Anglo - Chinese School (Independent)

FINAL EXAMINATION 2016

YEAR ONE EXPRESS
MATHEMATICS
PAPER 1

Tuesday　　　　　11 OCTOBER 2016　　　　　1 hour

Candidates answer on the Question Paper.
No additional materials are required.

READ THESE INSTRUCTIONS FIRST

Write your index number on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.
The number of marks is given in brackets [ ] at the end of each question or part question.
If working is needed for any question, it must be shown in the space below that question.
Omission of essential working will result in loss of marks.
The total of the marks for this paper is 40.

NEITHER ELECTRONIC CALCULATORS NOR MATHEMATICAL TABLES MAY BE USED IN THIS PAPER.

For Examiner's Use

This question paper consists of 10 printed pages.

[Turn over

Answer **all** the questions

1   Simplify $9c - [7d - 2(4c - d)]$.

2   Evaluate $3 - \dfrac{2}{3} \div \left(-\dfrac{1}{2}\right)^2 \times \left(\dfrac{4}{5}\right)$.

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3   Solve the inequality $-7y \le -50 + 3y$.

                                        Answer_____ [2]

4   The numbers 660 and 72, when written as the product of their prime factors, are
         $660 = 2^2 \times 3 \times 5 \times 11$,
         $72 = 2^3 \times 3^2$.

(a) Find the HCF and LCM of 660 and 72, giving your answer as a product of prime factors.

                                Answer: (a) HCF = _____ [1]
                                             LCM = _____ [1]

(b) Hence, find the smallest number m that must be multiplied to 72 such that the product is a multiple of 660.

                                Answer (b) _____ [1]

                                                              [Turn over

5 (i) If eight students can assemble 76 toy cars in 2 hours, how many toy cars can ten students assemble in the same period of time?

Answer (i)_____ [1]

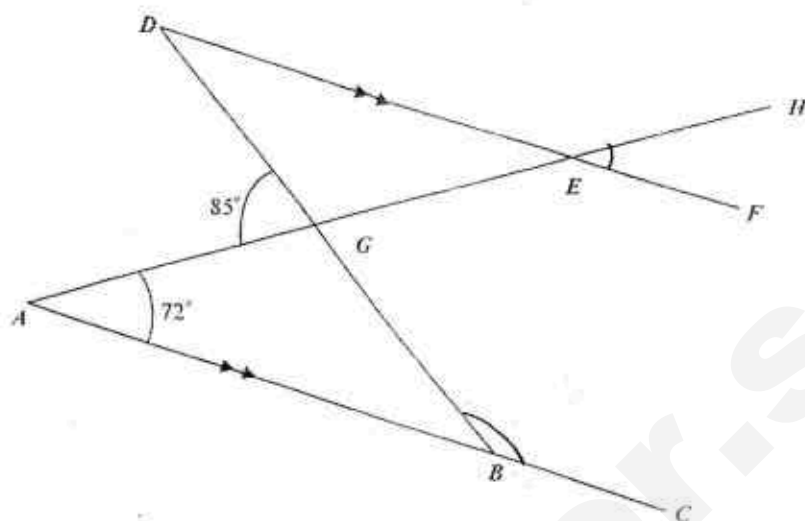(ii) Simplify 0.6 hour : $\frac{1}{3}$ hour : 48 minutes.

Answer (ii)_____ [2]

6 (a) Factorize $ac - ab$ completely.

Answer (a)_____ [1]

(b) Hence, find the value of $6300 - 63 \times 99$.

Answer (b)_____ [2]

7   In the diagram, AC is parallel to DF, ∠AGD = 85° and ∠GAB = 72°.

Find, stating your reasons clearly,

(a)   ∠HEF,

Answer. (a)_____ [1]

(b)   ∠GBC

Answer (b)_____ [2]

[Turn over

8   Evaluate $\dfrac{-\dfrac{1}{2}+5}{1-\dfrac{1}{\dfrac{1}{4}-\dfrac{2}{3}}}$.

Answer _____ [3]

9 (i) The co-ordinates of two points on a straight line graph are (0, 1) and (-2, 7). Find the equation of the straight line graph.

Answer (i) _____ [2]

(ii) A square has the same perimeter as the circumference of a circle. If the area of the square is 484 cm^2, what is the radius of the circle? (Take $\pi = \frac{22}{7}$)

Answer (ii) _____ [3]

[Turn over

10 (i) Solve $1.6(p-2)+1.2p=2.4$

(ii) Express $\dfrac{2(2-k)}{3}-\dfrac{1}{4}+\dfrac{k-1}{2}$ as a single fraction in its simplest form.

11 (i) A man borrows $3 500 from a bank that charges simple interest at the rate of 4% per annum. Find the total amount of money he has to pay to the bank at the end of 15 months.

Answer i) _____ [2]

(ii) A digital TV set was sold at $920 after a 20% discount.

(a) Find the original price of the digital TV set.

Answer (ii)(a) _____ [1]

(b) During a clearance sale, each digital TV set was sold at a 30% discount followed by another 5% on the discounted price. What was the selling price of each digital TV set during the clearance sale?

Answer (ii)(b) _____ [2]

[Turn over

9

5

12   (i)   Construct a quadrilateral $ABCD$ where $AB = 7$ cm, $BC = 8$ cm, $\angle ABC = 80°$, $\angle BCD = 60°$
           and $CD = 6cm$.   [2]

     (ii) Construct a perpendicular bisector of the line AB.   [1]

     (iii) This perpendicular bisector meets the line CD at point X. Find the length of BX.   [1]

END OF PAPER 1

Anglo - Chinese School

(Independent)

FINAL EXAMINATION 2016

YEAR ONE EXPRESS

MATHEMATICS

PAPER 2

Tuesday	11 October 2016	1 hour

Additional Materials: Answer Paper (5 sheets)

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Answer **all** questions.
If working is needed for any question, it must be shown with the answer.
Omission of essential working will result in loss of marks.
You are expected to use a scientific calculator to evaluate explicit numerical expressions.
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, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work together securely.
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Answer **all** the questions.

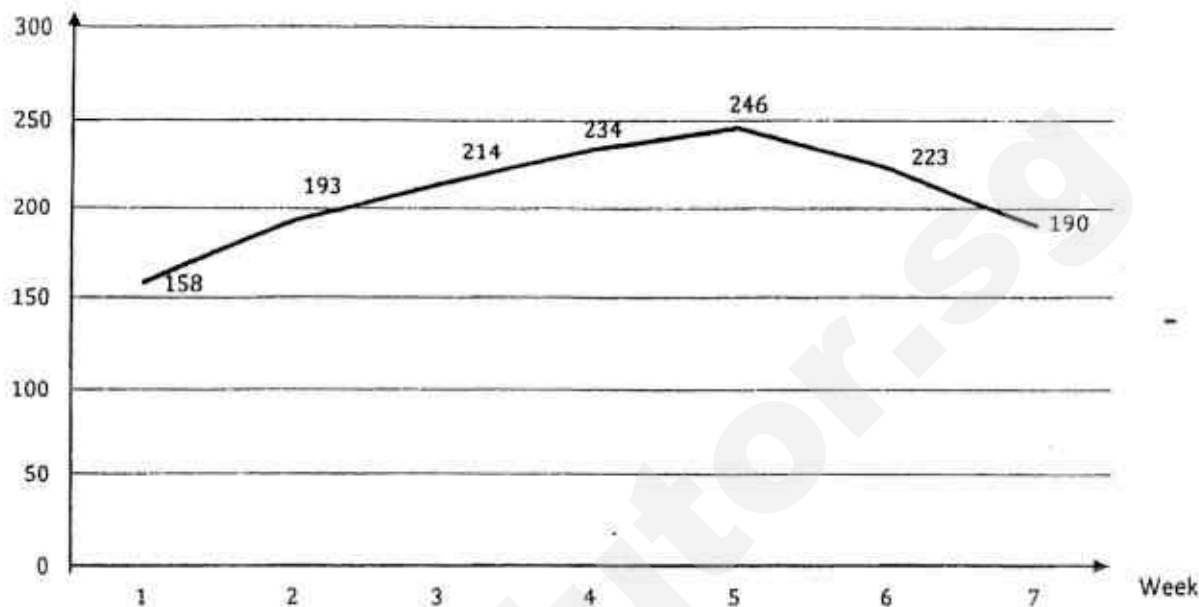1   The table below shows part of Singapore Power Services bill.

Billing Period 06 Jul 2016 – 06 Aug 2016			
Breakdown of Current Charges	Usage	Rate	Total
Electricity Services	p kWh	$0.1927	$ q
Gas Services by City Gas Pte Ltd	15 kWh	$0.1603	$3.23
	5 kWh	$0.1660	
Subtotal	–		$47.94

Find the value of

(i) q,   [1]

(ii) p, leaving your answer correct to whole number.   [2]

2   (a) Evaluate $\dfrac{(-2.65)^3 \div 1.789}{0.987 - (-1.654)}$, leaving your answer correct to 3 significant figures.   [1]

     (b) Identical cubic blocks are to be placed in an empty box.

          (i)   If the dimension of the box is 42 cm by 18 cm by 12 cm, find the greatest length of each cube
                if the box is to be completely filled.   [2]

          (ii) Hence, find the minimum number of cubes.   [1]

3   (a) Mr Lim is a household appliances salesman who gets a basic salary of $2 000 per month. For every
          electrical appliances he sold, he earned a 8% commission. For the month of June, he sold some
          electrical appliances which amount to $12 800. What was his salary for June?   [1]

     (b) John exchanged S$4 000 for British Pounds when he went to London. At that time, the
          exchange rate was £1 = S$1.77.

          (i)   Calculate the amount of pounds he received, correct to the nearest whole number.   [1]

          He spent £1 847 in London. When he returned to Singapore, he decided to exchange his remaining
          pounds back to Singapore dollars.

          (ii) Given that the exchange rate was S$1 = £0.575, calculate the amount of Singapore dollars he
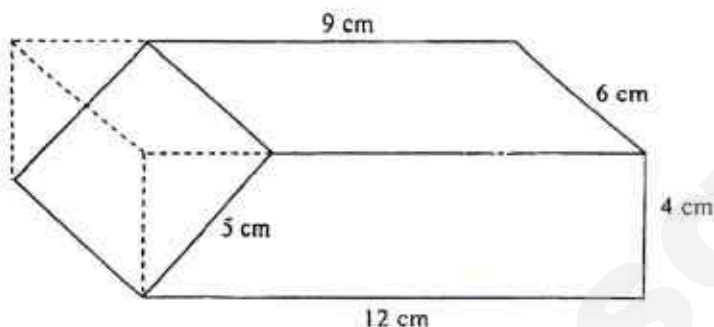   received, correct to the nearest whole number.   [2]

2

4   The diagram below shows a line graph for the number of dengue fever cases over the past 7 weeks.

number of dengue fever cases

(a) Find the average number of dengue fever cases, giving your answer correct to the nearest whole number, reported for the 7 weeks.   [2]

(b) Find the percentage increase of the number of dengue fever cases between week 2 and week 5, giving your answer correct to 3 significant figures.   [2]

5   The first five numbers in a sequence are $-2, 1, 4, 7$ and 10.

(a) Find the next two terms.   [1]

(b) Find the nth term of this sequence.   [2]

(c) Find the 55th term of this sequence.   [1]

(d) Is it possible to have the number 359 in the sequence? Support your answer with detailed workings.   [2]

6   (a) Solve the equation $\frac{2}{3}(x-3) - \frac{5}{4}(1-3x) = \frac{1}{2}(3x-4)$.   [3]

(b) Factorise $\frac{x(p-3)}{3} + 6(3-p)$.   [2]

3

7   A door stopper was made by removing a right-angled triangular block from a rectangular block of wood of dimension 12 cm by 4 cm by 6 cm.

9 cm

6 cm

4 cm

5 cm

12 cm

(a)   Calculate the volume of the door stopper.   [3]

(b)   Calculate the total surface area of the door stopper.   [3]

8   (a)   Given that each interior angle of a regular n-sided polygon is $78°$ more than each exterior angle of a regular pentagon, form an equation in n and solve it.   [4]

(b)   Edward drove at 70 km/h from Town X to Town Y. The distance between Town X and Y is 119 km.

(i)   Find the time he took to reach his destination.   [1]

When he drove back, he decided to increase his speed by x km/h.

(ii)   Write down an expression, in terms of x, for the time he took for his return journey.   [1]

He planned to spend at most 1 hour and 20 mins for his return journey.

(iii)   Form an inequality in x and find the minimum integer value of x.   [2]

4

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Answer **all** the questions

1. Simplify $9c - [7d - 2(4c - d)]$.

$$= 9c - [7d - 8c + 2d]$$
$$= 9c - [9d - 8c]$$
$$= 9c - 9d + 8c$$
$$= 17c - 9d \quad \#$$

Answer $\underline{17c - 9d}$ [2]

---

2. Evaluate $3 - \frac{2}{3} \div \left(-\frac{1}{2}\right)^2 \times \left(\frac{4}{5}\right)$.

$$3 - \frac{2}{3} \div \left(-\frac{1}{2}\right)^2 \times \left(\frac{4}{5}\right)$$
$$= \frac{3}{1} - \frac{2}{3} \div \frac{1}{4} \times \frac{4}{5}$$
$$= \frac{3}{1} - \frac{2}{3} \times \frac{4}{1} \times \frac{4}{5}$$
$$= \frac{3}{1} - \frac{8}{3} \times \frac{4}{5}$$
$$= \frac{3}{1} - \frac{32}{15}$$
$$= \frac{45}{15} - \frac{32}{15}$$
$$= \frac{13}{15} \quad \#$$

Answer $\underline{\frac{13}{15}}$ [2]

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3 Solve the inequality $-7y \le -50 + 3y$.

$$-7y \le -50 + 3y$$
$$-7y - 3y \le -50$$
$$-10y \le -50$$
$$10y \ge 50$$
$$y \ge 5$$

Answer ___$y \ge 5$___ [2]

---

4 The numbers 660 and 72, when written as the product of their prime factors, are
$$660 = 2^2 \times 3 \times 5 \times 11,$$
$$72 = 2^3 \times 3^2.$$

(a) Find the HCF and LCM of 660 and 72, giving your answer as a product of prime factors.

$$660 = 2^2 \times 3 \times 5 \times 11$$
$$72 = 2^3 \times 3^2$$

HCF → lowest power per factor (both numbers 660 & 72 must have as factor)

LCM → highest power per factor.

HCF → $2^2 \times 3 = \underline{12}$ #

LCM → $2^3 \times 3^2 \times 5 \times 11 = \underline{3960}$ #

Answer: (a) HCF = ___12___ [1]
LCM = ___3960___ [1]

(b) Hence, find the smallest number m that must be multiplied to 72 such that the product is a multiple of 660.

```
      0055
72 | 3960
     -0
      39
     - 0
     396
    -360
    0360
   -0360
    0000
```

LCM of 72 and 660 → 3960
$m = 3960 \div 72 = \underline{55}$ #

Answer (b) ___55___ [1]

[Turn over

5   (i)   If eight students can assemble 76 toy cars in 2 hours, how many toy cars can ten students assemble in the same period of time?

$$\underline{\frac{\text{no. of students}}{8}} \qquad \underline{\frac{\text{no. of toy cars}}{76}} \qquad \underline{\frac{\text{time}}{2h}}$$

2 students $\longrightarrow$ $76 \div 4 = 19$
(in 2 hours)

10 students $= 19 \times 5 = \underline{95}$ ✳
(in 2 hours)

Answer (i) __95 toy cars__ [1]

(ii)   Simplify 0.6 hour : $\frac{1}{3}$ hour : 48 minutes.

0.6 hour $= 0.6 \times 60$ mins $= 36$ mins

$\frac{1}{3}$ hour $= \frac{1}{3} \times 60$ mins $= 20$ mins

36 mins : 20 mins : 48 mins
$\downarrow$
18 mins : 10 mins : 24 mins
$\downarrow$
9 mins : 5 mins : 12 mins
$\downarrow$
9 : 5 : 12 ✳

Answer (ii) __9 : 5 : 12__ [2]

---

6   (a)   Factorize $ac - ab$ completely.

$$\begin{array}{c|c} a & ac, \ ab \\ \hline & c, \ b \end{array}$$

$\therefore ac - ab$ (factorised) $\rightarrow a(c-b)$ Answer (a) __a (c-b)__ [1]

(b)   Hence, find the value of $6300 - 63 \times 99$.

$6300 - 63 \times 99$

$6300 = 63 \times 100$
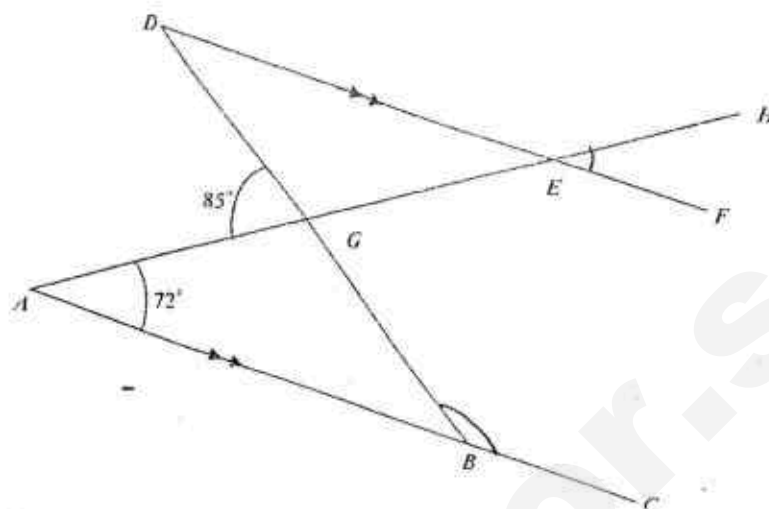
Hence, $63 \times 100 - 63 \times 99$

$= 63 \times 1$

$= \underline{63}$ ✳

Answer (b) __63__ [2]

7   In the diagram, *AC* is parallel to *DF*, ∠*AGD* = 85° and ∠*GAB* = 72°.

Find, stating your reasons clearly,

(a)   ∠*HEF*.

∠BAG = ∠GED = ∠HEF (alternate angles and vertically opposite angles)

∴ ∠BAG = 72°

∠HEF = 72°

Answer (a)____72°____ [1]

(b)   ∠*GBC*.

∠AGB → 180° − 85° = 95° (angles on a straight line)

∠GBA → 180° − 95° − 72° = 13° (angles of a triangle)

∠GBC → 180° − 13° = 167° (angles on a straight line)

Answer (b)____167°____ [2]

[Turn over

8 Evaluate $\dfrac{-\frac{1}{2}+5}{1-\frac{1}{\frac{1}{4}-\frac{2}{3}}}$.

$$= \dfrac{-\frac{1}{2}+\frac{5}{1}}{1-\dfrac{1}{\frac{3}{12}-\frac{8}{12}}}$$

$$= \dfrac{-\frac{1}{2}+\frac{10}{2}}{1-\dfrac{1}{-\frac{5}{12}}}$$

$$= \dfrac{\frac{9}{2}}{1-\dfrac{\frac{12}{12}}{-\frac{5}{12}}}$$

$$= \dfrac{\frac{9}{2}}{1-\dfrac{12}{-5}}$$

$$= \dfrac{\frac{9}{2}}{1-\left(-\frac{12}{5}\right)}$$

$$= \dfrac{\frac{9}{2}}{\frac{5}{5}+\frac{12}{5}}$$

(CONTINUATION...)

$$= \dfrac{\frac{9}{2}}{\frac{17}{5}}$$

$$= \dfrac{\frac{45}{10}}{\frac{34}{10}}$$

$$= \frac{45}{34}$$

$$= 1\frac{11}{34}$$ #

Answer _____ $1\frac{11}{34}$ _____ [3]

9 (i) The co-ordinates of two points on a straight line graph are (0, 1) and (-2, 7). Find the equation of the straight line graph.

Gradient of line $= \dfrac{y_1 - y_2}{x_1 - x_2}$

$= \dfrac{1 - 7}{0 - (-2)}$

$= \dfrac{-6}{2}$

$= -\dfrac{6}{2}$

$= -\dfrac{3}{1}$

$= -3$

Taking point $(-2, 7)$

$7 = -3 \times (-2) + c$

$(y = m \times x + c)$

$c \rightarrow y$ intercept

$7 = 6 + c$

$7 - 6 = c$

$1 = c$

∴ equation of graph → $y = -3x + 1$

Answer (i) $y = -3x + 1$ [2]

(ii) A square has the same perimeter as the circumference of a circle. If the area of the square is 484 cm², what is the radius of the circle? (Take $\pi = \dfrac{22}{7}$)

Length of square $= \sqrt{484\,cm^2} = 22\,cm$

Circumference of circle $= \dfrac{22}{7} \times$ diameter → $22\,cm \times 4 = 88\,cm$

$\dfrac{22}{7} \times$ diameter $= 88\,cm$

diameter $= \dfrac{88}{1} \div \dfrac{22}{7}$

diameter $= \dfrac{88}{1} \times \dfrac{7}{22}$

diameter $= \dfrac{616}{22}$

diameter $= 28\,cm$

radius → $28\,cm \div 2$

$= 14\,cm$

Answer (ii) $14\,cm$ [3]

[Turn over

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10 (i) Solve $1.6(p-2)+1.2p=2.4$

$$1.6(p-2) + 1.2p = 2.4$$
$$1.6p - 3.2 + 1.2p = 2.4$$
$$2.8p - 3.2 = 2.4$$
$$2.8p = 2.4 + 3.2$$
$$2.8p = 5.6$$
$$p = 2$$

Answer (i) _____ $p = 2$ _____ [2]

(ii) Express $\dfrac{2(2-k)}{3} - \dfrac{1}{4} + \dfrac{k-1}{2}$ as a single fraction in its simplest form.

$$\frac{2(2-k)}{3} - \frac{1}{4} + \frac{k-1}{2}$$

$$= \frac{4-2k}{3} - \frac{1}{4} + \frac{k-1}{2}$$

$$= \frac{16-8k-3+(6k-6)}{12}$$

$$= \frac{16-3-6-8k+6k}{12}$$

$$= \frac{7-2k}{12}$$

Answer (ii) $\dfrac{7-2k}{12}$ [3]

11 (i) A man borrows $3 500 from a bank that charges simple interest at the rate of 4% per annum. Find the total amount of money he has to pay to the bank at the end of 15 months.

per annum = 12 months
    rate = 4%
    15 months = $1\frac{1}{4}$ years

= $140 × $1\frac{1}{4}$
= $140 + $35
= $175

Simple interest paid = principal × rate × time (years)
= $3500 × 4% × $1\frac{1}{4}$

interest + amount borrowed = $3500 + $175
= $3675

Answer i) $3675 [2]

(ii) A digital TV set was sold at $920 after a 20% discount.

(a) Find the original price of the digital TV set.

100% − 20% = 80%
    80% = $920
    20% = $920 ÷ 4 = $230
Original price = $230 × 5 = $1150

Answer (ii)(a) $1150 [1]

(b) During a clearance sale, each digital TV set was sold at a 30% discount followed by another 5% on the discounted price. What was the selling price of each digital TV set during the clearance sale?

100% − 30% = 70%
(Final) discounted price (%) = 70% − 5% of 70%
    5% of 70% = 70% ÷ 20% = 3.5%
Final discounted price (%) = 70% − 3.5% = 66.5%

Discounted price of digital TV = 66.5% × $1150
= $764.75

Answer (ii)(b) $764.75 [2]

[Turn over

12   (i)   Construct a quadrilateral $ABCD$ where $AB = 7$ cm, $BC = 8$ cm, $\angle ABC = 80°$, $\angle BCD = 60°$
            and $CD = 6cm$.   [2]

      (ii)   Construct a perpendicular bisector of the line AB.   [1]

    • (iii) This perpendicular bisector meets the line CD at point X. Find the length of BX.   [1]
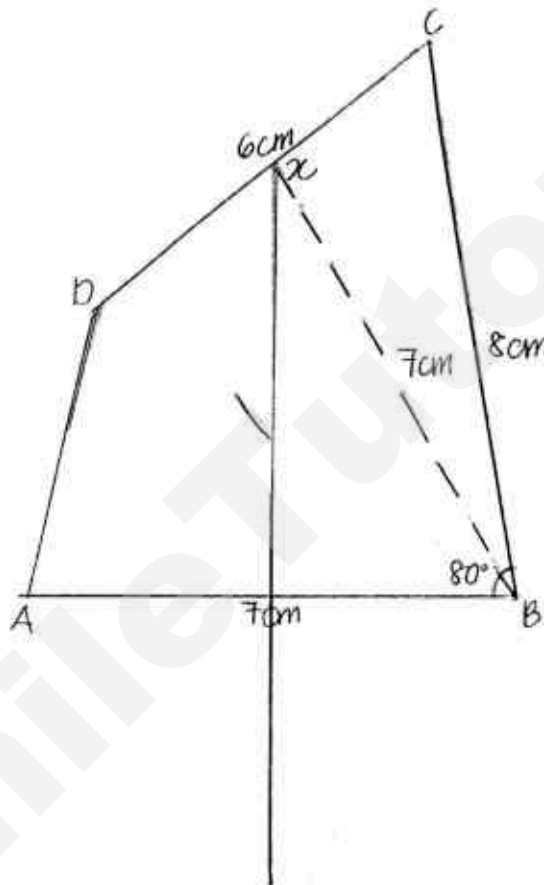
(iii) BX = 7cm (shown)

END OF PAPER 1

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FINAL EXAMINATION 2016

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MATHEMATICS

PAPER 2

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13

Answer all the questions.

1   The table below shows part of Singapore Power Services bill.

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Breakdown of Current Charges	Usage	Rate	Total
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Gas Services by City Gas Pte Ltd	15 kWh	$0.1603	
	5 kWh	$0.1660	$3.23
Subtotal			$47.94

Find the value of

(i) q.   [1]

(ii) p, leaving your answer correct to whole number.   [2]

2   (a) Evaluate $\dfrac{(-2.65)^2 + 1.789}{0.987 - (-1.654)}$, leaving your answer correct to 3 significant figures.   [1]

     (b) Identical cubic blocks are to be placed in an empty box.

          (i)   If the dimension of the box is 42 cm by 18 cm by 12 cm, find the greatest length of each cube if the box is to be completely filled.   [2]

          (ii) Hence, find the minimum number of cubes.   [1]

3   (a) Mr Lim is a household appliances salesman who gets a basic salary of $2 000 per month. For every electrical appliances he sold, he earned a 8% commission. For the month of June, he sold some electrical appliances which amount to $12 800. What was his salary for June?   [1]
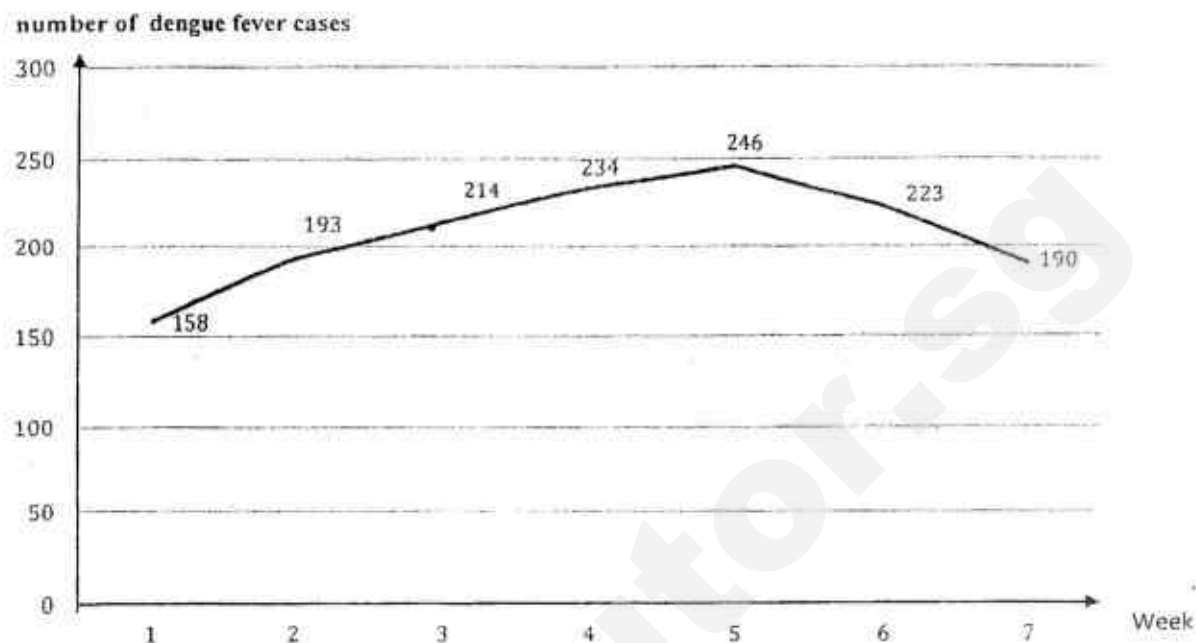
     (b) John exchanged S$4 000 for British Pounds when he went to London. At that time, the exchange rate was £1 = S$1.77.

          (i)   Calculate the amount of pounds he received, correct to the nearest whole number.   [1]

          He spent £1 847 in London. When he returned to Singapore, he decided to exchange his remaining pounds back to Singapore dollars.

          (ii) Given that the exchange rate was S$1 = £0.575, calculate the amount of Singapore dollars he received, correct to the nearest whole number.   [2]

2

4   The diagram below shows a line graph for the number of dengue fever cases over the past 7 weeks.
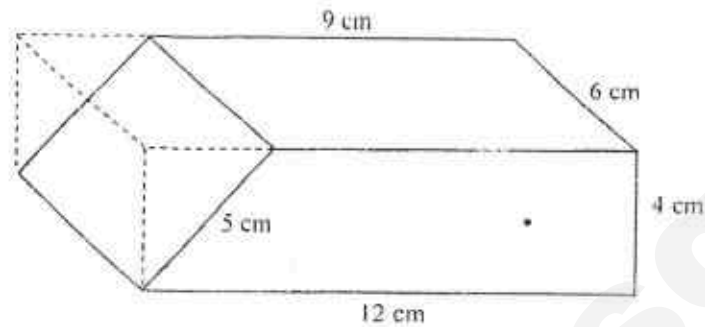
number of dengue fever cases

(a)   Find the average number of dengue fever cases, giving your answer correct to the nearest whole number, reported for the 7 weeks.   [2]

(b)   Find the percentage increase of the number of dengue fever cases between week 2 and week 5, giving your answer correct to 3 significant figures.   [2]

5   The first five numbers in a sequence are -2, 1, 4, 7 and 10.

(a)   Find the next two terms.   [1]

(b)   Find the nth term of this sequence.   [2]

(c)   Find the 55th term of this sequence.   [1]

(d)   Is it possible to have the number 359 in the sequence? Support your answer with detailed workings.   [2]

6   (a)   Solve the equation $\frac{2}{3}(x-3) - \frac{5}{4}(1-3x) = \frac{1}{2}(3x-4)$.   [3]

(b)   Factorise $\frac{x(p-3)}{3} + 6(3-p)$.   [2]

3

7   A door stopper was made by removing a right-angled triangular block from a rectangular block of wood of dimension 12 cm by 4 cm by 6 cm.

(a)   Calculate the volume of the door stopper.   [3]

(b)   Calculate the total surface area of the door stopper.   [3]

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(i)   Find the time he took to reach his destination.   [1]

When he drove back, he decided to increase his speed by x km/h.

(ii)   Write down an expression, in terms of x, for the time he took for his return journey.   [1]

He planned to spend at most 1 hour and 20 mins for his return journey.

(iii)   Form an inequality in x and find the minimum integer value of x.   [2]

.... End of Paper 2 ....

4

2016 ACS(I) FINAL EXAMINATION, YEAR 1 EXPRESS, MATHEMATICS PAPER 2

1(i) $q = \$47.94 - \$3.23 = \$44.71$

$q = \$44.71$

1(ii) $\$44.71 \div 0.1927 = 232$ (to the nearest whole no.)

$\qquad p = 232$

$\qquad p$ is 232 #

2(a) $\dfrac{(-2.65)^3 \div 1.789}{0.987 - (-1.654)} = -3.94$ (to 3 s.f.)

2(b)(i)

```
2 | 42, 18, 12
3 | 21, 9, 6
  | 7, 3, 2
```

HCF $= 2 \times 3$

$\qquad = 6$

Hence, the greatest length of each cube if the box is filled is 6cm.

2(b) Number of cubes that can fit in $\Rightarrow 42\text{cm} \div 6\text{cm} = 7$ cubes

Number of cubes that can fit in width $\Rightarrow 18\text{cm} \div 6\text{cm} = 3$ cubes

Number of cubes on first level $\Rightarrow 7 \times 3 = 21$ cubes

Number of cubes on height $\Rightarrow 12\text{cm} \div 6\text{cm} = 2$ cubes

Total number of cubes that can fit in $\Rightarrow 21 \times 2 = 42$ cubes

3(a) 8% of $\$12800 = \dfrac{8}{100} \times \$12800 = \$1024$

$\qquad$ Salary for June $= \$1024 + \$2000$

$\qquad\qquad\qquad\qquad\quad = \$3024$ #

Subject ....

Nr. ....
Date: ....

3(b) i. amount of pounds received = $4000 ÷ $1.77
                                   = 2260 pounds (to the nearest whole no.)

(b) ii. 2260 pounds − 1847 pounds = 413 pounds
         413 pounds ÷ 0.575 pounds = 718 (to the nearest whole no.)
         He received 718 Singapore dollars.

4(a) Total cases reported → 158 + 193 + 214 + 234 + 246 + 223 + 190
                          = 1458

     Average per week = 1458 ÷ 7
                      = 208 (to the nearest whole no.)

4(b) Week 2 = 193
      Week 5 = 246
      Difference = 246 − 193
                 = 53

      ∴ Percentage increase from week 2 to week 5 = $\frac{53}{193} \times 100\%$

                                                  = 27.461 % (to 3 s.f)

5(a) 13 and 16

5(b) number of intervals between terms = $T_n - 1$
      ∴ $-2 + [(T_n - 1) \times 3]$
           $= -2 + 3T_n - 3$

      n^{th} term of sequence = $-2 + 3n - 3$
                               $= -2 - 3 + 3n$
                               $= 3n - 5$ #

5(c) 55 − 1 = 54
      −2 + 54 × 3 = 160 #

5(d) number of intervals between terms = Tn-1

Hence, formula for sequence = -2 (1st term) + [(Tn-1) × 3]
                                              ↓
                                          intervals

$= -2 + [(Tn-1) \times 3$

$= -2 + 3Tn - 3$

$359 = -2 + 3Tn - 3$

$359 + 2 + 3 = 3Tn$

$364 = 3Tn$

$121\frac{1}{3} = Tn$

Term number is not whole. Therefore, 359 is not in the number sequence.

6(a) $\frac{2}{3}(x-3) - \frac{5}{4}(1-3x) = \frac{1}{2}(3x-4)$

$\frac{2}{3}x - 2 - \left(\frac{5}{4} - 3\frac{3}{4}x\right) = 1.5x - 2$

$\frac{15}{4}x + \frac{2}{3}x - 2 - 1\frac{1}{4} = 1.5x - 2$

$\frac{45+8}{12}x - 3\frac{1}{4} = 1.5x - 2$

$\frac{53}{12}x - 3\frac{1}{4} = 1.5x - 2$

$\left(4\frac{5}{12}\right)x - 3\frac{1}{4} = 1.5x - 2$

$4\frac{5}{12}x - 1.5x = 3\frac{1}{4} - 2$

$\frac{53}{12}x - \frac{3}{2}x = 1\frac{1}{4}$

$\frac{53}{12}x - \frac{18}{12}x = 1\frac{1}{4}$

$\frac{35}{12}x = 1\frac{1}{4}$

$\frac{1}{12}x = \frac{1}{28}$

$x = \frac{3}{7}$

Subject... No.................

Date.................

6(b) $\dfrac{x(p-3)}{3} + 6(3-p)$

$= \dfrac{x(p-3)}{3} + \dfrac{6(3-p)}{1}$

$= \dfrac{x(p-3)}{3} + \dfrac{18-6p}{1}$

$= \dfrac{x(p-3)}{3} + \dfrac{54-18p}{3}$

3	54, 18
3	18, 6
2	6, 2
	3, 1

HCF of 54 and 18 → $3^2 \times 2 = 18$

$= \dfrac{x(p-3)}{3} + \dfrac{18(3-p)}{3}$

$= \dfrac{x(p-3) + 18(3-p)}{3}$

$= \dfrac{x(p-3) - 18(p-3)}{3}$

$= (x-18)(p-3) \div 3$ #

7(a) Volume of figure (including cut out part) $= 6cm \times 4cm \times 12cm$

$= 288 cm^3$

Area of cut out part $= \dfrac{1}{2} \times 4cm \times (12cm - 9cm)$

$= 36 cm^3$

Volume of doorstopper $= 288 cm^3 - 36 cm^3$

$= 252 cm^3$ #

7(b) $5cm \times 6cm = 30 cm^2$ (slanted area)

$9cm \times 6cm = 54 cm^2$ (topside area)

$12cm \times 6cm = 72 cm^2$ (bottom side area)

2 trapezium area sides $= 4cm \times (12cm + 9cm) = 84 cm^2$

Back side area $= 6cm \times 4cm = 24 cm^2$

Total surface area $= 30 cm^2 + 54 cm^2 + 72 cm^2 + 84 cm^2 + 24 cm^2$

$= 264 cm^2$ #

Subject:

Net:

Date:

8(a) sum of interior angle $= (n-2) \times 180°$

pentagon sum of interior angle $= (5-2) \times 180°$
$$= 540°$$

interior angle of pentagon $\quad = 540° \div 5$
$$= 108°$$

exterior angle of pentagon $\quad = 180° - 108°$
$$= 72°$$

interior angle of n-sided polygon $= 72° + 78°$
$$= 150°$$

interior angle of polygon $\quad = \dfrac{(n-2) \times 180°}{n}$

$$= \dfrac{180n° - 360°}{n}$$

$$\dfrac{150°}{1} = \dfrac{180n° - 360°}{n}$$

$$150n° = 180n° - 360°$$

$$150n° - 180n° = -360°$$

$$-30n° = -360°$$

$$-n° = -12$$

$$n = 12$$

8(b) i) $119 \, km \div 70 \, km/h = 1.7h$
$$= 1 \, h \, 42 \, mins$$

ii) $119 \, km \div (70 km + x \, km/h) = $ total time taken

$\therefore$ Time taken $= 119 \, km \div (70 \, km + x \, km)/h$

iii) $119 \, km \div (70 \, km + x \, km)/h \leqslant 1 \, hour \, 20 \, mins$
$$x \geqslant 19.25$$

minimum integer value of $x = 20$

17

AHMAD IBRAHIM SECONDARY SCHOOL

END OF , YEAR EXAMINATION 2016

MATHEMATICS PAPER
(100 Marks)

Level: Secondary 1 Express

DATE: 5th Oct 2016
DURATION: 2 hours 30 minutes

NAME: _____   CLASS: _____

INDEX NO: _____

ADDITIONAL MATERIALS:
Nil

READ THESE INSTRUCTIONS FIRST

Write your answers and working on all the separate writing papers provided.
Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions in Section A and Section B.
If working is required for any question, it must be shown with the answer in the given space.
Omission of essential working will result in loss of marks.
Write your answers in the spaces provided on the question paper.
Calculators should be used where appropriate.
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 answer in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total marks for this paper is 100.

This question paper consists of **19** printed pages including the cover page.

88

SECTION A (50 Marks)

1. Consider the ten numbers: 1, 5, 8, 19, 47, 51, 111, 216, 999, 1000.

   Write down

   (a) the composite numbers,

   (b) the perfect cubes.

   Ans: (a) _____ [2]

   (b) _____ [2]

2. Find the value of $\sqrt[3]{13824}$ by using prime factorisation.

   Ans: _____ [3]

2

3. If p and q are whole numbers such that $p \times q = 37$, **find** the value of $p+q$ and **explain** your answer.

    Ans: $p+q =$ _____ [1]

    Explain: _____ [2]

    _____

4. (a) Determine whether the statement "If 2 and 4 are factors of a number, then 8 is also a factor of that number" is **true or false**.

    (b) If it is true, explain your reasoning. If it is false, give a counterexample.

    Ans: (a) The above statement is _____. [1]

    (b) _____ — [1]

5. Consider the eight numbers: $(-0.5)^2$, 0, $\sqrt[3]{-9}$, $\dfrac{18}{5}$, $\sqrt{100}$, $(-4)^3$, 17, $-\dfrac{24}{3}$.

    Write down

    (a) the positive numbers,

    (b) the integers.

    Ans: (a) _____ [2]

    (b) _____ [2]

3

89

6. (a) Showing your working, express $100 \times 0.5\dot{7}$ as a repeating decimal.

    (b) Hence, find the value of $100 \times 0.\dot{5}\dot{7} - 0.\dot{5}\dot{7}$.

Ans: (a) _____ [2]

      (b) _____ [2]

7. Factorise the algebraic expression $4a - 8(b - 2c)$ completely.

Ans: _____ [2]

4

8.   (a)   If $z = -3^x - y^3$, find the value of z when $x = 2$ and $y = -3$.

   (b)   Simplify $(-2a) \times (-3b) + 5ba - 7a + 4b \times (-a) - a$.
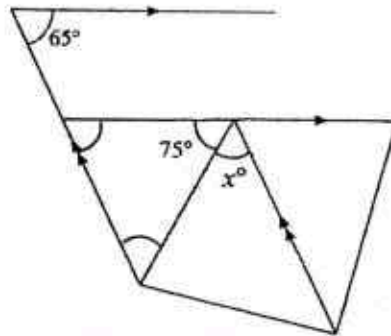
Ans: (a) $z =$ _____   [2]

   (b)   _____   [2]

5   90

9. Solve the equation $\dfrac{2x+1}{x-3} = 2\dfrac{1}{3}$.

Ans: $x =$ _____ [3]

6

10. Explain clearly in the space provided why $x = 40$ in the figure below. Show your working and reasoning clearly.

[3]

11. If the sum of the interior angles of a decagon (10-sided) is greater than the sum of the interior angles of another regular polygon by $540°$, find the number of sides of the polygon.

Ans: No. of sides = _____ [3]

9)

12. An object moves 7.2 km in 1 hour. Find its speed in

    (a)   metres per minute,

    (b)   centimetres per second.

Ans: (a) _____ m/min [2]

           (b) _____ cm/s [2]

13. (a) Solve the inequality $8x - 11x > -9$.

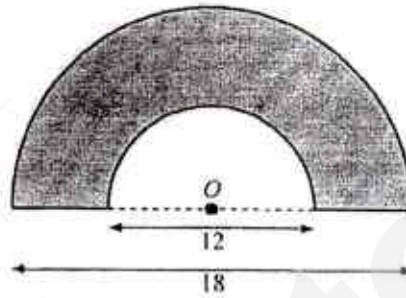   (b) Illustrate the above solutions on a number line.

(b)   [1]

Ans: (a) _____ [2]

8

14. The diagram shows two semicircles with the same centre O. Measurements are in metres.

Find, **in terms of π,**

(a) the perimeter of the shaded region,

(b) the area of the shaded region.

Ans: (a) _____ m [2]

(b) _____ m² [2]

9

15. Tasnim earns $85 on selling 80 tins of biscuits. If Tasnim bought 100 tins of biscuits for $425, calculate

(a) the cost of one tin of biscuits that Tasnim paid,

(b) the profits of one tin of biscuits as a percentage of its cost. —

Ans: (a) $_____ [1]

(b) _____ % [3]

10

1. Ms Lim has 200 g of red plasticine, 380 g of grey plasticine and 420 g of yellow plasticine. She divided the plasticine into small balls of equal mass for her Art lesson.

    Find

    (a) the largest possible mass of one small ball of plasticine,

    (b) the number of plasticine balls she obtained for each colour.

    Ans: (a) _____ g   [3]

          (b) _____ red balls   [1]

               _____ grey balls   [1]

               _____ yellow balls   [1]

93

11

2. (a) Construct $\triangle ABC$ such that $AB = 5.5$ cm, $BC = 10$ cm and $AC = 5.5$ cm. [2]

(b) Construct the perpendicular bisector of AC. [1]

(c) Construct the angle bisector of $\angle CAB$. [1]

12

(d) Qi Yun, Erni, Kwan Pin and Zeti share a sum of money. Qi Yun takes $\frac{1}{5}$ of the sum of money. After Qi Yun has taken her share, Erni takes $\frac{1}{3}$ of the remaining money. After Erni has taken her share, Kwan Pin takes $\frac{1}{4}$ of the remaining money. After Kwan Pin has taken her share, Zeti takes all of the remaining money. What fraction of the sum of money is Zeti's share?

Ans: (d) _____ [4]

94

13

3. (a) The marks scored by a class of 20 students in a Mathematics test are as follows:
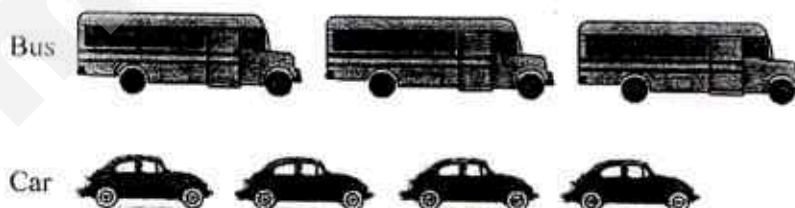
49	46	69	61	49
50	45	62	57	69
68	60	49	59	57
68	45	55	46	50

Copy and complete the frequency table below.   [2]

Marks (x)	Tally	Frequency
$45 \leq x < 50$		
$50 \leq x < 55$		
$55 \leq x < 60$		
$60 \leq x < 65$		
$65 \leq x < 70$		

(b) Mei Xuan conducted a survey among a group of students who travel to school either by bus or by car. She displayed the data collected with a pictogram shown below.

Bus

Car

What is a possible misinterpretation of the above data and how would you modify the above pictogram to avoid ē misinterpretation?
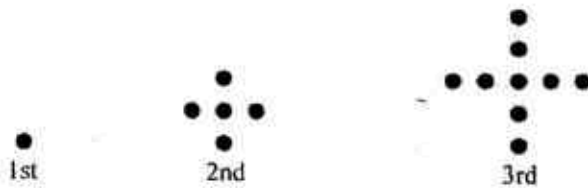
Ans: _____

_____ [2]

14

4. Mave drove for a distance of 135 km at a speed of x km/h and Charmaine drove for a distance of 120 km at a speed 10 km/h slower than Mave. Given that the **time taken** by the both of them are the **same**, find the speed each of them drove at.

Ans: **Mave:** _____ km/h

Charmaine: _____ km/h [5]

95

15

5.   The diagram below shows the first three of a sequence of dot patterns.

1st   2nd   3rd

(a)   The information from the sequence of dots is tabulated below.
       Complete the table.   [1]

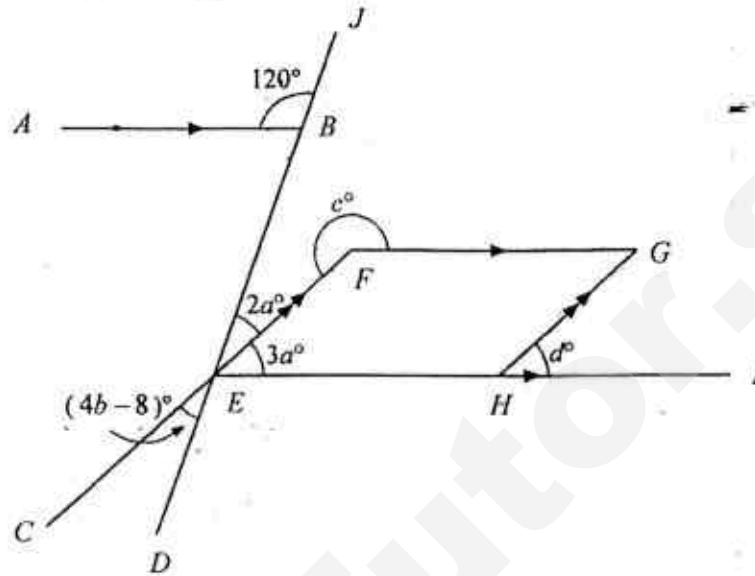| Pattern	Formula	Number of dots
1	1	1
2	4 + 1	5
3	4 + 4 + 1	9
4		

(b)   Write down a formula, T_n, to calculate the number of dots in the nth pattern.

(c)   Hence, find the number of dots in the 25th pattern.

(d)   Find the value of m if there are 501 dots in the mth pattern.

Ans: (b) $T_n =$ _____   [2]

       (c)   _____ dots   [1]

       (d) $m =$ _____   [2]

16

6. **(a)** Find the values of a, b, c and d in the figure below.

(b) What type of angle is $c°$?


Ans: **(a)** $a = $ _____ [2]

$b = $ _____ [2]

$c = $ _____ [2]

$d = $ _____ [1]

(b) _____ angle [1]

96

17

7. A solid prism whose cross section is a trapezium is moulded into a solid cylinder of radius 10 cm. All dimensions given in the diagram are in centimetres.

(a) Find the height of the cylinder, giving your answer correct to 3 significant figures.

(b) Find the total surface area of the cylinder, giving your answer correct to the nearest whole number.

Ans: (a) _____ cm   [4]

     (b) _____ cm²   [3]

18
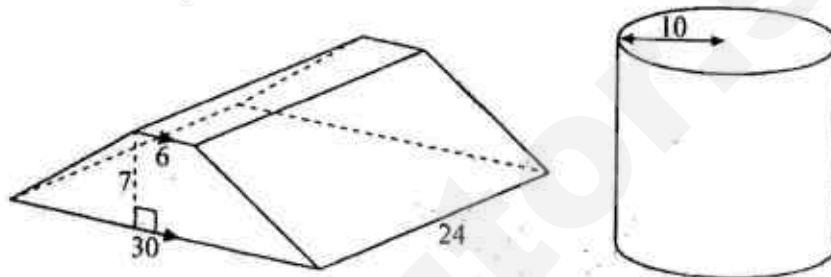
8. The line graph below shows the change in body temperature of a patient from 8 am to 11 pm. The temperatures are taken every 3 hours. The normal temperature of a person is approximately $37°C$.

Patient's Body Temperature
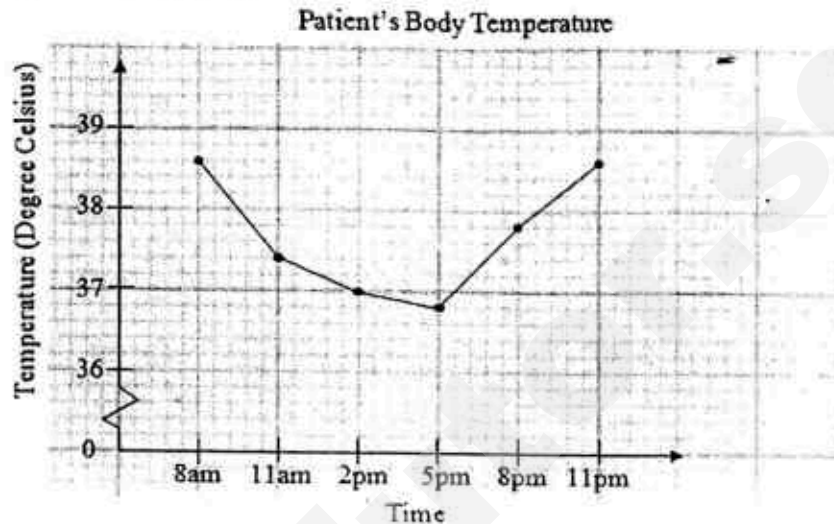
(a) State the time taken (in hours) for his temperature to decline till it reaches normal temperature.

(b) State a possible reason for the drop in the patient's temperature.

Ans: _____ [1]

(d) Find the percentage increase in temperature from 5pm to 8pm.

(e) Do you think the patient has recovered by 11 pm? Explain your answer.

Ans: _____ [2]

Ans: (a) _____ hours [1]

(d) _____ % [2]

---END OF PAPER-------------------------------------

SETTER: Ms Chow CW

97

19

AHMAD IBRAHIM SECONDARY SCHOOL

END OF , YEAR EXAMINATION 2016

MATHEMATICS PAPER
(100 Marks)

Level: Secondary 1 Express

DATE: 5th Oct 2016
DURATION: 2 hours 30 minutes

NAME: _____

CLASS: _____

INDEX NO: _____

ADDITIONAL MATERIALS:
Nil

READ THESE INSTRUCTIONS FIRST

Write your answers and working on all the separate writing papers provided.
Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions in Section A and Section B.
If working is required for any question, it must be shown with the answer in the given space.
Omission of essential working will result in loss of marks.
Write your answers in the spaces provided on the question paper.
Calculators should be used where appropriate.
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 answer in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total marks for this paper is 100.

This question paper consists of **19** printed pages including the cover page.

98

SECTION A (50 Marks)

1. Consider the ten numbers: 1, 5, 8, 19, 47, 51, 111, 216, 999, 1000.

   Write down

   (a) the composite numbers,

   (b) the perfect cubes.

K Deduct one mark for every error.

Ans: (a) $\underline{8, 216, 999, 1000, 51, 111}$ [2] B2

(b) $\underline{1, 8, 216, 1000}$ [2] B2

2. Find the value of $\sqrt[3]{13824}$ by using prime factorisation.

$$13824 = 2^9 \times 3^3 \qquad \text{[M1]}$$

$$\sqrt[3]{13824} = \sqrt[3]{2^9 \times 3^3}$$

$$= 2^3 \times 3^1 \qquad \text{[M1]}$$

$$= 24$$

Ans: $\underline{24}$ [3] A1

2

3. If p and q are whole numbers such that $p \times q = 37$, **find** the value of $p+q$ and **explain** your answer.

$$p \times q = 37$$
$$1 \times 37 = 37.$$
$$\therefore p+q = 1 + 37$$
$$= 38.$$

Ans: $p+q = $ ___38.___   [1] A1

Explain: _Since 37 is a prime number, it only has_   [[B1]]   [2]
two factors > 1 and 37 itself. [B1]

4. (a) Determine whether the statement "If 2 and 4 are factors of a number, then 8 is also a factor of that number" is **true or false**.

   (b) If it is true, explain your reasoning. If it is false, give a counterexample.

   Ans: (a) The above statement is ___false___ .   [1] B1

   (b) _If 4 is the number, 8 cannot be a_   [1] B1
   factor of 4.

5. Consider the eight numbers: $(-0.5)^2$, 0, $\sqrt[3]{-9}$, $\dfrac{18}{5}$, $\sqrt{100}$, $(-4)^3$, 17, $-\dfrac{24}{3}$.

   Write down

   (a) the positive numbers,

   (b) the integers.

   ✳ Deduct one mark   Ans: (a) $(-0.5)^2$, $\dfrac{18}{5}$, $\sqrt{100}$, 17 [2] B2
   for every error.

        (b) 0, $\sqrt{100}$, $(-4)^2$, 17, $-\dfrac{24}{3}$ [2] B2

3   99

6. (a) Showing your working, express $100 \times 0.5\dot{7}$ as a repeating decimal.

    (b) Hence, find the value of $100 \times 0.\dot{5}\dot{7} - 0.\dot{5}\dot{7}$.

(a) $100 \times 0.\dot{5}\dot{7} = 100 \times 0.575757$ [MI]

    $= 57.5757$

    $= 57.\dot{5}\dot{7}$

(a) $100 \times 0.\dot{5}\dot{7}$

    $= 100 \times \frac{19}{33}$ [MI]

    $= 57.5757$

    $= 57.\dot{5}\dot{7}$

(b) $100 \times 0.\dot{5}\dot{7} - 0.\dot{5}\dot{7}$

    $= 57.\dot{5}\dot{7} - 0.\dot{5}\dot{7}$ [MI]

    $= 57$

Ans: (a) ___$57.\dot{5}\dot{7}$___ [2] A1

      (b) ___57___ [2] A1

7. Factorise the algebraic expression $4a - 8(b - 2c)$ completely.

    $4a - 8(b - 2c)$

    $= 4a - 8b + 16c$ [MI]

    $= 4(a - 2b + 4c)$

Ans: ___$4(a - 2b + 4c)$___ [2] A1

4

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8. (a) If $z = -3^x - y^3$, find the value of z when $x = 2$ and $y = -3$.

(b) Simplify $(-2a) \times (-3b) + 5ba - 7a + 4b \times (-a) - a$.

(a) $z = -3^x - y^3$

$= -3^2 - (-3)^3$ [M1]

$= -9 - (-27)$

$= -9 + 27$

$= 18$

(b) $(-2a) \times (-3b) + 5ba - 7a + 4b \times (-a) - a$

$= 6ab + 5ba - 7a + (-4ab) - a$ [M1]

$= 6ab - 4ab + 5ba - 7a - a$

$= 7ab - 8a$

Ans: (a) $z = $ ___18___ [2] A1

(b) ___7ab - 8a___ [2] A1

5

9. Solve the equation $\dfrac{2x+1}{x-3} = 2\dfrac{1}{3}$.

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

$$\frac{3(2x+1)}{3(x-3)} = \frac{7(x-3)}{3(x-3)}$$

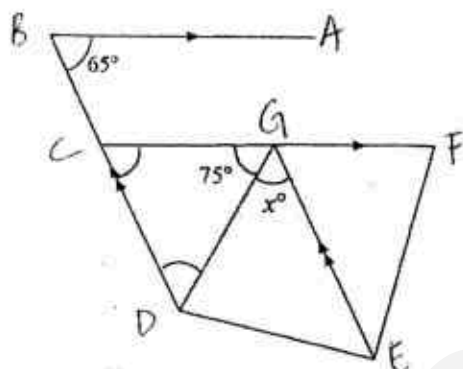either step can get [M1].

$$3(2x+1) = 7(x-3)$$

$$6x + 3 = 7x - 21$$

$$6x - 7x = -21 - 3 \quad [M1]$$

$$-x = -24$$

$$x = 24$$

Ans: $x = $ _____24_____ [3] **A1**

6

10. Explain clearly in the space provided why $x = 40$ in the figure below. Show your working and reasoning clearly.

$\angle DCG = 65°$ (corr $\angle$s, AB // FC) [M1]

$\angle CDG = 180° - 65° - 75°$ ($\angle$ sum of $\triangle$) [M1]
$= 40°$

$\angle x = 40°$ (alt $\angle$s, CD // GE) [A1]
$x = 40$

[3]

11. If the sum of the interior angles of a decagon (10-sided) is greater than the sum of the interior angles of another regular polygon by 540°, find the number of sides of the polygon.

Sum of int $\angle$s of decagon
$= (10-2) \times 180°$ [M1]
$= 1440°$

Sum of int $\angle$s of another polygon
$= 1440° - 540°$
$= 900°$

$(n-2) \times 180° = 900°$ [M1]
$n-2 = 900° \div 180°$
$= 5$
$n = 5 + 2$
$= 7$

Ans: No. of sides = __7__ [3] A1

7   101

12. An object moves 7.2 km in 1 hour. Find its speed in

    (a)   metres per minute,

    (b)   centimetres per second.

(a)   1 hour = 7.2 km.

    60 mins = 7200 m [M1]

    1 min = 7200 ÷ 60

          = 120 m.

(b)   60 mins = 7200 m

    3600 s = 720 000 cm [M1]

    1 s = 720 000 ÷ 3600

       = 200 cm.

＊ Part (b) can ECF for M1 if students used wrong part (a) answer.

Ans: (a)   ____120____ m/min [2] A1

        (b)   ____200____ cm/s [2] A1

13. (a)   Solve the inequality $8x - 11x > -9$.

    (b)   Illustrate the above solutions on a number line.

(a) $8x - 11x > -9$

    $-3x > -9$ [M1]

    $x < -9 ÷ (-3)$

    $x < 3$

$x < 3$

(b)
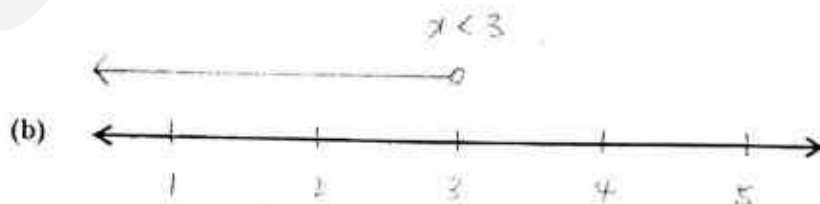
[1] B1

＊ ECF given for correct number line.

Ans: (a)   ____$x < 3$____ [2] A1

8

14. The diagram shows two semicircles with the same centre O. Measurements are in metres.

Find, **in terms of** π,

(a) the perimeter of the shaded region,

(b) the area of the shaded region.
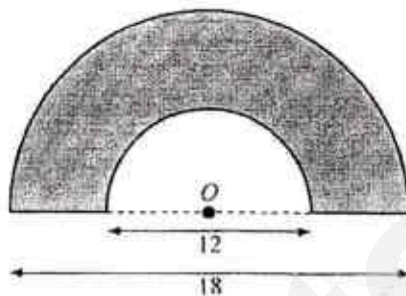
(a) Circumference of big semicircle
$$= \pi(9)$$
$$= 9\pi$$

Circumference of small semicircle $\searrow$ either step can
$$= \pi(6)$$
$$= 6\pi$$ $\nearrow$ get [M1]

$\therefore$ Perimeter $= 9\pi + 6\pi + 3 + 3$
$$= 15\pi + 6$$

(b) Area of big semicircle
$$= \frac{1}{2} \times \pi \times (9)^2$$
$$= 40.5\pi$$

either step
canget [M1] Area of small semicircle
$$= \frac{1}{2} \times \pi \times (6)^2$$
$$= 18\pi$$

$\therefore$ Shaded area $= 40.5\pi - 18\pi$
$$= 22.5\pi$$

Ans: (a) ___(15\pi + 6)___ m [2] A1

(b) ___22.5\pi___ m² [2] A1

15. Tasnim earns $85 on selling 80 tins of biscuits. If Tasnim bought 100 tins of biscuits for $425, calculate

    (a)   the cost of one tin of biscuits that Tasnim paid,

    (b)   the profits of one tin of biscuits as a percentage of its cost.

(a) $100 \text{ tins} = \$425$.

         $1 \text{ tin} = \$425 \div 100$

                $= \$4.25$.

(b) $80 \text{ tins} = \$85$.

         $1 \text{ tin} = \$85 \div 80$ [M1].

              $= \$1.0625$

$$\frac{earning}{cost} \times 100\% = \frac{1.0625}{4.25} \times 100\% \quad [M1]$$

$$= 25\%$$

Ans: (a) $ __4.25__   [1] **A1**

          (b)   __25__ %   [3] **A1**

10

SECTION B (50 Marks)

1. Ms Lim has 200 g of red plasticine, 380 g of grey plasticine and 420 g of yellow plasticine. She divided the plasticine into small balls of equal mass for her Art lesson.

    Find

    (a)   the largest possible mass of one small ball of plasticine,

    (b)   the number of plasticine balls she obtained for each colour.

(a) $200 = 2^3 \times 5^2$

$380 = 2^2 \times 5 \times 19$ $\Big\}$ [M1]

$420 = 2^2 \times 3 \times 5 \times 7$

$HCF = 2^2 \times 5$ [M1]

$= 20$

(b) $Red = 200 \div 20$

$= 10$

$Grey = 380 \div 20$

$= 19$

$Yellow = 420 \div 20$

$= 21$

Ans: (a)   _____20_____ g   [3] A1
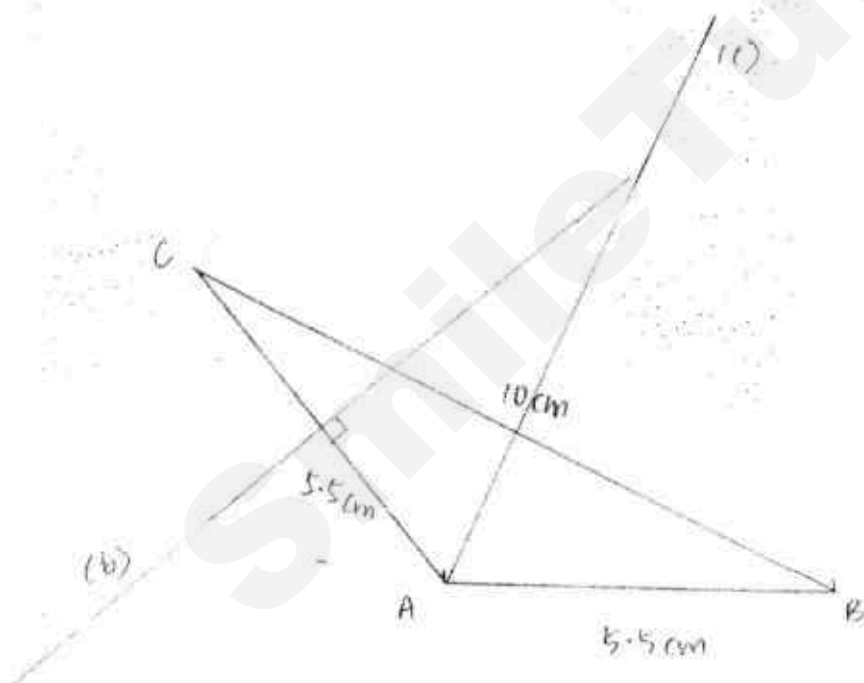
(b)   _____10_____ red balls   [1] A1

_____19_____ grey balls   [1] A1

_____21_____ yellow balls   [1] A1

11

2. (a) Construct $\triangle ABC$ such that $AB = 5.5$ cm, $BC = 10$ cm and $AC = 5.5$ cm. [2] B2

(b) Construct the perpendicular bisector of AC. [1] B1

(c) Construct the angle bisector of $\angle CAB$. [1] B1

* labels and arcs
have to be present

(d) Qi Yun, Erni, Kwan Pin and Zeti share a sum of money. Qi Yun takes $\frac{1}{5}$ of the sum of money. After Qi Yun has taken her share, Erni takes $\frac{1}{3}$ of the remaining money. After Erni has taken her share, Kwan Pin takes $\frac{1}{4}$ of the remaining money. After Kwan Pin has taken her share, Zeti takes all of the remaining money. What fraction of the sum of money is Zeti's share?

After Qiyun, $1 - \frac{1}{5} = \frac{4}{5}$.

$$\text{Erni} = \frac{1}{3} \times \frac{4}{5} \quad [M1]$$
$$= \frac{4}{15}.$$

After Erni $= \frac{4}{5} - \frac{4}{15}$
$$= \frac{8}{15}.$$

$$\text{Kwan Pin} = \frac{1}{4} \times \frac{8}{15} \quad [M1]$$
$$= \frac{2}{15}$$

$$\text{Zeti} = \frac{8}{15} - \frac{2}{15} \quad [M1]$$
$$= \frac{6}{15}$$
$$= \frac{2}{5}$$

Ans: (d) _____$\frac{2}{5}$_____ [4] A

104

13

3. (a) The marks scored by a class of 20 students in a Mathematics test are as follows:

49	46	69	61	49
50	45	62	57	69
68	60	49	59	57
68	45	55	46	50

Copy and complete the frequency table below.

[2] B2

※ Deduct one mark for every error

Marks (x)	Tally	Frequency
$45 \leq x < 50$	�H+ II	7
$50 \leq x < 55$	II	2
$55 \leq x < 60$	IIII	4
$60 \leq x < 65$	III	3
$65 \leq x < 70$	IIII	4

(b) Mei Xuan conducted a survey among a group of students who travel to school either by bus or by car. She displayed the data collected with a pictogram shown below.

Bus

Car

What is a possible misinterpretation of the above data and how would you modify the above pictogram to avoid ē misinterpretation?

Ans: It seems like there are more students taking bus [B1]
I will make the bus and car to be of the same size [B1]

[2]

14

4. Mave drove for a distance of 135 km at a speed of x km/h and Charmaine drove for a distance of 120 km at a speed 10 km/h slower than Mave. Given that the **time taken** by the both of them are the **same**, find the speed each of them drove at.

Time taken by Mave $= \dfrac{135}{x}$

Time taken by Charmaine $= \dfrac{120}{x-10}$ $\Big\}$ [M1]

$\dfrac{135}{x} = \dfrac{120}{x-10}$ [M1]

$\dfrac{135(x-10)}{x(x-10)} = \dfrac{120x}{x(x-10)}$ $\searrow$ either step can
$\nearrow$ get [M1]

$135(x-10) = 120x$

$135x - 1350 = 120x$

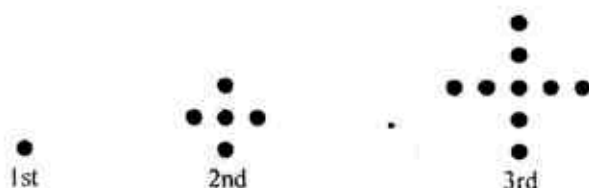$135x - 120x = 1350$

$15x = 1350$

$x = 90$ [A1]

$x - 10 = 90 - 10$
$ = 80$ [A1]

Ans: **Mave:** _____90_____ km/h

Charmaine: _____80_____ km/h [5]

105

15

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5. The diagram below shows the first three of a sequence of dot patterns.

| 1st | 2nd | 3rd |

(a) The information from the sequence of dots is tabulated below.
Complete the table. [1] B1

Pattern	Formula	Number of dots
1	1	1
2	4 + 1	5
3	4 + 4 + 1	9
4	4 + 4 + 4 + 1	13

(b) Write down a formula, T_n to calculate the number of dots in the nth pattern.

(c) Hence, find the number of dots in the 25th pattern.

(d) Find the value of m if there are 501 dots in the mth pattern.

(b) $T_2 = 4 \times 1 + 1$

$T_3 = 4 \times 2 + 1$

$T_4 = 4 \times 3 + 1$

$T_n = 4 \times (n-1) + 1$ [M1]

$= 4n - 4 + 1$

$= 4n - 3$

(c) $T_{25} = 4(25) - 3$

$= 97$.

(d) $T_m = 4(m) - 3$

$501 = 4m - 3$ [M1]

$4m = 501 + 3$

$= 504$

$m = 126$

Ans: (b) $T_n = \underline{\quad 4n-3 \quad}$ [2] A1 / B2

(c) $\underline{\quad 97 \quad}$ dots [1] A1

(d) $m = \underline{\quad 126 \quad}$ [2] A1

16

6. (a) Find the values of a, b, c and d in the figure below.

   (b) What type of angle is $c°$?
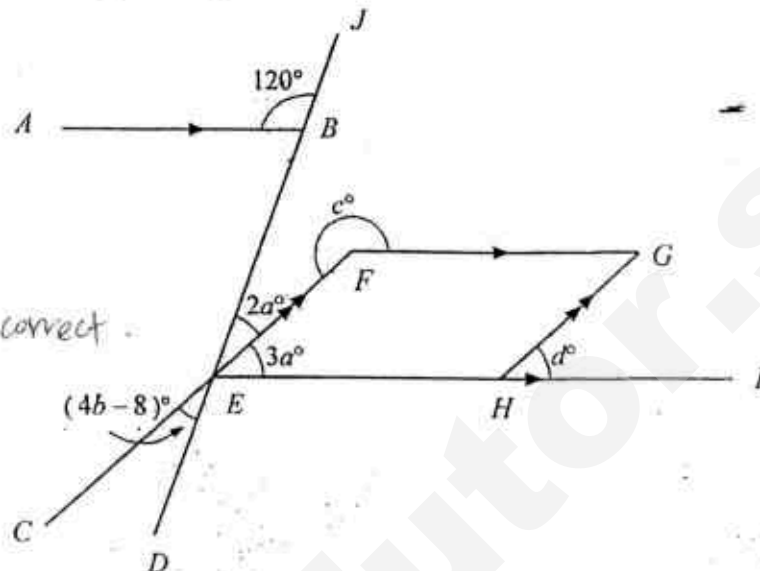
* MI and AI
awarded when
reasonings are correct.

(a) $\angle ABE = 180° - 120°$ (adj $\angle$s on str line) [M1]
$\qquad = 60°$

$d° = 3a°$ (corr $\angle$s, EF // HG)
$\qquad = 3(12)°$
$\qquad = 36$

$2a° + 3a° = 60°$ (alt $\angle$s, AB // EI)
$\qquad 5a° = 60°$
$\qquad a = 12$

$4b - 8 = 2a$ (vert opp $\angle$s) [M1]
$4b - 8 = 2(12)$
$\qquad = 24$
$4b = 24 + 8$
$\qquad = 32$
$\qquad b = 8$

$\angle EFG = 180° - 3a°$ (int $\angle$s, EH // FG) [M1]
$\qquad = 180° - 3(12)°$
$\qquad = 144°$

$c° = 360° - 144°$ ($\angle$s at a point)
$\qquad = 216°$

Ans: (a) $a = \underline{\quad 12 \quad}$ [2] A

$b = \underline{\quad 8 \quad}$ [2] A

$c = \underline{\quad 216 \quad}$ [2] A

$d = \underline{\quad 36 \quad}$ [1] A

(b) $\underline{\quad \text{Reflex} \quad}$ angle [1] b

:06

17

7. A solid prism whose cross section is a trapezium is moulded into a solid cylinder of radius 10 cm. All dimensions given in the diagram are in centimetres.

(a) Find the height of the cylinder, giving your answer correct to 3 significant figures.

(b) Find the total surface area of the cylinder, giving your answer correct to the nearest whole number.
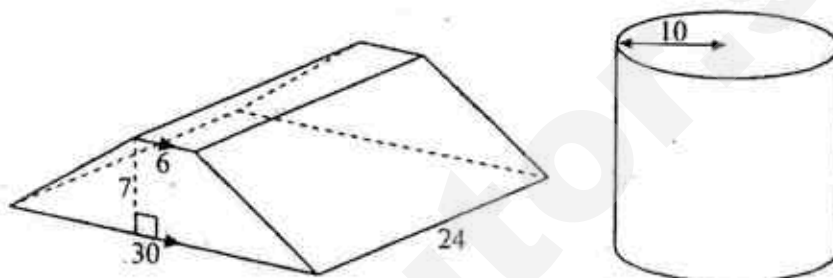
(a) Area of trapezium $= \frac{1}{2}(a+b)(h)$
$= \frac{1}{2}(6+30)(7)$ [M1]
$= 126 \text{ cm}^2$

Vol of prism $=$ BA $\times$ Height
$= 126 \times 24$ [M1]
$= 3024 \text{ cm}^3$

Area of circle $= \pi(10)^2$
$= 314.16 \text{ cm}^2$

Vol of cylinder $=$ BA $\times$ Height

$3024 = 314.16 \times H$ [M1]

$H = 9.6257$

$= 9.63 \text{ cm} (3sf)$

(b) Perimeter of base $= 2\pi(10)$
$= 62.82$
[M1]
$SA = (62.832 \times 9.6257) + 2(314.16)$
$= 1233.12$
$= 1233 \text{ cm}^2$

Ans: (a) _____9.63_____ cm [4] A1

(b) _____1233_____ cm² [3] A1

木 ECF for height

18

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8. The line graph below shows the change in body temperature of a patient from 8 am to 11 pm. The temperatures are taken every 3 hours. The normal temperature of a person is approximately 37°C.

Patient's Body Temperature
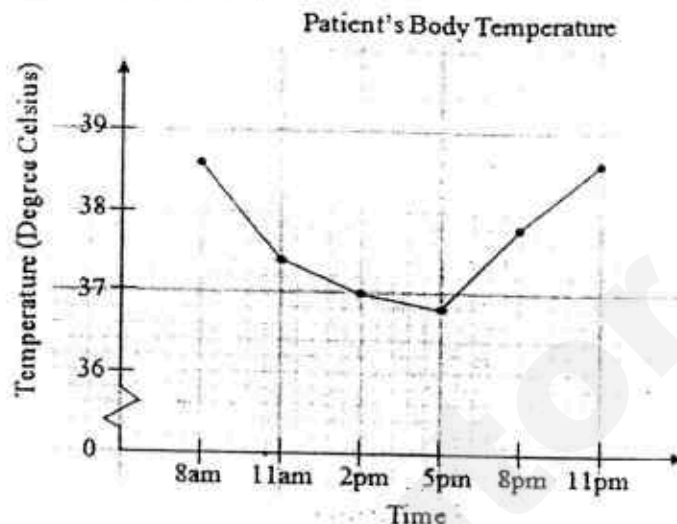
(a) State the time taken (in hours) for his temperature to decline till it reaches normal temperature.

(b) State a possible reason for the drop in the patient's temperature.

Ans: _He has taken medicine_ [1] B!

(d) Find the percentage increase in temperature from 5pm to 8pm.

(e) Do you think the patient has recovered by 11 pm? Explain your answer.
[B1]   [B1]
Ans: _NC. His temperature went up to 38.6°c_ [2]

(d) Percentage = $\frac{37.8 - 36.8}{36.8} \times 100\%$ [M1]
     Increase

                                    Ans: (a) ____6____ hours [1] B|

           $= \frac{1}{36.8} \times 100\%$

                                         (d) ____2.72____ % [2] A|

           $= 2.72\%$ (3sf).

-----------------------------END OF PAPER-----------------------------
SETTER: Ms Chow CW

19   107

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Class	Register Number	Name

Bukit Batok Secondary School
Second Semestral Examination 2016
Secondary 1 Express

MATHEMATICS
Paper 1

10 October 2016 (Monday)
0750 - 0905
1 hour 15 min

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.

Calculators must not be used in this paper.
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, unless the question requires the answer in terms of π.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is **40**.

For Examiner's Use

This document consists of **8** printed pages.

Strive for accuracy & precision!

1

68

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1. Round off the following to 3 significant figures.
    (a)   13750.73578
    (b)   0.019049987

                              Ans: (a)_____ [1]

                                   (b)_____ [1]

2. If $a : b = 21 : 10$ and $a : c = 14 : 22$, find $b : c$, giving your answer in the simplest form.

                              Ans: _____ [2]

3. In November 2015, the Centers for Disease Control and Prevention noted in their report, "The percentage of U.S. adults who smoke cigarettes declined... Cigarette smoking was significantly lower in 2014 (16.8%) than in 2013 (17.8%)..."

    Explain why the following chart is a misleading representation of this information.

                              _____

                              _____ [1]
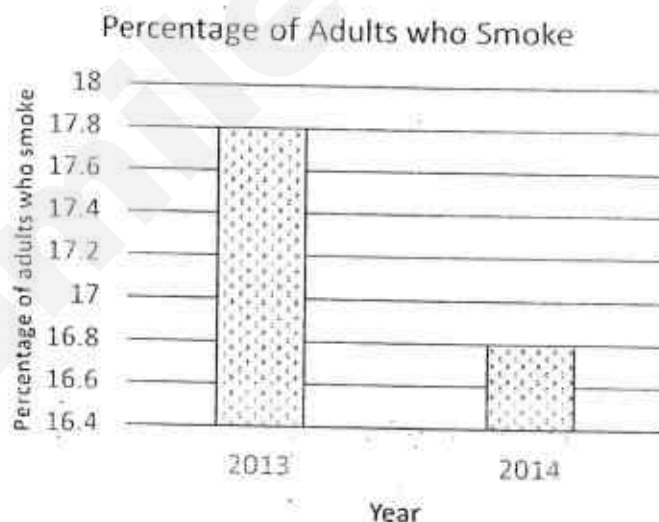
4. Find the difference in the total surface area of the two prisms shown.
    All dimensions are in cm.
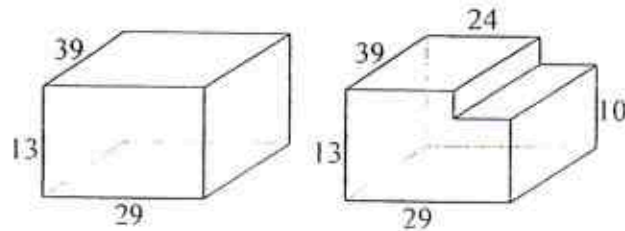
Ans: _____ cm² [2]

5. (a) (i)   Solve the inequality $-3x \geq 10$.
        (ii) Hence write down the greatest integer value of x which satisfies $-3x \geq 10$.
    (b) The following is part of a headline seen in the *Washington Post* on 20 June 2016.

'Stop the madness': At least 1,000 Republicans dial into anti-Trump conference

Letting y represent the number of Republicans who dialled into the anti-Trump conference, write down an inequality in y that represents the above information.

Ans: (a)(i) _____ [1]

(ii) _____ [1]

(b) _____ [1]

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6. The total surface area of a cylinder is $2\pi r^2 + 2\pi rh$.
   (i) Completely factorise $2\pi r^2 + 2\pi rh$.
   (ii) Use your answer in (i) to find, in terms of π, the total surface area of a cylinder where $r = 30.3$ and $h = 69.7$.

Ans: (i)_____ [1]

(ii)_____ [2]

7. Fill in each blank with >, = or <.
   (a) 0.7% _____ $\dfrac{7}{100}$
   (b) $0.3\dot{1}$ _____ $0.\dot{3}$
   (c) 3.142 _____ $\dfrac{22}{7}$
   (d) 1.5 _____ $\sqrt{\dfrac{45}{20}}$

Ans: (a)_____ [1]

(b)_____ [1]

(c)_____ [1]

(d)_____ [1]

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4

8. Given that $m = 3^7 \times 7^4$ and $n = 11^5 \times 5^3$, find
   (a) the HCF of m and n,
   (b) the LCM of m and n, giving your answer in index notation.
   (c) the smallest positive integer q such that $\sqrt[3]{\dfrac{n}{q}}$ is an integer.

Ans: (a) _____ [1]

(b) _____ [1]

(c) _____ [2]

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5

9. Two identical circles centred at A and B respectively intersect at C and D.
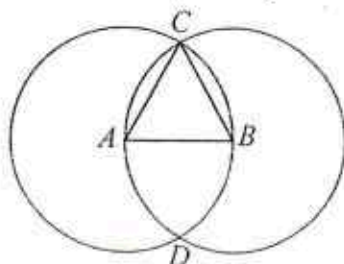
The diameter of each circle is 20 cm.

(a) (i)   State the length of AC. Explain your answer.

(ii)   Hence write down the special name given to $\triangle ABC$.

(b) Given further that $CD = 17.3$ cm, find the area of the quadrilateral $ACBD$.

Ans: (a)(i) _____ [1]

(a)(ii) _____ [1]

(b) _____ cm² [2]

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10. In the diagram, a, b and c are the interior angles of $\triangle ABC$.
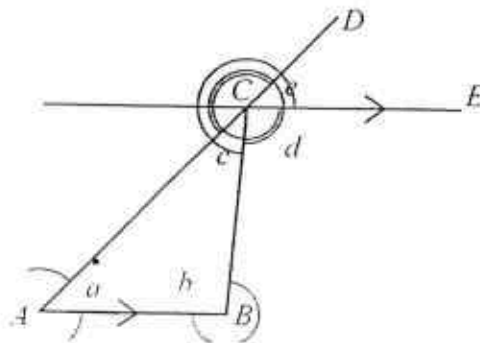
(a) The following steps show the proof that $a + b + c = 180°$. Complete the proof by writing, in the spaces provided, the angle or the reason that justifies each statement.

$d = b$ (_____) [1]

$e =$ _____ (corr ∠s, $AB/\!/CE$) [1]

Therefore $a + b + c = e + d + c$

$= 180°$ (_____) [1]

(b) Write down the reason that justifies the following statement:

Reflex angle $CAB = 360° - a$ (_____) [1]

---

11. The figure below is made up of an isosceles trapezium and a rectangle. All dimensions are in cm.

(a) Show that the area, A, of the figure is given by the formula $A = 6xh - 8x$. [3]

(b) Hence find the value of h when $A = 14$ and $x = 2$.

Ans: (b)_____ [2]

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12. The following chart shows the average 12-month fixed deposit interest rates based on the figures provided by 10 leading banks and finance companies. Study the chart and answer the questions that follow.

Average 12-month fixed deposit interest rates by 10 leading banks and finance companies.

(a) (i) In which year was the interest rate highest?

(ii) If a man deposits $1000 at the bank for a year when the rate was highest, how much would he have at the end of the one-year period?

(b) There were 4 consecutive years when the interest rate remained relatively constant. Which were the 4 consecutive years?

(c) Between which 2 consecutive years did the interest rate register the sharpest drop in percentage points? By what percentage points did the rate drop?

Ans: (a)(i) _____ (ii) _____ [3]

(b) _____ [1]

(c) _____ [2]

End of Paper

Strive for accuracy & precision!

8

Paper 1

1. Round off the following to 3 significant figures.

   (a) 13750.73578

   (b) 0.019049987

   (a) 13800

   (b) 0.0190

2. If $a : b = 21 : 10$ and $a : c = 14 : 22$, find $b : c$, giving your answer in the simplest form.

   $\dfrac{b}{c} = \dfrac{b}{a} \times \dfrac{a}{c} = \dfrac{10}{21} \times \dfrac{14}{22}$

   $= \dfrac{10}{33}$

   $b : c = 10 : 33$

3. In November 2015, the Centers for Disease Control and Prevention noted in their report, "The percentage of U.S. adults who smoke cigarettes declined... Cigarette smoking was significantly lower in 2014 (16.8%) than in 2013 (17.8%)..." Explain why the following chart is a misleading representation of this information.

Percentage of Adults who Smoke
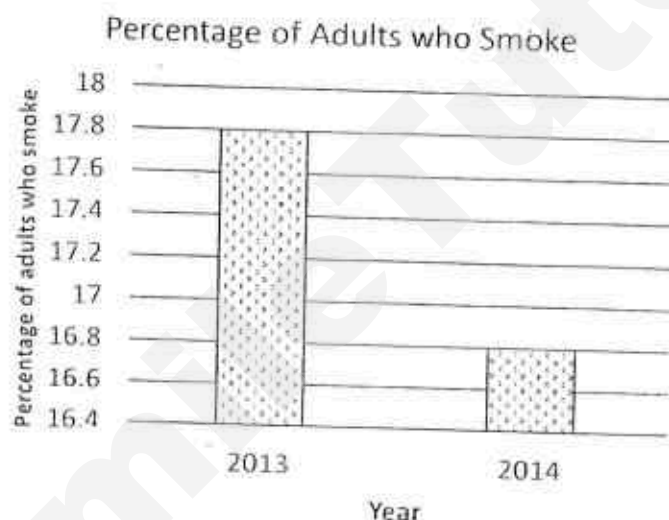
It gives the impression the percentage more than halved but actually it dropped by only 1 percentage point.

4. Find the difference in the total surface area of the two prisms shown. All dimensions are in cm.
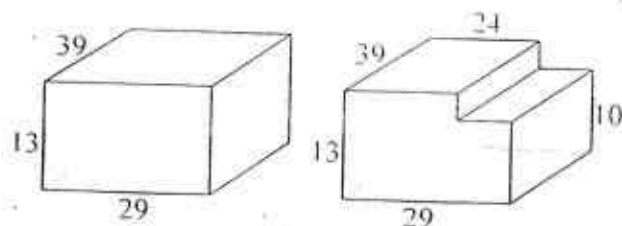
Difference = $2 \times 5 \times 3 = 30$ cm^2

5. (a) (i) Solve the inequality $-3x \geq 10$.
   (ii) Hence write down the greatest integer value of x which satisfies $-3x \geq 10$.
   (b) The following is part of a headline seen in the *Washington Post* on 20 June 2016.

   > 'Stop the madness': At least 1,000
   > Republicans dial into anti-Trump
   > conference

   Letting y represent the number of Republicans who dialled into the anti-Trump conference, write down an inequality in y that represents the above information.

   (i) $x \leq -\dfrac{10}{3}$ (or equivalent)

   (ii) -4

   (iii) $y \geq 1000$

6. The total surface area of a cylinder is $2\pi r^2 + 2\pi rh$.
   (i) Completely factorise $2\pi r^2 + 2\pi rh$.
   (ii) Use your answer in (i) to find, in terms of π, the total surface area of a cylinder where $r = 30.3$ and $h = 69.7$.

   (i) $2\pi r(r + h)$

   (ii) $2\pi(30.3)(30.3 + 69.7) = 60.6\pi(100) = 6060\pi$

7. Fill in each blank with $>$, $=$ or $<$.
   (a) 0.7% ___ $\dfrac{7}{100}$
   (b) $0.3\dot{1}$ ___ $0.\dot{3}$
   (c) 3.142 ___ $\dfrac{22}{7}$
   (d) 1.5 ___ $\sqrt{\dfrac{45}{20}}$

   (a) $<$
   (b) $<$
   (c) $<$
   (d) $=$

8. Given that $m = 3^7 \times 7^4$ and $n = 11^5 \times 5^3$, find
   (a) the HCF of m and n,
   (b) the LCM of m and n, giving your answer in index notation.
   (c) the smallest positive integer q such that $\sqrt[3]{\dfrac{n}{q}}$ is an integer.

   (a) HCF $= 1$
   (b) LCM $= 3^7 \cdot 7^4 \cdot 11^5 \cdot 5^3$
   (c) $q = 11^2 = 121$

9. Two identical circles centred at A and B respectively intersect at C and D.
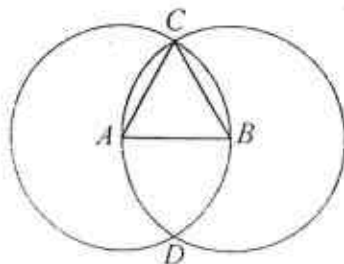
The diameter of each circle is 20 cm.
(a) (i) State the length of AC. Explain your answer.
   (ii) Hence write down the special name given to $\triangle ABC$.
(b) Given further that $CD = 17.3$ cm, find the area of the quadrilateral $ACBD$.

(a) (i) $AC = 10$ cm. because it is the radius of the circle.
   (ii) Equilateral $\triangle$.
(b) Area $= \frac{1}{2} \times 10 \times 17.3 = 86.5$ cm^2

10. (a) In the diagram. a, b and c are the interior angles of $\triangle ABC$.
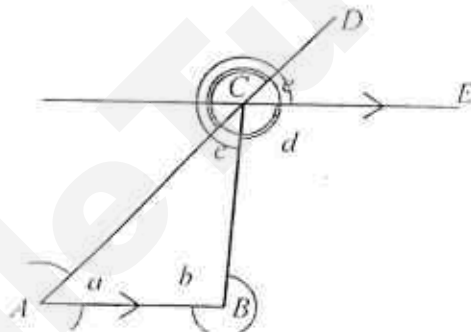
(a) The following steps show the proof that $a + b + c = 180°$. Complete the proof by writing, in the spaces provided. the angle or the reason that justifies each statement.

$d = b$ (_____) [1]

$e =$ _____ (corr $\angle$s. $AB//CE$) [1]

Therefore $a + b + c = e + d + c$
$= 180°$ (_____) [1]

(b) Write down the reason that justifies the following statement.

Reflex angle $CAB = 360° - a$ (_____)[1]

(a) alt $\angle$s. $AB//CE$
   a
   adj $\angle$s on a straight line

(b) ($\angle$s at a point)

7k

11. The figure below is made up of an isosceles trapezium and a rectangle. All dimensions are in cm.

(a) Show that the area, A, of the figure is given by the formula $A = 6xh - 8x$. [3]

(b) Hence find the value of h when $A = 14$ and $x = 2$.
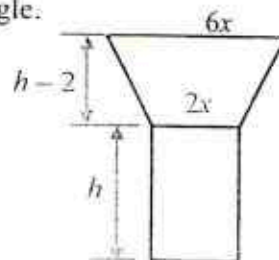
(a) $A = \frac{1}{2} \times (2x + 6x) \times (h - 2) + 2x \times h$

$= \frac{1}{2} \times (8x) \times (h - 2) + 2xh$

$= 4x \times (h - 2) + 2xh$

$= 4xh - 8x + 2xh$

$= 6xh - 8x$ (shown)

(b) $14 = 6(2)(h) - 8(2)$

$h = \frac{14 + 16}{12} = \frac{30}{12} = 2.5$

12. The following chart shows the average 12-month fixed deposit interest rates based on the figures provided by 10 leading banks and finance companies. Study the chart and answer the questions that follow.

Average 12-month fixed deposit interest rates by 10 leading banks and finance companies.

(a) (i) In which year was the interest rate highest?
    (ii) If a man deposits $1000 at the bank for a year when the rate was highest, how much would he have at the end of the one-year period?
(b) There were 4 consecutive years when the interest rate remained relatively constant. Which were the 4 consecutive years?
(c) Between which 2 consecutive years did the interest rate register the sharpest **drop** in percentage points? By what percentage points did the rate drop?

(a) (i) 1984

(ii) Interest = $1000 × 6.8%   1 yr
+$68

Total = $1000 + $68 = $1068

(b) 2011-2014

(c) 1984-1985 or 1997-1998. drop by 1.9%

BUKIT VIEW SECONDARY SCHOOL
END OF YEAR EXAMINATION 2016
SECONDARY ONE EXPRESS

CANDIDATE NAME	

CLASS		REGISTER NUMBER	

Mathematics
Paper 1

7 October 2016
1 hour 15 mins

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class in the spaces provided on top of this cover page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
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, unless the question requires the answer in terms of π.

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 50.

Marks
50

Setter: Mrs Leong Wee Choo   Parents' Signature: _____

This question paper consists of **13** printed pages and 1 blank page.

1   (a)   The salaries of Amy and Betty are in the ratio 8 : 3. The salaries of Amy and
          Cathy are in the ratio 5 : 12. Express the salaries of Betty and Cathy in the form
          of a ratio in its simplest form.

Answer (a) .... [1]

(b)   If Amy earns $125 more than Betty, calculate Cathy's salary.

Answer (b) $ .... [2]

2   (a)   Express 324 as a product of its prime factors.

Answer (a) .... [1]

(b)   Find the smallest value of p such that the LCM of p and 12 is 324.

Answer (b) $p =$ .... [1]

3 **(a)** Express 45 kg as a percentage of 1800 g.

Answer (a) .... % [1]

(b) A salesman is paid a basic salary of $850 per month plus a commission of 12% of his total sales made during the month. If his total salary for a particular month is $1483.60, calculate his total sales made that month.

Answer (b) $ .... [2]

---

4 To celebrate the first-month of his new-born, Andy sets aside a budget of $460 to rent a function room and cater food for his guests. The rental fee for the function room is $110 and the caterer charges $9 per person. By setting up an inequality, find the maximum number of guests he can invite for this celebration.

Answer .... [3]

53

5   (a)   By writing each number correct to 1 significant figure, estimate the value of

$$\frac{36.87 \times 19.012}{4.28}.$$

Show all workings clearly.

Answer (a) .... [2]

(b)   **Use your result in (a)** to estimate the value of $\dfrac{3687 \times 190.12}{428}$.

Answer (b) .... [2]

6   The equation of a function is $y = -\dfrac{1}{2}x + 2$.

(a) Find the value of x when $y = -6$.

Answer (a) $x =$ .... [1]

(b) Determine whether the point $\left(5, \dfrac{1}{2}\right)$ lies on the line of the equation.

Answer (b) ....

....

....

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....

....

.... [2]

5k

7   The first 4 terms of a sequence are 4, 11, 18 and 25.

(a)   Write down the next two terms of the sequence.

Answer (a) .... [1]

(b)   Find an expression, in terms of n, for the nth term of the sequence.

Answer (b) .... [1]

(c)   Determine whether 4962 is a term in the sequence.

Answer (c) ....

....

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....

....

.... [2]

8 Abby bought 60 pens at p cents each and 80 highlighters at q cents each.

(a) She wishes to pack all the pens and highlighters into maximum number of bags without any leftovers. Show that the maximum number of bags is 20.

Answer (a) ....

....

....

....

....

.... [1]

She sells each bag for $(4p + 5q)$ cents. Write down, in terms of p and q, an expression for

(b) the total amount of money, in cents, she spent on the stationery,

Answer (b) .... [1]

(c) the amount of money, in cents, she got after she sold all the bags of stationery.

Answer (c) .... [1]

She made a profit of \$5 from selling all the bags of stationery.

(d) By forming an equation, show that $p + q = 25$.

Answer (d) ....

....

....

....

....

.... [2]

9 (a) Solve $\dfrac{2x}{3} - \dfrac{x+3}{4} = \dfrac{1}{4}$.

Answer (a) $x =$ .... [2]

(b) If $\dfrac{3q^2}{r} = \dfrac{3p-2q}{p+q}$, find the value of r when $p = 3$ and $q = -\dfrac{1}{2}$.

Answer (b) $r =$ .... [2]

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10 A plumber charges a transportation fee for attending a house call. The graph shows the charges for the number of hours spent on the job.
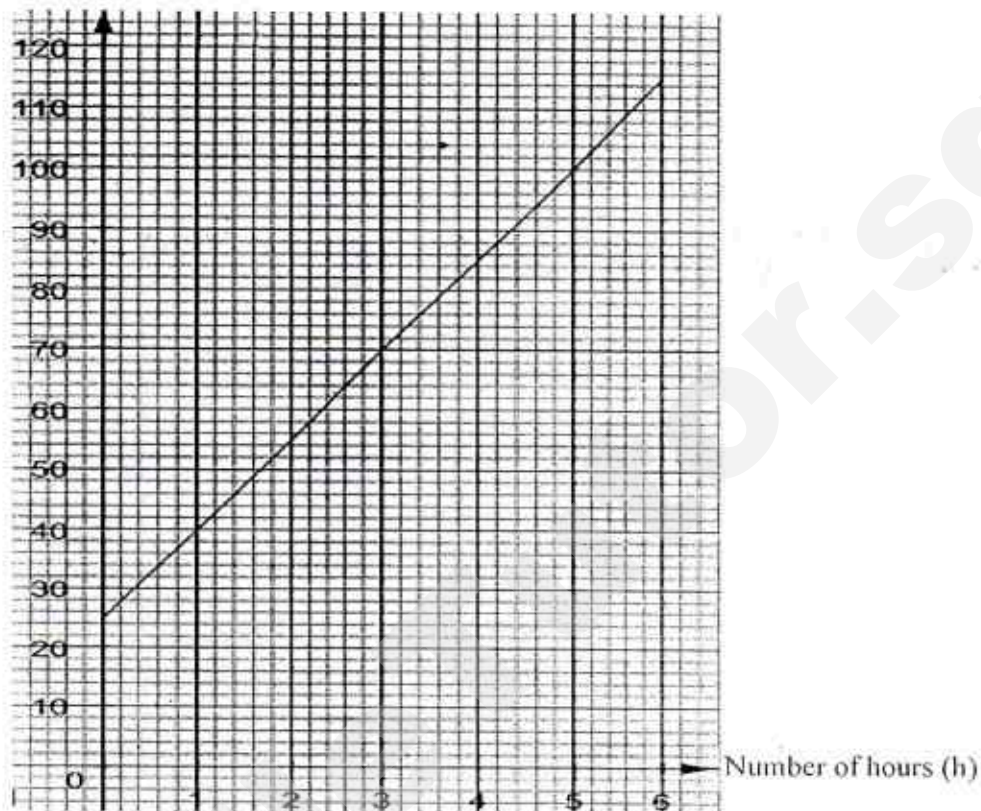
Charges ($)

(a) State the transportation fee charged by the plumber.

Answer (a) $ .... [1]

(b) Find the amount charged for every hour spent on the job.

Answer (b) $ .... [1]

(c) Find the duration, in hours and minutes, the plumber spent on the job if he charges $94.

Answer (c) .... hours .... minutes [1]

56

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11   In the diagram, ABC is an isosceles triangle where $AB = AC$, BAD is a straight line, angle $EAB = 93°$ and angle $BAC = 88°$.
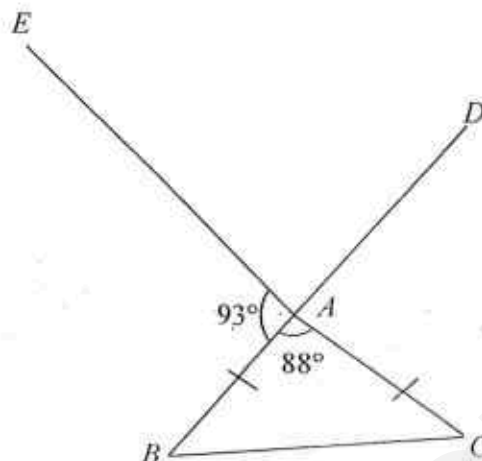
(a)   Alice says that angle $EAD = 88°$. Explain whether she is correct.

Answer (a) ....

....

....

....

.... [1]

(b)   By stating the reasons clearly, find

(i) $\angle ABC$.

Answer (b)(i) ....° [1]

(ii)   reflex $\angle ACB$.

Answer (b)(ii) ....° [1]

12   **(a)**   **(i)**   Express 12.2 m² in cm².

Answer (a)(i) .... cm² [1]

       (ii)   Express 15000 cm³ in m³.

Answer (a)(ii) .... m³ [1]

  (b)   An open cylindrical tank of radius 40 cm and height 1.2 m is to be painted on its exterior surfaces.

       (i)   Find the total surface area, in m², that needs to be painted.

Answer (b)(i) .... m² [2]

       (ii)   Calculate the amount of water, in litres, needed to fill the tank completely.

Answer (b)(ii) .... litres [2]

5

13 The diagram shows the sales of BV Gift Shop from June to September 2016.

Sales from June to September 2016
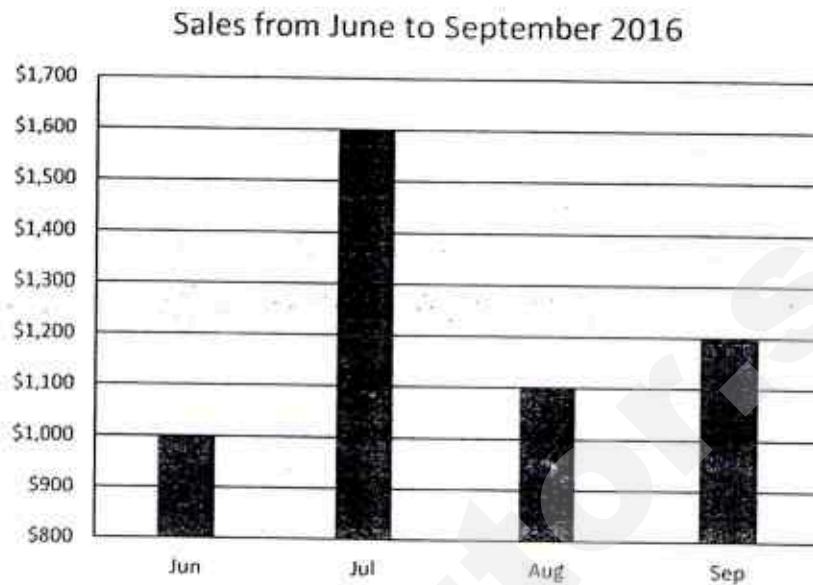
(a) Calculate the average sales.

Answer (a) $ .... [2]

(b) Anthony suggested that in future, the shop must prepare at least 2 times more items in the month of July since that month's sales is at least twice the sales in the other 3 months. By considering only the sales of these 4 months, explain whether you agree with Anthony's suggestion.

Answer (b) ....

....

....

....

....

....

.... [1]

14 (a) Construct a triangle *ABC* such that *AB* = 9 cm and *AC* = 7 cm.

BC has already been drawn. [1]

Answer (a) and (c)

B ——————————————————— C

(b) Alex says that angle *ACB* is the greatest interior angle of this triangle. **Without using a protractor**, explain whether Alex is correct.

Answer (b) ....

....

....

.... [1]

(c) Construct

(i) the perpendicular bisector of *BC*. [1]

(ii) the angle bisector of angle *ABC*. [1]

END OF PAPER

1   **(a)**   The salaries of Amy and Betty are in the ratio 8 : 3. The salaries of Amy and Cathy are in the ratio 5 : 12. Express the salaries of Betty and Cathy in the form of a ratio in its simplest form.

$$A : B \quad \& \quad A : C \quad \left.\begin{array}{l} \\ \\ \end{array}\right\} \quad A : B : C$$
$$8 : 3 \qquad 5 : 12 \qquad \qquad 40 : 15 : 96$$

Answer (a) ....5........ : ....32........ [1]

Some students did not reduce to the simplest form.

Some gave the ratio of all the 3, instead of Betty and Cathy.

Some students did not make use of the answer line fully. These students wrote 5:32 in the first part of the answer line.

(b)   If Amy earns \$125 more than Betty, calculate Cathy's salary.

Difference in units = 40 − 15 = 25

$25u \rightarrow \$125$

$1u \rightarrow \dfrac{\$125}{25} = \$5$ **· M1 (able to work out 1 unit)**

$96u \rightarrow \$5\times96 = \$480$

Answer (b) \$ ....480........ [2]

To remind students of relevant working. No method mark is awarded for the following answer (due to lack of working)

$25u \rightarrow \$125$

$96u \rightarrow \$480$

2   (a)   Express 324 as a product of its prime factors.

Answer (a) .... $2^2 \times 3^4$ .... [1]

> Some students did not write in index notation.

(b)   Find the smallest value of p such that the LCM of p and 12 is 324.

$12 = 2^2 \times 3$

$p = ??$

$LCM = 2^2 \times 3^4$

$p = 3^4 = 81$

Answer (b) $p =$ .... 81 .... [1]

> Badly done. Many gave 27 as the answer.

3   (a)   Express 45 kg as a percentage of 1800 g.

$\frac{45}{1.8} \times 100\% = 2500\%$

Answer (a) .... 2500% .... [1]

> Many students were not able to convert kg to g correctly. These students x100, instead of x1000.
>
> Quite a big group of students found 1800g as a percentage of 45kg !
>
> Some were simply oblivious to the units !
>
> Another group did not write x100% or wrote, but did not key into calculator. They had 25 instead of 2500 as the answer.

(b) A salesman is paid a basic salary of $850 per month plus a commission of 12% of his total sales made during the month. If his total salary for a particular month is $1483.60, calculate his total sales made that month.

Let x be the total sales

$850 + 12\% \times x = 1483.6$ - M1 (able to form equation)

$0.12x = 633.6$

$x = 5280$

OR

$12\% \rightarrow 633.6$ - M1 (able to show 12% equivalent to 633.6)

$100\% \rightarrow \frac{633.6}{12} \times 100 = 5280$

Answer (b) $ .... 5280 .... [2]

Concept of commission is rather weak. Common mistakes
• 112% - $1483.60
• 100% - $1483.60
• 112% - $633.60

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4 To celebrate the first-month of his new born, Andy sets aside a budget of $460 to rent a function room and cater food for his guests. The rental fee for the function room is $110 and the caterer charges $9 per person. By setting up an inequality, find the maximum number of guests he can invite for this celebration.

Let x be the number of guests

$110 + 9x \leq 460$ — M1 (able to form inequality, must be $\leq$)

$9x \leq 350$

$x \leq 38\frac{8}{9}$ — M1 (able to solve for x)

Answer .... **38** .... [3]

Very badly done as very few were able to form inequality. Some left their final answer as an inequality !

5 (a) By writing each number correct to 1 significant figure, estimate the value of

$$\frac{36.87 \times 19.012}{4.28}$$

Show all workings clearly.

$$\frac{36.87 \times 19.012}{4.28} \approx \frac{40 \times 20}{4}$$ — M1 (able to express each number to 1 sf)

$$= 200$$

Answer (a) .... **200** .... [2]

Very badly done. Either they did not read the question carefully or the concept of significant figure is very weak. Commonly seen wrong answers were $\frac{4 \times 2}{4}$, $\frac{40.00 \times 19.00}{4.00}$, $\frac{37 \times 19}{4}$, etc.

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(b) Use your result in (a) to estimate the value of $\dfrac{3687 \times 190.12}{428}$.

$$\frac{3687 \times 190.12}{428} = \frac{36.87 \times 100 \times 19.012 \times 10}{4.28 \times 100}$$ - M1 (able to use (a))

$$\approx 200 \times 10$$

$$= 2000$$

Answer (b) .... 2000 .... [2]

> Not many were able to use their result in (a). Nonetheless, those who reworked the question were given 1 mark for their final answer.

---

6 The equation of a function is $y = -\dfrac{1}{2}x + 2$.

(a) Find the value of x when $y = -6$.

$$-6 = -\frac{1}{2}x + 2$$

$$-8 = -\frac{1}{2}x$$

$$x = 16$$

Answer (a) $x =$ .... 16 .... [1]

> Quite a significant group were not able to solve this equation although they were able to substitute -6 into the equation. This revealed their weakness in algebraic manipulation.
>
> Quite a lot gave -16 as the answer, either through carelessness or they left at $-x = -16$ and hence stated -16 as the answer.

(b) Determine whether the point $\left(5, \frac{1}{2}\right)$ lies on the line of the equation.

Answer (b) Let $x = 5$

$$y = -\frac{1}{2}(5) + 2 = -\frac{1}{2}$$

— M1 (able to subst 1 coord to find another)

Since y is $-\frac{1}{2}$ and not $\frac{1}{2}$

$\left(5, \frac{1}{2}\right)$ is NOT on the line

— M1 (able to use result to determine)

[2]

Many did not attempt this part.

Those who did showed very weak understanding of equation and coordinates. Some "out of the world" answers included :

- 5 is in, but $\frac{1}{2}$ is not (and vice versa)
- coordinates treated as $5\frac{1}{2}$
- must be whole number
- must be positive/negative
- $\frac{1}{2}$ not a factor of 5
- not between -6 and 16

Some surprisingly used -6 in the calculation for (b).

7 The first 4 terms of a sequence are 4, 11, 18 and 25.

(a) Write down the next two terms of the sequence.

Answer (a) ....**32, 39**................. [1]

(b) Find an expression, in terms of n, for the nth term of the sequence.

$T_1 = 4$

$T_2 = 4 + 7(1)$

$T_3 = 4 + 7(2)$

$T_n = 4 + 7(n-1)$

$= 7n - 3$

Answer (b) ....**7n – 3**................. [1]

> Most were able to come out with the general term. Marker accepted the following responses for this exam, but they must be reminded to simplify their answers in future.
>
> $4 + 7(n-1)$, $\times 7 - 3$, $7 \times n - 3$, $7n + (-3)$

(c) Determine whether 4962 is a term in the sequence.

Answer (c) ....$7n - 3 = 4962$.......] - M1 (attempt to find n)

$n = \dfrac{4965}{7} = 709\frac{2}{7}$

Since n is not a whole number,] - M1 (able to use result to determine)

4962 is NOT a term in the sequence.

[2]

> Not well done. Students must be reminded to work out their steps rather than describing them. This is after all a Mathematics paper.
>
> Inability to use the word "integer". Many said "number with a decimal. decimal point", etc. These answers were accepted though.
>
> Weak understanding of "term" and "n".
>
> Vague answers included using "it" to refer to different things.

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8 Abby bought 60 pens at p cents each and 80 highlighters at q cents each.

(a) She wishes to pack all the pens and highlighters into maximum number of bags without any leftovers. Show that the maximum number of bags is 20.

Answer (a) $60 = 2^2 \times 3 \times 5$ — M1 (able to apply HCF)

$80 = 2^4 \times 5$

$HCF = 2^2 \times 5 = 20$

[1]

Not well done. Quite a big group of students used 20 (which they have to show) in their answers.
Instead of calculating number of bags. many calculated the number of pens and highlighters instead.

She sells each bag for $(4p + 5q)$ cents. Write down, in terms of p and q, an expression for

(b) the total amount of money, in cents, she spent on the stationery,

Answer (b) **$60p + 80q$** [1]

(c) the amount of money, in cents, she got after she sold all the bags of stationery.

Answer (c) **$20(4p + 5q)$** [1]

She made a profit of $5 from selling all the bags of stationery.

(d) By forming an equation, show that $p + q = 25$.

Answer (d) $20(4p + 5q) - (60p + 80q) = 500$ — M1 (able to form eqn)

$80p + 100q - 60p - 80q = 500$

$20p + 20q = 500$

$p + q = 25$ (shown) — A1 [2]

Most were able to form the equation BUT they wrote the units in the equation. However, they were not able to proceed to show the result.
Some described their steps in words, instead of working it out ☹

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9 (a) Solve $\dfrac{2x}{3} - \dfrac{x+3}{4} = \dfrac{1}{4}$.

$$\dfrac{4(2x)}{4(3)} - \dfrac{3(x+3)}{3(4)} = \dfrac{1}{4}$$

$$\dfrac{8x-3(x+3)}{12} = \dfrac{1}{4} \quad \text{— M1 (able to form a single fraction)}$$

$$\dfrac{8x-3x-9}{12} = \dfrac{1}{4}$$

$$5x - 9 = \dfrac{12}{4}$$

$$5x = 12$$

$$x = \dfrac{12}{5} = 2\dfrac{2}{5}$$

Answer (a) x = ... $2\dfrac{2}{5}$ .... [2]

Very badly done due to weakness in expansion involving negatives. Brackets are also not used when necessary.

Still encountered redundant '=' in the solving of equations.

Some still cannot solve equations in the proper way. They simplified common terms in isolation.

(b). If $\dfrac{3q^2}{r} = \dfrac{3p-2q}{p+q}$, find the value of r when $p=3$ and $q=-\dfrac{1}{2}$.

$$\dfrac{3\left(-\frac{1}{2}\right)^2}{r} = \dfrac{3(3)-2\left(-\frac{1}{2}\right)}{3+\left(-\frac{1}{2}\right)}$$ — M1 (able to show substitution correctly)

$$\dfrac{3}{4r} = 4$$

$$3 = 16r$$

$$r = \dfrac{3}{16}$$

Answer (b) $r = \underline{\qquad \dfrac{3}{16} \qquad}$ [2]

Most showed substitution correctly, but was not able to solve the equation correctly. This revealed their weakness with fractions.

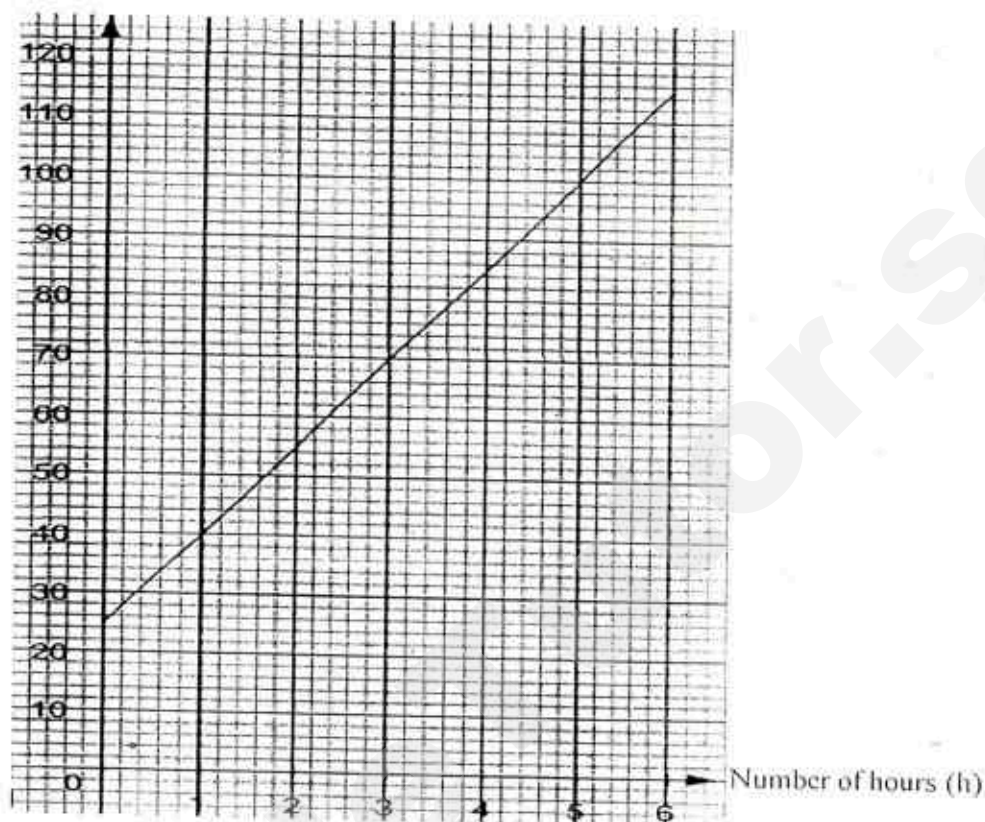The weaker ones did not use brackets when taking the square of the $-\dfrac{1}{2}$.

They ended up with $-\dfrac{1}{4}$.

There were even instances where multiplication was changed to subtraction $3-\left(\dfrac{1}{2}\right)^2$

10 A plumber charges a transportation fee for attending a house call. The graph shows the charges for the number of hours spent on the job.

Charges ($)

(a) State the transportation fee charged by the plumber.

Answer (a) $ ___25 (accept 24 – 26)___ [1]

(b) Find the amount charged for every hour spent on the job.

Answer (b) $ ___15 (accept 14 – 16)___ [1]

(c) Find the duration, in hours and minutes, the plumber spent on the job if he charges $94.
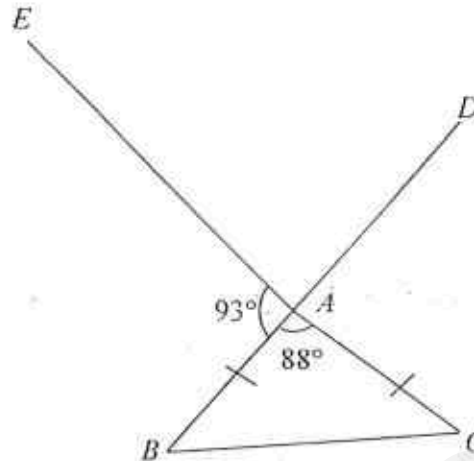
Answer (c) ___4___ hours ___36___ minutes [1]

> Surprisingly badly done as students did not seem to understand the "transportation fees".
>
> Some students calculated the amount, instead of reading off from the graph.
>
> Conversion of time was also rather weak.

11   In the diagram, ABC is an isosceles triangle where $AB = AC$, BAD is a straight line, angle $EAB = 93°$ and angle $BAC = 88°$.

(a)   Alice says that angle $EAD = 88°$. Explain whether she is correct.

Answer (a)   No, she is not correct

$\angle EAD = 180° - 93°$ ($\angle$ on a str. line)

$= 87°$

OR $\angle CAB + \angle BAE = 88° + 93° = 181°$

EAC is NOT a straight line

- M1 (able to work out the correct value OR state that EAC is not a straight line)

No marks if students quote "vert. opp. $\angle$"

[1]

Most were able to state that EAC is not a straight line. However, they can improve on their answer by justifying (not merely stating).

Many also wrote "did not state that EAC is a straight line". Students to take note that since enough information is given, this statement NEED NOT be stated in the question.

Some, however, made the mistake of applying vertically opposite angles. They were most probably led by "visually driven errors".

(b) By stating the reasons clearly, find

   (i) $\angle ABC$,

$$\angle ABC = \frac{180° - 88°}{2} \quad \text{(base } \angle \text{ of isos. } \Delta\text{)}$$

$$= 46°$$

Answer (b)(i) .... 46 .... ° [1]

   (ii) reflex $\angle ACB$.

$$\angle ACB = 360° - 46° \quad (\angle s \text{ at a point})$$

$$= 314°$$

Answer (b)(ii) .... 314 .... ° [1]

Some students did not know what reflex angle is.

---

12 (a) (i) Express 12.2 m² in cm².

$$1\,m = 100\,cm$$

$$1\,m^2 = (100 \times 100)\,cm^2$$

$$12.2\,m^2 = 10000 \times 12.2 = 122000\,cm^2$$

Answer (a)(i) .... 122000 .... cm² [1]

(ii) Express 15000 cm³ in m³.

$$100\,cm = 1\,m$$

$$(100 \times 100 \times 100)\,cm^3 = 1\,m^3$$

$$15000\,cm^3 = \frac{15000}{1000000} = 0.015\,m^3$$

Answer (a)(ii) .... 0.015 .... m³ [1]

Very badly done as most students did not seem to know the difference between area/volume and length. They just ×100 or ÷100 when doing the conversion.

(b) An open cylindrical tank of radius 40 cm and height 1.2 m is to be painted on its exterior surfaces.

(i) Find the total surface area, in m², that needs to be painted.

Total surface area = $\pi(0.4)^2 + 2\pi(0.4)(1.2)$ - **M1 (able to include base and curved SA)**

= 3.51585

≈ $3.52\ m^2$

Answer (b)(i) .... 3.52 .... m² [2]

(ii) Calculate the amount of water, in litres, needed to fill the tank completely.

Volume = $\pi(40)^2(120)$ - **M1 (able to find volume)**

= 603185.7895 cm³

= 603 litres

Answer (b)(ii) .... 603 .... litres [2]
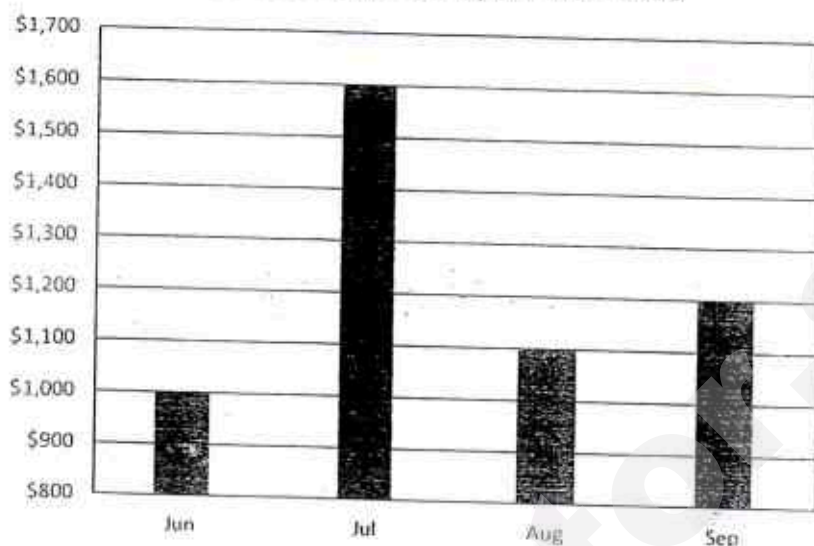
Very badly done as most students did not know the formulae.

Another mistake is finding the area of the top when it is an OPEN cylinder.

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13   The diagram shows the sales of BV Gift Shop from June to September 2016.

Sales from June to September 2016

(a)   Calculate the average sales.

$$\text{Average sales} = \frac{1000+1600+1100+1200}{4} \quad \text{- M1 (show correct concept)}$$

$$= 1225$$

Answer (a) $ .... 1225 .... [2]

(b)   Anthony suggested that in future, the shop must prepare at least 2 times more items in the month of July since that month's sales is at least twice the sales in the other 3 months. By considering only the sales of these 4 months, explain whether you agree with Anthony's suggestion.

Answer (b) I disagree with Anthony's suggestion.

The bar chart did not start from 0. Hence, Anthony is not

correct to say that the sales of July is at least 2 times more

than the other months.

- M1 (able to state that the sales is NOT at least twice)

.... [1]

Most were able to find average sales.

Many only focused on the word "more", ignoring "at least 2 times more" and were therefore not able to explain mathematically.

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14   (a)   Construct a triangle *ABC* such that *AB* = 9 cm and *AC* = 7 cm.

BC has already been drawn.   [1]

Answer (a) and (c)

A

(c)(ii)

9cm

7cm

B

C

(c)(i)
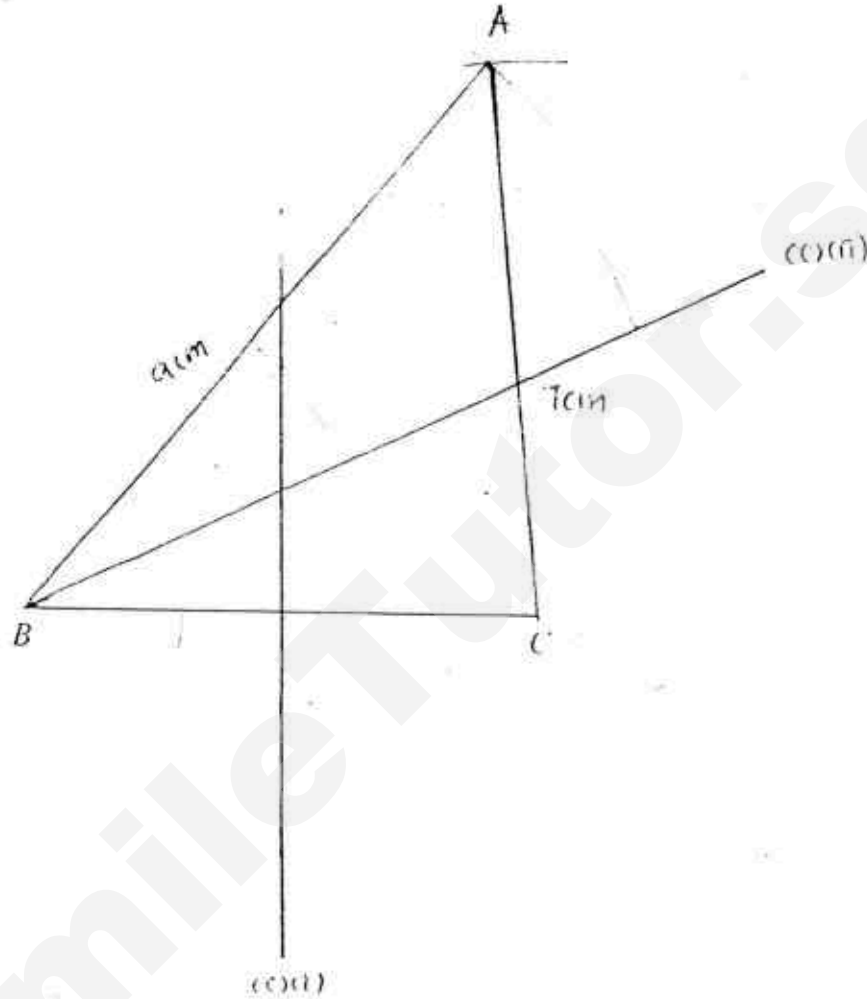
Many did not use intersecting arcs to get point *A*. They would have, expectedly, spent quite some time in getting point *A* accurately. Some were however not successful.

(b) Alex says that angle *ACB* is the greatest interior angle of this triangle. **Without using a protractor**, explain whether Alex is correct.

Answer (b) Alex is correct. AB is the longest side of this triangle.

Hence, ∠ACB - the angle facing the longest side will be the

greatest.

- **M1 (able to use relationship to explain)**

[1]

Almost all responses hinges on "the said angle is almost 90°, therefore greatest", "the other 2 angles are smaller, therefore said angle biggest". There were no attempt to explain, hence no marks given.

(c) Construct

(i) the perpendicular bisector of *BC*. [1]

(ii) the angle bisector of angle *ABC*. [1]

No marks if there are missing/no working arcs for bisectors.

END OF PAPER

Name _____ (   )   Class: _____

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MATHEMATICS
PAPER 2

Duration: 1 hour 15 minutes

Classes: 103, 104, 105, 106

READ THESE INSTRUCTIONS FIRST

Write your name, class and registration number 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/tape.

Answer **all** questions.
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The use of an approved scientific calculator is expected, where appropriate.
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, unless the question requires the answer in terms of π.

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 number of marks for this paper is 50.

FOR EXAMINER'S USE	
Total marks	/50

Answer **all** the questions.

1   Madeline has 45 lollipops, 90 chocolates and 225 sweets to make as many gift packs as possible. Each gift pack has the same number of lollipops, chocolates and sweets.

    (a)   What is the greatest number of gift packets that can be made?   [2]

    (b)   Using your answer in (a), determine the number of chocolates in each gift packet.   [1]

2   (a)   Express $1.25 : \dfrac{3}{16}$ in its simplest form.   [1]

    (b)   Arrange the numbers in ascending order.

$$-0.31, \quad -\frac{1}{3}, \quad -0.\dot{3}0\dot{3}$$

    [2]

    (c)   Find the largest integer value for x that satisfies $-\dfrac{2x}{3} \geq 6 + x$.   [2]

3   The sum of the ages of Nurul and Sabrina now is 34 years.
Five years ago, Nurul was three times as old as Sabrina.
Let Sabrina's age now be x years old.

    (a)   Write an expression in terms of x, for Nurul's age five years ago.   [1]

    (b)   Hence, form an equation in x and solve it.   [3]

    (c)   Find Nurul's present age.   [1]

Answer question 5 on a blank sheet of A4 paper

4   (a)   Using only a ruler and a pair of compasses, construct triangle ABC in which $AB = 10.5$ cm, $BC = 9.5$ cm and $AC = 8.5$ cm.   [2]

    (b)   Using your drawing in (a),

        (i)   construct the angle bisector of $\angle CAB$.   [1]

        (ii)   mark and label the point P, given that the angle bisector of $\angle CAB$ meet BC at point P.   [2]
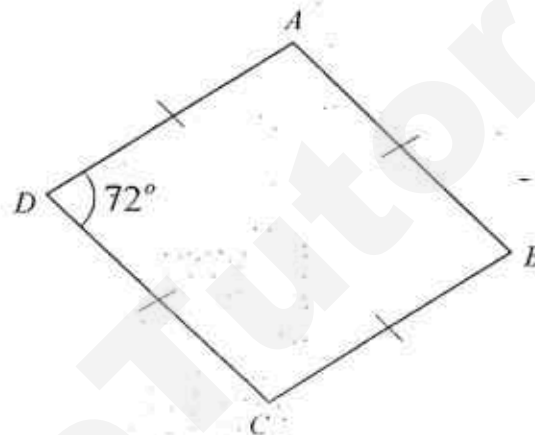   Measure and write down the length of P.

5   Ferrell ran at 4.2 m/s for 20 minutes for the first part of his run. In the second part of his run, he travelled a further 8000 m in 80 minutes.

Find

   (a)   the distance travelled for the first part of Ferrell's run,   [1]

   (b)   Ferrell's running speed of the second part of his run in km/h,   [2]

   (c)   the average speed of his entire run in m/s.   [2]

6

The figure above shows quadrilateral $ABCD$ with four equal sides.

   (a)   Write down the name for the quadrilateral $ABCD$.   [1]

   (b)   Giving your reasons clearly, find $\angle DAB$.   [2]

7   The temperature, y °C of a frozen product at time x minutes after it is taken from the freezer is given by the function $y = -3 + 7x$.

   (a)   Find the change in temperature of the product from $x = 3$ to $x = 5$.   [2]

   (b)   Interpret the physical meaning of the constant term -3.   [1]

   (c)   Find the time lapsed for the frozen product to reach a temperature of 14.5 °C after it is taken from the freezer.   [1]

8   The figure shows a parallelogram $ABCD$ with two semicircles of diameters $AB = 18$ cm and $DA = 24$ cm attached to it.
The length of OB is 21.5 cm and $\angle COB = 90°$.
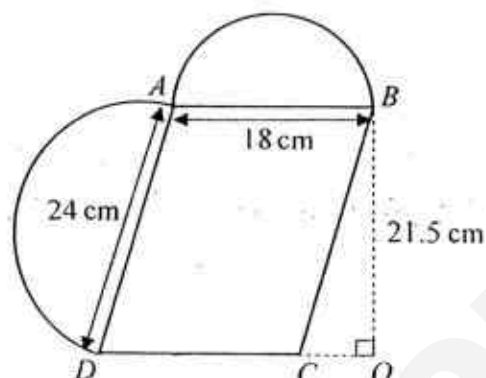
Find, in terms of π,

(a)   the perimeter and   [2]

(b)   the area of the figure.   [2]

Name: _____ (　) 　　　　　　　　　Class: _____

9　Refer to the receipt below issued by a restaurant in which the prices listed by the restaurant are not inclusive of GST.

```
u               Lolla
                 ✗✗✗
         GST Reg no.  201210804H
      22                5(069702)
         Tel: +65
         www.         .sg

            TABLE=53
Pax:2        OP:Nick           Sanjiv
POS Title:POS001          POS:POS001
Rcpt#:A13000002174    26/03/2013 19:56
----------------------------------------
  1 Baguette w/E B            $6.00
  1 Cinco Jotas Jamon        $42.00
  1 D.Chocolate Pudding      $15.00
  1 Doughnut Lemon Curd      $12.00
  1 Duck Fat Potatoes        $13.00
  1 Gratinated Leek          $15.00
  1 Ribeye Steak             $52.00
  1 Sea Urchin Pudding       $19.00
  1 Sperino Uvaggio         $128.00
  1 Toasted Baguette          $7.00
  1 Tuna Belly Tartare       $39.00
----------------------------------------
  SUBTOTAL                      A
  10% SVC CHG                   B
  7% GST                        C
----------------------------------------
  TOTAL                         D
```

Find

(a)　the subtotal amount A.　　　　　　　　　　　　　　　　　　　[1]

(b)　the service charge amount B.　　　　　　　　　　　　　　　　[1]

(c)　the GST amount C,　　　　　　　　　　　　　　　　　　　　[1]

(d)　the total amount D which is rounded up to the nearest 5 cents.　　[1]

80

10 (a)   The following list shows the height (in metres) of students in a certain class.

1.45	1.41	1.27	1.32	1.33
1.32	1.30	1.30	1.32	1.33
1.30	1.32	1.30	1.30	1.27
1.34	1.30	1.30	1.35	1.36
1.39	1.29	1.35	1.34	1.34

(i)   Copy and complete the frequency table below for the data above.

Height (x m)	Tally	No of Students
$1.25 < x \le 1.29$		
$1.29 < x \le 1.33$		
$1.33 < x \le 1.37$		
$1.37 < x \le 1.41$		
$1.41 < x \le 1.45$		
Total:		

[1]

(ii)   Find the percentage of students whose height is more than 1.37 m.   [1]

(b)   The following line graphs below show the performance of Rick and Roy in the school Mathematics assessment for the first semester.

Maths results of Rick

Maths results of Roy
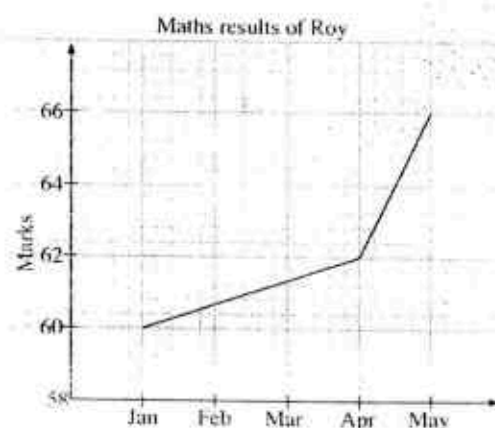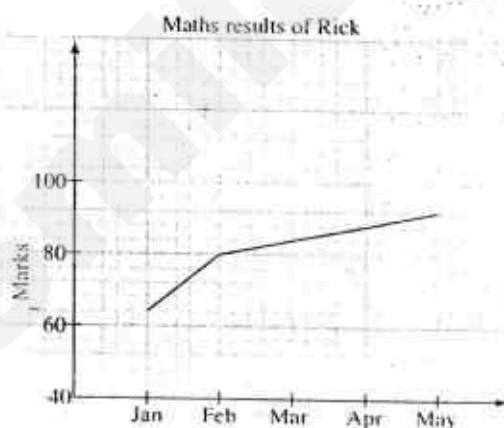
(i)   Find the percentage improvement of Rick's Maths results from January to May.   [1]

(ii)   Upon observing these line graphs, a classmate commented that Roy has done better than Rick. In what way have the graphs misled the classmate?   [1]

11   The diagram below shows an unsharpened pencil manufactured by a company. The pencil is in the shape of a cylinder with a diameter of 1.5 cm and a height of 13 cm.
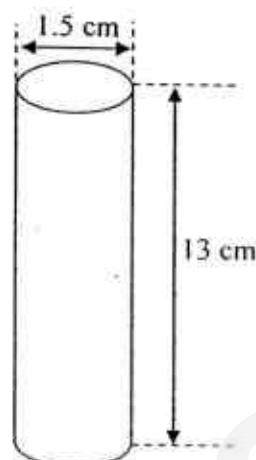
Suppose you are the manufacturer of the pencil and you would like to know more about the material required to make and paint each pencil.

(a)   Taking $\pi = 3.142$, calculate

      (i)   the total surface area of each pencil that needs to be painted and   [2]

      (ii)   the volume of the material needed to make each pencil,   [2]

    giving all your answers correct to 2 decimal places.

(b)   The company decides to manufacture a box to fit the pencils.
    The diagram below shows 14 of these pencils, which just fit into a box.
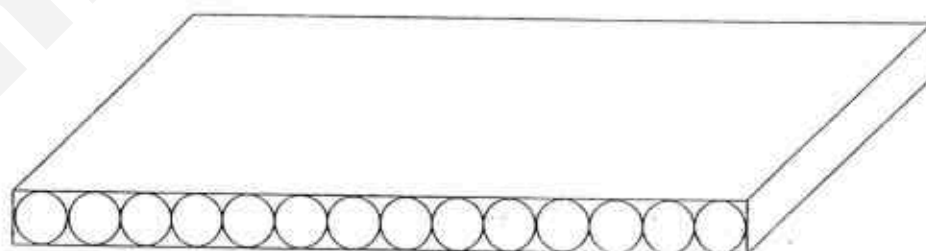
    (i)   Show the volume of the box is 409.5 cm³.   [2]

    (ii)   The manufacturer is considering inserting bubble wraps into these boxes to cushion the pencils from force and needs to determine the free space available in each box.
        Calculate the percentage of the volume of the box that is not occupied by the pencils, giving your answer correct to 2 decimal places.   [2]
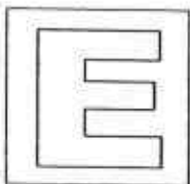
-- *End of Paper* --

Answer Key

1a				
	3	45	90	225
	3	15	30	75
	5	5	10	25
		1	2	5

or equivalent

$HCF = 3 \times 3 \times 5 = 45$

The greatest number of gifts that can be made = 45

1b   Number of chocolates = 90/45 = 2

2a

$1.25 : \dfrac{3}{16}$ (multiply by 16 throughout)

$20 : 3$

2b

$-0.31, -\dfrac{1}{3}, -0.30\dot{3}$

1 mark for changing all the numbers to decimal (or equivalent) for comparison

$-0.31 = -0.310$

$-\dfrac{1}{3} = -0.333...$

$-0.30\dot{3} = -0.303303....$

1 mark for answer

$-\dfrac{1}{3}, -0.31, -0.30\dot{3}$

2c

$$-\frac{2x}{3} \geq 6 + x$$

$$-x - \frac{2x}{3} \geq 6$$

$$-\frac{5x}{3} \geq 6$$

$$\frac{5x}{3} \leq -6$$

$x \leq -3\frac{3}{5}$ or $x \leq -3.6$

Answer: $x = -4$

3a

Sabrina's age now = x

Sabrina's age 5 years ago = $x - 5$

Nurul's age 5 years ago = $3(x - 5) = 3x - 15$

Or

$29 - x$

3b

Nurul's age now = $3x - 15 + 5 = 3x - 10$

Required equation is:

$$x + 3x - 10 = 34$$
$$4x = 44$$
$$x = 11$$

3c	Nurul's age = $3(11) - 10$ $= 23$	
4	Refer to attached A4 paper	
4a	1 mark for the two construction arcs 1 mark for 3 correct dimensions for the triangle	
4bi	1 mark for construction arcs and accurate angle bisector	
4bii	1 mark for location of P 1 mark for the length, tolerance of 5%, $7.77 \leq Answer \leq 8.59$	
5a	Distance travelled = $4.2 \times 20 \times 60 = 5040$ m	
5b	Speed $= \frac{8000m}{80min}$ $= \frac{8km}{\frac{80}{60}h}$ $= 6km/h$	
5c	Average Speed $= \frac{totaldistance}{totaltime} = \frac{5040+8000}{(20+80)\times 60} = 2.17m/s$ (3 s.f)	
6a	A rhombus	
6b	$\angle DAB = 180 - 72$ (interior angles, AB parallel to DC, property of rhombus) $= 108°$	
7a	$y = -3 + 7x$ When $x = 3$, $y = -3+7(3) = 18$ When $x = 5$, $y = -3+7(5) = 32$ Difference $= 32 - 18$ $= 14°C$	
7b	-3 represents the fixed temperature of the freezer that is keeping the frozen product. It illustrates the temperature at which the frozen product is kept in the freezer.	
7c	$14.5 = -3 + 7x$ $17.5 = 7x$ $x = 2.5$ minutes	
8a	Perimeter $= 24 + 18 + 12\pi + 9\pi$ $= (42 + 21\pi) cm$	
8b	Area $= 18 \times 21.5 + \frac{1}{2} \times \pi \times (12)^2 + \frac{1}{2} \times \pi \times (9)^2$ $= (387 + 112.5\pi) cm^2$	
9a	Subtotal $= 6 + 42 + 15 + 12 + 13 + 15 + 52 + 19 + 128 + 7 + 39 = \$348$	
9b	10% service charge $= \frac{10}{100} \times 348 = \$34.80$	
9c	GST amount $= \frac{7}{100} \times (348 + 34.80)$ $= \$26.80$ (2 d.p.)	
9d	The total amount $= 348 + 34.80 + 26.796$ $= \$409.60$ (nearest 5 cents)	

10ai				

Height (x m)	Tally	No of Students
$1.25 < x \le 1.29$	111	3
$1.29 < x \le 1.33$	11111, 11111, 111	13
$1.33 < x \le 1.37$	11111, 1	6
$1.37 < x \le 1.41$	11	2
$1.41 < x \le 1.45$	1	1
	Total:	25

10aii	Percentage $= \dfrac{3}{25} \times 100 = 12\%$
10bi	$\dfrac{92-64}{64} \times 100\% = 43.75\%$
10bii	The scales of the vertical axis for the two graphs are different; (the scale of the vertical axis on Rick's graph is, in fact, 10 times that on Roy's graph or the vertical scale is 5 squares represent 20 marks on Rick's graph and 5 squares represent 2 marks on Roy's graph or equivalent) Thus Roy's graph which looks steeper gave the classmate the wrong impression that Roy has done better than Rick.
11ai	Total surface area $= 2 \times (3.142)\left(\dfrac{1.5}{2}\right)^2 + 2(3.142)(\dfrac{1.5}{2}) \times (13)$ $= 64.80 \text{ cm}^2$ (2 d.p.)
11aii	Total volume $= (3.142)\left(\dfrac{1.5}{2}\right)^2 (13)$ $= 22.98 \text{ cm}^3$ (2 d.p.)
11bi	Volume of the box $= (14)(1.5) \times 13 \times (1.5)$ $= 409.5 \text{ cm}^3$ (Shown)
11bii	Percentage not occupied $= \dfrac{409.5 - (22.9759 \times 14)}{409.5} \times 100\,\%$ $= \dfrac{409.5 - 22.9759 \times 14}{409.5} \times 100\,\%$ $= 21.45\%$ (2 d.p.)

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GAN ENG SENG SCHOOL
End-of-Year Examination 2016

G.E.S.S

CANDIDATE
NAME

CLASS

INDEX
NUMBER

MATHEMATICS
Paper 1

Sec 1 Express

4048/01

11th Oct 2016
1 hour

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
Calculators are NOT allowed.
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 3.142, unless the question requires the answer in terms of π.

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 50.

	For Examiner 's Use
Total	50

This paper consists of 14 pages including the cover page and 1 blank page.

Answer **all** the questions.

1. (a) If one-fifth of 1260 is the same as $2^x \times 3^y \times 7^z$, write down the values of x, y and z.

   Ans: (a) ___ $x =$ ___ $y =$ ___ $z =$ ___ [2]

   (b) Find the smallest positive integer n for which $\sqrt[3]{2250n}$ is a whole number.

   Ans: (b) ___ $n =$ ___ [1]

2. (a) Arrange the following numbers in descending order.

   $$0.\dot{6} \ , \ -6 \ , \ \frac{1}{6} \ , \ 0.666$$

   Ans: (a) ___ [2]

2. (b) Without using a calculator, evaluate the following,

(i) $-7-(-5)+(-3)$,

Ans: (bi) _____ [1]

(ii) $(-2)^2 \div (-8) \times \dfrac{2}{5}$.

Ans: (bii) _____ [2]

(c) (i) Can $\dfrac{7}{15}$ be expressed as a terminating decimal or repeating decimal? [2]

Show or explain why.

(ii) Rewrite $0.3\dot{4}$ as a fraction in its simplest form.

Ans: (cii) _____ [1]

GESS 1EXP EM P1 EOY 16 NMC

3.   (a)   The length and breadth of a rectangular field, measured correct to 2 decimal places, are 29.35 m and 10.14 m respectively.

(i)   Write down the least possible dimensions of the field.

Ans: (ai) _____ [2]

(ii)   Estimate the area of the field, correct to 1 significant figure.

Ans: (aii) _____ m² [1]

(b)   Estimate the value of $\dfrac{\sqrt[3]{345}}{\sqrt{80}}$.

Ans: (b) _____ [2]

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4. (a) Simplify $2x \div 6 + 1 \times y$.

Ans: (a) _____ [2]

(b) Find the value of $\dfrac{x - xy}{xy + y}$, given $x = 2$ and $y = 3$.

Ans: (b) _____ [2]

(c) The average of 2 numbers is x. If a third number is added, the average is 6. Express the third number in terms of x.

Ans: (c) _____ [1]

5. (a) Simplify $-11x-2x+3x$.

Ans: (a) _____ [2]

(b) Factorise $18a+21ab-33ac$.

Ans: (b) _____ [2]

(c) Find the value of $789\times121-789\times111$.

Ans: (c) _____ [1]

6. (a) Solve the equation $3(2x-1)+1=2(x+5)$.

Ans: (a) $x =$ _____ [3]

(b) Given the equation $\dfrac{5}{y-2} = \dfrac{4}{3y+1}$, find the value of y.

Ans: (b) $y =$ _____ [2]

7. (a) In the figure below, AOB is a straight line.
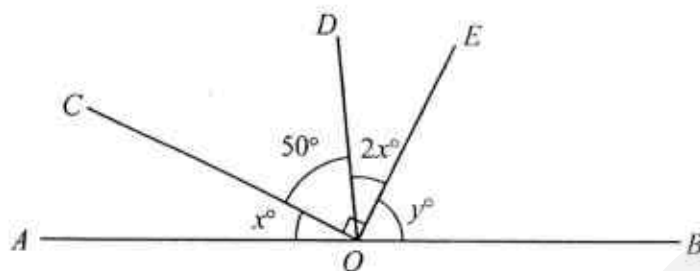
(i) Find the value of x, stating your reasons clearly.

Ans: (ai) $x =$ _____ [1]

(ii) Find the value of y, stating your reasons clearly.

Ans: (aii) $y =$ _____ [2]

7. (b) Find $\angle VXZ$ in the figure below, stating your reasons clearly.
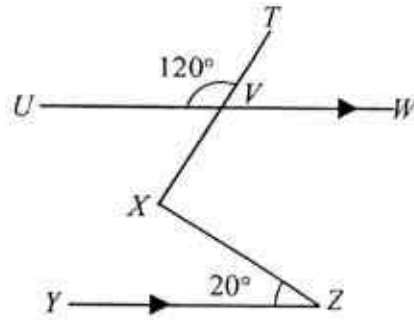
Ans: (b) _____ [3]

8. (a) The first four terms of a sequence are 4, 7, 10 and 13.

(i) Write down the next term of the sequence.

Ans: (ai) _____ [1]

(ii) The nth term of the sequence above can be expressed as $kn +1$. Find the value of k.

Ans: (aii) $k =$ _____ [1]

(b) The diagram below shows a sequence of patterns, where n is the pattern number.

$n = 1$
(T_1) Number of Triangles = 4

$n = 2$
(T_2) Number of Triangles = 9

$n = 3$
(T_3) Number of Triangles = 16

$n = 4$
(T_4) Number of Triangles = 25
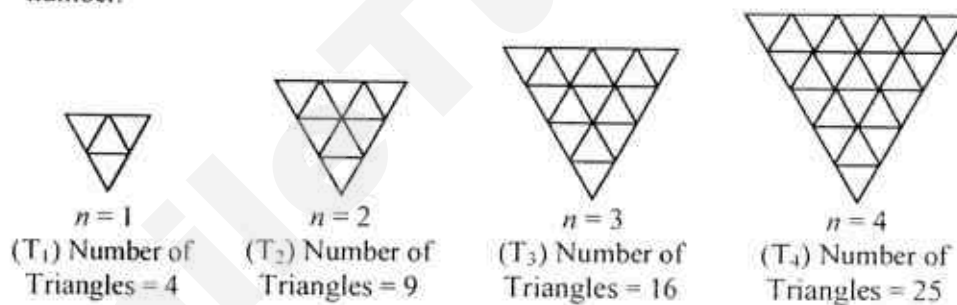
(i) Find the number of triangles when $n = 5$.

Ans: (bi) _____ [1]

(ii) Find the general term, T_n, in terms of n.

Ans: (bii) $T_n =$ _____ [1]

9.   A square of side 2x is shaped from part or all of a string of length 68 cm.

(a)   Form an inequality in x and solve it.

Ans: (a) _____ [2]

(b)   Hence or otherwise, write down the maximum integer value of x.

Ans: (b) $x =$ _____ [1]

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10. (a) A group of Gessians were surveyed on which of the four countries they would like to visit the most for their overseas school trip. Their choices were represented on a pie chart given below.
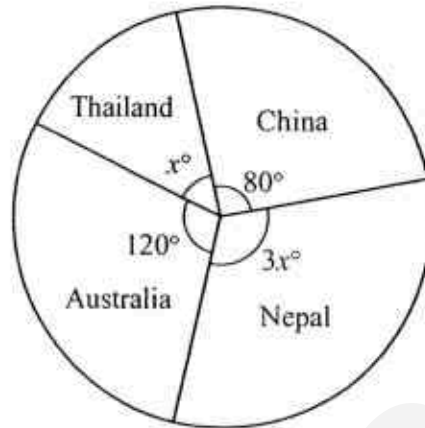
(i) Find the value of x.

Ans: (ai) $x =$ _____ [1]

(ii) Hence, calculate the percentage of the group who like to visit Nepal the most.

Ans: (aii) _____ % [2]

(iii) If 40 Gessians would like to visit China the most, find the total number of Gessians surveyed.

Ans: (aiii) _____ [1]

10. (b) Two twin sisters, Jasmine and Jaslyn, chart their performance in the school Mathematics assessment for the first semester as shown in the following line graphs.

Maths results of Jasmine

Maths results of Jaslyn
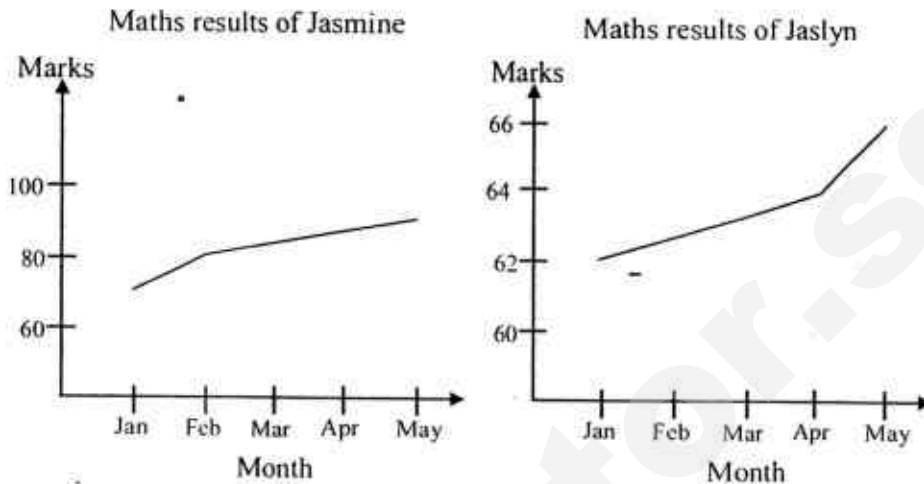
With a quick glance of the two graphs, the twin's mother commented that Jaslyn has done better than Jasmine. Do you think the mother is correct? Explain your answers.

[2]

_____

_____

_____

_____

_____

_____

_____

_____

END OF PAPER
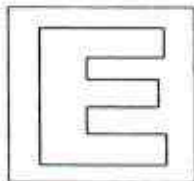
GAN ENG SENG SCHOOL
End-of-Year Examination 2016

CANDIDATE NAME	*Teacher's Copy Marking Scheme*

CLASS			INDEX NUMBER	

MATHEMATICS
Paper 1

Sec 1 Express

4048/01

11ᵗʰ Oct 2016
1 hour

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

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For π, use 3.142, unless the question requires the answer in terms of π.

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 50.

	For Examiner 's Use
Total	50

This paper consists of 14 pages including the cover page and 1 blank page.

BLANK PAGE

Answer **all** the questions.

1. (a) If one-fifth of 1260 is the same as $2^x \times 3^y \times 7^z$, write down the values of x, y and z.

$1260 \div 5 = 252$
Using ladder method,
$252 = 2^2 \times 3^2 \times 7^1$

2	252
2	126
3	63
3	21
	7

Marker's Comment
★ Deduct 1 mark for each wrong answers.

B2

Ans: (a) $x = 2$ $y = 2$ $z = 1$ [2]

(b) Find the smallest positive integer n for which $\sqrt[3]{2250n}$ is a whole number.

$2250 = 2^1 \times 3^2 \times 5^3$
Smallest perfect cube
$= 2^3 \times 3^3 \times 5^3$
$n = 2^2 \times 3^1 = 12$

5	2250
5	450
5	90
3	18
3	6
	2

B1

Ans: (b) $n = 12$ [1]

2 (a) Arrange the following numbers in descending order.

$$0.\dot{6} \ , \ -6 \ , \ \frac{1}{6} \ , \ 0.666$$

Covert all to decimals
$0.66666\ldots \ , -6, \ 0.166\ldots \ , \ 0.666$
In descending order
$$0.\dot{6} \ , \ 0.666 \ , \ \frac{1}{6} \ , \ -6$$

Marker's Comment
★ Deduct 1 mark for each pair of wrong answers.
★ No marks for more than 3 wrong answers.

B2

Ans: (a) $0.\dot{6} \ , \ 0.666 \ , \ \frac{1}{6} \ , \ -6$ [2]

3. (a) The length and breadth of a rectangular field, measured correct to 2 decimal places, are 29.35 m and 10.14 m respectively.

   (i) Write down the least possible dimensions of the field.

Range of values of 29.35 rounded to 2dp
29.345 to 29.354999.... Ans: 29.345   B1
Range of values of 10.14 rounded to 2dp
10.135 to 10.13999.... Ans: 10.135   B1

Ans: (ai) _____ **29.345 x 10.135** [2]

   (ii) Estimate the area of the field, correct to 1 significant figure.

29.35 x 10.14
≈ 30 x 10 (1sf)
= 300   B1

Ans: (aii) _____ **300** m² [1]

(b) Estimate the value of $\dfrac{\sqrt[3]{345}}{\sqrt{80}}$.

$$\frac{\sqrt[3]{345}}{\sqrt{80}} \approx \frac{\sqrt[3]{343}}{\sqrt{81}}$$ M1

$$= \frac{7}{9}$$ A1
(or B2)

Ans: (b) _____ 7/9 [2]

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4. (a) Simplify $2x \div 6 + 1 \times y$.

$2x \div 6 + 1 \times y$

$= \dfrac{x}{3} + 1 \times y$ **M1**

$= \dfrac{x}{3} + y$ **A1**

Ans: (a) _____ $x/3 + y$ [2]

(b) Find the value of $\dfrac{x - xy}{xy + y}$, given $x = 2$ and $y = 3$.

$\dfrac{x - xy}{xy + y}$

$= \dfrac{2 - (2)(3)}{(2)(3) + 3}$ **M1**

$= \dfrac{2 - 6}{6 + 3}$

$= \dfrac{-4}{9}$

A1

Ans: (b) _____ $-4/9$ [2]

(c) The average of 2 numbers is x. If a third number is added, the average is 6. Express the third number in terms of x.

Let the 3rd number be y
Sum of 1st 2 numbers $= 2x$

$\dfrac{2x + y}{3} = 6$

$2x + y = 18$

$y = 18 - 2x$ **B1**

Ans: (c) _____ $18 - 2x$ [1]

5. (a) Simplify $-11x-2x+3x$.

$$-11x-2x+3x$$
$$=-13x+3x$$
$$=-10x$$

M1
A1
(or B2)

Ans: (a) $\underline{\qquad\qquad -10x}$ [2]

(b) Factorise $18a+21ab-33ac$.

$$18a+21ab-33ac$$
$$=3(6a+7ab-11ac)$$
$$=3a(6+7b-11c)$$

M1
A1

Ans: (b) $\underline{\qquad 3a(6+7b-11c)}$ [2]

(c) Find the value of $789\times121-789\times111$.

$$789\times121-789\times111$$
$$=789(121-111)$$
$$=789(10)$$
$$=7890$$

B1

Ans: (c) $\underline{\qquad\qquad 7890}$ [1]

6. (a) Solve the equation $3(2x-1)+1=2(x+5)$.

$3(2x-1)+1=2(x+5)$ **M1**

$6x-3+1=2x+10$

$6x-2=2x+10$ **M1**

$6x-2x=10+2$

$4x=12$

$x=\dfrac{12}{4}$

$x=3$ **A1**

Ans: (a) $\underline{\quad x=\textbf{3}\qquad\qquad\qquad}$ [3]

(b) Given the equation $\dfrac{5}{y-2}=\dfrac{4}{3y+1}$, find the value of y.

$\dfrac{5}{y-2}=\dfrac{4}{3y+1}$ **M1**

$5(3y+1)=4(y-2)$

$15y+5=4y-8$

$11y=-13$

$y=-\dfrac{13}{11}$ or $-1\dfrac{2}{11}$ **A1**

Ans: (b) $\underline{\quad y=\textbf{-13/11 or -1 2/11}\quad}$ [2]

7. (a)   In the figure below, *AOB* is a straight line.
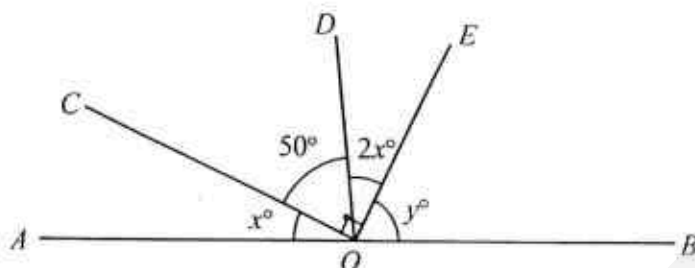
(i)   Find the value of *x*, stating your reasons clearly.

$50° + 2x° = 90°$

$2x° = 90° - 50° = 40°$

$x° = 20°$

B1

Ans: (ai) $x = $ **20**   [1]

(ii)   Find the value of *y*, stating your reasons clearly.

$x° + 50° + 2x° + y° = 180°$ (adj. ∠s on a st.line)

$20° + 50° + 2(20°) + y° = 180°$

$y° = 180° - 20° - 50° - 2(20°)$

$= 70°$

Marker's Comment	**M1**
★ Deduct 1 mark for whole paper if no properties given.	**A1**

Ans: (aii) $y = $ **70**   [2]

7. (b) Find $\angle VXZ$ in the figure below, stating your reasons clearly.
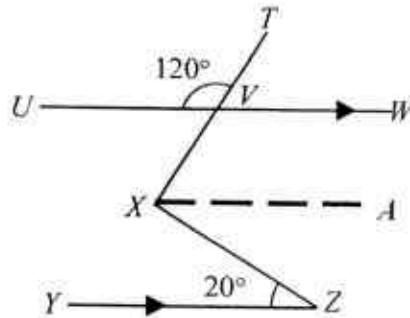
$\angle WVX = 120°$ (vert. opp. $\angle$s)

Draw and label line XA

$\angle AXZ = 20°$ (alt. $\angle$s, $XA \parallel$ to YZ)

$\angle AXV = 180° - \angle WVX$ (int. $\angle$s, $UW \parallel$ to XA)
$\quad = 180° - 120°$
$\quad = 60°$

$\angle VXZ = \angle AXZ + \angle AXV$
$\quad = 20° + 60°$
$\quad = 80°$

M1

M1

A1

Ans: (b) _____ **80** ° [3]

8. (a) The first four terms of a sequence are 4, 7, 10 and 13.

    (i) Write down the next term of the sequence.

    $4+3=7, 7+3=10, 10+3=13, 13+3=16$ **B1**

    Ans: (ai) _____ **16** [1]

    (ii) The nth term of the sequence above can be expressed as $kn+1$. Find
    the value of k.

    $k=3$. $3(1)+1=4, 3(2)+1=7, 3(3)+1=10, 3(4)+1=13$ **B1**

    Ans: (aii) $k=3$ _____ [1]

(b) The diagram below shows a sequence of patterns, where n is the pattern
    number.

$n=1$	$n=2$	$n=3$	$n=4$
(T_1) Number of Triangles $=4$	(T_2) Number of Triangles $=9$	(T_3) Number of Triangles $=16$	(T_4) Number of Triangles $=25$
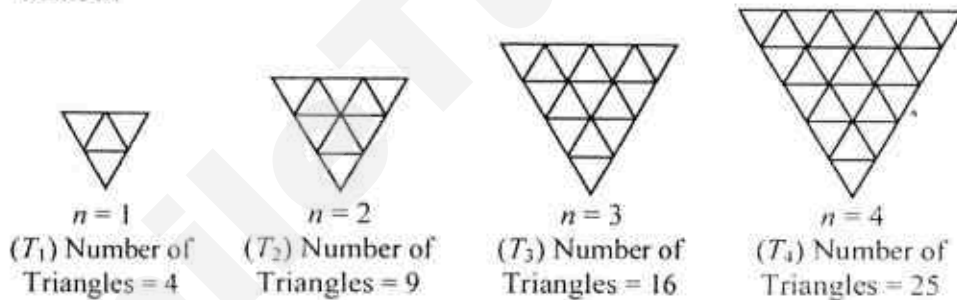
    (i) Find the number of triangles when $n=5$.

    $6^2=36$ or sketch out the next diagram to count the triangles.   **B1**

    Ans: (bi) _____ **36** [1]

    (ii) Find the general term, T_n, in terms of n.

    The square sequence $T_n=n^2 \Rightarrow 1, 4, 9, 16, 25, 36$
    The required sequence $=4, 9, 16, 25, 36 \Rightarrow T_n=(n+1)^2$ **B1**

    Ans: (bii) $T_n=(n+1)^2$ _____ [1]

9. A square of side $2x$ is shaped from part or all of a string of length 68 cm.

    (a) Form an inequality in x and solve it.

    Perimeter $= 2x \times 4 = 8x$

    $8x \le 68$ **M1**

    .

    $x \le \dfrac{68}{8}$ or $x \le 8.5$ **A1**

    Ans: (a) _____ $x \le 8.5$ [2]

    (b) Hence or otherwise, write down the maximum integer value of x.

    $x \le 8.5$

    Max. integer $x = 8$ **B1**

    Ans: (b) $x = 8$ _____ [1]

10. (a) A group of Gessians were surveyed on which of the four countries they would like to visit the most for their overseas school trip. Their choices were represented on a pie chart given below.
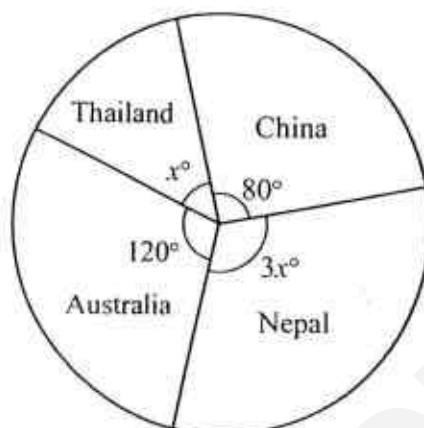
(i) Find the value of x.

$x + 80 + 3x + 120 = 360$

$4x = 360 - 120 - 80 = 160$

$x = 40$ **B1**

Ans: (ai) $x = \textbf{40}$ [1]

(ii) Hence, calculate the percentage of the group who like to visit Nepal the most.

$3x = 3 \times 40 = 120$ **M1**

Required percentage $= \dfrac{120}{360} \times 100\%$

$= \dfrac{100}{3}\% = 33\dfrac{1}{3}\%$ or 33.3% (3sf) **A1**

Ans: (aii)   **33 1/3 %** [2]

(iii) If 40 Gessians would like to visit China the most, find the total number of Gessians surveyed.

Required number $= \dfrac{40}{80} \times 360$

$= \dfrac{1}{2} \times 360 = 180$ **B1**

Ans: (aiii)   **180** [1]

10. (b) Two twin sisters, Jasmine and Jaslyn, chart their performance in the school Mathematics assessment for the first semester as shown in the following line graphs.

Maths results of Jasmine

Marks

100
80
60

Jan Feb Mar Apr May
Month

Maths results of Jaslyn

Marks

66
64
62
60

Jan Feb Mar Apr May
Month
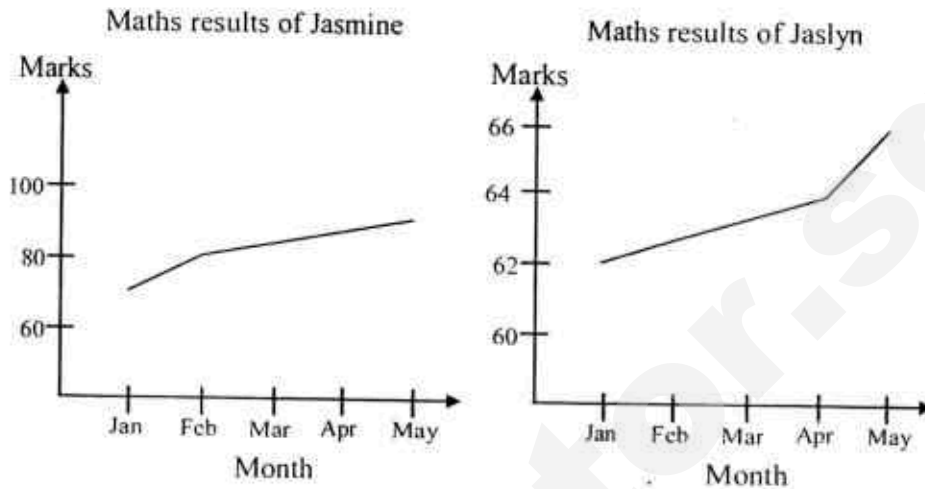
With a quick glance of the two graphs, the twin's mother commented that Jaslyn has done better than Jasmine. Do you think the mother is correct? Explain your answers. [2]

No, the mother is not correct. B1

The scales of the vertical axis for the 2 graphs are different. B1
The vertical scale on Jaslyn's graph is 10 times that of Jasmine's graph. Thus Jaslyn's graph looks bigger and steeper, giving the wrong impression that Jaslyn has done better than Jasmine.

END OF PAPER

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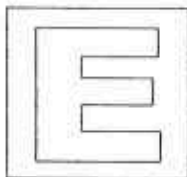
GAN ENG SENG SCHOOL
End of Year Examination 2016

CANDIDATE NAME

CLASS

INDEX NUMBER

MATHEMATICS
Paper 2

Sec 1 Express

10 October 2016
1 hour 15 minutes

Additional Materials: Writing Paper

Blank Paper

Graph Paper

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
Calculators should be used where appropriate.
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, unless the question requires the answer in terms of π.

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 50.

	For Examiner's Use
Total	50

Answer **all** the questions.

1   Use a calculator to evaluate the following, leaving your answer correct to
    3 decimal places.   [1]

$$\left(\frac{\pi + 9.7}{-3.6}\right)^2$$

---

2   Find the highest common factor of the two numbers:

    $$2^7 \times 5 \times 7^3 \times 19^2$$
    $$2^5 \times 3^3 \times 7^5 \times 19$$

    giving your answers as a product of its prime factors.   [1]

---

3   The start of each lesson for schools is denoted by a chime. The table below shows
    the duration of a lesson.

School	Duration of each period (in minutes)
Gan Eng Seng School	35
Valley High School	49

    Suppose the first chime rings at 07 30 daily for both schools, find the time when
    the chimes will next ring together.   [3]

---

4   *Ekko* charges petrol at *x* cents per litre. Mr. Ng was charged *y* dollars when he
    went there to pump one day. Express the number of litres Mr. Ng pumped in
    terms of *x* and *y*.   [2]

5   Simplify

(a) $10a + 13b - 2(a + b)$,   [2]

(b) $\dfrac{c + 4d}{2} + \dfrac{2c - 5d}{3}$.   [3]

---

6   The figure below shows a rectangle $ABCD$ with sides $AD = 3x$ cm and
    $AB = (4x - 1)$ cm.
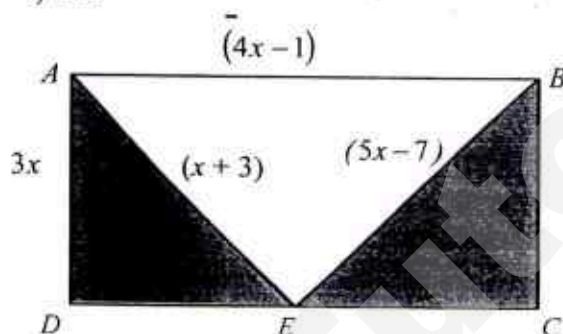
(a)   Given that triangle AEB is an isosceles triangle where the sides
      $AE = (x + 3)$ cm and $BE = (5x - 7)$ cm are of equal lengths, by forming an
      equation, find the value of x.   [2]

(b)   Using your answer in (a), calculate the area of the shaded part of the figure.   [3]

---

7   Mr. Sea walks a distance of 3.5 km at an average speed of 6 km/h and takes a
    break for 20 minutes before continuing to jog a distance of 1.2 km in 8 minutes.
    Calculate

(a)   the time taken for Mr. Sea to walk 3.5 km in minutes.   [2]

(b)   his jogging speed in km/h.   [1]

(c)   his average speed for the entire journey in km/h.   [2]

8   Mr. Teng took his family to *Tony Mamas* for his wife's birthday. The following shows a receipt from the restaurant.

```
                        Tony Mamas
                   1 Suntec Boulevard #01-49
                        S(123456)
                      Tel: 6987 5432

Order#: 117                              Table 34
Date: 8/8/2016 7.45 PM                      -
Server: Ah Lian
-----------------------------------------------------
2 steak salad                              25.00
5 calamari                                 44.50
2 fish & chips                             35.80
3 New York cheesecake                      20.70
-----------------------------------------------------
Total 12 item(s)                            (a)
Service charge (10%)
GST (7%)
-----------------------------------------------------
-----------------------------------------------------
GRAND TOTAL                                 (b)
```

(a)   Calculate the total cost of the 12 items.   [2]

(b)   A service tax of 10 % was imposed on the cost of the dishes served followed by the 7 % GST. Calculate the grand total for this bill, correcting your answer to the nearest cent.   [2]

(c)   Mr. Teng forgot to present his *Tony Mamas* VIP card which entitles him to a 15% discount on the Grand Total. Calculate the amount of discount Mr. Teng should have received, correcting your answer to the nearest cent.   [2]

11   Answer the whole of this question on a sheet of **GRAPH** paper.

The table below shows some values for the equation $2y + 3x = 6$.

x	-1	a	2	4
y	4.5	3	0	b
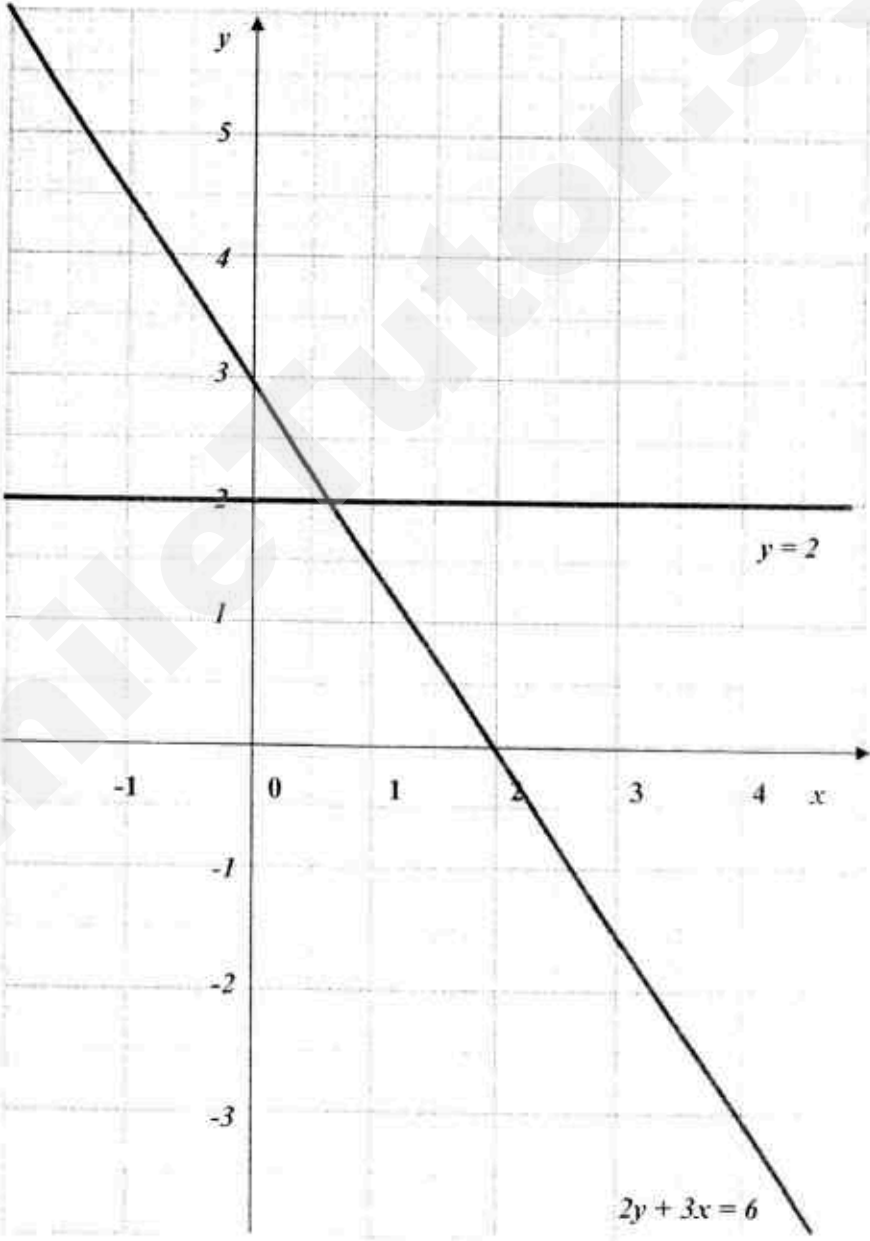
(a)   Find the values of a and b. [2]

(b)   Using a scale of 2 cm to represent 1 unit for both axes, plot the graph
$2y + 3x = 6$ for $-1 \le x \le 4$. [2]

(c)   Using your graph, find

    (i)   the value of x when $y = -1.5$, [1]

    (ii)   the value of y when $x = 1.5$, [1]

    (iii)   The value of c if the point $(3, 2c)$ lies on the straight line,
$2y + 3x = 6$. [1]

(d)   Find the gradient of the line $2y + 3x = 6$. [1]

(e)   On the same axes, draw the graph $y = 2$. [1]

(f)   State the number of intersection point(s) between the lines
$2y + 3x = 6$ and $y = 2$. [1]

END OF PAPER

1 EXPRESS EOY PAPER 2 MARK SCHEME

1			$\left(\dfrac{\pi + 9.7}{-3.6}\right)^2 = 12.724\,2$ $= 12.724\ (3d.p.)$	[B1]
2			$HCF = 2^5 \times 7^3 \times 19$	[B1]

3				
			7	35	49
			5	5	7
			7	1	7
				1	1	[M1] for correct ladder method

$LCM = 5 \times 7^2$

$\quad = 245\ min$

$\quad = 4h\ 5\ min$ [M1] for LCM

Next time $= 07\ 30 \rightarrow 4h\ 5\ min$

$\quad = 1135$ [A1]

4			$x\ cents \rightarrow 1\ litre$	
			$1\ cent \rightarrow \dfrac{1}{x}\ litre$	[M1]
			$100y\ cents \rightarrow \dfrac{1}{x} \times 100y$	
			$\quad = \dfrac{100y}{x}\ litres$	[A1] or [B2]

5	(a)		$10a+13b-2(a+b)$ $=10a+13b-2a-2b$ $=8a+11b$	[M1] for change of operators [A1] or [B2]
	(b)		$\dfrac{c+4d}{2}+\dfrac{2c-5d}{3}$ $=\dfrac{3c+12d}{6}+\dfrac{4c-10d}{6}$ $=\dfrac{7c+2d}{6}$	[M2] for the change of common denominator for each fraction [A1]
6	(a)		Length AE = Length BE $x+3=5x-7$ $4x=10$ $x=2.5cm$	[M1] for forming equation [M1] for value of x
6	(b)		**Method 1** Area of unshaded triangle $=\dfrac{1}{2}bh$ $=\dfrac{1}{2}(3x)(4x-1)$ $=\dfrac{1}{2}(3\times2.5)(4\times2.5-1)$ $=33.75cm^2$ Area of rectangle $=lb$ $=(3x)(4x-1)$ $=(3\times2.5)(4\times2.5-1)$ $=67.5cm^2$ Area of shaded part $=67.5-33.75$ $=33.75cm^2$	[M1] for area of unshaded triangle [M1] for area of rectangle [A1]

37

			Method 2	
			Area of shaded part	
			$= \frac{1}{2} bh$	
			$= \frac{1}{2}(3x)(4x-1)$	[M2]
			$= \frac{1}{2}(3 \times 2.5)(4 \times 2.5 - 1)$	
			$= 33.75 cm^2$	[A1]
7	(a)		Time taken	
			$= \frac{Distance}{Speed}$	
			$= 3.5 \div 6$	[M1]
			$= \frac{7}{12} h$	
			$= 35 min$	[A1]
	(b)		Jogging Speed	
			$= \frac{Distance}{Time}$	
			$= 1.2 \div \frac{8}{60}$	
			$= 9 km/h$	[B1]
	(c)		Average Speed	
			$= \frac{Total\ Distance}{Total\ Time}$	
			$= (3.5 + 1.2) \div \left(\frac{7}{12} + \frac{8}{60} + \frac{20}{60} \right)$	[M1] allow ECF
			$= 4\frac{10}{21} km/h$	
			$= 4.4761 km/h\ (5 s.f.)$	
			$= 4.48 km/h\ (3 s.f.)$	[A1]

8	(a)		Total Cost $= 25 + 44.5 + 35.8 + 20.7$ $= \$126$	[B1]
	(b)		$100\% \rightarrow \$126$ $10\% \rightarrow \dfrac{126}{100} \times 10$ $\qquad = \$12.60$	[M1]
			$100\% \rightarrow \$138.60$ $107\% \rightarrow \dfrac{138.60}{100} \times 107$ $\qquad = \$148.302$ $\qquad = \$148.30 (nearest\ cent)$	[A1]
	(c)		Amount of discount $= \dfrac{15}{100} \times 148.302$ $= \$22.2453$ $= \$22.25\ (nearest\ cent)$	[M1] [A1]
9	(a)		Int. Angle + Ext. Angle $= 180$ $\qquad 7x + 2x = 180$ $\qquad\qquad 9x = 180$ $\qquad\qquad\ x = 20$ 1 Ext. Angle $= 2x$ $\qquad\qquad = 2(20)$ $\qquad\qquad = 40^{\circ}$ No. of sides $= \dfrac{360^{\circ}}{1\ Ext.\ Angle}$ $\qquad\qquad\quad = \dfrac{360^{\circ}}{40}$ $\qquad\qquad\quad = 9$ Name of regular polygon $= $ Nonagon	[M1] [A1] [B1] Note: No marks awarded for incorrect spelling

	(b)	Sum of int. angles $= (n-2) \times 180$ $= (9-2) \times 180$ $= 1260^\circ$	[M1] [A1]
10		**LAST PAGE**	
11	(a)	$a = 0$ $b = -3$	[B1] [B1]
	(b)		

[B1] for correct plotting of points
[B1] for correct scale, labelling of axes and equations.

(c)	(i)	$x = 3.0$ (accept 2.9 to 3.1)	
	(ii)	$y = 0.65$ to 0.85	
	(iii)	$c = -0.7$ to -0.8	
(d)		Gradient $= -\dfrac{3}{2}$ or $-1\dfrac{1}{2}$ or -1.5	[B1]
(e)		**On the graph**	
(f)		There is 1 point of intersection.	[B1]

	Class	Index No	Name
O			

Jurongville Secondary School
End-Of-Year Examination 2016
Secondary 1 Express

Mathematics
Paper 1

Candidates answer on the Question Paper.

4048/01
11 October 2016 (Tue)
1 hour 15 minutes

*Observe our school values of **Integrity** and **Excellence** by not cheating and doing your best in this paper*

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on all the work you hand in.
Write in dark blue or black pen.
You may use pencil for drawing diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **ALL** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
All working must be written step-wise and shown clearly in **INK**.
CAUTION: Any working or answer not written in ink will NOT be marked.

The total marks for this paper is 50.
The number of marks is given in brackets [ ] at the end of each question or part question
You are expected to use a scientific calculator to evaluate explicit numerical expressions.
If the degree of accuracy is not specified in the question and if the answer is not exact, give the answer to 3 significant figures. Give answers in degrees to 1 decimal place.
For π, use either your calculator value or 3.142.

INSTRUCTIONS FOR SUBMISSION:
At the end of the examination, fasten all your work securely together.

DO NOT OPEN THE BOOKLET UNTIL YOU ARE TOLD TO DO SO

Parent's Signature	For Examiner's Use
	50

Setter: Ms Loh So Boey

This document consists of **10** printed pages.

[Turn over

Answer ALL Questions

1   Each interior angle of a polygon is 135°. Find the number of sides of this polygon.

Answer .... [2]

2   (a)   Showing your working clearly, evaluate $(-8-5)+(\frac{4}{0.1}-24)^2$

Answer   (a) .... [2]

(b)   State which of the following number(s) are irrational.

$$\frac{22}{7}, 2\sqrt{49}, \quad 1.\dot{7}, \quad \sqrt{2}\times\sqrt{15}, \quad -0.025$$

Answer   (b)

.... [1]

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3   (a)   Express 3528 as a product of its prime factors, giving your answer in index notation.

Answer *(a)* .... [1]

(b)   Given that the LCM of 4, 63 and *p* is 3528, find the largest possible value of *p*.

Answer *(b)* .... [2]

4   Katie took 10 minutes and 40 seconds to swim 800 m.

(a)   Find her average swimming pace in m/s.

Answer *(a)* .... [1]

(b) Julie can swim at 75% of Katie's swimming pace.
Find the time taken, in minutes, by Julie to swim 1500m.
Round off the time taken to the nearest minute.

Answer *(b)* _____ [2]

---

5 **(a)** In an IT Show, a total earning of $ 1 451 680 was received from the sales of 215 units of laptops. Calculate an estimate of the average cost of laptops.

Answer *(a)* _____ [1]

(b) **(i)** Write down the value of $\dfrac{551.67}{3.25}$, giving your answer correct to 2 significant figures.

Answer *(b)(i)* _____ [1]

(ii) Hence, using your result in (b)(i), estimate the value of $\dfrac{5.5167}{0.00325}$.

Answer *(b)(ii)* _____ [1]

6

In the figure below, $FE//GH$, $FC = GC$, reflex $\angle FGH = 240°$, $\angle FCD = 90°$ and BCD is a straight line. Stating your reasons clearly, find $\angle CFG$ and $\angle CGD$ respectively.

Answer $\angle CFG =$ _____ [2]

$\angle BCF =$ _____ [1]

7   Alice has $3100 in her savings account. Each month, she will top up $540 more into her savings account. Let n be the number of months Alice has saved.

(a)   Express the total amount of money that she has saved after n months.

Answer (a) _____ [1]

(b)   Find the amount of savings that she has after 8 months.

Answer (b) _____ [1]

(c)   After n months, Alice uses all her savings to buy watches costing $$r$ each. If $n = 13$ and $r = 500$, find the maximum number of watches that Alice can buy.

Answer (c) _____ [2]

8 (a) Solve the inequality $2x - \dfrac{11x}{5} > -8$.

Answer (a) .... [2]

(b) If $-75 \le e \le 20$ and $5 \le f \le 30$ and e and f are integers, find

    (i) the smallest value of $\dfrac{e}{f}$,

    (ii) the largest value of $2f - e$.

Answer (bi) .... [1]

        (bii) .... [1]

---

9 Consider the sequence $1, 0.4, -0.2, -0.8, \ldots$.

(a) Find its general term.

Answer .... [1]

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(b) Hence, find its 68th term.

Answer _____ [1]

(c) Determine if the number -2016 is within the number sequence. Explain your answer.

Answer _____ [1]

10 (a) Subtract the sum of $2cd + a - 5b$ and $4b - 3a + 10dc$ from $12a - 4cd$.

Answer (a) _____ [2]

(b) Factorize fully $-24ax - 12ay + 4bx + 2by$.

Answer (b) _____ [3]

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8

11 (a) Express 15.9 seconds as a percentage of 2 minutes.

Answer *(a)* _____ [1]

11 (b) Given that $x\%$ of 10.95 m is 0.0049275 km, find x.

Answer *(b)* _____ [1]

(c) The number of coins in a bag is twice that of stamps.
There is an increase of 75% in the number of stamps.
Find the percentage decrease in number of coins if the number of coins and stamps are now the same.

Answer *(c)* _____ [3]

Jurongville Secondary School   1EXP EOY 4048_01 2016

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12 The figure shows a cylinder of height 15 cm and diameter of 14 cm.

A square hole of sides 3cm is drilled through the cylinder.

Taking π to be 3.142 and giving your answer correct to 2 decimal places,

(a) find the volume of the solid,

Answer (a) _____ [2]

(b) Find the surface area of the solid.

Answer (b) _____ [3]

13 Solve the following equations.

(a) $3m - 2 = 40 - [4m + 3(m - 6)]$

Answer *(a)* _____ [3]

(b) $\dfrac{3q + 2}{5} - \dfrac{q - 1}{2} = \dfrac{3(q + 1)}{4}$

Answer *(b)* _____ [3]

END OF PAPER

Jurongville Secondary School
End-Of-Year Examination 2016
Secondary 1 Express

Mathematics

Paper 1

4048/01

11 October 2016 (Tue)

1 hour 15 minutes

Candidates answer on the Question Paper.

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This document consists of **10** printed pages.

[Turn over

1 Each interior angle of a polygon is 135°. Find the number of sides of this polygon.

$\frac{(n-2)\times 180}{n} = 135°$ $\frac{180n-360}{n} = 135°$ $135n = 180n - 360$ $45n = 360$ $n = 8$	M1 for the correct input in formula A1

Answer .... 8 .... [2]

2 (a) Showing your working clearly, evaluate $(-8-5)+(\frac{4}{0.1}-24)^2$

$(-8-5)+(\frac{4}{0.1}-24)^2$ $= (-13) + (40-24)^2$ $= (-13) + (16)^2$ $= -13 + 256$ $= 243$	*M1 A1 Award mark only if the working is shown clearly. No marks awarded if no working is shown.

Answer (a)   243   [2]

(b) State which of the following number(s) are irrational.

$$\frac{22}{7}, \quad 2\sqrt{49}, \quad 1.\dot{7}, \quad \sqrt{2}\times\sqrt{15}, \quad -0.025$$

$\sqrt{2}\times\sqrt{15}$	B1 Award mark only when the 2 correct answers are written. If only 1 correct, no marks awarded.

Answer (b) $\sqrt{2}\times\sqrt{15}$

[1]

3 (a) Express 3528 as a product of its prime factors, giving your answer in index notation.

2	3528
2	1764
2	882
3	441
3	147
7	49
7	7
	1

$3528 = 2^3 \times 3^2 \times 7^2$

B1

Award mark for correct index notation.

Answer (a) _____ $2^3 \times 3^2 \times 7^2$ _____ [1]

(b) Given that the LCM of 4, 63 and p is 3528, find the largest possible value of p.

Since $3528 = 2^3 \times 3^2 \times 7^2$

$4 = 2^2$

$63 = 3 \times 3 \times 7^2$

$p = ?$

By comparison.

largest value of p must include

$2^3 \times 7^2 = 8 \times 49 = 392$

M1 for prime factorization of 4 and 63.

A1 for correct answer

Answer (b) _____ 392 _____ [2]

4 Katie took 10 minutes and 40 seconds to swim 800 m.

(a) Find her average swimming pace in m/s.

$\dfrac{800}{640} m/s$

$= 1.25 m/s$

B1

Answer (a) _____ 1.25 m/s _____ [1]

(b) Julie can swim at 75% of Katie's swimming pace.
Find the time taken, in minutes, by Julie to swim 1500m.
Round off the time taken to the nearest minute.

Katie's pace = 1.25 m/s Julie's pace is slower. Swim at 75% capacity means slower. Julie's pace = $\frac{75}{100} \times 1.25 = \frac{15}{16} = 0.9375 m/s$ $Time = \frac{Dis\tan ce}{Speed} = \frac{1500}{0.9375} = 1600s$ 1600 seconds = 26.6 mins ≈ 27mins	M1 for calculating Julie's pace. A1

Answer (b) _____27 mins_____ [2]

5 (a) In an IT Show, a total earning of $ 1 451 680 was received from the sales of 215 units of laptops. Calculate an estimate of the average cost of laptops.

Average cost of laptops = $\frac{\$1451680}{215}$ = \$6752	B1

Answer (a) _____$6752_____ [1]

(b) (i) Write down the value of $\frac{551.67}{3.25}$, giving your answer correct to 2 significant figures.

$\frac{551.67}{3.25}$ = 169.744615 = 170 (correct to 2 s.f.)	B1

Answer (b)(i) _____170_____ [1]

(ii) Hence, using your result in (b)(i), estimate the value of $\dfrac{5.5167}{0.00325}$.

$\dfrac{5.5167}{0.00325} = \dfrac{551.67 \div 100}{3.25 \div 1000}$ $= \dfrac{551.67}{3.25} \times 10 = 170 \times 10$ $= 1700$	Must show working to be awarded the mark B1

Answer   (b)(ii)   1700   [1]

---

6   In the figure below, FE //GH, FC = GC, reflex $\angle FGH = 240°$, $\angle FCD = 90°$ and BCD is a straight line. Stating your reasons clearly, find $\angle CFG$ and $\angle CGD$ respectively.

$\angle FGD = 360° - 240° = 120°$ (sum of angles at a point $= 360°$) $\angle CFG = 180° - 120° = 60°$ (int angles, FE //GH) $\angle CFG = \angle CGF = 60°$ (angles in isosceles triangle) $\angle CGD = 120° - 60° = 60°$ (alternate angles, FE //GH)	M1 (award marks for correct reason stated) Penalize 1 mark if two reasons are not stated as a whole question. A1 B1

Answer $\angle CFG =$ 60   [2]

$\angle BCF =$ 60   ?   [1]

---

7. Alice has $3100 in her savings account. Each month, she will top up $540 more into her savings account. Let n be the number of months Alice has saved.

(a) Express the total amount of money that she has saved after n months.

Total amount of money = $(3100+540n)$	B1

Answer (a) $(3100+540n)$ [1]

(b) Find the amount of savings that she has after 8 months.

| Total amount of money = $[3100+540(8)]$ | |
| = $7420 | B1 |

Answer (b) $ 7420 [1]

(c) After n months. Alice uses all her savings to buy watches costing $r each. If $n = 13$ and $r = 500$, find the maximum number of watches that Alice can buy.

Money for each watch = $\dfrac{\$(3100+540n)}{r}$	M1 for forming the expression.
When $n = 13$, $r = 500$,	
$\dfrac{\$[3100+540(13)]}{500} = \dfrac{\$7020+3100}{500}$	
$= \dfrac{10120}{500} = 20$	A1

Answer (c) 20 [2]

8. (a) Solve the inequality $2x - \dfrac{11x}{5} > -8$.

$2x - \dfrac{11x}{5} > -8$	M1 for manipulating the expression to be common denominator:
$\dfrac{10x-11x}{5} > -8$	
$\dfrac{-x}{5} > -8$	$\dfrac{10x-11x}{5} > -8$
$-x > -40$	
$x < 40$	A1

Answer (a) $x < 40$ [2]

1EXP EOY 4048 01 2016

(b) If $-75 \le e \le 20$ and $5 \le f \le 30$ and e and f are integers, find

(i) the smallest value of $\frac{e}{f}$,

(ii) the largest value of $2f - e$.

(i)	For smallest value, f must be largest and e must be of smallest. $\frac{e}{f} = \frac{-75}{5} = -15$	B1
(ii)	the largest value of $2f - e =$ $2(30)-(-75) = 60+75 = 135$	B1

Answer (bi) .... -15 .... [1]

(bii) .... 135 .... [1]

9 Consider the sequence $1, 0.4, -0.2, -0.8, \ldots$.

(a) Find its general term.

$T1 = 1$	
$T2 = 0.4 = 1 - 0.6$	
$T3 = -0.20 = 1 - 0.6 - 0.6$	
$T4 = 1 - 0.6 - 0.6 - 0.6 = 1 - 0.6(3)$	
$Tn = 1 - 0.6(n-1)$ $= 1 - 0.6n + 0.6$ $= 1.6 - 0.6n$	B1

Answer $1.6 - 0.6n$ [1]

(b) Hence, find its 68th term.

T68 = 1.6 – 0.6 (68) = –39.2	B1

Answer _____ –39.2 _____ [1]

(c) Determine if the number – 2016 is within the number sequence. Explain your answer.

– 2016 = 1.6 – 0.6 n – 2016 – 1.6 = –0.6n $n = \dfrac{-2017.6}{-0.6}$ = 3362.$\dot{6}$ n is a recurring decimal or non-whole number. There is no such term in the number sequence and hence, it is not a term in the sequence.	B1 for the correct explanation.

Answer _____ [1]

10 (a) Subtract the sum of $2cd + a - 5b$ and $4b - 3a + 10dc$ from $12a - 4cd$.

$12a - 4cd - (2cd + a - 5b + 4b - 3a + 10dc)$	M1 for forming the expression.
$= 12a - 4cd - (2cd - 2a - b + 10dc)$	
$= 12a - 4cd - 2cd + 2a + b - 10dc$	
$= 14a - 6cd + b - 10dc$	
$= 14a + b - 16cd$	A1

Answer (a) $14a + b - 16cd$ [2]

(b) Factorize fully $-24ax - 12ay + 4bx + 2by$.

$-24ax - 12ay + 4bx + 2by$	M1 for manipulating the
$= -24ax + 4bx - 12ay + 2by$	expression to find common terms:
$= -4x(6a - b) - 2y(6a - b)$	$-4x(6a - b) - 2y(6a - b)$
$= (-4x - 2y)(6a - b)$	
$= -2(2x + y)(6a - b)$	M1
$= 2(2x + y)(b - 6a)$	A1
OR	
$-24ax - 12ay + 4bx + 2by$	
$= -12a(2x + y) + 2b(2x + y)$	M1
$= (2b - 12a)(2x + y)$	M1
$= 2(b - 6a)(2x + y)$	A1

Answer *(b)* $2(2x + y)(b - 6a)$ [3]

---

11 (a) Express 15.9 seconds as a percentage of 2 minutes.

$\dfrac{15.9}{2 \times 60} \times 100\% = \dfrac{15.9}{120} \times 100\%$	B1
$= 13.25\%$	

Answer *(a)*   13.25%   [1]

11 (b) Given that x % of 10.95 m is 0.0049275 km, find x.

$0.0049275 \text{km} = 4.9275 \text{m}$	
$\dfrac{x}{100} \times 10.95 = 4.9275$	
$\dfrac{10.95x}{100} = 4.9275$	
$10.95x = 492.75$	
$x = 45$	B1

Answer *(b)*   45   [1]

(c) The number of coins in a bag is twice that of stamps.
There is an increase of 75% in the number of stamps.
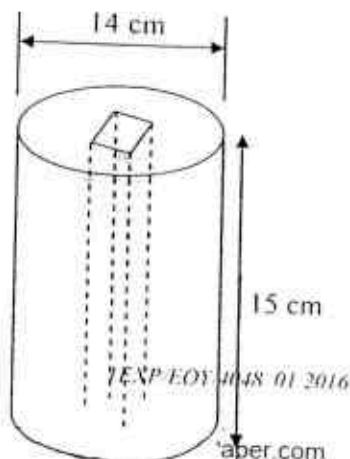Find the percentage decrease in number of coins if the number of coins and stamps are now the same.

| Let x be the number of stamps.

No. of coins $= 2x$

No. of stamps $= x$

No. of stamps after 75% increase $= 1.75x$

Decrease in number of coins

$= 2x - 1.75x$

$= 0.25x$

Percentage decrease $=$

$\dfrac{0.25x}{2x} \times 100\% = 12.5\%$ | M1 for finding no. of stamps after decrease.

M1 for showing decrease in amt of coins $= 0.25x$

A1 |

Answer (c) ....12.5 %.......... [3]

12 The figure shows a cylinder of height 15 cm and diameter of 14 cm.
A square hole of sides 3cm is drilled through the cylinder.

3 cm

Taking π to be 3.142 and giving your answer correct to 2 decimal places.

(a)   find the volume of the solid,

Volume of solid = vol. of cylinder − vol. of square hole $Vol = \pi r^2 h - (area \times ht)$ $= \pi \left(\dfrac{14}{2}\right)^2 \times 15 - (3 \times 3 \times 15)$ $= \pi(7)^2(15) - (9 \times 15)$ $= 735\pi - 135$ $= 2309.37 cm^3 - 135 cm^3$ $= 2174.37 cm^3$	M1 for the correct input in formula A1

Answer   (a)   _____2174.37 cm³_____   [2]

(b)   Find the surface area of the solid.

Surface area of solid = 2 surface area of top and bottom of the solid + $2\pi rh + 4 \times 3 \times 15$ $S.A = (2 \times \pi r^2 - 2 \times 3 \times 3) + 2\pi rh + 180$ $= (2 \times 3.142 \times 7 \times 7 - 18) + (2 \times 3.142 \times 7 \times 15) + 180$ $= (307.916 - 18) + (659.82) + 180$ $= 949.736 cm^2 + 180 cm^2$ $= 1129.736 cm^2$	M1 for the expression. M1 for addition of the two surface area A1

Answer   (b)   _____1129.74 cm²_____   [3]

13 Solve the following equations.

(a) $3m - 2 = 40 - [4m + 3(m - 6)]$

$3m - 2 = 40 - [4m + 3(m - 6)]$	
$3m - 2 = 40 - [4m + 3m - 18]$	M1 for internal expansion.
$3m - 2 = 40 - [7m - 18]$	
$3m - 2 = 40 - 7m + 18$	M1 for another round of expansion
$10m = 40 + 18 + 2$	
$10m = 60$	
$m = 6$	
	A1

Answer (a) _____ $m = 6$ _____ [3]

(b) $\dfrac{3q + 2}{5} - \dfrac{q - 1}{2} = \dfrac{3(q + 1)}{4}$

$\dfrac{3q + 2}{5} - \dfrac{q - 1}{2} = \dfrac{3(q + 1)}{4}$	
$\dfrac{2(3q + 2)}{5(2)} - \dfrac{5(q - 1)}{2(5)} = \dfrac{3q + 3}{4}$	M1 for expressing common denominator.
$\dfrac{6q + 4 - 5(q - 1)}{10} = \dfrac{3q + 3}{4}$	
$\dfrac{6q + 4 - 5q + 5}{10} = \dfrac{3q + 3}{4}$	
$\dfrac{q + 9}{10} = \dfrac{3q + 3}{4}$	
$10(3q + 3) = 4(q + 9)$	M1 for removal of fractions to
$30q + 30 = 4q + 36$	become linear equation
$26q = 6$	
$q = \dfrac{6}{26} = \dfrac{3}{13}$	A1

Answer (b) _____ $q = \dfrac{3}{13}$ _____ [3]

END OF PAPER

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XINMIN SECONDARY SCHOOL

新民中学

SEKOLAH MENENGAH XINMIN
End-of-Year Examination 2016

CANDIDATE NAME

CLASS

INDEX NUMBER

MATHEMATICS

4048

Secondary 1 Express

Setter : Ms Pang Hui Chin
Vetter : Mr Bennett Lim
Moderator : Mrs Sabrina Phang

6 October 2016

2 hours

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

Write your name, register number and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
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Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions in the question booklet.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
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 unless the question requires the answer in terms
of π.

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 number of marks for this paper is **80.**

Errors	Qn No.	Errors	Qn No.
Accuracy		Graphs	
Brackets		Geometry	
Fractions		Diagram	
Units		Others	

For Examiner's Use

80

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This document consists of **18 printed pages.**

[Turn over

Section A (40 marks)

Answer **all** the questions in this section.

1 (a) Solve $-24 > 3x$.

Answer (a) .... [1]

(b) **Hence**, state the largest integer that satisfies the inequality.

Answer (b) .... [1]

2 Given that $p:q = 5:4$ and $q:r = 3:7$, find $p:r$.

Answer .... [2]

3 Express, correct to 3 significant figures,
   (a) 0.02496,

Answer (a) .... [1]

(b) 32047.

Answer (b) .... [1]

4   From the following set of numbers

$$\frac{22}{7},\ 1,\ 0,\ \sqrt{5},\ -3,\ -\frac{2}{9},\ \pi,\ 4.\dot{7},\ 13,$$

write down

(a)   all the prime numbers,

Answer (a) .... [1]

(b)   all the irrational numbers,

Answer (b) .... [1]

(c)   all the whole numbers.

Answer (c) .... [1]

5   In a computer game, players gain points by capturing the game's characters which appear at various time intervals.
Character A appears every 28 minutes, character B appears every 48 minutes and character C appears every 120 minutes.
Ryan started playing the game at 8 am on Monday and all three characters appeared together. When will all three characters next appear together again?

Answer .... [3]

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6 Alex bought a laptop in May. During an IT fair in August, he noticed that the price of the same laptop dropped by 16% to $2016.

(a) Calculate the original price of the laptop.

Answer (a) $ .... [1]

(b) The salesman at the fair told Alex that the price, $2016, would be increased by 18% after the event. Alex thinks that the new price would be more than his original purchase price.
Do you think Alex is correct? Explain your answer with calculations.

....

....

.... [2]

7 Derek started running at an average speed of 15 km/h for 20 minutes. He took a rest of 10 minutes before running another 10 km in 50 minutes.
Calculate Derek's average speed for his entire journey.

Answer .... km/h [3]

8   Solve $\dfrac{3x-7}{3} - \dfrac{2x+3}{6} = -2$.

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

9   The latest computer costs $2490. George purchased it on hire purchase according to the following terms for the price:

> A deposit of 30% and the remaining to be paid in monthly instalments over 2 years at a simple interest rate of 3.5% per annum.

(a)   Find the amount that George has to pay every month.

Answer .... [2]

(b)   Find the total amount that George has to pay for the computer.

Answer $ .... [1]

10   Meredith and her family travelled to Rio de Janeiro in Brazil to watch the 2016
      Summer Olympic Games. The rate of exchange between Brazilian Real and
      Singapore dollars (S$) is S$1 = 2.37 Real.

(a)   The family exchanged S$7650 and spent 8240 Real.
       Calculate the remaining amount of money, in Real.

Answer (a) .... Real   [2]

(b)   Meredith travelled   to the United States of America without her family
       after the games ended.
       She exchanged 6000 Real to US dollars (US$). The rate of exchange between
       US$ and real is US$1 = 3.26 Real.
       Calculate the amount of money, in US$, that Meredith has.

Answer (b) US$ ....   [1]

[Turn over

11 The graph shows the amount of money a company spent on training programmes for its employees in the first 4 months of 2016.

Amount spent (in $1000)

month

(a) Calculate the amount of money spent on training programmes in the four months.

Answer (a) $ .... [1]

(b) Calculate the percentage decrease in the amount spent in training programmes from January to February.

Answer (b) ....% [1]

(c) If the information is illustrated on a pie chart, find the angle of the sector for April, giving your answer correct to one decimal place.

Answer (c) ....° [2]

12 (a) Factorise $8x^2y^3 - 4xy^5$ completely.

Answer (a) .... [1]

(b) Factorise $3a(2a-b)+5(b-2a)$.

Answer (b) .... [1]

(c) Expand and simplify $3[-22x - 2x(15-18y)]$.

Answer (c) .... [2]

13 The diagram shows part of a regular polygon ABCDE... and a regular pentagon DEFGH. It is given that ∠BAC = 20°.

Calculate

(a) the exterior angle of the polygon ABCDE..., stating your reasons clearly,

Answer (a) ....° [2]

(b) the number of sides of the polygon ABCDE..., stating your reasons clearly,

Answer (b) .... [1]

(c) ∠CDH.

Answer (c) ....° [2]

Section B (40 marks)

Answer **all** the questions in this section.

14 In the diagram, WX is parallel to YZ and WS is a straight line that intersects YZ at T.

Given that $\angle WXT = 59°$ and $\angle WTY = 63°$, find $\angle XTS$. State your reasons clearly.   [3]

15   *ABCD* is a parallelogram such that $AB = (8x-11)$ cm and $AD = (2x-1)$ cm.
     PQR is a triangle such that $PQ = (6x-3)$ cm, $QR = 2x$ cm and $PR = (4x+3)$ cm.

The perimeter of the parallelogram is equal to the perimeter of the triangle.

(a)   By forming an equation in x, show that $x = 3$.   [2]

(b)   Given that the perpendicular from *D* to *AB* is $(3x-5)$ cm, find the area of the parallelogram *ABCD*.   [2]

16   In the diagram, *ABCD* is a rhombus found in a kite *BCDE*. The diagonals *CE* and *BD* intersect each other at *M*.

Given that $\angle BCD = 110°$ and $\angle BED = 30°$, stating your reasons clearly, find

(a) $\angle BAD$,   [1]

(b) $\angle BME$,   [1]

(c) $\angle ABE$.   [3]

17 Isabelle made a series of diagram using dots and lines. The first three figures are as shown.

Figure 1   Figure 2   Figure 3

(a) Draw Figure 4.   [1]

(b) The number of dots and the number of the smallest right-angled triangles formed to make each of the figures are shown in the table below.
Complete the table below for the row of Figure 4.   [1]

Figure	Number of Dots	Number of Smallest Right-Angled Triangles
1	4	2
2	9	8
3	16	18
4		

(c) (i) Form an expression in n, for the number of dots for Figure n.   [1]
     (ii) Hence, find the number of dots for Figure 37.   [1]

(d) Form an expression in n, for the number of the smallest right-angled triangles formed for Figure n.   [1]

18   Construct a quadrilateral $PQRS$ such that $PQ = 10.5$ cm, $QR = 5$ cm, $PS = 8$ cm,

     SR = 5·3 cm and $\angle PQR = 70°$.   [2]

     (a)   Construct the perpendicular bisector of QR.   [1]

     (b)   The point X lies on the perpendicular bisector of QR and is equidistant from RS

              and PS. By constructing a suitable line, find and label the point X.   [2]

     (c)   **Hence**, measure and state the value of $\angle RSX$.   [1]

19   The diagram below shows a cage for a pet hamster that comprises   a trapezium-
      base prism *ABCDEFGH* with *AB* parallel to *DC* and an open cylindrical tunnel.
      AB = 43 cm, *BC* = 24 cm, *CD* = 50 cm, *AD* = 25 cm and *AE* = 20 cm. $\angle ABC = 90°$
      and $\angle EFG = 90°$.
      The cylindrical tunnel is 35 cm long.

Take $\pi = \dfrac{22}{7}$ in your calculations.

(a)   Given that the curved surface area of the cylindrical tunnel is 2200 cm², show
        that the radius of the cylindrical tunnel is approximately 10 cm.   [1]

Hence, calculate

(b)   the total volume of the cage, in *l*,   [3]
(c)   the total surface area of the cage, in m²,   [4]

Write your answer for the whole of question 19 on the next page.

Write your answer for the whole of question 19 on this page.

20 Answer the whole of this question on a sheet of graph paper.

Two companies are recruiting students to sell a new energy drink, at $4 per bottle, at the Food Fair during the December school holidays.

Drinks Paradise

Calling out to all students!
Earn $7 / hour and a commission of 10% on your total sales made!

Call us!

Yummy Palace

Are you an 'N'/'O'/'A' level graduate looking for a part-time job?
Earn $10 / hour.

Join us now!

Christina is committed to working 8 hours a day.
The tables below show Christina's possible income for one day, y, when she sells x bottles of energy drinks if she works for the respective companies.

Drinks Paradise:

Number of bottles of energy drinks, x bottles	0	80	120
Income, y	56	p	104

Yummy Palace:

Number of bottles of energy drinks, x bottles	0	80	120
Income, y	80	80	80

(a) Show that $p = 88$. [1]

(b) (i) Using a scale of 2 cm to represent 20 bottles on the horizontal axis and 2 cm to represent $10 on the vertical axis, draw the graph of y against x bottles for Drinks Paradise. [3]

(ii) Similarly, on the same axes, draw the graph for Yummy Palace. [1]

(c) State the equation of the line for Yummy Palace. [1]

(d) Find

(i) the gradient of the line, [1]

(ii) the y-intercept of the line. [1]

(e) Using both the graphs, determine the minimum number of bottles of energy drinks that Christina needs to sell so that Drinks Paradise would be paying her more than Yummy Palace. [1]

END OF PAPER

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MATHEMATICS

4048

Secondary 1 Express

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The use of an approved scientific calculator is expected, where appropriate.
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 unless the question requires the answer in terms of π.

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The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is **80**.

Errors	Qn No.	Errors	Qn No.	For Examiner's Use
Accuracy		Graphs		
Brackets		Geometry		
Fractions		Diagram		80
Units		Others		

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Section A (40 marks)

Answer **all** the questions in this section.

1 (a) Solve $-24 > 3x$.

$$-24 > 3x$$

$$\frac{-24}{3} > x$$

$$-8 > x$$

Answer (a) .... $-8 > x$ or $x < -8$. — either B1 [1]

(b) **Hence**, state the largest integer that satisfies the inequality.

Answer (b) .... -9 — B1 [1]

---

2 Given that $p:q = 5:4$ and $q:r = 3:7$, find $p:r$.

$$p:q = 5:4 \qquad q:r = 3:7$$
$$= 15:12 \qquad\qquad = 12:28 \quad — \text{M1 for both}$$

$$\therefore p:r = 15:28$$

Answer .... 15 : 28 — A1 [2]

---

3 Express, correct to 3 significant figures,

(a) 0.02496,

Answer (a) .... 0.0250 — B1 [1]

(b) 32047.

Answer (b) .... 32000 — B1 [1]

---

4   From the following set of numbers

$$\frac{22}{7}, 1, 0, \sqrt{5}, -3, -\frac{2}{9}, \pi, 4.\dot{7}, 13,$$

write down

(a)   all the prime numbers,

Answer (a) .... 13 —B1 ...... [1]

(b)   all the irrational numbers,

Answer (b) .... $\sqrt{5}$, π —B1 ...... [1]

(c)   all the whole numbers.

Answer (c) .... 0, 1, 13 —B1 ...... [1]

5   In a computer game, players gain points by capturing the game's characters which appear at various time intervals.
Character A appears every 28 minutes, character B appears every 48 minutes and character C appears every 120 minutes.
Ryan started playing the game at 8 am on Monday and all three characters appeared together. When will all three characters next appear together again?

$28 = 2^2 \times 7$
$48 = 2^4 \times 3$ } M1
$120 = 2^3 \times 3 \times 5.$

2	28	48	120
2	14	24	60
2	7	12	30
3	7	6	15
	7	2	5
} M1

$LCM = 2^4 \times 3 \times 5 \times 7$ —M1
$= 1680$ minutes
$= 28h$

∴ 8am, Monday + 28h = 12pm, Tuesday

Answer .... 12pm, Tuesday —A1 ...... [3]

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6 Alex bought a laptop in May. During an IT fair in August, he noticed that the price of the same laptop dropped by 16% to $2016.

(a) Calculate the original price of the laptop.

$$\text{original price} = \frac{100}{84} \times \$2016 \quad \text{or} \quad \frac{\$2016}{84\%} \times 100\%$$
$$= \$2400 \qquad\qquad = \$2400$$

Answer (a) $ .... 2400 —A1 .... [1]

(b) The salesman at the fair told Alex that the price, $2016, would be increased by 18% after the event. Alex thinks that the new price would be more than his original purchase price.
Do you think Alex is correct? Explain your answer with calculations.

$$\frac{118}{100} \times \$2016 = \$2378.88 \quad \text{—M1}$$

No, Alex is wrong as the new price is $2378.88, which is lesser than $2400. —A1

[2]

7 Derek started running at an average speed of 15 km/h for 20 minutes. He took a rest of 10 minutes before running another 10 km in 50 minutes.
Calculate Derek's average speed for his entire journey.

$$\text{total distance} = \left(15 \times \frac{20}{60}\right) + 10 \quad \text{—M1}$$
$$= 5 + 10$$
$$= 15\text{ km}$$

$$\text{total time} = 20 + 10 + 50$$
$$= 80\text{ min}$$
$$= 1\tfrac{1}{3}\text{ h}$$

$$\therefore \text{average speed} = \frac{15}{1\tfrac{1}{3}} \quad \text{—M1}$$
$$= 11.25\text{ km/h}$$

Answer .... 11.25 or 11¼ —A1 .... km/h [3]

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8 Solve $\dfrac{3x-7}{3} - \dfrac{2x+3}{6} = -2$.

$\dfrac{3x-7}{3} - \dfrac{2x+3}{6} = -2$

$\dfrac{2(3x-7) - (2x+3)}{6} = -2$ —— M1: common denominator

$\dfrac{6x-14-2x-3}{6} = -2$

$4x - 17 = -12$ —— M1: simplifying

$4x = -12 + 17$

$= 5$

$x = \dfrac{5}{4}$

$= 1\frac{1}{4}$

Alternatively,

$2(3x-7) - (2x+3) = -12$ —— M1: 'removing' denominator

$6x - 14 - 2x - 3 = 12$

$4x - 17 = -12$ —— M1: simplifying

$4x = 5$

$x = 1\frac{1}{4}$

Answer $x = $ ....$1\frac{1}{4}$ — A1........ [3]

9   The latest computer costs $2490. George purchased it on hire purchase according to the following terms for the price:

> A deposit of 30% and the remaining to be paid in monthly instalments over 2 years at a simple interest rate of 3.5% per annum.

(a)   Find the amount that George has to pay every month.

amount remaining $= \frac{70}{100} \times \$2490$

$= \$1743$

Alternatively,

interest amount $= \frac{3.5}{100} \times \$1743 \times 2$ —— B1

$= \$122.01$

interest amount $= \frac{70}{100} \times \$2490 \times \frac{3.5}{100} \times 2$ —— B1

$= \$122.01$

monthly instalment $= (\$1743 + \$122.01) \div 24$

$= \$77.71 \ (2 \text{d.p.})$

Answer $ ....77.71 —— A1........ [2]

(b)   Find the total amount that George has to pay for the computer.

total amount $= \$2490 + \$122.01$

$= \$2612.01$

Alternatively, total amount $= \left(\frac{70}{100} \times \$2490 \times \frac{3.5}{100} \times 2\right) + \$2490$

$= \$2612.01$

Answer $ ....2612.01 —— A1........ [1]

10 Meredith and her family travelled to Rio de Janeiro in Brazil to watch the 2016 Summer Olympic Games. The rate of exchange between Brazilian Real and Singapore dollars (S$) is S$1 = 2.37 Real.

(a) The family exchanged S$7650 and spent 8240 Real.
Calculate the remaining amount of money, in Real.

amount of money left = S$7650 - 8240 Real
= (7650 × 2.37) Real - 8240 Real — M1
= 9890.50 Real.

Answer (a) 9890.50 — A1 .... Real [2]

(b) Meredith travelled to the United States of America without her family after the games ended.
She exchanged 6000 Real to US dollars (US$). The rate of exchange between US$ and Real is US$1 = 3.26 Real.
Calculate the amount of money, in US$, that Meredith has.

amount of money = $\frac{6000}{3.26}$

≈ US$ 1840.49 (2dp.)

Answer (b) US$ 1840.49 — A1 [1]

[Turn over

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11 The graph shows the amount of money a company spent on training programmes for its employees in the first 4 months of 2016.

(a) Calculate the amount of money spent on training programmes in the four months.

$$60\,000 + 25\,000 + 90\,000 + 40\,000$$
$$= 215\,000$$

Answer (a) $ ....215 000 —B1........ [1]

(b) Calculate the percentage decrease in the amount spent in training programmes from January to February.

$$\% \text{ decrease} = \frac{60\,000 - 25\,000}{60\,000} \times 100\%$$
$$= 58\tfrac{1}{3}\%$$

Answer (b) ....$58\tfrac{1}{3}$ —B1......% [1]

(c) If the information is illustrated on a pie chart, find the angle of the sector for April, giving your answer correct to one decimal place.

$$\angle \text{ for April} = \frac{40\,000}{215\,000} \times 360° \quad \text{—M1}$$
$$= 67.0° \text{ (1dp)}$$

Answer (c) ....67.0 —A1......° [2]

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12 **(a)** Factorise $8x^2y^3 - 4xy^5$ completely.

$$8x^2y^3 - 4xy^5$$
$$= 4xy^3(2x - y^2)$$

Answer (a) ......$4xy^3(2x - y^2)$ — B1...... [1]

(b) Factorise $3a(2a - b) + 5(b - 2a)$.

$$3a(2a - b) + 5(b - 2a)$$
$$= 3a(2a - b) - 5(2a - b)$$
$$= (2a - b)(3a - 5)$$

Answer (b) ......$(2a - b)(3a - 5)$ — B1...... [1]

(c) Expand and simplify $3[-22x - 2x(15 - 18y)]$.

$$3[-22x - 2x(15 - 18y)]$$
$$= 3[-22x - 30x + 36xy] \text{ — M1: expansion}$$
$$= 3(-52x + 36xy)$$
$$= -156x + 108xy$$

Answer (c) ......$-156x + 108xy$ — A1...... [2]

[Turn over

13   The diagram shows part of a regular polygon *ABCDE*... and a regular pentagon
DEFGH. It is given that ∠*BAC* = 20°.

*penalise 'geometry' if
missing/wrong reason
given for (a) & (b)*

Calculate

(a) the exterior angle of the polygon *ABCDE*..., stating your reasons clearly.

∠BCA = 20° (base ∠s of isos. △) —M1

ext. ∠ = 20° + 20°

= 40° (ext. ∠ of △)

Alternatively,

∠BCA = 20° (base ∠s of isos. △) —M1

∠ABC = 180° − 20° − 20°

= 140° (∠ sum of △)

ext. ∠ = 180° − 140° = 40° (adj. ∠s on a str. line)

Answer (a) ....40 —A1.......° [2]

(b) the number of sides of the polygon *ABCDE*..., stating your reasons clearly.

no. of sides = 360°/4

= 9 sides.

Alternatively,

int. ∠ = (n−2) × 180° / n

140° × n = 180° × n − 360°

40° × n = 360°

n = 9

Answer (b) ....9 —A1.......... [1]

(c) ∠*CDH*.

∠HDE = (5−2) × 180° / 5

= 108° —M1

∠CDE = 140°

∴ ∠CDH = 360° − 108° − 140°

= 112° (∠s at a pt.)

Alternatively,

ext. ∠ of pentagon = 360°/5

= 72° —M1

∠CDH = 40° + 72°

= 112°

Answer (c) ....112 —A1.......° [2]

Section B (40 marks)

Answer **all** the questions in this section.

14   In the diagram, *WX* is parallel to *YZ* and *WS* is a straight line that intersects *YZ* at *T*.

*penalise 'geometry' if
mrong/missing reason.

Given that $\angle WXT = 59°$ and $\angle WTY = 63°$, find $\angle XTS$. State your reasons clearly.   [3]

$\angle XTZ = 59°$ (alt. $\angle$s, // lines) — M1

$\angle STZ = 63°$ (vert. opp. $\angle$s) — M1

$\angle XTS = 59° + 63°$

$= 122°$. — A1

Alternatively,

$\angle XTZ = 59°$ (alt. $\angle$s, / lines) — M1

$\angle WTX = 180° - 59° - 63°$

$= 58°$ (adj. $\angle$s on a str. line)   } M1

$\angle STZ = 180° - 59° - 58°$

$= 63°$ (adj. $\angle$s on a str. line)

$\therefore \angle XTS = 63° + 59°$

$= 122°$. — A1

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15   $ABCD$ is a parallelogram such that $AB = (8x-11)$ cm and $AD = (2x-1)$ cm.
     PQR is a triangle such that $PQ = (6x-3)$ cm, $QR = 2x$ cm and $PR = (4x+3)$ cm.

The perimeter of the parallelogram is equal to the perimeter of the triangle.

(a)   By forming an equation in x, show that $x=3$.   [2]

(b)   Given that the perpendicular from D to AB is $(3x-5)$ cm, find the area of the
         parallelogram $ABCD$.   [2]

(a) $2[2x-1+8x-11] = (4x+3)+(6x-3)+2x$ ─M1: form equation.
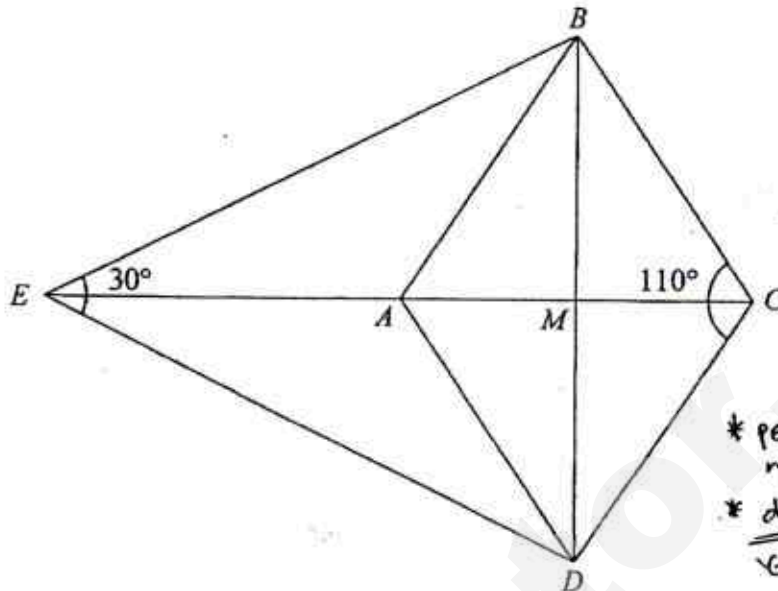
$2(10x-12) = 12x$

$20x - 24 = 12x$.

$20x - 12x = 24$

$8x = 24$

$x = 3$ (shown). ─A1

(b) area of parallelogram $= (8x-11) \times (3x-5)$

$= [8(3)-11]-[3(3)-5]$ ─M1: substitution

$= 13 \times 4$

$= 52$ cm² ─A1

16 In the diagram, ABCD is a rhombus found in a kite BCDE. The diagonals CE and BD intersect each other at M.

* penalise under 'Geometry' if wrong/missing reasons.
* do not penalise under 'Geometry' if underlined ones are wrong/missing.

Given that ∠BCD = 110° and ∠BED = 30°, stating your reasons clearly, find

(a)   ∠BAD,   [1]
(b)   ∠BME,   [1]
(c)   ∠ABE.   [3]

(a) ∠BAD = 110° (opp. ∠s of rhombus) — B1

Alternatively,

∠ABC = 180° − 110°
     = 70° (int. ∠s, // lines)   ⎫
                                    ⎬ B1
∠BAD = 180° − 70°   ⎭
     = 110° (int. ∠s, // lines)

(b) ∠BME = 90° (diagonals of kite/rhombus) — B1

(c) ∠BEA = 30° ÷ 2
         = 15° (bisected ∠) — M1

∠MBE = 180° − 90° − 15°
      = 75° (∠ sum of △)

∠ABM = (180° − 110°)/2
      = 35° (base ∠s of isos. △) — M1

∠ABE = 75° − 35°
      = 40°. — A1

Alternatively,

∠CBE = (360° − 30° − 110°)/2
      = 110° (∠ sum of quad.) — M1

∠ABC = 180° − 110°
      = 70° (int. ∠s, // lines) — M1

∠ABE = 110° − 70°
      = 40° — A1

[Turn over   133

17 Isabelle made a series of diagram using dots and lines. The first three figures are as shown.

Figure 1   Figure 2   Figure 3
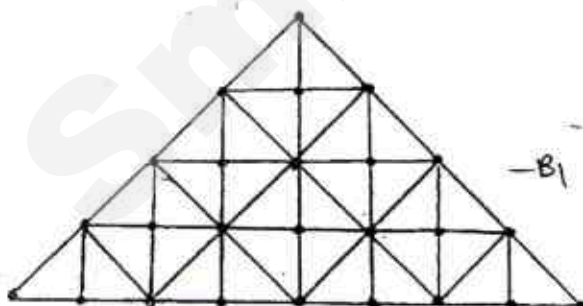
(a) Draw Figure 4.   [1]

(b) The number of dots and the number of the smallest right-angled triangles formed to make each of the figures are shown in the table below.
Complete the table below for the row of Figure 4.   [1]

Figure	Number of Dots	Number of Smallest Right-Angled Triangles
1	4	2
2	9	8
3	16	18
4	25	32	—B1

(c) (i) Form an expression in n, for the number of dots for Figure n.   [1]
     (ii) **Hence**, find the number of dots for Figure 37.   [1]

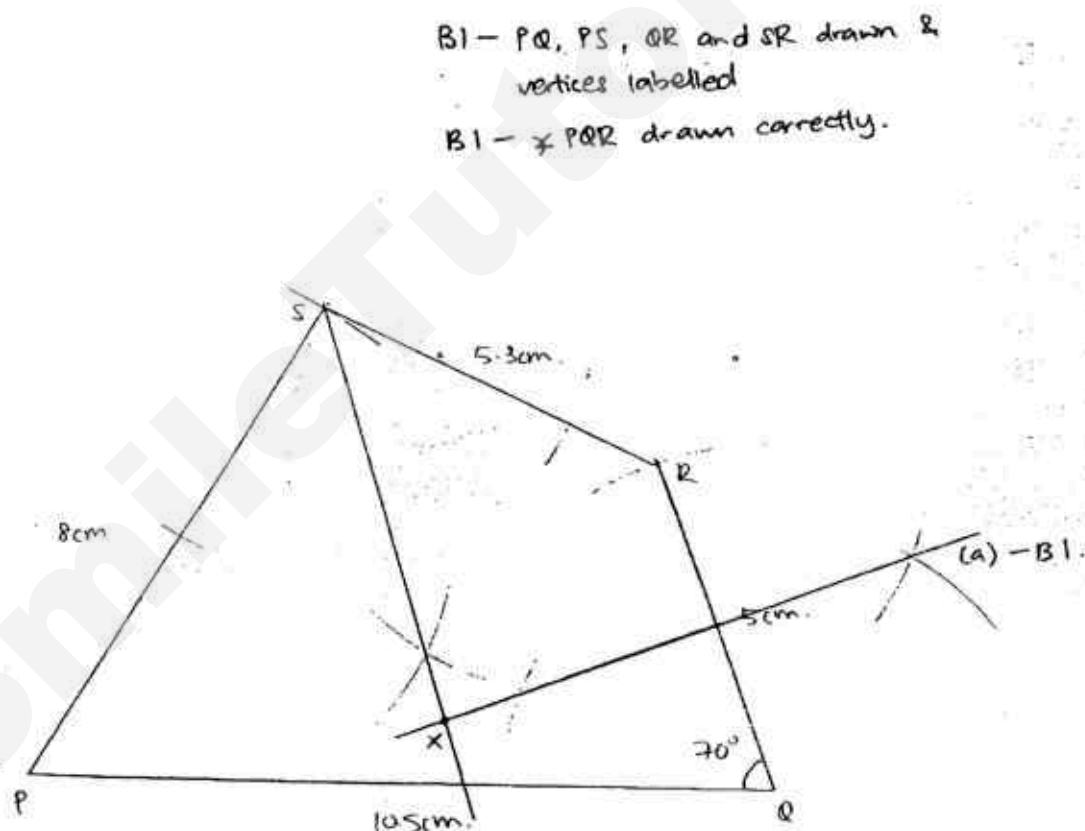(d) Form an expression in n, for the number of the smallest right-angled triangles formed for Figure n.   [1]

(a)

—B1

(c)(i) no. of dots $= (n+1)^2$ —B1

(ii) no. of dots $= (37+1)^2$
$= 1444$ —B1 (allow ecf)

(d) no. of smallest right-angled $\triangle$

$= 2n^2$ —B1

18 Construct a quadrilateral *PQRS* such that *PQ* = 10.5 cm, *QR* = 5 cm, *PS* = 8 cm,
    SR = 5.3 cm and ∠*PQR* = 70°.   [2]
    (a)   Construct the perpendicular bisector of *QR*.   [1]
    (b)   The point *X* lies on the perpendicular bisector of *QR* and is equidistant from *RS*
          and *PS*. By constructing a suitable line, find and label the point *X*.   [2]
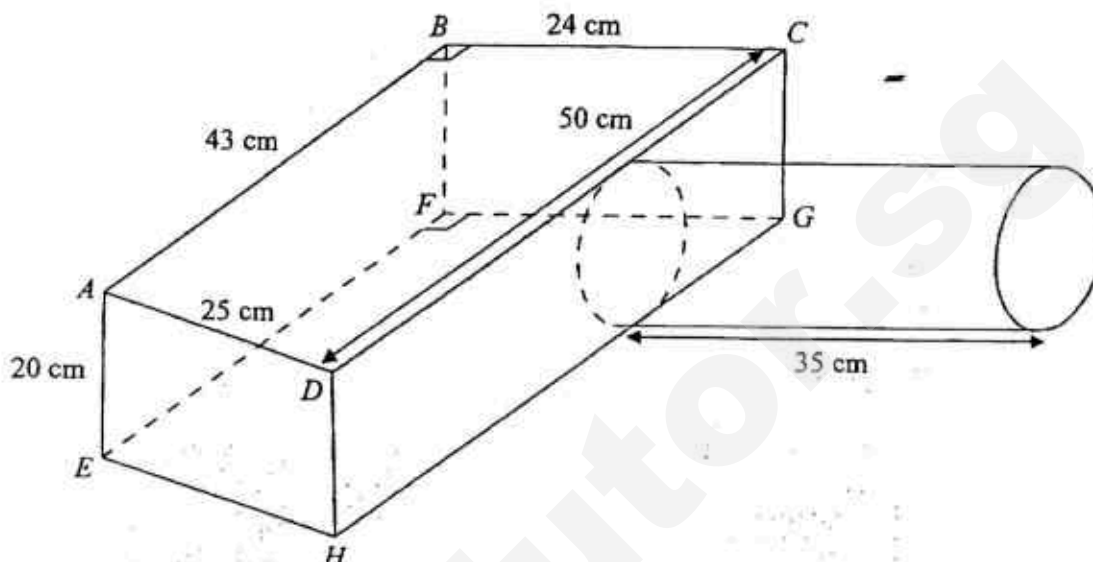   (c)   Hence, measure and state the value of ∠*RSX*.   [1]

BI — PQ, PS, QR and SR drawn &
      vertices labelled
BI — ∡PQR drawn correctly.

8cm

5.3cm

(a) — BI.

5cm

70°

10.5cm

(b) BI — drawing angle bisector of ∡PSR
     BI — locating X and labelling

(c) ∡RSX = 48° ± 0.1° — BI

19   The diagram below shows a cage for a pet hamster that comprises   a trapezium-
      base prism *ABCDEFGH* with *AB* parallel to *DC* and an open cylindrical tunnel.
      AB = 43 cm, *BC* = 24 cm, *CD* = 50 cm, *AD* = 25 cm and *AE* = 20 cm. $\angle ABC = 90°$
      and $\angle EFG = 90°$.
      The cylindrical tunnel is 35 cm long.

Take $\pi = \dfrac{22}{7}$ in your calculations.

(a)   Given that the curved surface area of the cylindrical tunnel is 2200 cm², show
       that the radius of the cylindrical tunnel is approximately 10 cm.   [1]

Hence, calculate

(b)   the total volume of the cage, in *l*,   [3]

(c)   the total surface area of the cage, in m²,   [4]

Write your answer for the whole of question 19 on the next page.

Write your answer for the whole of question 19 on this page.

(a) Let the radius be r cm,

$$\text{curved surface area} = 2\pi r (35)$$

$$2200 = 2\left(\frac{22}{7}\right) r (35)$$

$$r = \frac{2200}{2\left(\frac{22}{7}\right)(35)} \quad \Big\} \; A1$$

$$= 10 \text{ cm}.$$

(b) total volume

$$= \left[\frac{1}{2} \times (50 + 43) \times 24\right] \times 20 + \left[\left(\frac{22}{7}\right)(10^2)(35)\right] - M1 + M1$$

$$= 22320 + 11000$$

$$= 33320 \text{ cm}^3$$

$$= 33.32 \ell. \quad -A1$$

(c) total surface area

$$= \left\{\left[\frac{1}{2} \times (50 + 43) \times 24\right] \times 2 + (43 \times 20) + (50 \times 20) + (24 \times 20) + (25 \times 20)\right\} - \text{prism S.A}$$
$$ \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \hookrightarrow M1$$

$$+ \; 2\left(\frac{22}{7}\right)(10)(35) - \left(\frac{22}{7}\right)(10^2)\Big\} \rightarrow \text{cylinder S.A}$$
$$ \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \hookrightarrow M1$$

$$= 5072 + 1885\frac{5}{7}.$$

$$= 6957\frac{5}{7} \text{ cm}^2. \quad -M1$$

$$1 \text{ cm} = \frac{1}{100} \text{ m}$$

$$1 \text{ cm}^2 = \left(\frac{1}{100}\right)^2 \text{ m}^2.$$

$$= 0.0001 \text{ m}^2.$$

$$\therefore \text{ total surface area} = 6957\frac{5}{7} \times 0.0001$$

$$= \underline{\frac{3044}{4375}} \text{ m}^2 \quad \text{or} \quad \underline{0.696 \text{ m}^2 \; (3 \text{ sf.})} \; -\text{either } A1$$

20 **Answer the whole of this question on a sheet of graph paper.**

Two companies are recruiting students to sell a new energy drink, at \$4 per bottle, at the Food Fair during the December school holidays.

Drinks Paradise

Calling out to all students!
Earn \$7 / hour and a
commission of 10% on your
total sales made!

Call us!

Yummy Palace

Are you an 'N'/'O'/'A'
level graduate looking for a
part-time job?
Earn \$10 / hour.

Join us now!

Christina is committed to working 8 hours a day.

The tables below show Christina's possible income for one day, \$y, when she sells x bottles of energy drinks if she works for the respective companies.

Drinks Paradise:

Number of bottles of energy drinks, x bottles	0	80	120
Income, \$y	56	p	104

Yummy Palace:

Number of bottles of energy drinks, x bottles	0	80	120
Income, \$y	80	80	80

(a) Show that $p = 88$. [1]

(b) (i) Using a scale of 2 cm to represent 20 bottles on the horizontal axis and 2 cm to represent \$10 on the vertical axis, draw the graph of \$y against x bottles for Drinks Paradise. [3]

(ii) Similarly, on the same axes, draw the graph for Yummy Palace. [1]

(c) State the equation of the line for Yummy Palace. [1]

(d) Find

(i) the gradient of the line, [1]

(ii) the y-intercept of the line. [1]

(e) Using both the graphs, determine the minimum number of bottles of energy drinks that Christina needs to sell so that Drinks Paradise would be paying her more than Yummy Palace. [1]
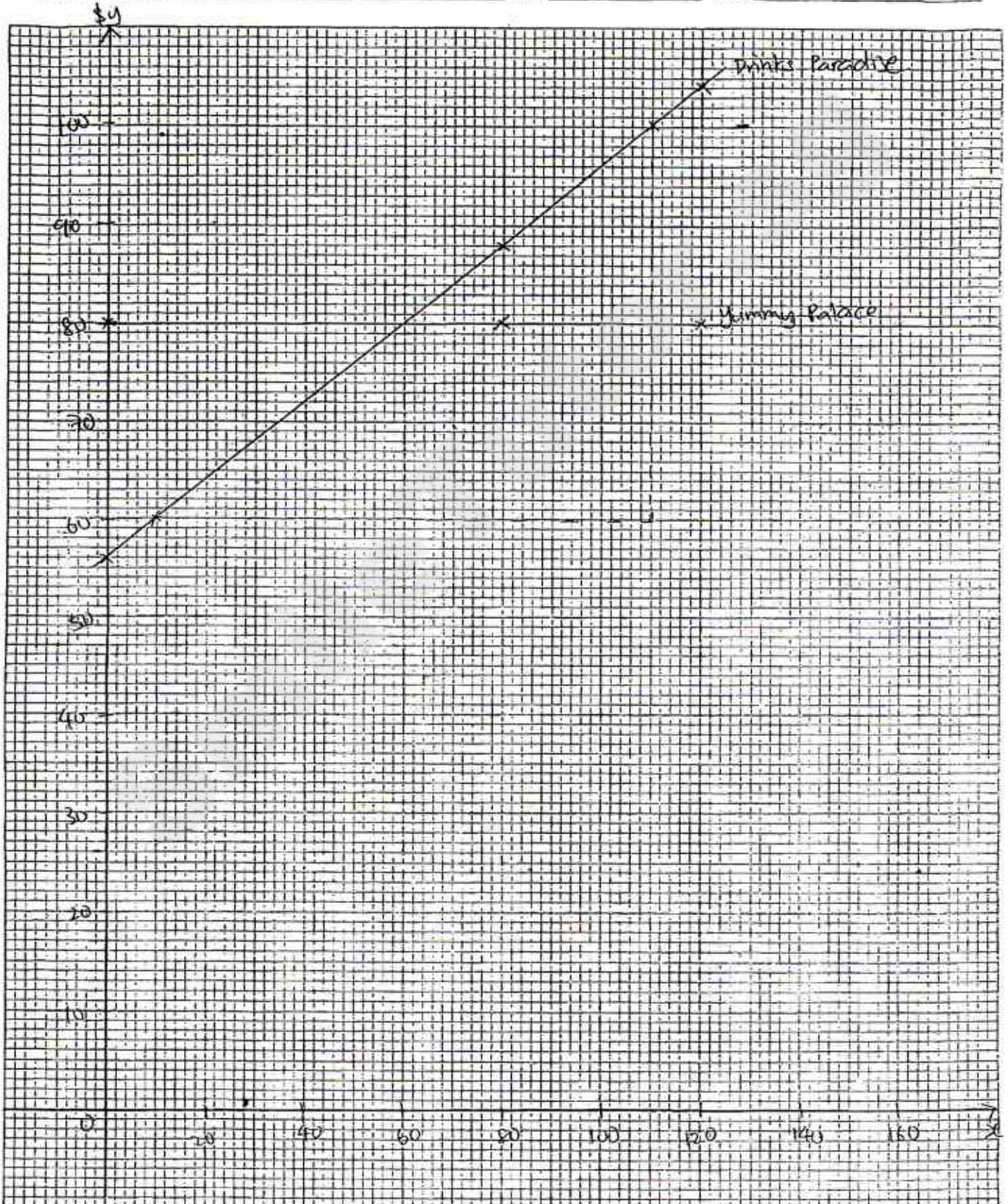
END OF PAPER

(b)(i) scale & axis — B1
plotted points — B1
line & label — B1

(b)(ii) line with label — B1

Name_____ Index No._____

Subject_____ Class_____ Date_____

(a) $p = \$7 \times 8 + \dfrac{10}{100} \times 80 \times \$4 \Bigg\}$ B1.

$\qquad = 88.$ (shown).

(c) $y = 80$ — B1

(d) (i) gradient $= \dfrac{40}{100}$

$\qquad\qquad\qquad = 0.4$ or $\dfrac{2}{5}$. — A1

(ii) y-intercept $= 56.$ — B1

(e) 60 bottles. — B1

Note : Students can achieve answer by using graph or by using values in table to calculate. Award marks for either cases.