\frac{5}{8}$.

If it rains, the probability that Rafael walks to school is $\frac{1}{6}$.

If it does not rain, the probability that Rafael walks to school is $\frac{7}{10}$.

(a) Complete the tree diagram.



[3]

(b) Calculate the probability that it will rain tomorrow and Rafael walks to school.

..... [2]

(c) Calculate the probability that Rafael does not walk to school.

..... [3]

10 **(a)** In 2017, the membership fee for a sports club was \$79.50 .
This was an increase of 6% on the fee in 2016.

Calculate the fee in 2016.

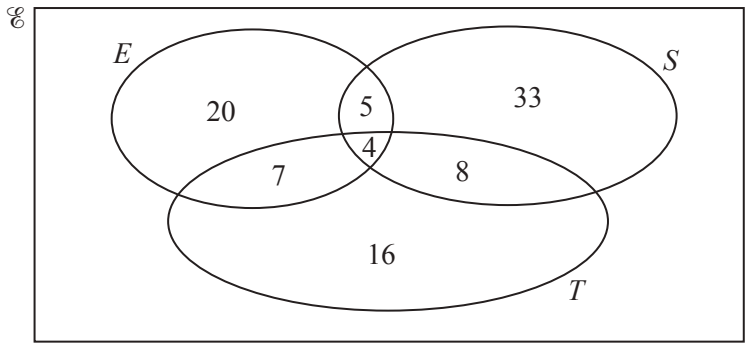
\$ ..... [3]

(b) On one day, the number of members using the exercise machines was 40, correct to the nearest 10.
Each member used a machine for 30 minutes, correct to the nearest 5 minutes.

Calculate the lower bound for the number of minutes the exercise machines were used on this day.

..... min [2]

(c) On another day, the number of members using the exercise machines (E), the swimming pool (S) and the tennis courts (T) is shown on the Venn diagram.



(i) Find the number of members using only the tennis courts.

..... [1]

(ii) Find the number of members using the swimming pool.

..... [1]

(iii) A member using the swimming pool is chosen at random.

Find the probability that this member also uses the tennis courts and the exercise machines.

..... [2]

(iv) Find $\mathrm{n}(T \cap (E \cup S))$.

..... [1]

11 **(a)** $\overrightarrow{OA} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$ $\overrightarrow{AB} = \begin{pmatrix} 8 \\ -7 \end{pmatrix}$ $\overrightarrow{AC} = \begin{pmatrix} -3 \\ 6 \end{pmatrix}$

Find

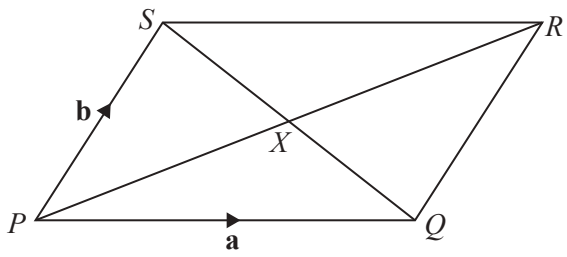
(i) $\left|\overrightarrow{OB}\right|$,

$\left|\overrightarrow{OB}\right|$ = ... [3]

(ii) $\overrightarrow{BC}$.

$\overrightarrow{BC}$ = $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(b)



NOT TO SCALE

PQRS is a parallelogram with diagonals *PR* and *SQ* intersecting at *X*.
$\overrightarrow{PQ} = \mathbf{a}$ and $\overrightarrow{PS} = \mathbf{b}$.

Find $\overrightarrow{QX}$ in terms of **a** and **b**.
Give your answer in its simplest form.

$\overrightarrow{QX}$ = ... [2]

(c) $\mathbf{M} = \begin{pmatrix} 2 & 5 \\ 1 & 8 \end{pmatrix}$

Calculate

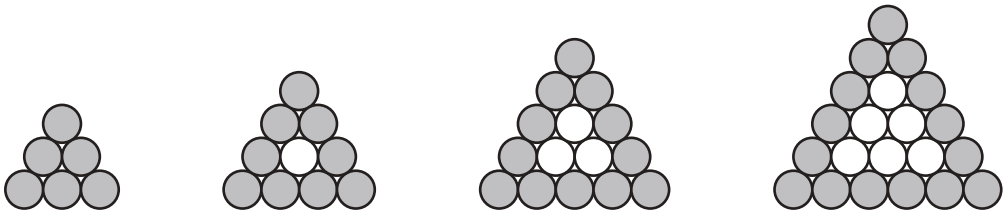
(i) $\mathbf{M}^2$,

$\mathbf{M}^2 =$ $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(ii) $\mathbf{M}^{-1}$.

$\mathbf{M}^{-1} =$ $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

12 Marco is making patterns with grey and white circular mats.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

The patterns form a sequence.
Marco makes a table to show some information about the patterns.

Pattern number	1	2	3	4	5
Number of grey mats	6	9	12	15	
Total number of mats	6	10	15	21	

(a) Complete the table for Pattern 5. [2]

(b) Find an expression, in terms of n, for the number of grey mats in Pattern n.

..... [2]

(c) Marco makes a pattern with 24 grey mats.

Find the total number of mats in this pattern.

..... [2]

(d) Marco needs a total of 6 mats to make the first pattern.
He needs a total of 16 mats to make the first two patterns.
He needs a total of $\frac{1}{6}n^3 + an^2 + bn$ mats to make the first n patterns.

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [6]

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Cambridge IGCSE

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CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5134426042

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2018**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

1 **(a)** Here is a list of ingredients to make 20 biscuits.

260 g of butter
500 g of sugar
650 g of flour
425 g of rice

(i) Find the mass of rice as a percentage of the mass of sugar.

..... % [1]

(ii) Find the mass of butter needed to make 35 of these biscuits.

..... g [2]

(iii) Michel has 2 kg of each ingredient.

Work out the greatest number of these biscuits that he can make.

..... [3]

(b) A company makes these biscuits at a cost of $1.35 per packet.
These biscuits are sold for $1.89 per packet.

(i) Calculate the percentage profit the company makes on each packet.

..... % [3]

(ii) The selling price of $1.89 has increased by 8% from last year.

Calculate the selling price last year.

$ ..... [3]

(c) Over a period of 3 years, the company's sales of biscuits increased from 15.6 million packets to 20.8 million packets.
The sales increased exponentially by the same percentage each year.

Calculate the percentage increase **each year**.

..... % [3]

(d) The people who work for the company are in the following age groups.

Group A	Group B	Group C
Under 30 years	30 to 50 years	Over 50 years

The ratio of the number in group A to the number in group B is 7 : 10.
The ratio of the number in group B to the number in group C is 4 : 3.

(i) Find the ratio of the number in group A to the number in group C.
Give your answer in its simplest form.

..... : ..... [3]

(ii) There are 45 people in group C.

Find the total number of people who work for the company.

..... [3]

2 The time taken for each of 120 students to complete a cooking challenge is shown in the table.

Time (t minutes)	$20 < t \leqslant 25$	$25 < t \leqslant 30$	$30 < t \leqslant 35$	$35 < t \leqslant 40$	$40 < t \leqslant 45$
Frequency	44	32	28	12	4

(a) (i) Write down the modal time interval.

..... $< t \leqslant$ ..... [1]

(ii) Write down the interval containing the median time.

..... $< t \leqslant$ ..... [1]

(iii) Calculate an estimate of the mean time.

..... min [4]

(iv) A student is chosen at random.

Find the probability that this student takes more than 40 minutes.

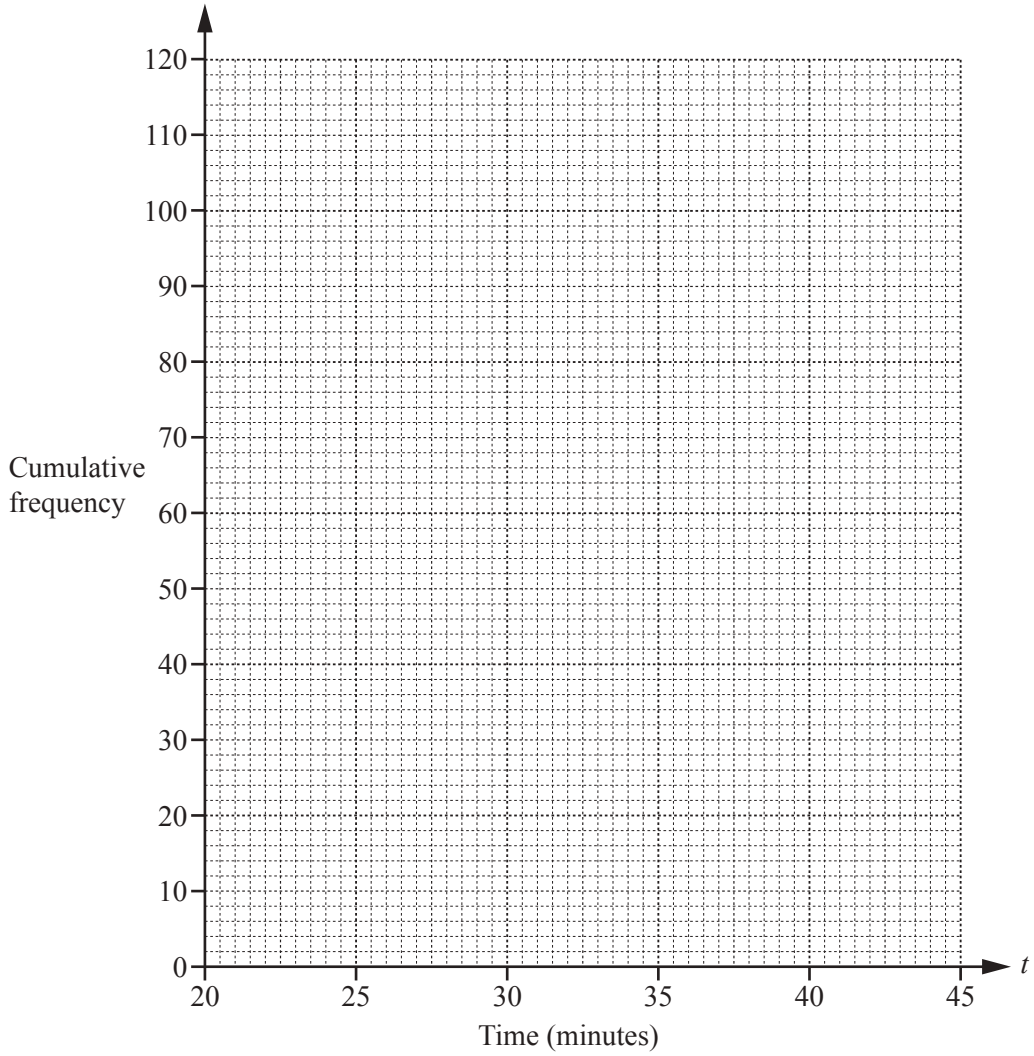
..... [1]

(b) (i) Complete the cumulative frequency table.

Time (t minutes)	$t \leqslant 20$	$t \leqslant 25$	$t \leqslant 30$	$t \leqslant 35$	$t \leqslant 40$	$t \leqslant 45$
Cumulative frequency	0	44				

[2]

(ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(iii) Find the median time.

..... min [1]

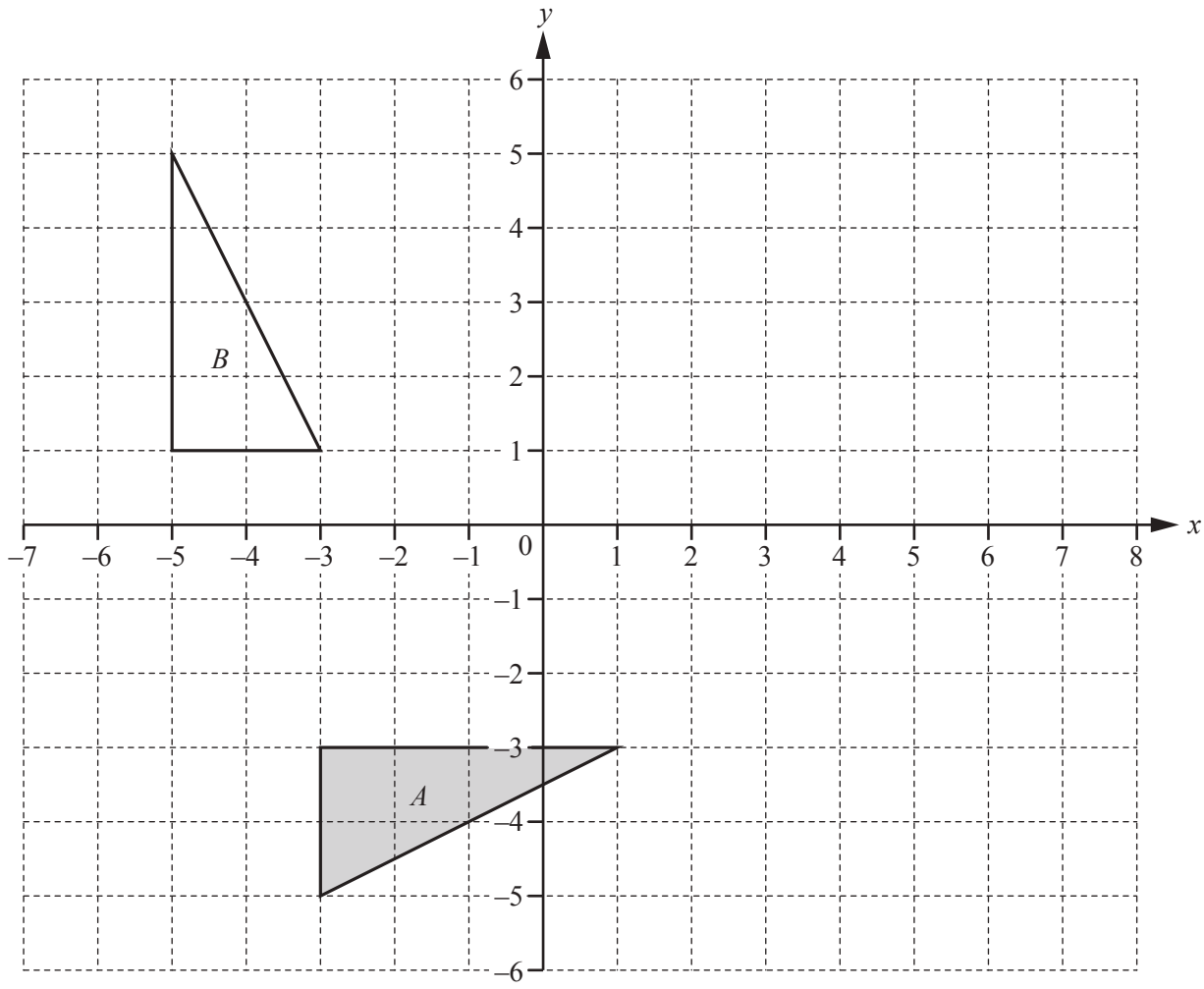
(iv) Find the interquartile range.

..... min [2]

(v) Find the number of students who took more than 37 minutes to complete the cooking challenge.

..... [2]

3



(a) **(i)** Draw the image of triangle A after a reflection in the line $x = 2$. [2]

(ii) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$. [2]

(iii) Draw the image of triangle A after an enlargement by scale factor $-\frac{1}{2}$, centre (3, 1). [3]

(b) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

(c) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$.

.....

..... [2]

4 **(a)** Simplify.

(i) $(3p^2)^5$

..... [2]

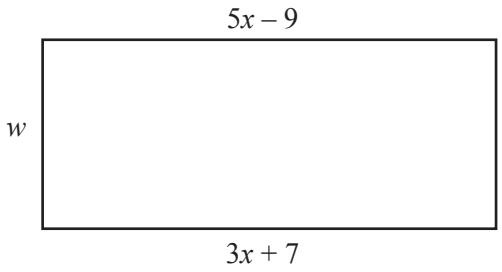
(ii) $18x^2y^6 \div 2xy^2$

..... [2]

(iii) $\left(\frac{5}{m}\right)^{-2}$

..... [1]

(b) In this part, all measurements are in metres.



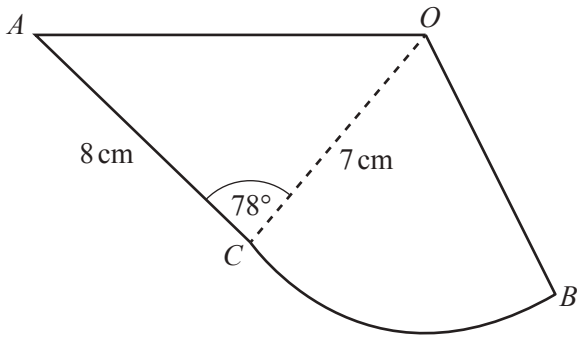
NOT TO SCALE

The diagram shows a rectangle.
The area of the rectangle is $310\,m^2$.

Work out the value of w.

$w =$ ..... [4]

5



NOT TO SCALE

The diagram shows a design made from a triangle AOC joined to a sector OCB.
$AC = 8$ cm, $OB = OC = 7$ cm and angle $ACO = 78°$.

(a) Use the cosine rule to show that $OA = 9.47$ cm, correct to 2 decimal places.

[4]

(b) Calculate angle OAC.

Angle $OAC =$ ..... [3]

(c) The perimeter of the design is 29.5 cm.

Show that angle $COB = 41.2°$, correct to 1 decimal place.

[5]

(d) Calculate the total area of the design.

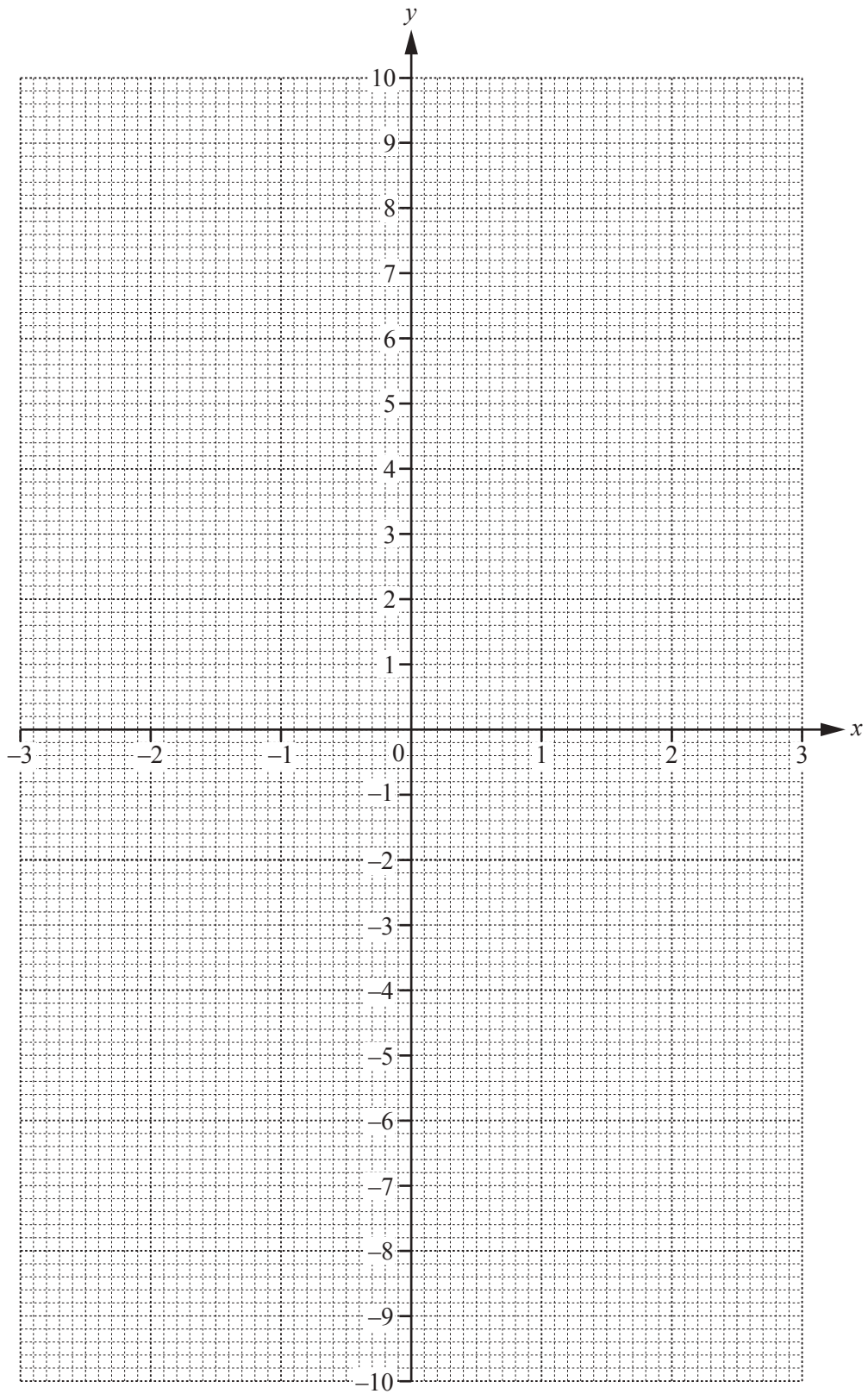
..... cm^2 [4]

6 **(a)** Complete the table of values for $y = \frac{x^3}{3} - \frac{1}{2x^2}$, $x \neq 0$.

x	-3	-2	-1	-0.5	-0.3		0.3	0.5	1	2	3
y	-9.1	-2.8	-0.8		-5.6		-5.5	-2.0			8.9

[3]

(b) On the grid, draw the graph of $y = \frac{x^3}{3} - \frac{1}{2x^2}$ for $-3 \leqslant x \leqslant -0.3$ and $0.3 \leqslant x \leqslant 3$.



[5]

(c) **(i)** By drawing a suitable tangent, find an estimate of the gradient of the curve at $x = -2$.

..... [3]

(ii) Write down the equation of the tangent to the curve at $x = -2$.
Give your answer in the form $y = mx + c$.

$y =$ ..... [2]

(d) Use your graph to solve the equations.

(i) $\frac{x^3}{3} - \frac{1}{2x^2} = 0$

$x =$ ..... [1]

(ii) $\frac{x^3}{3} - \frac{1}{2x^2} + 4 = 0$

$x =$ ..... or $x =$ ..... or $x =$ ..... [3]

(e) The equation $\frac{x^3}{3} - \frac{1}{2x^2} + 4 = 0$ can be written in the form $ax^n + bx^{n-3} - 3 = 0$.

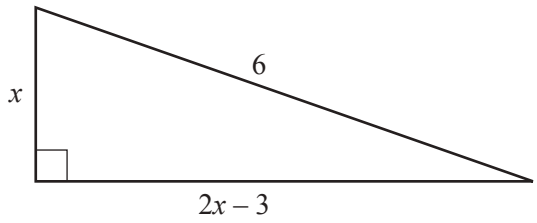
Find the value of a, the value of b and the value of n.

$a =$ .....

$b =$ .....

$n =$ ..... [3]

7 In this question, all measurements are in metres.



NOT TO SCALE

The diagram shows a right-angled triangle.

(a) Show that $5x^2 - 12x - 27 = 0$.

[3]

(b) Solve $5x^2 - 12x - 27 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [4]

(c) Calculate the perimeter of the triangle.

..... m [2]

(d) Calculate the smallest angle of the triangle.

..... [2]

8 $f(x) = 8 - 3x$ $g(x) = \frac{10}{x+1}$, $x \neq -1$ $h(x) = 2^x$

(a) Find

(i) $hf\left(\frac{8}{3}\right)$,

..... [2]

(ii) $gh(-2)$,

..... [2]

(iii) $g^{-1}(x)$,

$g^{-1}(x)$ = ... [3]

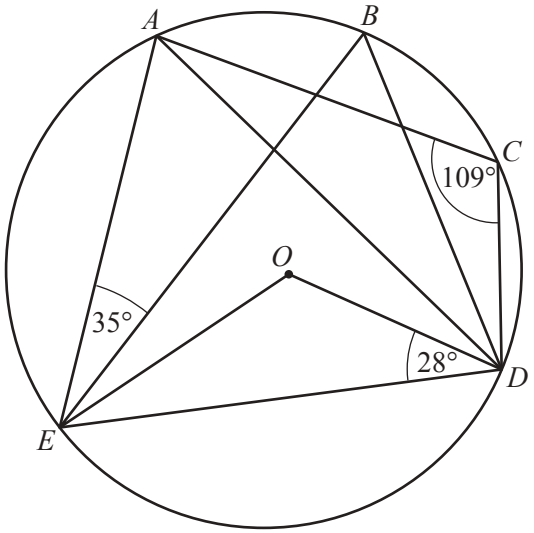
(iv) $f^{-1}f(5)$.

..... [1]

(b) Write $f(x) + g(x)$ as a single fraction in its simplest form.

..... [3]

9 (a)



NOT TO SCALE

A, B, C, D and E lie on the circle, centre O.
Angle $AEB = 35°$, angle $ODE = 28°$ and angle $ACD = 109°$.

(i) Work out the following angles, giving reasons for your answers.

(a) Angle $EBD =$ ..... because .....

.....

..... [3]

(b) Angle $EAD =$ ..... because .....

..... [2]

(ii) Work out angle BEO.

Angle $BEO =$ ..... [3]

(b) In a regular polygon, the interior angle is 11 times the exterior angle.

(i) Work out the number of sides of this polygon.

..... [3]

(ii) Find the sum of the interior angles of this polygon.

..... [2]

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

3232999774

MATHEMATICS **0580/43**

Paper 4 (Extended) **May/June 2018**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Geometrical instruments
Tracing paper (optional).

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
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For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

This document consists of **19** printed pages and **1** blank page.

1 **(a)** Rowena buys and sells clothes.

(i) She buys a jacket for \$40 and sells it for \$45.40 .

Calculate the percentage profit.

..... % [3]

(ii) She sells a dress for \$42.60 after making a profit of 20% on the cost price.

Calculate the cost price.

\$ ..... [3]

(b) Sara invests \$500 for 15 years at a rate of 2% per year simple interest.

Calculate the total interest Sara receives.

\$ ..... [2]

(c) Tomas has two cars.

(i) The value, today, of one car is \$21 000.
The value of this car **decreases** exponentially by 18% each year.

Calculate the value of this car after 5 years.
Give your answer correct to the nearest hundred dollars.

\$ ..... [3]

(ii) The value, today, of the other car is \$15 000.
The value of this car **increases** exponentially by x% each year.
After 12 years the value of the car will be \$42 190.

Calculate the value of x.

$x =$ ..... [3]

2 (a) (i) $y = 2^x$

Complete the table.

x	0	1	2	3	4
y		2	4	8	

[2]

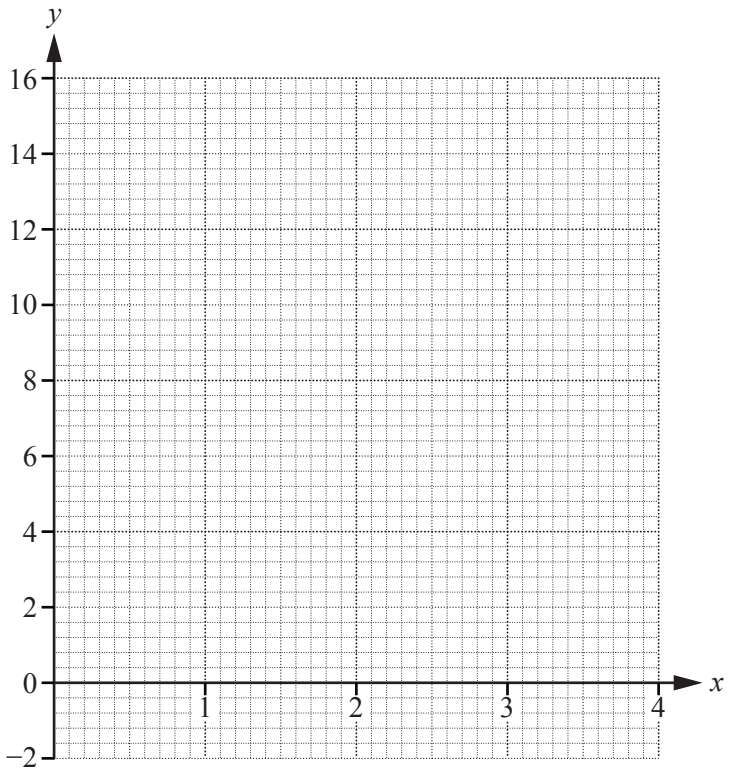
(ii) $y = 14 - x^2$

Complete the table.

x	0	1	2	3	4
y		13	10	5	

[2]

(b) On the grid, draw the graphs of $y = 2^x$ and $y = 14 - x^2$ for $0 \leqslant x \leqslant 4$.



[6]

(c) Use your graphs to solve the equations.

(i) $2^x = 12$

$x =$ ..... [1]

(ii) $2^x = 14 - x^2$

$x =$ ..... [1]

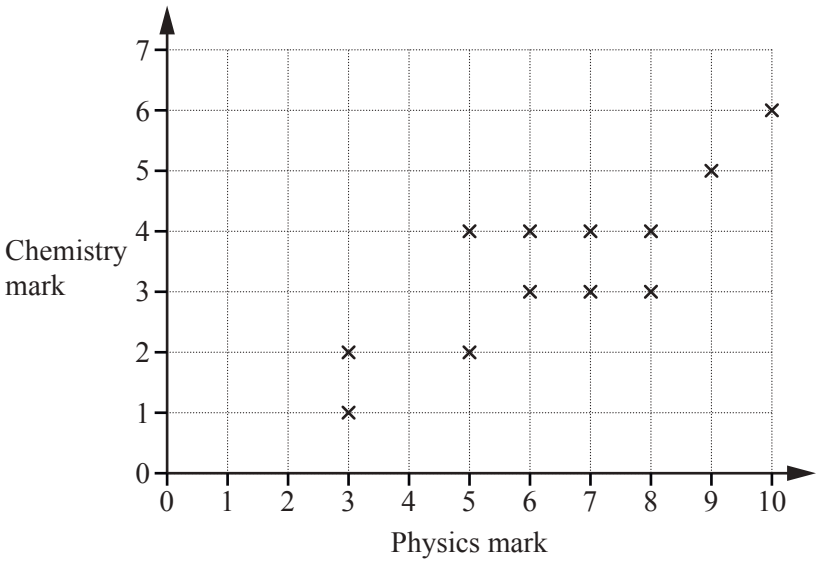
(d) **(i)** On the grid, draw the line from the point (4, 2) that has a gradient of -4. [1]

(ii) Complete the statement.

This straight line is a ..... to the graph of $y = 14 - x^2$

at the point (..... , ...). [2]

3 **(a)** The scatter diagram shows the physics mark and the chemistry mark for each of 12 students.



(i) What type of correlation is shown in the scatter diagram?

..... [1]

(ii) On the scatter diagram, draw a line of best fit. [1]

(iii) Find an estimate of the chemistry mark for another student who has a physics mark of 4.

..... [1]

(b) A teacher records the number of days each of the 24 students in her class are absent.
The frequency table shows the results.

Number of days	0	1	2	3	4	5
Frequency	10	8	3	2	0	1

Find the mode, the median and the mean.

Mode = ...

Median = ...

Mean = ... [5]

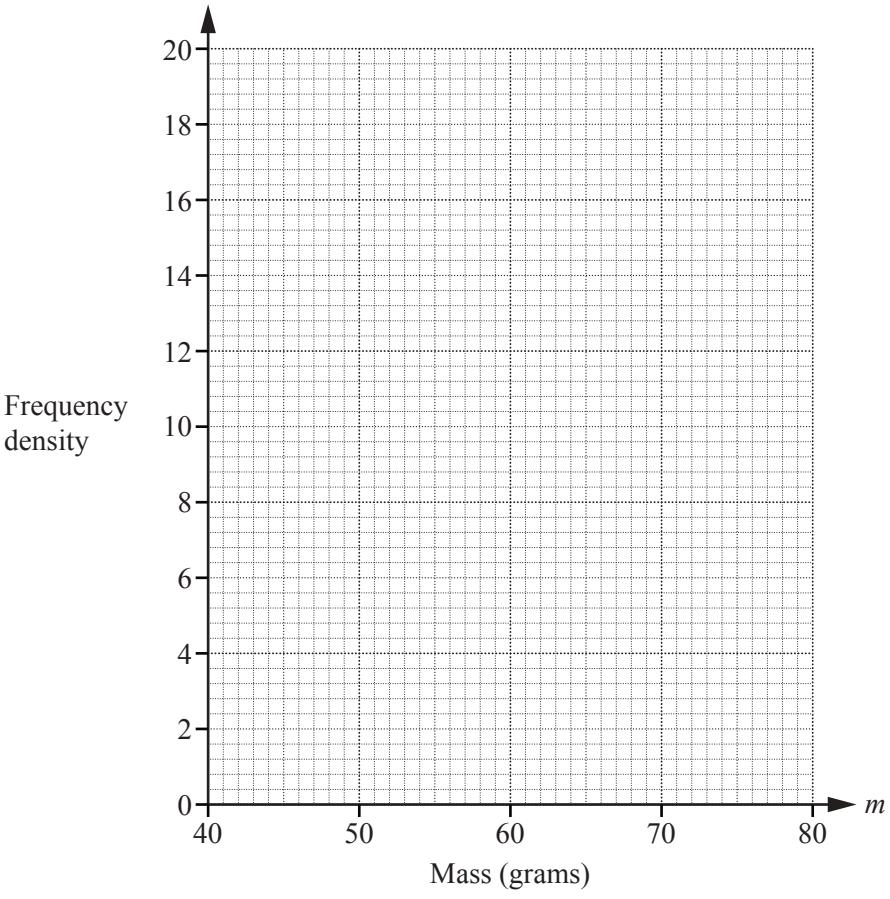
(c) Three sizes of eggs are sold in a shop.
The table shows the number of eggs of each size sold in one day.

Size	Small	Medium	Large
Mass (m grams)	$46 < m \leqslant 52$	$52 < m \leqslant 62$	$62 < m \leqslant 80$
Number of eggs sold	78	180	162

(i) Calculate an estimate of the mean mass.

..... g [4]

(ii) On the grid, draw a histogram to show the information in the table.



[4]

4 **(a)** The diagram shows two sets of cards.

Set *A*	1	1	2	2	2
Set *B*	0	1	1	1	2

(i) Jojo chooses two cards at random from Set *A* without replacement.

Find the probability that the two cards have the same number.

..... [3]

(ii) Jojo replaces the two cards.
Kylie then chooses one card at random from Set *A* and one card at random from Set *B*.

Find the probability that the two cards have the same number.

..... [3]

(iii) Who is the most likely to choose two cards that have the same number?
Show all your working.

..... [1]

(b)

Set C	4	4	5	5	5

Lena chooses three cards at random from Set C without replacement.

Find the probability that the third card chosen is numbered 4.

..... [3]

5 **(a)** At a football match, the price of an adult ticket is $\$x$ and the price of a child ticket is $\$(x-2.50)$.
There are 18 500 adults and 2400 children attending the football match.
The total amount paid for the tickets is \$320 040.

Find the price of an adult ticket.

\$..... [4]

(b) **(i)** Factorise $y^2+5y-84$.

..... [2]

(ii)

NOT TO SCALE

The area of the rectangle is $84\,\text{cm}^2$.

Find the perimeter.

..... cm [3]

(c) In a shop, the price of a monthly magazine is \$$m$ and the price of a weekly magazine is \$$(m - 0.75)$.
One day, the shop receives

- \$168 from selling monthly magazines
- \$207 from selling weekly magazines.

The total number of these magazines sold during this day is 100.

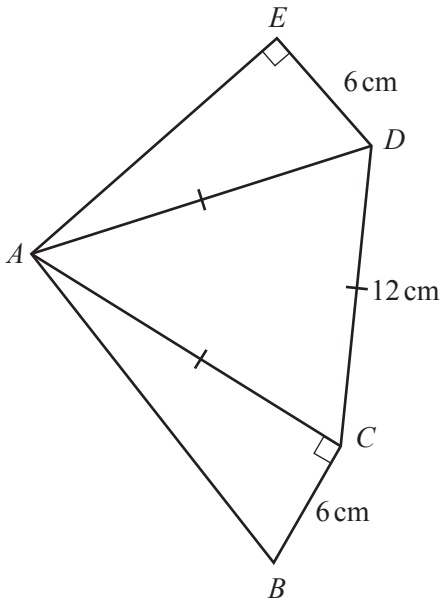
(i) Show that $50m^2 - 225m + 63 = 0$.

[3]

(ii) Find the price of a monthly magazine.
Show all your working.

\$ ..... [3]

6 (a)



NOT TO SCALE

In the pentagon $ABCDE$, angle ACB = angle AED = 90°.
Triangle ACD is equilateral with side length 12 cm.
$DE = BC = 6$ cm.

(i) Calculate angle BAE.

Angle BAE = ... [4]

(ii) Calculate AB.

AB = ... cm [2]

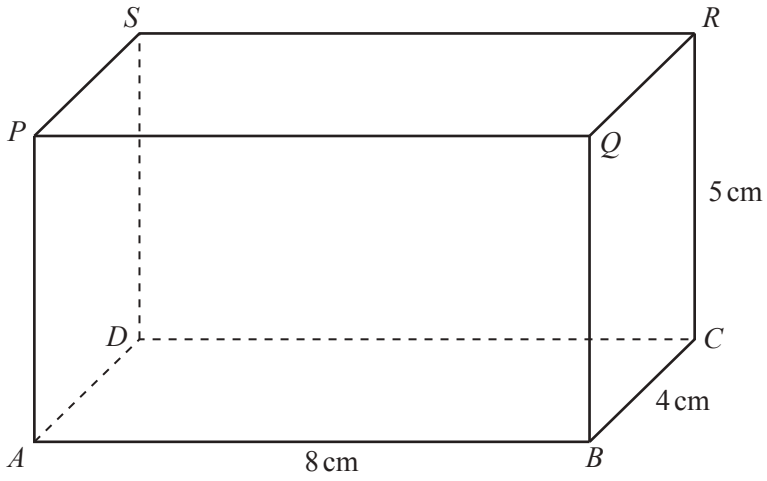
(iii) Calculate AE.

AE = ... cm [3]

(iv) Calculate the area of the pentagon.

..... cm^2 [4]

(b)



NOT TO SCALE

The diagram shows a cuboid.
$AB = 8$ cm, $BC = 4$ cm and $CR = 5$ cm.

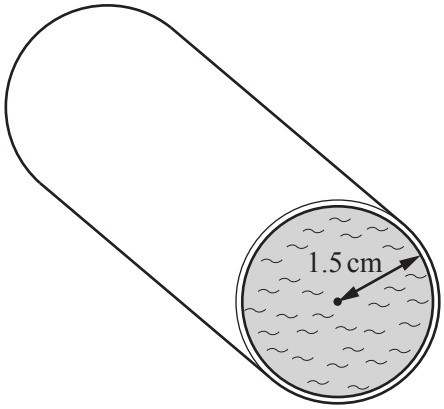
(i) Write down the number of planes of symmetry of this cuboid.

..... [1]

(ii) Calculate the angle between the diagonal AR and the plane $BCRQ$.

..... [4]

7 (a)



NOT TO SCALE

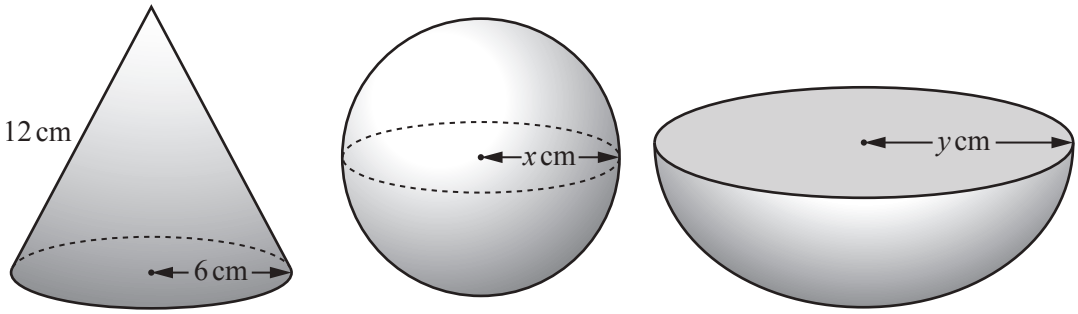
Water flows through a cylindrical pipe at a speed of 8 cm/s.
The radius of the circular cross-section is 1.5 cm and the pipe is always completely full of water.

Calculate the amount of water that flows through the pipe in 1 hour.
Give your answer in litres.

..... litres [4]

(b)

NOT TO SCALE



The diagram shows three solids.
The base radius of the cone is 6 cm and the slant height is 12 cm.
The radius of the sphere is x cm and the radius of the hemisphere is y cm.
The **total** surface area of each solid is the same.

(i) Show that the total surface area of the cone is $108\pi\,\text{cm}^2$.

[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]

[2]

(ii) Find the value of x and the value of y.

[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

x = ...

y = ... [4]

8 **(a)** $\mathbf{M} = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 1 & 2 \end{pmatrix}$ $\mathbf{P} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$

(i) For the following calculations, put a tick (✓) if it is possible or put a cross (✗) if it is not possible. There is no need to carry out any of the calculations.

Calculation	✓ or ✗
$\mathbf{N} + \mathbf{P}$	
$\mathbf{NP}$	
$\mathbf{M}^2$	
$\mathbf{N}^2$	
$\mathbf{MN}$	
$\mathbf{NM}$	

[4]

(ii) Work out $\begin{pmatrix} 1 \\ 2 \end{pmatrix} + \mathbf{P}$.

..... [1]

(iii) Work out $\mathbf{PN}$.

..... [2]

(iv) Work out $\mathbf{M}^{-1}$.

..... [2]

(b) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$.

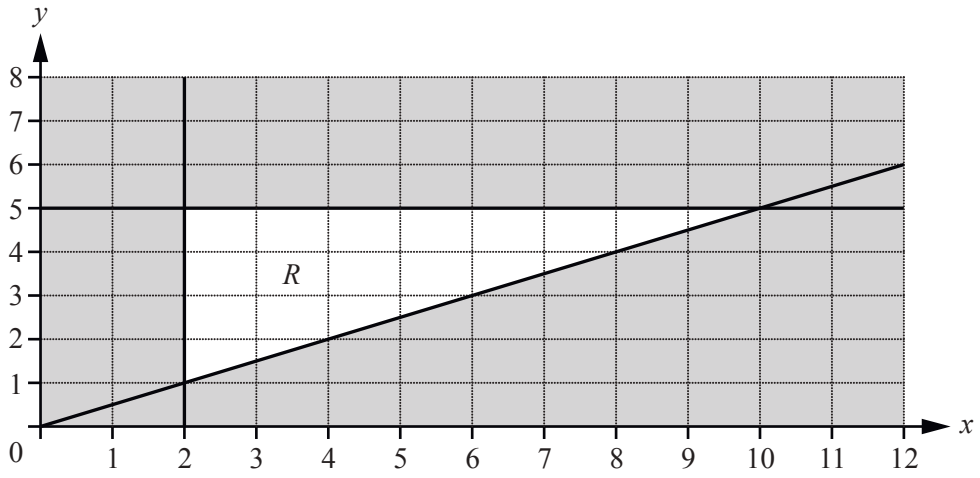
.....

..... [3]

9 **(a)** Find the equation of the straight line that is perpendicular to the line $y = \frac{1}{2}x + 1$ and passes through the point (1, 3).

..... [3]

(b)



(i) Find the three inequalities that define the region R.

.....

.....

..... [4]

(ii) Find the point (x, y), with integer co-ordinates, inside the region R such that $3x + 5y = 35$.

(..... , ...) [2]

10 (a) $f(x) = 2x - 3$ $g(x) = x^2 + 1$

(i) Find gg(2).

..... [2]

(ii) Find $g(x+2)$, giving your answer in its simplest form.

..... [2]

(iii) Find x when $f(x) = 7$.

$x =$ ..... [2]

(iv) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

(b) $h(x) = x^x$, $x > 0$

(i) Calculate h(0.3).
Give your answer correct to 2 decimal places.

..... [2]

(ii) Find x when $h(x) = 256$.

$x =$ ..... [1]

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