BEATTY SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2015

SUBJECT : Mathematics | **LEVEL : Sec 1 Express**

PAPER : 1 | **DURATION : 1 hour 15 minutes**

SETTER : Mr Alvin Lim | **DATE : 7 Oct 2015**

CLASS :	NAME :	REG NO :

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on the top of this page.
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.

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.

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
50

This paper consists of 13 printed pages (including this cover page)

[Turn over

Answer all the questions.

For Examiner's Use

1 (a) Correct 5196.28 to 3 significant figures.

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

(b) Evaluate $\frac{268.221\times(7.562)^2}{(1.998)^3}$, giving your answer correct to 1 decimal place.

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

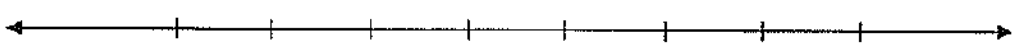
2 (a) Arrange the following numbers in ascending order.

$-\frac{1}{4}$, 0.33, $\sqrt{2}$, -1.45

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

(b) Represent the numbers in (a) on the given number line. [2]

Answer (b) :



For Examiner's Use

3 Kevin cycled at a speed of 8 km/h for 84 minutes for the first part of a journey. He then decided to slow down and continued to cycle for another 13 km at a speed of 5 km/h for the rest of the journey. Calculate

(a) the distance travelled in the first part of the journey,

Answer : *(a)* ..... km [1]

(b) the average speed for the whole journey.

Answer : *(b)* ..... km/h [2]

4 Andy wanted to buy a pair of shoes which costs $240. The shopkeeper gave Andy a discount and Andy paid $225 for the pair of shoes instead.
Calculate the percentage discount.

Answer : ..... % [2]

For Examiner's Use

5 Showing your workings clearly, evaluate

(a) $-22-6\div(-2)$,

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

(b) $\left(-\frac{1}{3}\right)^2-\left(-\frac{4}{9}\right)$.

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

6 Factorise the following completely.

(a) $9qx-12x^2$

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

(b) $(2y-3)+x(3-2y)$

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

For Examiner's Use

7 Solve the following equations.

(a) $5x - 25 = 3(3x + 2)$

Answer : (a) $x =$ ..... [3]

(b) $\frac{x}{3} - \frac{x-1}{6} = 2$

Answer : (b) $x =$ ..... [3]

For Examiner's Use

For Examiner's Use

8 **(a)** Find the prime factorization of 2772, expressing your answer in index notation.

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

(b) Given that the prime factorization of 4200 is $2^3 \times 3 \times 5^2 \times 7$, find the highest common factor of 2772 and 4200.

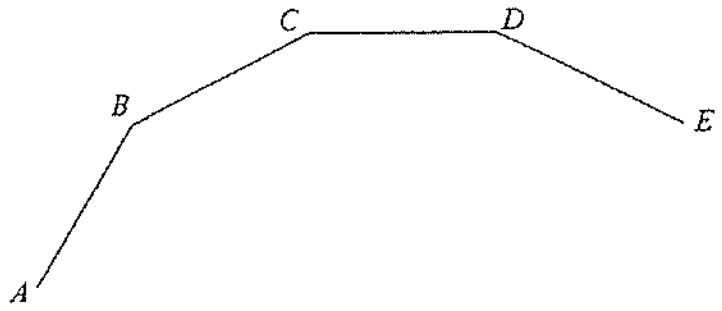
Answer : (b) ..... [1]

(c) Find the smallest integer k such that $(2772 \times 4200k)$ is a square number.

Answer : (c) $k =$..... [1]

For Examiner's Use

9 The diagram shows part of a regular 16-sided polygon.



Calculate

(a) $\angle BCD$,

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

(b) the size of the exterior angle.

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

For Examiner's Use

10 The first four terms of a sequence are 8, 13, 18, 23.

(a) Write down the 7th term of the sequence.

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

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

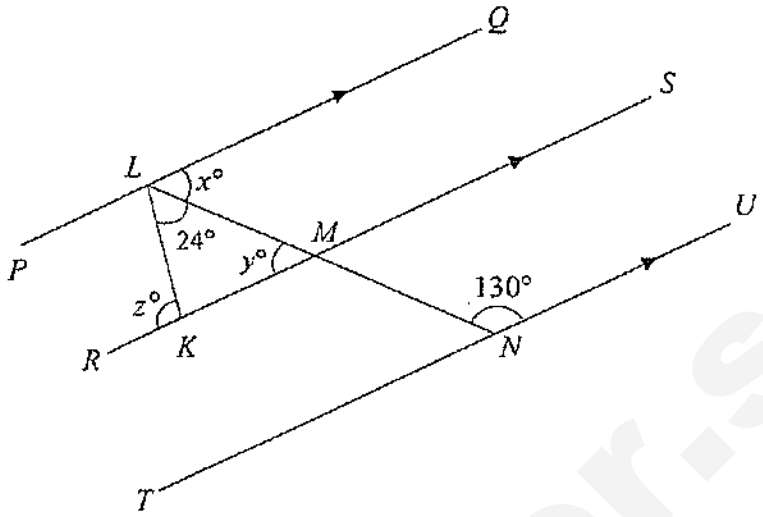
Answer : (b) ..... [1]

(c) Find the 65th term of the sequence.

Answer : (c) ..... [1]

For Examiner's Use

11 **(a)** Find the values of x, y and z in the following diagram, stating your reasons clearly.



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

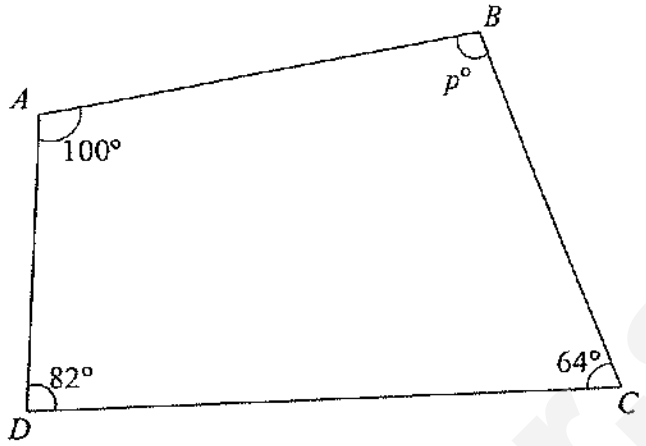
$y =$ ..... [1]

$z =$ ..... [1]

For Examiner's Use

For Examiner's Use

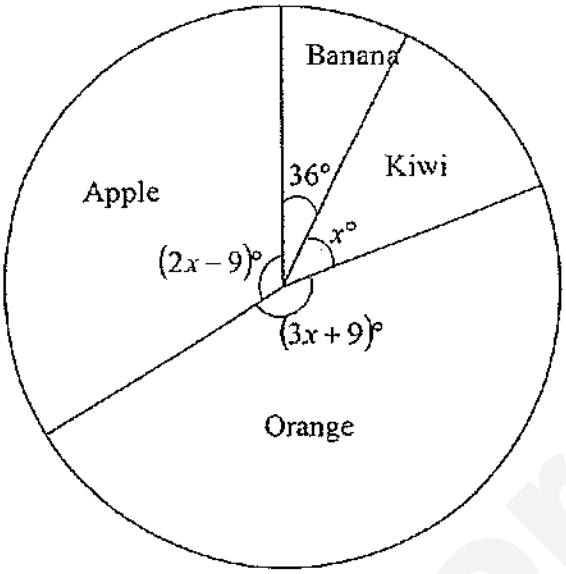
(b) $ABCD$ is a quadrilateral. Given that $\angle BAD = 100°$, $\angle ADC = 82°$ and $\angle BCD = 64°$, find the value of p.



Answer : *(b)* $p =$ ..... [2]

For Examiner's Use

12 The pie chart below represents the favourite fruits of students in a class.



(a) Find the value of x.

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

(b) Find the percentage of students whose favourite fruit is apple.

Answer : (b) ..... % [2]

(c) Given that there are a total of 40 students in the class, find the number of students whose favourite fruit is orange.

Answer : (c) ..... [2]

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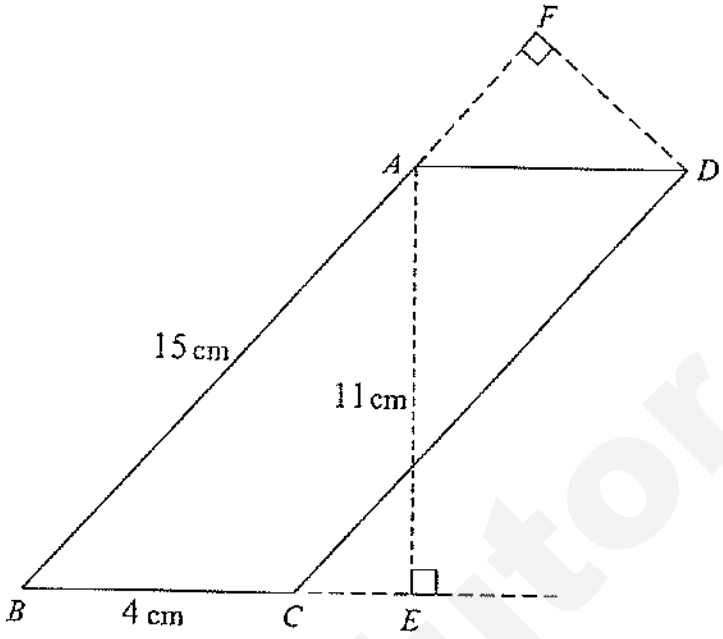
13 (a) In the diagram, $ABCD$ is a parallelogram. $AB = 15$ cm, $BC = 4$ cm and $AE = 11$ cm. AE is perpendicular to BE and DF is perpendicular to BF.



(i) Find the area of parallelogram $ABCD$.

Answer : (a) (i) ..... cm^2 [1]

(ii) Find the length of DF.

Answer : (a) (ii) ..... cm [2]

For Examiner's Use

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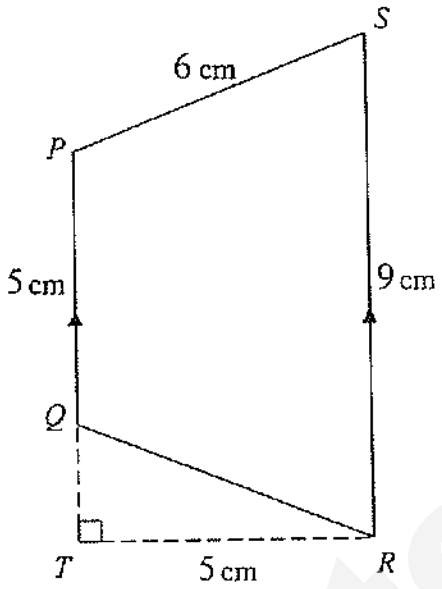
(b) In the diagram, $PQRS$ is a quadrilateral. $PQ = 5$ cm, $RS = 9$ cm, $PS = 6$ cm, $TR = 5$ cm and QP is parallel to RS.



(i) State the special name of quadrilateral $PQRS$.

(ii) Find the area of quadrilateral $PQRS$.

Answer : *(b)* *(i)* ..... [1]

(ii) ..... cm^2 [2]

~ End of Paper ~

12

Answers

1(a) 5200

1(b) 1923.0

2(a) $-1.45, -\frac{1}{4}, 0.33, \sqrt{2}$

3(a) $11.2 / 11\frac{1}{5}$ km

3(b) $6.05 / 6\frac{1}{20}$ km/h

4 $6.25 / 6\frac{1}{4}$ %

5(a) -19

5(b) $\frac{5}{9}$

6(a) $3x(3q-4x)$

6(b) $(2y-3)(1-x)$

7(a) $x=-7\frac{3}{4}$

7(b) $x=11$

8(a) $2772=2^2\times3^2\times7\times11$

8(b) HCF $=84$

8(c) $k=66$

9(a) 157.5°

9(b) 22.5°

10(a) 38

10(b) $3+5n$

10(c) 328

11(a) $x=50$

$y=50$

$z=74$

11(b) $p=114$

12(a) $x=54$

12(b) 27.5%

12(c)

19

13(a)

$44\,\text{cm}^2$

$2\frac{14}{15}$ cm

13(b)

Trapezium

35 cm^2

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PAPER : 1
DURATION : 1 hour 15 minutes
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MARKING SCHEME

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Answer **all** the questions.

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1 **(a)** Correct 5196.28 to 3 significant figures.

$5196.28 = 5200$ (3 s.f.) **[B1]**

Answer : (a) 5200 [1]

(b) Evaluate $\frac{268.221\times(7.562)^2}{(1.998)^3}$, giving your answer correct to 1 decimal place.

$\frac{268.221\times(7.562)^2}{(1.998)^3} = 1923.0$ (1 d.p.) **[B1]**

Answer : (b) 1923.0 [1]

2 **(a)** Arrange the following numbers in ascending order.

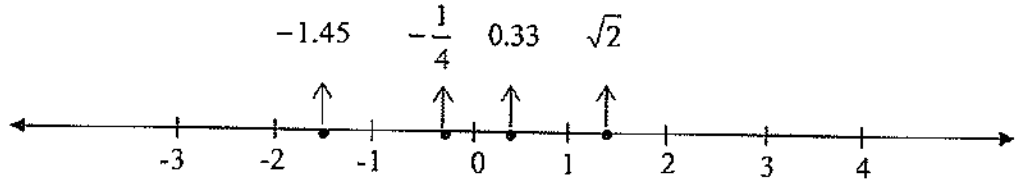
$-\frac{1}{4}$, 0.33, $\sqrt{2}$, -1.45

$-1.45, -\frac{1}{4}, 0.33, \sqrt{2}$ **[B1]**

Answer : (a) $-1.45, -\frac{1}{4}, 0.33, \sqrt{2}$ [1]

(b) Represent the numbers in **(a)** on the given number line. [2]

Answer (b) :



[-1 for any mistake]

For Examiner's Use

3 Kevin cycled at a speed of 8 km/h for 84 minutes for the first part of a journey. He then decided to slow down and continued to cycle for another 13 km at a speed of 5 km/h for the rest of the journey. Calculate

(a) the distance travelled in the first part of the journey,

84 min $\rightarrow 1.4h$

Distance travelled $= 8 \times 1.4 = 11.2$ **[B1]**

Answer : (a) $11.2 / 11\frac{1}{5}$ km [1]

(b) the average speed for the whole journey.

Time travelled for 2nd part = 2.6h

Average speed $= \frac{11.2+13}{2.6+1.4}$ **[M1]**

$= 6.05$ km/h **[A1]**

Answer : (b) $6.05 / 6\frac{1}{20}$ km/h [2]

4 Andy wanted to buy a pair of shoes which costs \$240. The shopkeeper gave Andy a discount and Andy paid \$225 for the pair of shoes instead.
Calculate the percentage discount.

Percentage discount $= \frac{240-225}{240} \times 100\%$ **[M1]**

$= 6.25\%$ **[A1]**

Answer : $6.25 / 6\frac{1}{4}$ % [2]

For Examiner's Use

5 Showing your workings clearly, evaluate

(a) $-22-6\div(-2)$,

$-22-6\div(-2)=-22+3$ **[M1]**

$=-19$ **[A1]**

Answer : (a) -19 [2]

(b) $\left(-\frac{1}{3}\right)^2-\left(-\frac{4}{9}\right)$.

$\left(-\frac{1}{3}\right)^2-\left(-\frac{4}{9}\right)=\left(\frac{1}{9}\right)-\left(-\frac{4}{9}\right)$ **[M1]**

$=\frac{5}{9}$ **[A1]**

Answer : (b) $\frac{5}{9}$ [2]

6 Factorise the following completely.

(a) $9qx-12x^2$

$9qx-12x^2=3x(3q-4x)$ **[B1]**

Answer : (a) $3x(3q-4x)$ [1]

(b) $(2y-3)+x(3-2y)$

$(2y-3)+x(3-2y)=(2y-3)-x(2y-3)$ **[M1]**

$=(2y-3)(1-x)$ **[A1]**

Answer : (b) $(2y-3)(1-x)$ [2]

For Examiner's Use

7 Solve the following equations.

(a) $5x - 25 = 3(3x + 2)$

$5x - 25 = 9x + 6$ **[M1]**

$5x - 9x = 25 + 6$ **[M1]**

$-4x = 31$

$x = -7\frac{3}{4}$ **[A1]**

Answer : (a) $x = -7\frac{3}{4}$ [3]

(b) $\frac{x}{3} - \frac{x-1}{6} = 2$

$\frac{2x}{6} - \frac{x-1}{6} = 2$ **[M1]**

$\frac{2x-(x-1)}{6} = 2$

$2x - (x-1) = 12$

$2x - x + 1 = 12$ **[M1]**

$x = 11$ **[A1]**

Answer : (b) $x = 11$ [3]

For Examiner's Use

8 **(a)** Find the prime factorization of 2772, expressing your answer in index notation.

2772
/ \
2 1386
/ \
2 693
/ \
3 231
/ \
3 77
/ \
7 11 **[M1] – factor tree**

$2772 = 2^2 \times 3^2 \times 7 \times 11$ **[A1]**

Answer : (a) $2772 = 2^2 \times 3^2 \times 7 \times 11$ [2]

(b) Given that the prime factorization of 4200 is $2^3 \times 3 \times 5^2 \times 7$, find the highest common factor of 2772 and 4200.

HCF = 84 **[B1]**

Answer : (b) HCF = 84 [1]

(c) Find the smallest integer k such that $(2772 \times 4200k)$ is a square number.

$k = 66$ **[B1]**

Answer : (c) $k = 66$ [1]

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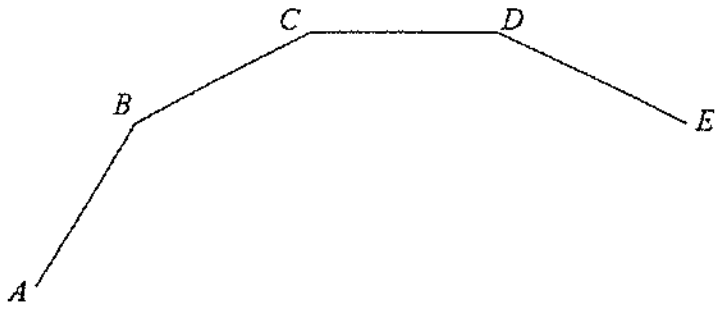
9 The diagram shows part of a regular 16-sided polygon.



Calculate

(a) $\angle BCD$,

Sum of interior angles $= (16-2)180°$ **[M1]**

$= 2520°$

$\angle BCD = 2520° \div 16$

$= 157.5°$ **[A1]**

Answer : (a) 157.5° [2]

(b) the size of the exterior angle.

Exterior angle $= 360° \div 16$

$= 22.5°$ **[B1]**

Answer : (b) 22.5° [1]

76 **[Turn over**

10 The first four terms of a sequence are 8, 13, 18, 23.

(a) Write down the 7th term of the sequence.

7^{th} term $= 38$ **[B1]**

Answer : (a) 38 [1]

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

n^{th} term $= 3 + 5n$ **[B1]**

Answer : (b) $3 + 5n$ [1]

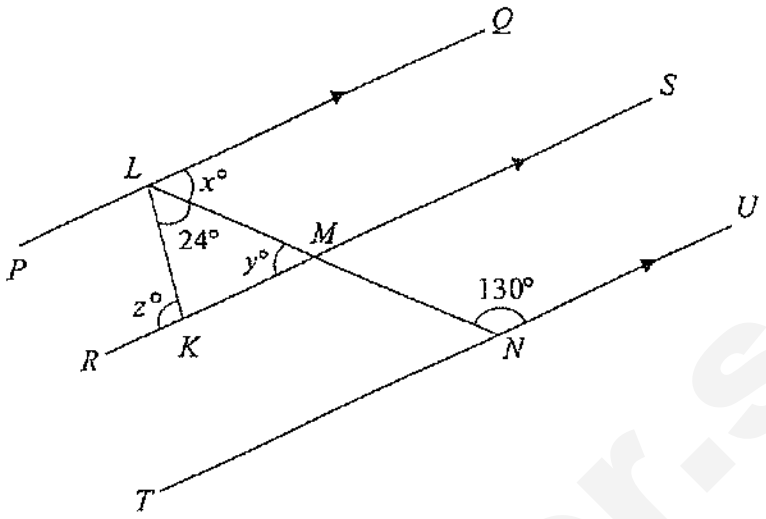
(c) Find the 65th term of the sequence.

65^{th} term $= 328$ **[B1]**

Answer : (c) 328 [1]

For Examiner's Use

11 **(a)** Find the values of x, y and z in the following diagram, stating your reasons clearly.



$130° + x° = 180°$ (interior angles)
$x = 50$ **[B1]**

$y° = x°$ (alternate angles)
$y = 50$ **[B1]**

$z° = 24° + y°$ (exterior angle of a triangle)
$z = 74$ **[B1]**

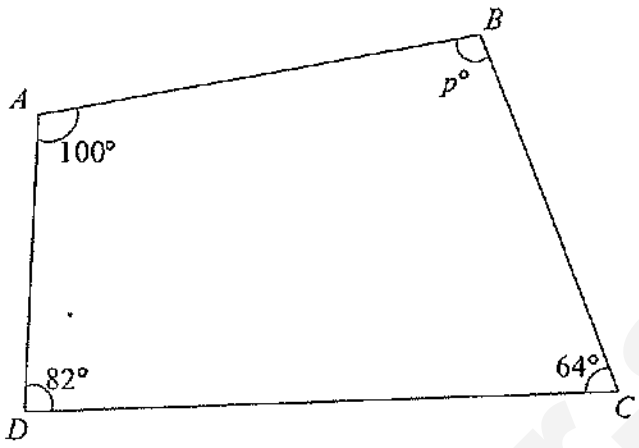
Answer : (a) $x = 50$ [1]

$y = 50$ [1]

$z = 74$ [1]

For Examiner's Use

(b) $ABCD$ is a quadrilateral. Given that $\angle BAD = 100°$, $\angle ADC = 82°$ and $\angle BCD = 64°$, find the value of p.



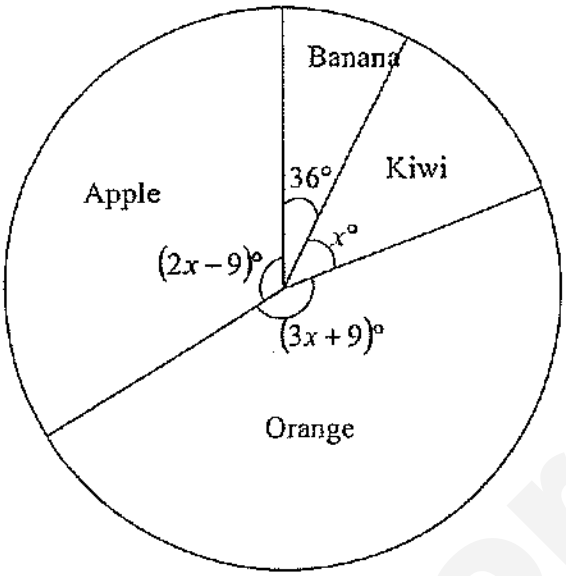
$100° + 82° + p° + 64° = 360°$ (angle sum of quad.) [M1]

$p = 114$ [A1]

Answer : (b) $p = 114$ [2]

For Examiner's Use

12 The pie chart below represents the favourite fruits of students in a class.



(a) Find the value of x.

$(2x-9)+(3x+9)+36+x=360$ **[M1]**

$x=54$ **[A1]**

Answer : (a) $x=54$ [2]

(b) Find the percentage of students whose favourite fruit is apple.

Percentage of students $=\frac{99}{360}\times 100\%$ **[M1]**

$=27.5\%$ **[A1]**

Answer : (b) 27.5% [2]

(c) Given that there are a total of 40 students in the class, find the number of students whose favourite fruit is orange.

Number of students $=\frac{171}{360}\times 40$ **[M1]**

$=19$ **[A1]**

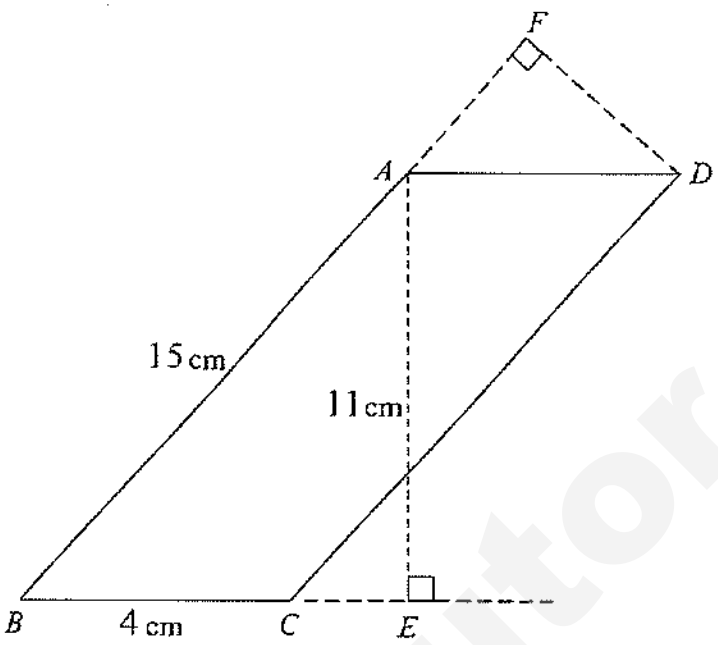
Answer : (c) 19 [2]

78

[Turn over

For Examiner's Use

13 (a) In the diagram, $ABCD$ is a parallelogram. $AB = 15$ cm, $BC = 4$ cm and $AE = 11$ cm. AE is perpendicular to BE and DF is perpendicular to BF.



(i) Find the area of parallelogram $ABCD$.

Area of parallelogram $= 4 \times 11$
$= 44 \text{ cm}^2$ **[B1]**

Answer : (a) (i) 44 cm^2 [1]

(ii) Find the length of DF.

$DF = 44 \div 15$ **[M1]**
$= 2\frac{14}{15} \text{ cm}$ **[A1]**

Answer : (a) (ii) $2\frac{14}{15} \text{ cm}$ [2]

For Examiner's Use

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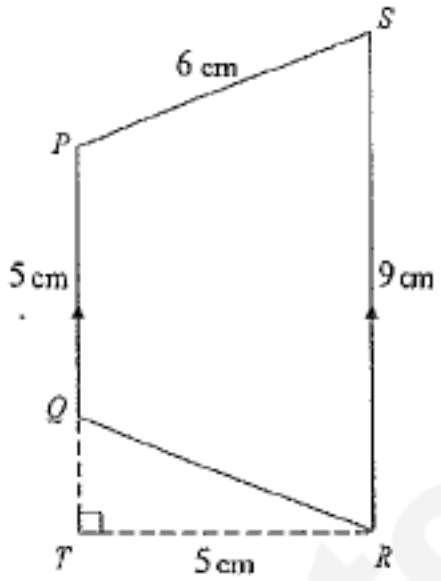
(b) In the diagram, $PQRS$ is a quadrilateral. $PQ = 5$ cm, $RS = 9$ cm, $PS = 6$ cm, $TR = 5$ cm and QP is parallel to RS.



(i) State the special name of quadrilateral $PQRS$.

(ii) Find the area of quadrilateral $PQRS$.

(i) Trapezium **[B1]**

(ii) Area of quadrilateral $PQRS = \frac{1}{2}(5+9)(5)$ **[M1]**

$= 35 \text{ cm}^2$ **[A1]**

Answer : *(b)* *(i)* Trapezium [1]

(ii) 35 cm^2 [2]

~ End of Paper ~

BEATTY SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2015

SUBJECT : Mathematics **LEVEL : Sec 1 Express**

PAPER : 2 **DURATION : 1 hour 30 minutes**

SETTER : Ms Yuen Shu Yan **DATE : 9 October 2015**

CLASS :	NAME :	REG NO :

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80 [Turn over

1 Subtract $11x^2 - 5$ from $8x^2 + 3x - 1$. [2]

2 Simplify $\frac{3a+4b}{6} - \frac{5b-a}{5} + b$. [3]

3 Buses for service number 231, 235 and 238 leave Toa Payoh bus interchange every 8 minutes, 3 minutes and 6 minutes respectively. If buses for all three service numbers left the interchange at 1900 hour, what is the next time when buses for all three service numbers leave the interchange at the same time again? [3]

4 If $\frac{1}{R} = \frac{1}{P} + \frac{1}{Q}$, find the value of P when $R = 5$ and $Q = \frac{2}{5}$. [3]

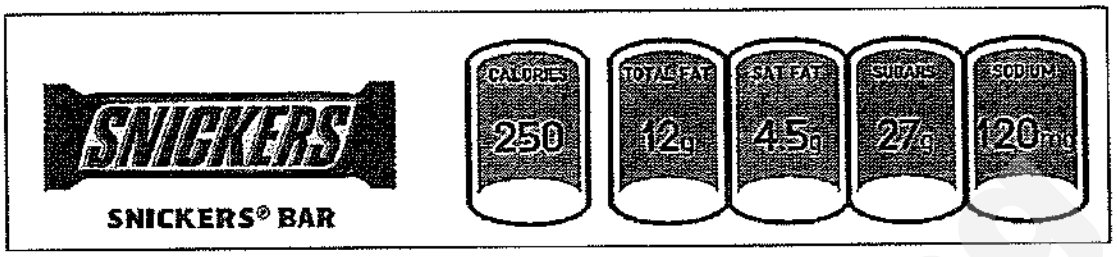
5 Solve the equation $\frac{2x+1}{x-3} = 2\frac{1}{3}$. [3]

6 Factorise $a(5x-1) - b(5x-1)$.

Hence, find the value of $20 \times 99 - 10 \times 99$. [3]

7 An interior angle of a regular polygon is five times its exterior angle. Find the number of sides of the polygon. [3]

8 The nutritional information of a Snickers bar is shown in the diagram below.



(a) Find the ratio in mass of Total Fat : Sat(urated) Fat : Sugars. [2]

(b) Calculate the percentage of the mass of sodium in one bar of Snickers. [2]

(c) If a student burns 30 calories by walking to school in 15 minutes, calculate the time taken, in hours, he will need to burn all the calories in one bar of Snickers. [2]

Answer the whole question on a blank piece of paper provided.

9 Draw a quadrilateral $ABCD$ given that $AB = 8.6$ cm, $AD = 4.4$ cm $\angle ADC = 120°$, $\angle BAD = 70°$ and $\angle ABC = 100°$. [3]

(a) Construct the angle bisector of $\angle BCD$. [1]

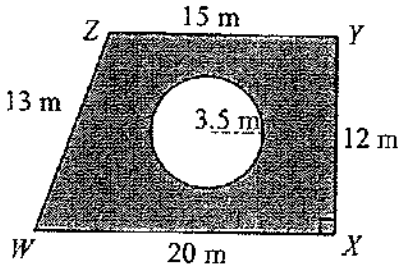
(b) Construct the perpendicular bisector of CD. [1]

(c) Label the point X where the angle bisector and the perpendicular bisector meet. Construct a circle with centre X which passes through points C and D. [1]

(d) Write down the radius of the circle. [1]

10 The diagram below shows a cross-section of a solid prism with a hole of radius 3.5 m drilled through it. $WXYZ$ is a trapezium, where $WX = 20$ m, $XY = 12$ m, $YZ = 15$ m, $WZ = 13$ m and $\angle WXY = 90°$.

The length of the solid is 24 m.



Find

(a) the area of the cross-section, leaving your answer in terms of π, [3]

(b) the volume of the solid, [2]

(c) the total surface area of the solid. [3]

Answer the whole of this question on a sheet of graph paper.

11 The table below shows some values of x and the corresponding values of y for the function $6y + 2x = 5$.

x	−5	−2	1	4
y	2.5	p	0.5	−0.5

(a) Calculate the value of p. [1]

(b) Using a scale of 2 cm to 1 unit on the x-axis for $-5 \le x \le 4$ and 4 cm to 1 unit on the y-axis for $-1 \le y \le 3$, draw the graph of $6y + 2x = 5$. [3]

(c) Find the gradient of the line. [1]

(d) From the graph, find

(i) the value of x when $y = 2$, [1]

(ii) the value of y when $x = -1$. [1]

(e) Draw and label the graph of $x = 2$. Hence, state the co-ordinates of point of intersection of the two graphs. [2]

~ End of Paper ~

Answers

1 $-3x^2+3x+4$

2 $\dfrac{21a+20b}{30}$

3 24 min, 1924 h

4 $-\dfrac{10}{23}$

5 24

6 $(5x-1)(a-b)$, 990

7 12

8(a) 8 : 3 : 18

(b) 0.275 %

(c) $12\dfrac{1}{12}$ hours

9(d) 5 cm

10(a) $210-12.25\pi$ m^2

(b) 4120 m^3

(c) 2310 m^2

11(a) $p = 1.5$

(c) $-\dfrac{1}{3}$

(d)(i) $x = -3.5$

(ii) $y = 1.15$

(e) (2 , 0.15)

BEATTY SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2015

MARKING SCHEME

SUBJECT : Mathematics **LEVEL : Sec 1 Express**

PAPER : 2 **DURATION : 1 hour 30 minutes**

SETTER : Ms Yuen Shu Yan **DATE : 9 October 2015**

CLASS :	NAME :	REG NO :

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on the top of this page.
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.

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.

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
50

1 Subtract $11x^2 - 5$ from $8x^2 + 3x - 1$. [2]

$(8x^2 + 3x - 1) - (11x^2 - 5) = 8x^2 + 3x - 1 - 11x^2 + 5$ M1

$= -3x^2 + 3x + 4$ A1

2 Simplify $\frac{3a+4b}{6} - \frac{5b-a}{5} + b$. [3]

$\frac{3a+4b}{6} - \frac{5b-a}{5} + b = \frac{5(3a+4b) - 6(5b-a) + 30b}{30}$ M1

$= \frac{15a + 20b - 30b + 6a + 30b}{30}$ M1

$= \frac{21a + 20b}{30}$ A1

3 Buses for service number 231, 235 and 238 leave Toa Payoh bus interchange every 8 minutes, 3 minutes and 6 minutes respectively. If buses for all three service numbers left the interchange at 1900 hour, what is the next time when buses for all three services numbers leave the interchange at the same time again? [3]

$8 = 2^3$

$3 = 1 \times 3$ M1 °

$6 = 2 \times 3$

LCM $= 2^3 \times 3$ M1

$= 24$

Next time when buses of all three services leave = 1924 hour *or* 7.24 pm. A1

4 If $\frac{1}{R} = \frac{1}{P} + \frac{1}{Q}$, find the value of P when $R = 5$ and $Q = \frac{2}{5}$. [3]

When $R = 5$, $Q = \frac{2}{5}$,

$\frac{1}{5} = \frac{1}{P} + \frac{1}{\left(\frac{2}{5}\right)}$ M1

$\frac{1}{P} = -\frac{23}{10}$ M1

$P = -\frac{10}{23}$ A1

5 Solve the equation $\frac{2x+1}{x-3}=2\frac{1}{3}$. [3]

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

$3(2x+1)=7(x-3)$ M1

$6x+3=7x-21$ M1

$x=24$ A1

6 Factorise $a(5x-1)-b(5x-1)$.

[redacted], find the value of $20\times99-10\times99$. [3]

$(5x-1)(a-b)$ B1

Let $x=20, a=20, b=10$,

$20\times99-10\times99=[5(20)-1][20-10]$ M1

$=(100-1)(10)$

$=99\times10$

$=990$ A1

$20\times99-10\times99=99(20-10)$

$=99\times10$

$=990$

7 An interior angle of a regular polygon is five times its exterior angle. Find the number of sides of the polygon. [3]

$\frac{(n-2)\times180}{n}=\frac{360}{n}\times5$ M1

$\frac{180n-360}{n}=\frac{1800}{n}$

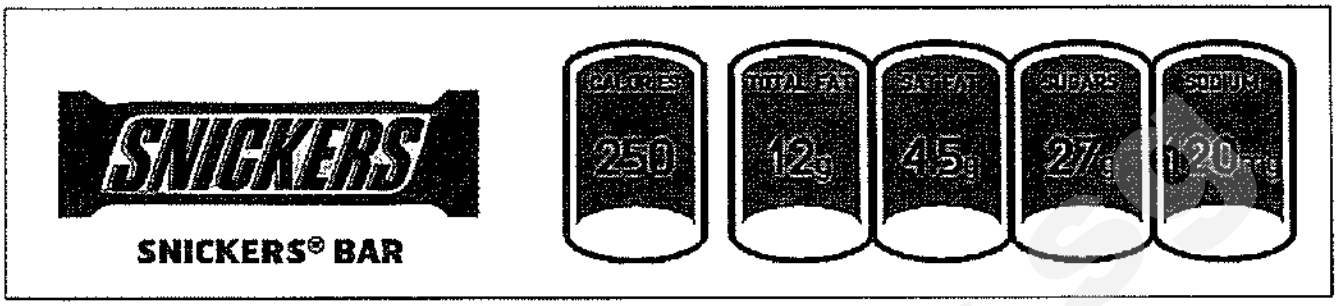
$180n-360=1800$ M1

$180n=2160$

$n=12$ A1

84

8 The nutritional information of a Snickers bar is shown in the diagram below.



(a) Find the ratio in mass of Total Fat : Sat(urated) Fat : Sugars. [2]

(b) Calculate the percentage of the mass of sodium in one bar of Snickers. [2]

(c) If a student burns 30 calories by walking to school in 15 minutes, calculate the time taken, in hours, he will need to burn all the calories in one bar of Snickers. [2]

(a) Ratio of Total Fat, Sat Fat and Sugars $= 12 : 4.5 : 27$ M1

$= 8 : 3 : 18$ A1

(b) Percentage of mass of sodium $= \frac{0.12}{12 + 4.5 + 27 + 0.12} \times 100\%$ M1

$= 0.275\%$ A1

(c) Time required $= \frac{15}{30} \times 250$ M1

$= 125$ minutes

$= 2\frac{1}{12}$ hours A1

Answer the whole question on a blank piece of paper provided.

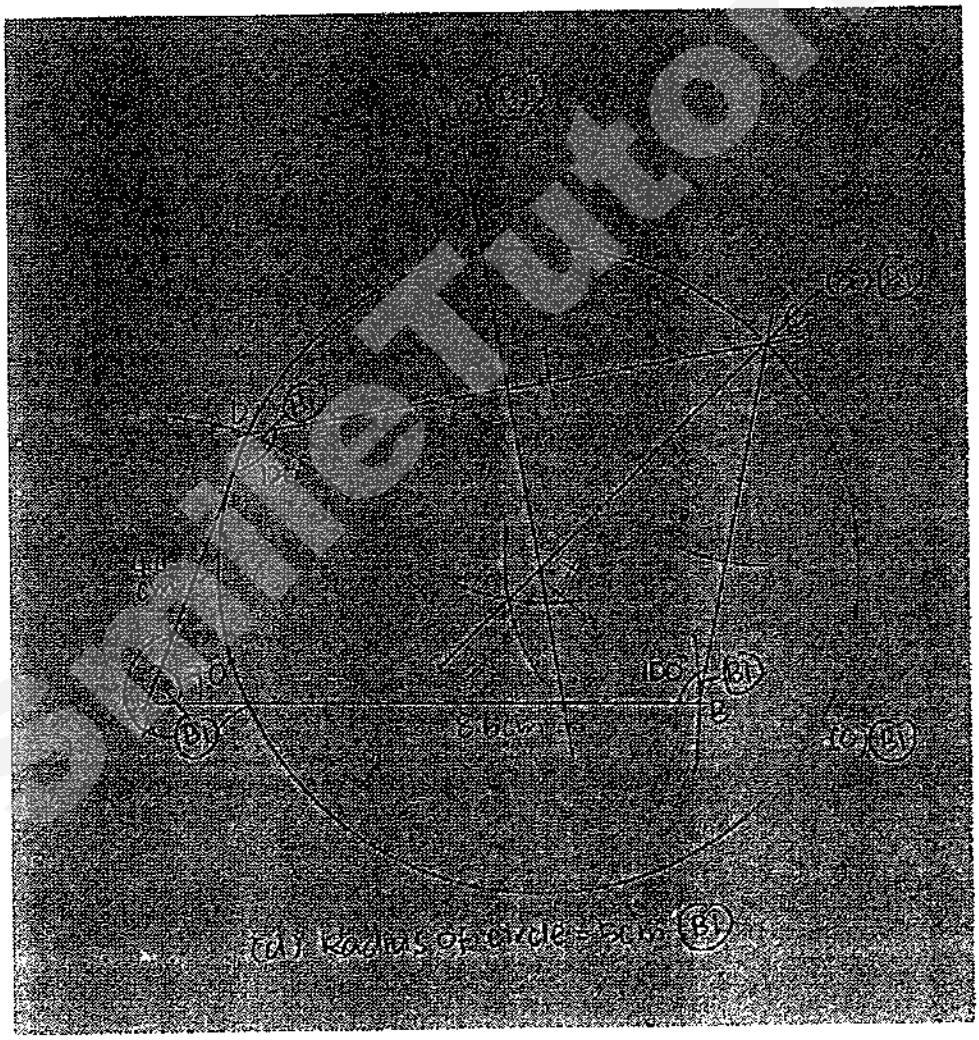
9 Draw a quadrilateral $ABCD$ given that $AB = 8.6$ cm, $AD = 4.4$ cm $\angle ADC = 120°$, $\angle BAD = 70°$ and $\angle ABC = 100°$. [3]

(a) Construct the angle bisector of $\angle BCD$. [1]

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

(c) Label the point X where the angle bisector and the perpendicular bisector meet. Construct a circle with centre X which passes through points C and D. [1]

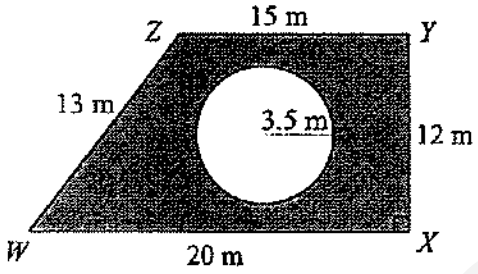
(d) Write down the radius of the circle. [1]



85

10 The diagram below shows a cross-section of a solid prism with a hole of radius 8 m drilled through it. $WXYZ$ is a trapezium, where $WX = 26$ m, $XY = 12$ m, $YZ = 15$ m, $WZ = 13$ m and $\angle WXY = 90°$.

The length of the solid is 24 m.



Find

(a) the area of the cross-section, leaving your answer in terms of π, [3]

(b) the volume of the solid. [2]

(c) the total surface area of the solid [3]

(a) Area of trapezium $= \frac{1}{2}(12)(15+20)$ M1

$= 210\,\text{m}^2$

Area of circle $= \pi(3.5)^2$ M1

$= 12.25\pi\,\text{m}^2$

Area of cross-section $= (210 - 12.25\pi)\,\text{m}^2$ A1

(b) Volume of solid $= (210 - 12.25\pi) \times 24$ M1

$= 4120\,\text{m}^3$ (to 3 sig fig) A1

(c) Surface area of trapezium $= 2(210 - 12.25\pi) + (20+12+15+13) \times 24$ M1

$= 2(210 - 12.25\pi) + 1440\,\text{m}^2$

Curved surface area of hole $= 2\pi(3.5) \times 24$ M1

$= 168\pi\,\text{m}^2$

Total surface area $= [2(210 - 12.25\pi) + 1440] + 168\pi$

$= 2310\,\text{m}^2$ (to 3 sig fig) A1

Answer the whole of this question on a sheet of graph paper.

11 The table below shows some values of x and the corresponding values of y for the function $6y + 2x = 5$.

x	−5	−2	1	4
y	2.5	p	0.5	−0.5

(a) Calculate the value of p. [1]

(b) Using a scale of 2 cm to 1 unit on the x-axis for $-5 \leq x \leq 4$ and 4 cm to 1 unit on the y-axis for $-1 \leq y \leq 3$, draw the graph of $6y + 2x = 5$. [3]

(c) Find the gradient of the line. [1]

(d) From the graph, find

(i) the value of x when $y = 2$, [1]

(ii) the value of y when $x = -1$. [1]

(e) Draw and label the graph of $x = 2$. Hence, state the co-ordinates of point of intersection of the two graphs. [2]

86

~ End of Paper ~

Name _____ Index No _____

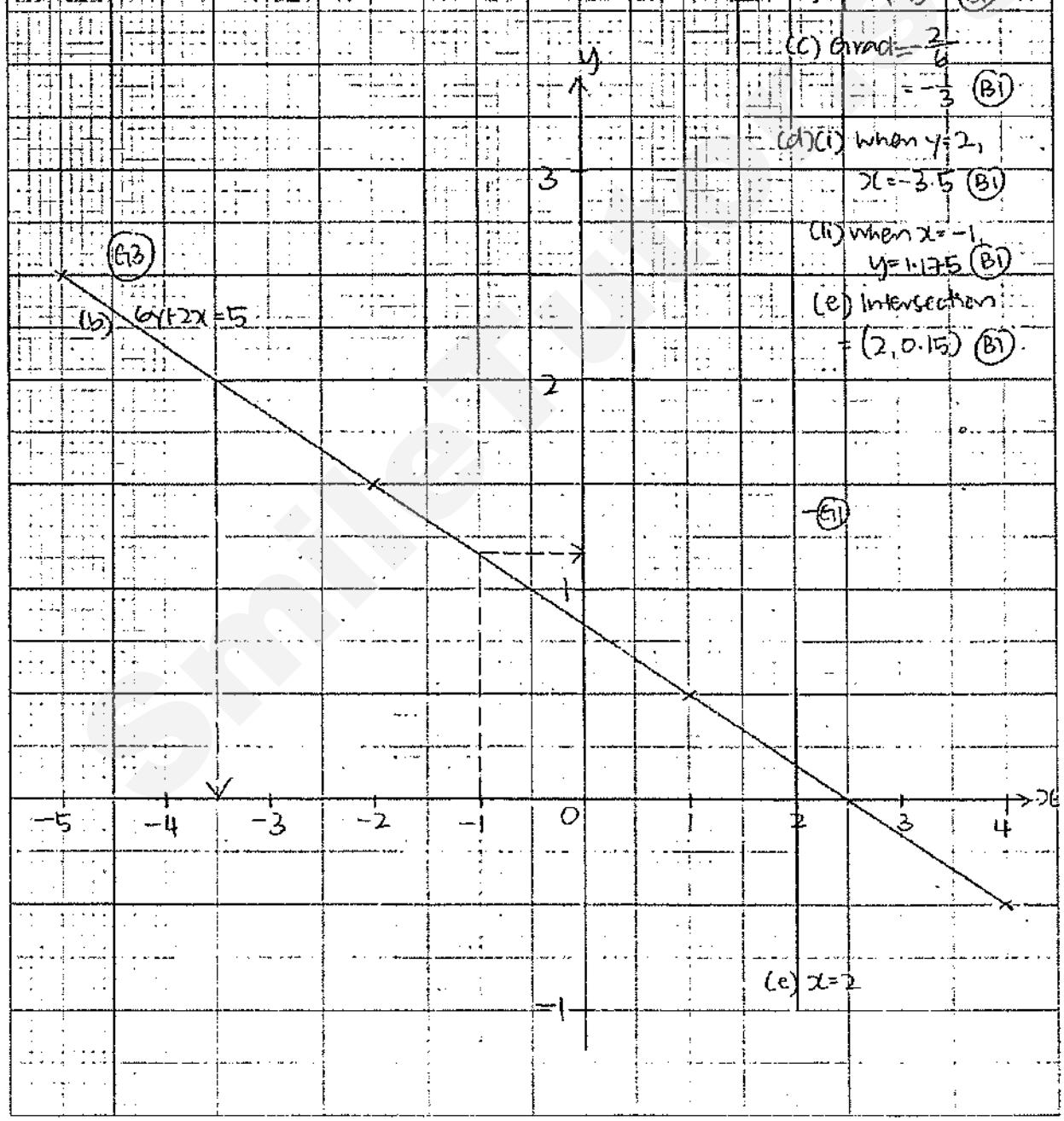
Subject _____ Class _____ Date _____

11 Graph of $6y + 2x = 5$

Scale x-axis : 2cm to 1 unit

y-axis : 4cm to 1 unit

x	-5	-2	1	4
y	2.5	1.5	0.5	-0.5



(a) $p = 1.5$ (B1)

(c) Grad $= -\frac{2}{6}$

$= -\frac{1}{3}$ (B1)

(d)(i) when $y = 2$,

$x = -3.5$ (B1)

(ii) when $x = -1$,

$y = 1.175$ (B1)

(e) Intersection

$= (2, 0.15)$ (B1)

(G3)

(E1)

(e) $x = 2$

20 cm x 24 cm

Class	Register No	Name

Bukit Merah Secondary School
End-of-Year Examination 2015
Secondary 1 Express

E

MATHEMATICS

1 Oct 2015

Paper 1

1 hour 15 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your class, register number and name 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.
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 when 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.

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**.

Calculator Model:

For Examiner's Use

Setter: Mdm CHOR O.M. Christina
Vetter: Ms Stella TOH Y.M.

87

This document consists of 9 printed pages.

Answer **all** the questions

For Examiner's use

1 **(a)** Given that $48 = 2^4 \times 3$ and $954 = 2 \times 3^2 \times 53$, find the

(i) HCF of 48 and 954, and

(ii) LCM of 48 and 954.

(b) Round off 30993 to the nearest 100.

(c) Express 1.2855, correct to 3 decimal places.

For Examiner's use

Answer *(a)* *(i)* ..... **[1]**

(ii) ..... **[1]**

(b) ..... **[1]**

(c) ..... **[1]**

2 **(a)** Fill in the blanks with '+', '−', '×', '÷' or '=' to form a correct mathematical statement.

You may use the signs more than once.

$-8 \_\_\_\_\_ 7 = 112 \_\_\_\_\_ 168 = -56$

[1]

(b) State the irrational number(s) from the list of numbers given below.

$\sqrt[3]{8}$, $\sqrt{5}$, π^2, $\sqrt{225}$

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

For Examiner's use

3 **(a)** Solve the inequality $11x < 33$.

(b) Hence, represent the solution from **(a)** on the number line given below.

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

Answer *(b)*

[1]

4 **(a)** Rewrite each of the following as an algebraic expression.

(i) Subtract 3 from the product of $2ab$ and $5c$.

(ii) Divide twice the sum of 4 and $7p$ by the cube of q.

(b) Evaluate $\frac{a^2+b}{2ab}$ when $a = -3$ and $b = 11$.

Answer *(a)* *(i)* ..... **[1]**

(ii) ..... **[1]**

(b) ..... **[1]**

5 **(a)** Convert 280.8 km/h to m/s.

(b) A washing machine takes 40 minutes to wash a laundry load of 2.5 kg.

Find

(i) the rate of washing in kg/min, and

(ii) the time required to wash a laundry load of 26 kg.

Answer *(a)* ..... m/s **[1]**

(b) *(i)* ..... kg/min **[1]**

(ii) ..... minutes **[1]**

For Examiner's use

6 **(a)** Simplify $16d^2 - 8d \times 2d + 5(-3d)$.

(b) Solve the equation $-5x - 3 = 18 + 2x$.

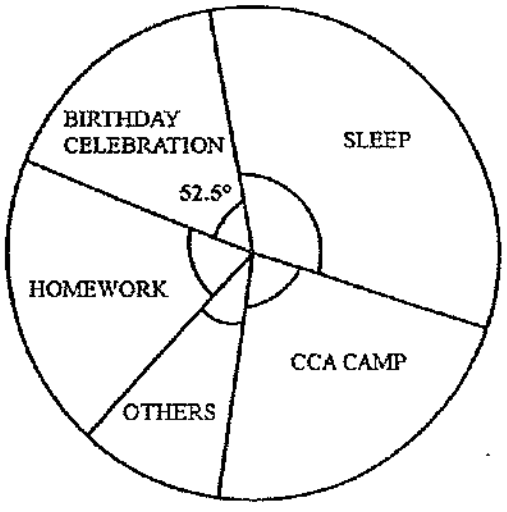
Answer *(a)* ..... [2]

(b) $x =$ ..... [2]

7 The pie chart below shows the proportion of time spent on various activities on a particular Sunday (24 hours) by Miley, a secondary one pupil.

(a) Find the number of hours she spent on the birthday celebration.

(b) 40 % of the time at the CCA camp is spent on learning survival skills.
Find the size of the angle represented by the CCA camp, if the time spent on learning survival skills is 2 hours.



Answer *(a)* .....hours [1]

(b) ..... [2]

For Examiner's use

8 The pictogram below shows the number of students who like different types of kendama: Digital kendama (type A), Baseball kendama (type B) and Wooden-doll kendama (type C).

Digital kendama (type A)	
Baseball kendama (type B)	
Wooden-doll kendama (type C)	
 represents 20 students	

(a) Find the ratio of the number of students who like type A to the number of students who like type C.

(b) Express the number of students who like type B as a percentage of the number of students who like type A.

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

(b) ..... % [2]

9 **(a)** Given that $(3, a)$ lies on the graph of $y = -4 + 3x$, find the value of a.

(b) The graph of $y = \frac{5}{4}x + 1$ cuts the x – axis at point A.

Find the coordinates of A.

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

(b) (..... , ...) [2]

For Examiner's use

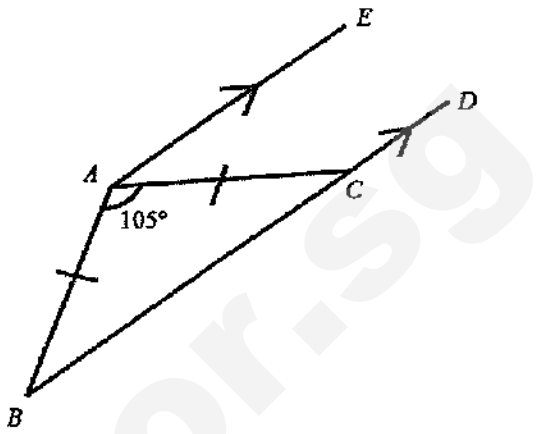
10 In the diagram below, AE and BCD are parallel lines.

$AB = AC$ and $\angle BAC = 105°$.

Find, by stating your reason(s) clearly in the space below,

(a) $\angle CAE$, and

(b) reflex $\angle ACD$.



Answer *(a)* $\angle CAE$ = ...° [2]

(b) Reflex $\angle ACD$ = ...° [1]

11 **(a)** Express 2.75 years as a percentage of 15 months.

(b) Find the value of the unknown in the following expression: 215 % of x is 6.88.

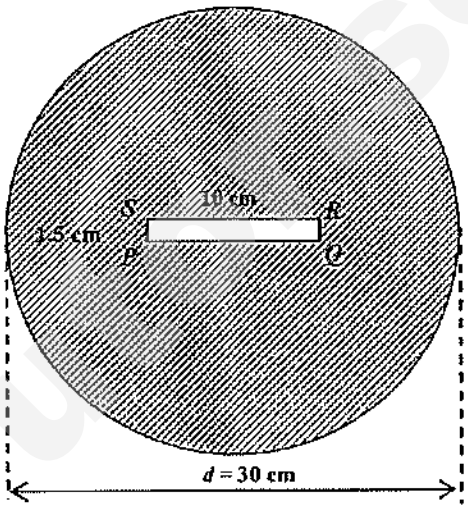
Answer *(a)* .....% [2]

(b) x = ... [2]

For Examiner's use

12 (a) Given that the sum of two parallel sides in a trapezium is 16 m and its perpendicular height is 3 m, calculate the area of the trapezium.

(b) The diagram below shows the top surface of a cylindrical ballot box.
The top surface has a rectangular slit $PQRS$ in the centre for voters to drop their ballot papers into the box.
Given that the diameter, d, of the top surface is 30 cm, RS = 10 cm and PS = 1.5 cm, calculate the area of the shaded region in m^2.



Answer (a) ..... m^2 [2]

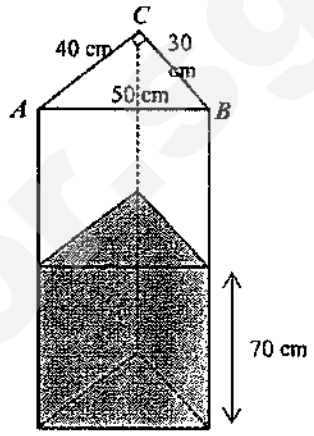
(b) ..... m^2 [3]

For Examiner's use

13 The diagram below shows a triangular prism that is a designer's flower vase.
It is filled up with water to a height of 70 cm.
$AB = 50$ cm, $BC = 30$ cm and $AC = 40$ cm.

(a) Find the volume of water in the vase.

(b) If 3468 cm^3 of water is drained from the vase, find the new water level.



For Examiner's use

Answer *(a)* ..... cm^3 **[2]**

(b) ..... cm **[3]**

For examiner's use

14 Lines AB and BC have been drawn for you in the diagram below.

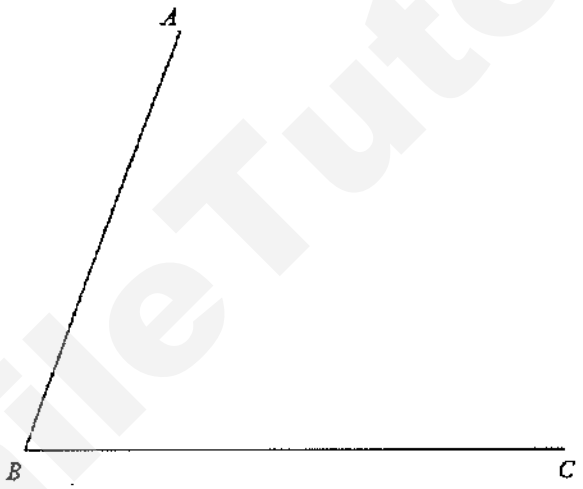
(a) Given that $AD = 4.8$ cm and $CD = 6.2$ cm, construct the quadrilateral $ABCD$. **[2]**

(b) Draw the angle bisector of $\angle ADC$. **[1]**

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

(d) The bisectors from parts **(b)** and **(c)** intersect at point X.

Measure and write down the length of BX.



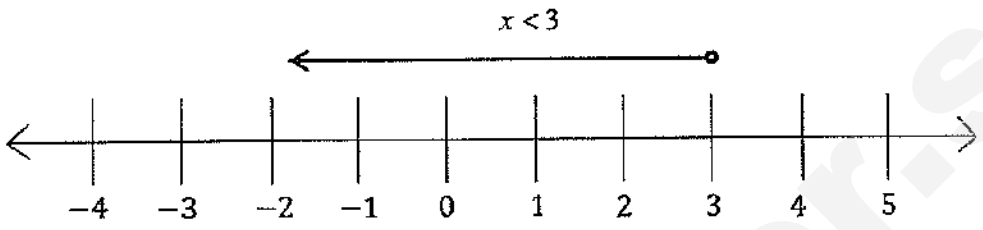
Answer (d) ..... cm **[1]**

For Examiner use

End-of-Paper 1

91

Sec 1 Express EOY Examinations 2015 Mathematics Paper 1
Marking Scheme

Question	Solution	Mark
1(a)(i)	6	B1
1(a)(ii)	7 632	B1
1(b)	31 000	B1
1(c)	1.286	B1
2(a)	$\times$, $-$	B1
2(b)	$\sqrt{5}$, π^2	B1
3(a)	$x < 3$	B1
3(b)		B1 Ecf, only for solutions showing inequalities
4(a)(i)	$10abc - 3$	B1 Accept (2ab×5c)-3
4(a)(ii)	$\frac{2(4+7p)}{q^3}$	B1
4(b)	$-\frac{10}{33}$ or $-0.\dot{3}\dot{0}$ Reject: -0.303 (3 s. f.)	B1
5(a)	78	B1
5(b)(i)	0.0625 or $\frac{1}{16}$	B1
5(b)(ii)	416	B1
6(a)	$16d^2 - 16d^2 - 15d$	M1 for either $-16d^2$ or $-15d$
	$-15d$	A1
6(b)	$-5x - 2x = 18 + 3$ $-7x = 21$	M1 (all working must be correct)
	-3	A1
7(a)	3.5 or $3\frac{1}{2}$	M1
7(b)	$\frac{100\%}{40\%} \times 2$ hours = 5 hours $\frac{5}{24} \times 360^\circ$	M1
	75	A1
8(a)	80 : 45	M1
	16 : 9	A1

92

Prepared by Mdm Chor O.M. Christina

8(b)	$\frac{1.5\times 20}{80}\times 100\%$	M1
	37.5 or $37\frac{1}{2}$	A1
9(a)	5	B1
9(b)	$0=\frac{5}{4}x+1$	M1
	$\left(-\frac{4}{5},0\right)$ or $(-0.8,0)$	A1
Note: For question 10(a) below, overall maximum deduction of 1 mark applies if <u>all</u> working is correct but the respective reason(s) is/are missing or wrong.		
10(a)	$\angle ACB=\frac{180^\circ-105^\circ}{2}$ (base $\angle$s of isos. Δ) $=37.5^\circ$ $\angle CAE=37.5^\circ$ (alt. $\angle$s, $AE \parallel BCD$)	M1 Marks deducted for not writing BASE $\angle$s and $AE \parallel BCD$
	37.5 or $37\frac{1}{2}$	A1
10(b)	217.5 or $217\frac{1}{2}$	B1
11(a)	$\frac{2.75\times 12}{15}\times 100\%$	M1
	220	A1
11(b)	$\frac{215}{100}x=6.88$	M1
	3.2 or $3\frac{1}{5}$	A1
12(a)	$\left(\frac{1}{2}\times 16\times 3\right)m^2$	M1
	24	A1
12(b)	$(\pi\times 15^2)cm^2-(1.5\times 10)cm^2$ $=692cm^2(3s.f.)$ or 691.85... cm^2 (-1mark for premature rounding)	M1 (for $\pi\times 15^2$) M1 (answer in cm^2)
	0.0692	A1
13(a)	$\left(\frac{1}{2}\times 30\times 40\right)cm^2\times 70cm$	M1
	42 000	A1
13(b)	$3468cm^3\div 600cm^2$ $=5.78cm$	M1
	$(70-5.78)cm$	M1
	64.22 Reject: 64.2 (3 s.f.)	A1
14	(a) – (d) answers: (marker to advise) (d) 4.2 ± 0.1 cm (marked according to student's drawing.)	B1 ×5

----- The End -----

Class	Register No	Name

Bukit Merah Secondary School
End-of-Year Examination 2015
Secondary 1 Express

E

MATHEMATICS

Paper 2

8 Oct 2015

1 hour 30 minutes

Additional Materials: Writing Paper (4 sheets)
Graph Paper (1 sheet)

READ THESE INSTRUCTIONS FIRST

Write your class, register number and name 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/tape.

Answer all questions on writing papers.
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 when 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.

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 **60**.

Begin each question on a fresh page.

Calculator Model:

For Examiner's Use

Setter: Mdm CHOR O.M. Christina
Vetter: Ms Stella TOH Y.M.

This document consists of 6 printed pages.

93

[TURN OVER

Answer **all** the questions

1 (a) (i) The number 1071, expressed in index notation, is $1071 = 3^a \times 7 \times 17$. Find the value of a. [2]

(ii) Given that $8748 = 2^2 \times 3^7$, find the smallest value of k such that $8748k$ is a perfect cube. [2]

(b) (i) Without using a calculator, find the value of $8 + (-2)^3 \div 4$. [2]

(ii) Mei Xi thinks that a fraction cannot be expressed as a recurring decimal. Do you agree or disagree with her? Support your answer with an example of a fraction that can or cannot be expressed as a recurring decimal. [2]

---

2 (a) In a supermarket, a 300-*ml* bottle of Shampoo *A* costs \$11.80 and a 350-*ml* bottle of Shampoo *B* costs \$13.98. Without the use of a calculator and by using only estimation, decide which shampoo is better value for money. [3]

(b) A black pen costs x cents. A pink pen costs 5 cents more than twice the cost of a black pen.

(i) Express the cost of a pink pen in terms of x. [1]

(ii) Express the total cost of ten black pens and two pink pens in terms of x. [2]

---

3 (a) Solve the equation $\frac{2x-1}{4} + \frac{x+4}{8} = \frac{1}{2}$. [3]

(b) Find the greatest odd integer value of x that satisfies the inequality $-7x \geq -112$. [2]

4 **(a)** If $a : b = 11 : 8$ and $b : c = 5 : 11$, calculate

(i) $a : b : c$, and [2]

(ii) $a : c$. [1]

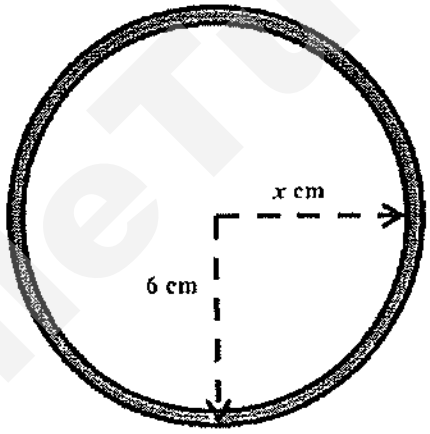
(b) Nick drove a car at a speed of 75 km/h for 15 minutes and then stopped the car for $\frac{1}{4}$ hour. He then continued to drive at 120 km/h for 10 minutes on an expressway.

Find the average speed of his entire journey in km/h. [3]

---

5 The diagram below shows the cross-section of a hollow circular pipe.

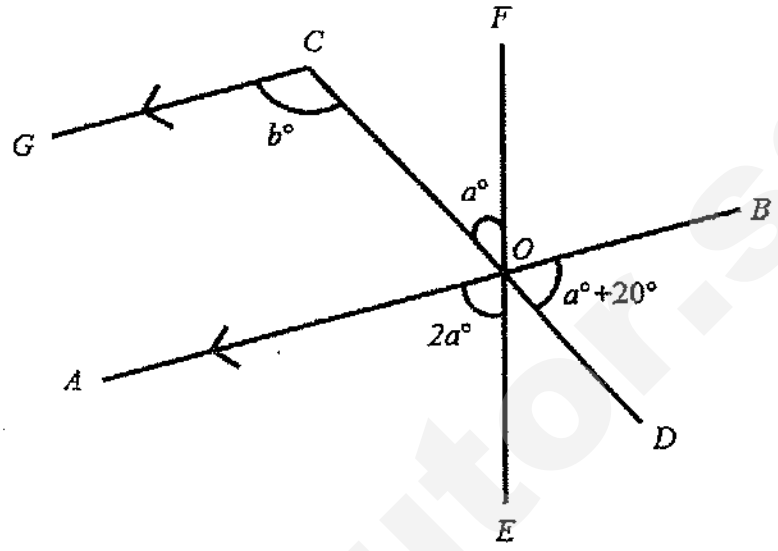
The outer radius is 6 cm while the inner radius is x cm.



(a) Write an algebraic expression for the shaded area of the diagram in terms of π and x, and then completely factorise it. [2]

(b) Given that the shaded area of the diagram is 28 cm^2, form an algebraic equation and solve it to find the value of x. [3]

6 **(a)** In the diagram below, AOB, COD and EOF are straight lines.
CG and AOB are parallel lines.



By stating your reason(s) clearly, find the values of

(i) a, and [2]

(ii) b. [2]

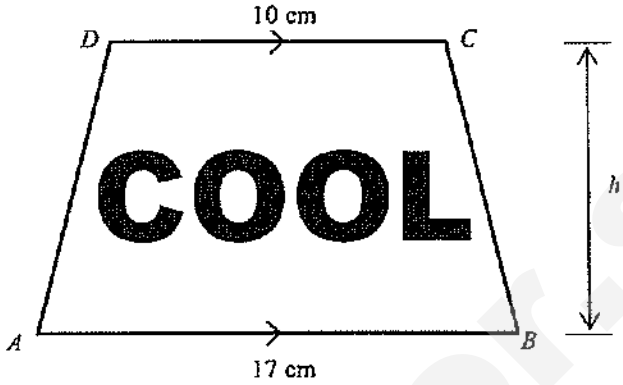
(b) (i) Find the size of an interior angle of a regular octagon. [2]

(ii) Two of the exterior angles of a n-sided polygon are 25° and 23°, and the remaining exterior angles are 24° each.
Find the value of n. [2]

7 The diagram below shows a trapezoidal sticker $ABCD$ with 'COOL' printed on it.

The shaded area of 'COOL' is 15 cm^2.

AB = 17 cm, CD = 10 cm and the perpendicular height, h, of $ABCD$ is 5 cm.



(a) Find the area of the unshaded region, in cm^2. [2]

(b) If the shaded area is reduced by 18 %, calculate the new shaded area, in cm^2. [2]

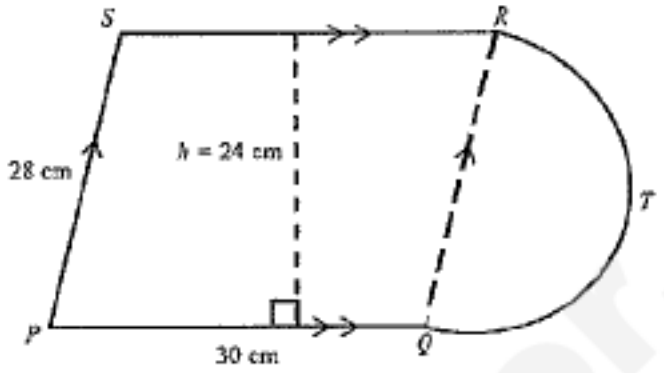
(c) The cost of printing 300 stickers after a discount of 10 % is \$711.

Find the cost of printing one sticker before discount, giving your answer to the nearest cent. [2]

95

8 The diagram shows the base, $PQTRS$, of a metal prism.

The base is made up of a parallelogram $PQRS$ and a semicircle RTQ. $PQ = RS = 30$ cm, $PS = RQ = 28$ cm, and the height of the parallelogram, $h = 24$ cm.



Find

(a) the area of $PQTRS$, in cm^2, [3]

(b) the total surface area of the metal prism, in cm^2, given that the vertical height of the solid from its base is 50 cm, and [3]

(c) the length of one side of a cube, in cm, given that the metal prism is recast into a cube. [2]

---

9 **Answer the whole of question 9 on a piece of graph paper.**

(a) Given that $y = 3x - 3$, find the values of a and b.

x	-3	1	5
$y = 3x - 3$	-12	a	b

[2]

(b) Plot the pairs of values of (x, y) from the table and draw the graph of $y = 3x - 3$ using the scale of 1 cm to 1 unit on the x – axis and 1 cm to 2 units on the y – axis. [3]

(c) Using the graph, find the value of x when $y = -6$. [1]

(d) Find the gradient of a line drawn from (3, 6) and the point of origin. [2]

End-of-Paper 2

Sec 1 Express EOY Examinations 2015 Mathematics Paper 2
Marking Scheme

Overall deduction of maximum 1 mark applies for the entire Paper 2 if there is any missing or wrong unit in a student's solutions or answer.		
Question	**Solution**	**Mark**
1(a)(i)	$3^a = \dfrac{1071}{7\times17}$ Accept: • $1071 \div 7 \div 17$ • $3^2 \times 7 \times 17 = 1071$ • Prime factorisation or tree diagram of 1071	M1
	$a = 2$	A1
1(a)(ii)	$k = 2\times3^2$ Accept: $k = \dfrac{2^3\times3^9}{2^2\times3^7}$	M1
	$k = 18$	A1
1(b)(i)	$8+(-2)$ or $8-2$	M1 Note: 1. Deduction of 1 mark for no bracket: $8+-2$. 2. If $8+-2$ is written first before $8-2$, and final answer is correct, deduction of 1 mark applies for the lack of brackets.
	$= 6$	A1
1(b)(ii)	Disagree. Reject: "Yes" or "No" single answers.	B1
	$\frac{1}{3} = 0.\dot{3}$ Accept: other fractions that can be expressed as a recurring decimal.	B1 Note: Examples must be well-supported by showing a recurring decimal.
2(a)	1st estimate: \$11.80 ≈ \$12, and 2nd estimate: \$13.98 ≈ \$14	M1 (show either 1st or 2nd estimate)
	50 ml – \$2 (Shampoo *A* and *B*) Accept: \$1 – 25 ml (Shampoo *A* and *B*) Or \$(14 – 12) = \$2, and Shampoo *B* (300 ml) : \$(14 – 2) = \$12 > \$11.80 (*Shampoo A*) Or Shampoo *A* (350 ml): \$(12 + 2) = \$14 > \$13.98 (Shampoo *B*) Reject if student showed only \$(14 – 12) = \$2, which is merely the difference of 1st and 2nd estimates.	M1
	Shampoo *A*. Reason: \$12 - \$11.80 = \$0.20. and \$14 - \$13.98 = \$0.02	A1 96

Note: For question 2(b)(i) and 2(b)(ii) below, overall maximum deduction of 1 mark applies if final answers are correct but no brackets are used.		
2(b)(i)	$(2x+5)$ cents Accept: $\$(2x+0.05)$	B1
2(b)(ii)	$10x+2(2x+5)$ $=10x+4x+10$ Accept: $10x+4x+0.10$ or $10x+4x+0.1$	M1 (show $10x+4x$)
	$(14x+10)$ cents Accept: $\$(14x+0.10)$ or $(14x+0.1)$	A1
3(a)	$\frac{4x-2+x+4}{8}=\frac{1}{2}$	M1 (correct fraction on LHS, after multiplying both sides by LCM or by re-writing a fraction so that both fractions have the same denominator)
	$4x-2+x+4=4$ Or $5x+2=4$ Or $5x=2$	M1 (no fractions on both sides, correct LHS and correct RHS)
	$x=\frac{2}{5}$ or 0.4	A1
Note: For question 3(b) below, overall deduction of 1 mark applies if a student did not solve the inequality as taught during Maths lessons.		
3(b)	$-7x \geq -112$ $\frac{-7x}{-7} \leq \frac{-112}{-7}$ $x \leq 16$ Accept but not preferred: $-7(15) \geq -112$ [trial and error method] Or $-7x=-112$ $\frac{-7x}{-7}=\frac{-112}{-7}$ [equation method] $x=16$	M1 (show $\frac{-7x}{-7} \leq \frac{-112}{-7}$ or $x \leq 16$)
	Greatest odd integer is 15.	A1
4(a)(i)	$a : b : c$ $=11\times5 : 8\times5 : 11\times8$	M1 (show 8×5 or 40)
	$=55 : 40 : 88$	A1
4(a)(ii)	5 : 8	B1
4(b)	Total distance $=75km/h\times\frac{15}{60}h+120km/h\times\frac{10}{60}h$ $=38.75km$	M1 (total distance)
	Total time taken $=\left(\frac{15+10}{60}+\frac{1}{4}\right)h$ $=\frac{2}{3}h$ Accept: (15+10+15) mins = 40 mins	M1 (total time taken)

	Average speed $= \dfrac{38.75km}{\frac{2}{3}h}$ $= 58\dfrac{1}{8} km/h$ Accept: 58.125 km/h Reject: 58.1 km/h (3 s.f.)	A1
5(a)	$\pi(6)^2 - \pi x^2$	M1 (show both $\pi(6)^2$ and πx^2)
	$= \pi(36 - x^2)$	A1
Note: For question 5(b) below, • **no marks awarded if a student did not form a correct equation in any part of the working to solve it,** • **deduction of 1 mark applies if a student wrote 3.142 or $\frac{22}{7}$ in any part of the working, and** • **deduction of 1 mark applies if there is premature approximation in any part of the working, given that the final answer in 3 s.f. is correct.**		
5(b)	$\pi(36 - x^2) = 28$	M1 (show a correct equation) Note: allow e.c.f. from previous algebraic expression obtained from **5(a)**
	$36 - x^2 = \dfrac{28}{\pi}$ $x^2 = 36 - \dfrac{28}{\pi}$ or $x^2 = 27.087...$ Accept: $36 - \dfrac{28}{\pi} = 27.087...$	M1
	$x = \sqrt{36 - \dfrac{28}{\pi}}$ $= 5.20$ (3 s.f.)	A1
Note: For question 6 below, overall maximum deduction of 1 mark applies if <u>all</u> working is correct but the respective reason(s) is/are missing or wrong.		
6(a)(i)	$\angle DOE = a^\circ$ (vert. opp. $\angle$ s) $2a^\circ + a^\circ + a^\circ + 20^\circ = 180^\circ$ (adj. $\angle$ s on a st. line) Accept: $4a^\circ + 2a^\circ + 2a^\circ + 40^\circ = 360^\circ$ ($\angle$ s at a point)	M1 (show a correct equation) Deduction of 1 mark if student writes this: $360^\circ - 40^\circ = 320^\circ$ $320^\circ \div 8a = 40^\circ$ Reason: presentation error. It should have been $a^\circ = 320^\circ \div 8 = 40^\circ$.
	$a = 40$	A1
6(a)(ii)	$b^\circ = \angle AOD$ (corr. $\angle$ s, $CG//AOB$) $= \angle AOE + \angle DOE$ $= 2 \times 40^\circ + 40^\circ$	M1 (correct last step of working) Note: 1. Students are not penalised if there is no mention of vert. opp. $\angle$ s in their working this time. 2. Allow e.c.f. from the value of a obtained from **6(a)(ii)** 3. Accept other workings that are supported by (alt. $\angle$ s, $CG//AOB$)

		or (int. $\angle$ s, $CG//AOB$). Deduction of 1 mark if student writes this: $60^\circ - 180^\circ = 120^\circ$ $b = 120$ Reason: presentation error. It should have been $180^\circ - 60^\circ = 120^\circ$.
	$b = 120$	A1
6(b)(i)	$\frac{(8-2)\times 180^\circ}{8}$ Accept: $360^\circ \div 8 = 45^\circ$ $180^\circ - 45^\circ$	M1 (formula to find sum of interior angles) Note: Deduction of 1 mark if student writes $8-2\times 180^\circ$ without any use of brackets, given that the student obtains the correct final answer. This is an unacceptable presentation error.
	135°	A1
6(b)(ii)	$25^\circ + 23^\circ + (n-2)\times 24^\circ = 360^\circ$ $24n^\circ = 360^\circ$ $n = 15$	M1 (accept other methods)
	Number of sides = 15	A1
7(a)	Total area $= \left[\frac{1}{2}(10+17)(5)\right] cm^2$	M1 (formula to find area of trapezium) Note: Deduction of 1 mark if student writes $\frac{1}{2}\times 10 + 17\times 5$ without any use of brackets. This is an unacceptable presentation error.
	Unshaded area $= \left[\frac{1}{2}(10+17)(5) - 15\right] cm^2$ $= 52.5 cm^2$	A1
7(b)	$\frac{82}{100}\times 15 cm^2$ Or $0.82\times 15 cm^2$ Or $18\% - 2.7 cm^2$	M1
	$12.3 cm^2$	A1
7(c)	$90\% - \$711$ Or $90\% - \frac{\$711}{300}$ Reject: $110\% - \$711$	M1
	$100\% - \$790$ Cost per sticker $= \frac{\$790}{300}$ $= \$2.63$ (nearest cent) Accept 263 cents (nearest cent) Reject: \$2.60 or 260 cents.	A1

Note:

1. **For whole of question 8, overall deduction of 1 mark applies if a student did not correct a final answer to 3 s.f. given that the respective final answer is correct.**
2. **For whole of question 8, overall deduction of 1 mark applies if a student wrote 3.142 or $\frac{22}{7}$ in any part of their working given that the required working is correct.**
3. **For questions 8(b) and 8(c), overall deduction of 1 mark applies if a student used 1030 cm^2 in their working, given that their final answers for 8(b) and 8(c) are correct.**

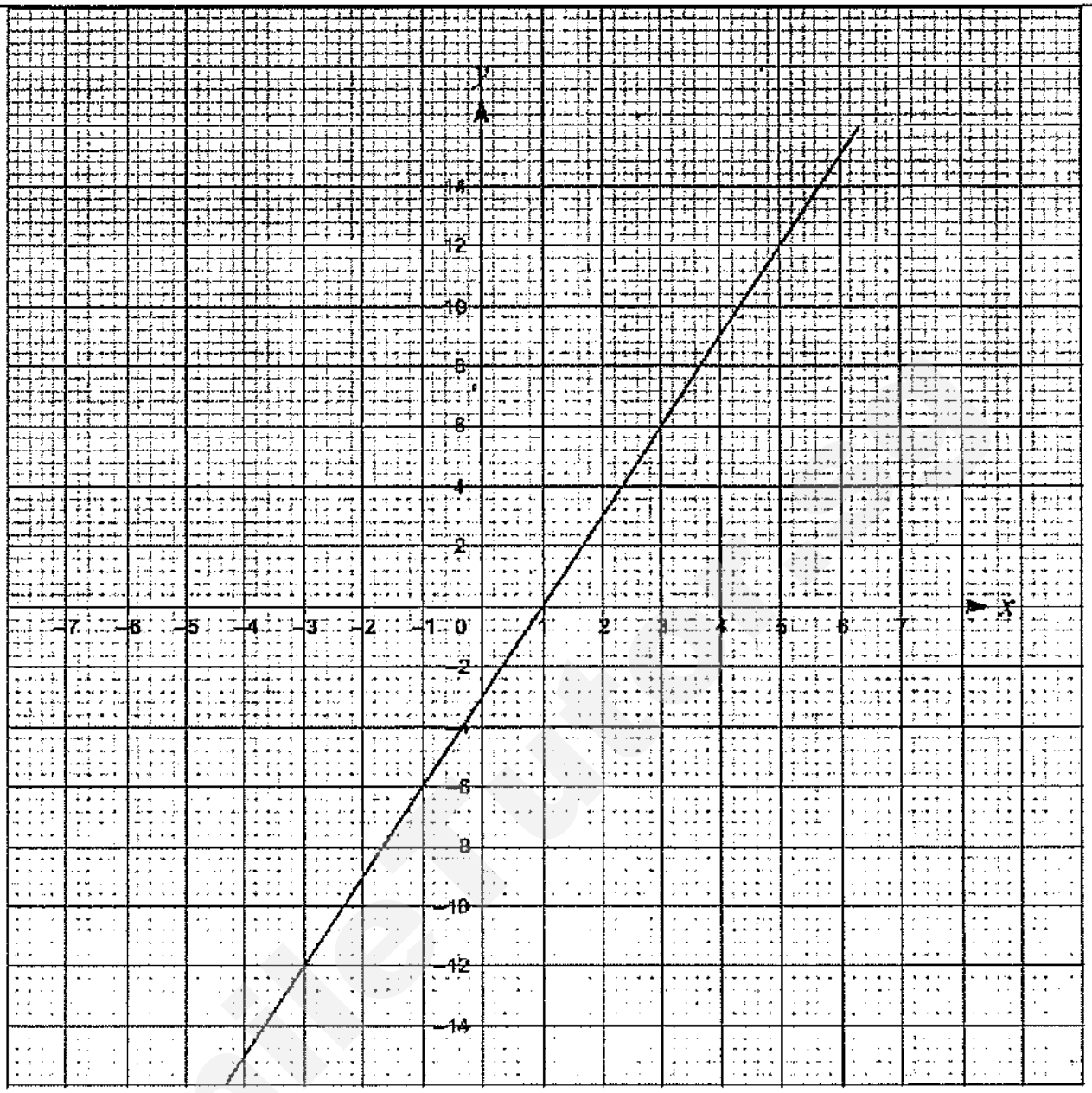
8(a)	$\left[(30\times 24)+\frac{1}{2}\pi\left(\frac{28}{2}\right)^2\right]cm^2$	M1 (show 30×24 to find the area of a paralleogram) M1 (show $\frac{1}{2}\pi\left(\frac{28}{2}\right)^2$ to find the area of a semi-circle)
	$=1027.87...cm^2$ $=1030cm^2$ (3 s.f.)	A1
8(b)	$2(1027.87...)cm^2+\left[(28+30+30+\frac{1}{2}\pi(28)\right]cm\times 50cm$	M1 (show $\frac{1}{2}\pi(28)$ to find half the circumference of a circle) M1(show 2 x base areas + perimeter of base area x height, and correct method to find the perimeter of base area) Note: Deduction of 1 mark if student writes $28+30+30+\frac{1}{2}\times\pi\times 28\times 50$ to calculate lateral surface area, without any use of brackets. This is an unacceptable presentation error.
	$=8654.8...cm^2$ $=8650cm^2$ (3 s.f.)	A1
8(c)	$\sqrt[3]{1027.87...\times 50}$ cm	M1 (show cube root of the product of base area and height)
	$=37.179...cm$ $=37.2cm$ (3 s.f.)	A1

Note:
For whole of question 9, overall deduction of 1 mark applies if

1. **a student did not draw both axes on the grid line of the graph paper, and/or**
2. **a student showed negative y values above x-axis and negative x values to the right of the y-axis**

given that the student showed the correct scale i.e. 1 cm to 1 unit on the $x-$ axis and 1 cm to 2 units on the $y-$ axis.

9(a)	$a=3(1)-3=0$ $b=3(5)-3=12$	B1 B1
9(b)	1. Correct plotting of all points from the table. 2. Straight line passing through all points only if there is correct plotting of points. 3. Correct scales for both axes are drawn.	B1 B1 B1



9(c)	Using the graph, $x = -1$ when $y = -6$	B1
9(d)	Point of origin = (0, 0) As given, the other point is (3, 6). Gradient $= \frac{6-0}{3-0}$ or $\frac{0-6}{0-3}$ $= 2$	 M1 A1

----- The End -----

Name: _____ ( ) Class: _____

FAIRFIELD METHODIST SCHOOL (SECONDARY)

END-OF-YEAR EXAMINATION 2015
SECONDARY 1 EXPRESS

MATHEMATICS

Paper 1

Date: 7 October 2015 **Duration: 1 hour 30 minutes**

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class 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 tape/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.
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 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 60.

For Examiner's Use	
Paper 1	/ 60
Paper 2	/ 60
Total	%

Setters: Miss Lee CP

This question paper consists of 14 printed pages including the cover page.

Name: _____ ( ) Class: _____

Answer **all** the questions.

1 State which of the following numbers are irrational.

$$\sqrt{2}\times\sqrt{8}, \quad \frac{22}{7}, \quad \pi, \quad 3\sqrt{5}, \quad 2.\dot{6}$$

Answer ..... [1]

---

2 Consider the following numbers.

$$942\frac{1}{3}\%, \quad 3\pi, \quad \frac{471}{50}, \quad 9.\dot{4}\dot{3}$$

Arrange the numbers in descending order.

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

---

3 (a) The area of a circle is 108π square centimetres. Find the length of radius of the circle correct to the nearest centimetre.

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

(b) Round off 198.45 to 2 significant figures.

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

Name: _____( ) Class: _____

4 Estimate, without the use of a calculator, $\frac{20.14\times(2.04)^3}{\sqrt{2512}}$ correct to 1 significant figure.

Answer ..... [2]

---

5 (a) Express $\frac{3}{20}$ % as a decimal number.

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

(b) A man bought a television set at a price of $1440 after a 20% discount during a sale. Find the marked price of the television set.

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

Name: _____ ( ) Class: _____

6 Solve $9x - (2x - 6) = 8 - x$.

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

---

7 **(a)** The nth term of a sequence is given by $2n^2 + 2$.
Write down the first 4 terms.

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

(b) The first 4 terms of another sequence are 2, 8, 18, 32, ...

(i) Write down the next term.

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

(ii) By comparing this sequence with your answer to **(a)**, write down the nth term.

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

8 Showing your working clearly, without the use of a calculator, evaluate

$$-\frac{7}{3}\div\left[\left(-\frac{1}{5}-\frac{2}{3}\right)\times 15\right]-\left(-\frac{1}{4}\right).$$

Answer ..... [2]

---

9 Given that $\frac{a}{b}=\sqrt{\frac{b^2-2c}{2}}$, find the value of c when $a=-1$ and $b=2$.

Answer $c=$..... [2]

Name: _____ ( ) Class: _____

10 Petrol costs w cents per litre.

(i) Find an expression, in terms of w, for the number of litres of petrol that can be bought with 1 cent.

Answer (i) .....*l* [1]

(ii) Find an expression, in terms of w and x, for the number of litres of petrol that can be bought with x dollars.

Answer (ii) .....*l* [1]

---

11 If the interior angles of a hexagon are in the ratio 2 : 3 : 3 : 4 : 4 : 4, find the largest exterior angle.

Answer ..... ° [3]

12 **(a)** Factorise completely $y(x + 2) + 3(x + 2)$.

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

(b) Expand and simplify $3(x - 2y) - 2[(3x - y) - 2x]$.

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

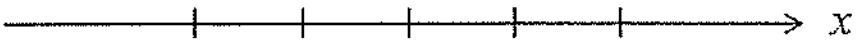
---

13 **(a)** Solve the inequality $x - 8 < 29 - 3x$.

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

(b) Express the solution in **(a)** on a number line.

Answer (b) [1]



(c) Find the largest prime number which satisfies the inequality.

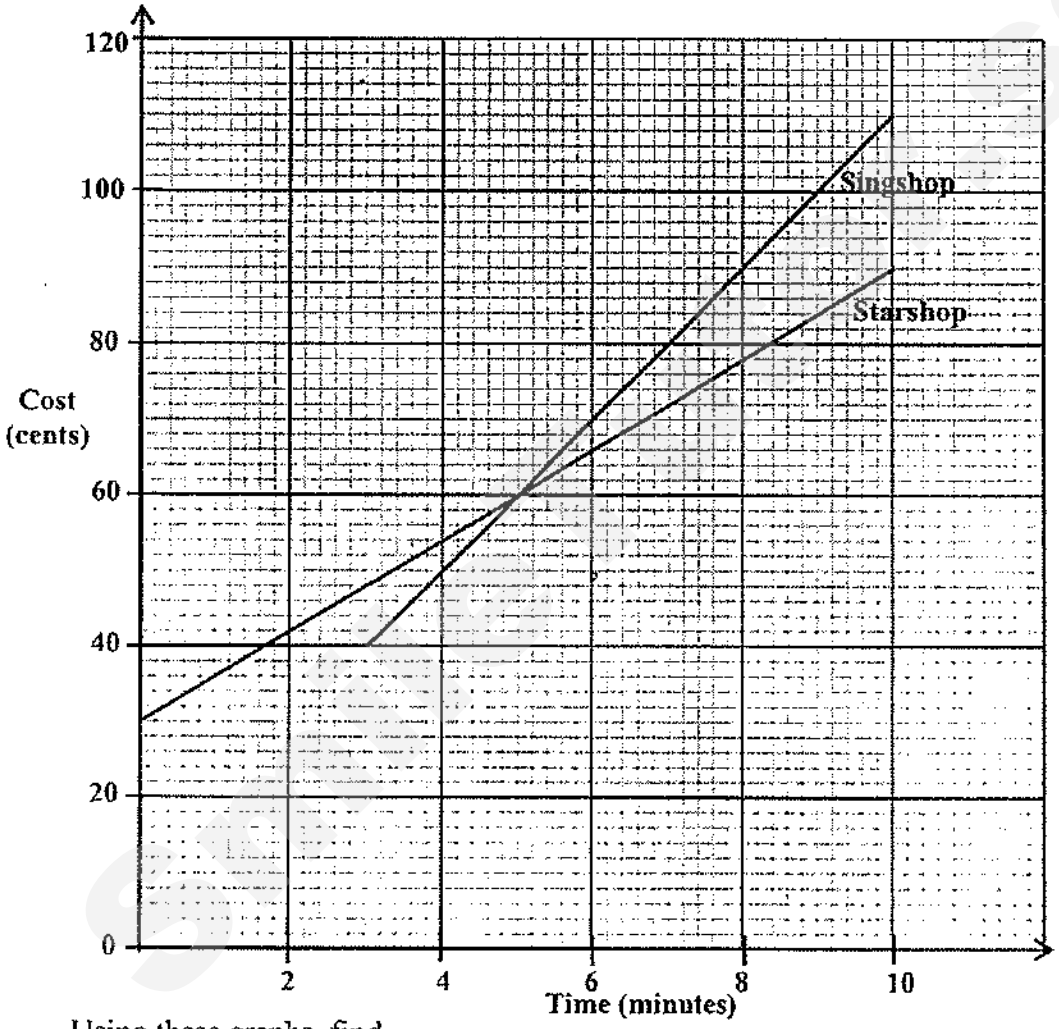
Answer (c) ..... [1]

Name: _____ ( ) Class: _____

14 The graph shows the charges made by two companies for telephone calls lasting up to 10 minutes.

Singshop charges 40 cents for calls for the first 3 minutes and 10 cents per minute for each subsequent minute.

Starshop charges a connection fee of p cents and all calls are charged at a constant rate of q cents per minute.



Using these graphs, find

(a) the cost of a 7-minute call made using Singshop,

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

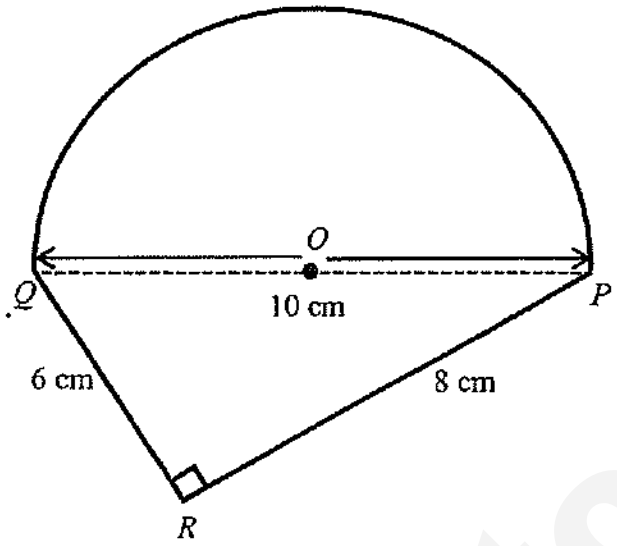
(b) the value of p,

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

(c) the value of q.

Answer (c) q = ... [1]

15 The figure is made up of a right-angled triangle PQR and a semicircle. POQ is the diameter of the semicircle with centre O.



Given that $PR = 8$ cm, $QR = 6$ cm and $POQ = 10$ cm, find

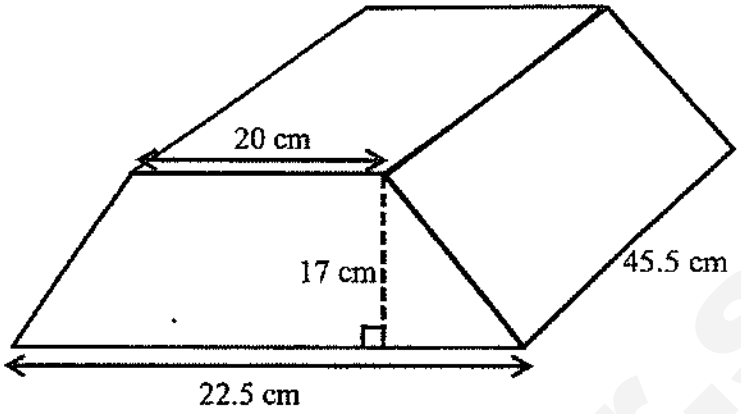
(a) the perimeter of the figure, leaving your answer in the form $(a + b\pi)$ cm,

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

(b) the area of the figure.

Answer (b) ..... cm^2 [2]

16 The figure shows a sketch of the world's largest gold bar that is 45.5 cm long. It is a solid prism with uniform cross section of a trapezium.



(a) Find the volume of the gold bar.

Answer (a) ..... cm^3 [2]

(b) The gold bar is melted and made into rectangular gold metal sheets of dimension 297 mm by 210 mm. Each sheet has a thickness of 2 mm. Find the maximum number of gold metal sheets that can be made using the gold bar.

Answer (b) ..... gold sheets [2]

17 Mrs Tan sponsored a total of 96 hot dogs, 72 packets of fruit juice and 48 cake slices for a class picnic.

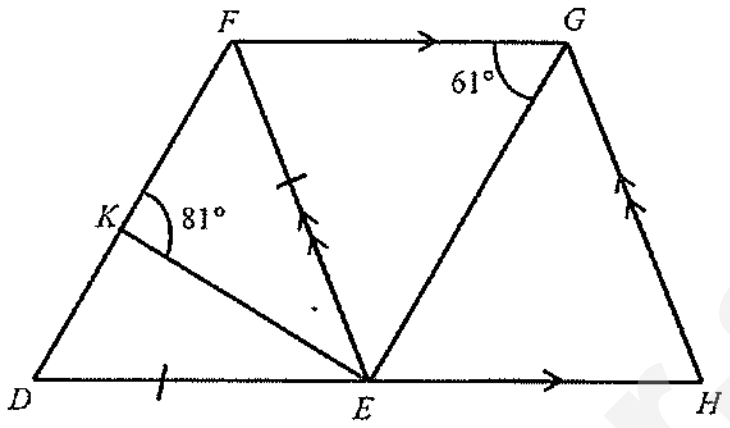
(a) Given that each student will receive the same amount of each item, find the maximum number of students that can attend the class picnic.

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

(b) How many hot dogs, packets of fruit juice and cake slices will each student receive?

Answer (b) ..... hot dogs , ... packet fruit juice, ... cake slices [1]

18 In the diagram, ΔDEF is an isosceles triangle and $EFGH$ is a rhombus. It given that $\angle FGE = 61°$, $\angle FKE = 81°$, $DE = FE$ and both DEH and DKF are straight lines.



By stating your reasons clearly, calculate

(a) $\angle EHG$,

Answer (a) $\angle EHG$ = ... ° [2]

(b) reflex $\angle FGH$,

Answer (b) reflex $\angle FGH$ = ... ° [1]

(c) $\angle KFG$,

Answer (c) $\angle KFG$ = ... ° [2]

(d) $\angle DEK$.

Answer (d) $\angle DEK$ = ...° [1]

19 (a) (i) Express 180 as the product of its prime factors.

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

(ii) The lowest common multiple of 12, 15, x is 180. Find the two possible values of x which are odd numbers and are greater than 1.

Answer (a)(ii) x =..... , ... [1]

(b) The numbers 2520 and 3375, written as the products of their prime factors, are

$$2520 = 2^3 \times 3^2 \times 5 \times 7 \ , \qquad 3375 = 3^3 \times 5^3$$

Find

(i) $\sqrt[3]{3375}$,

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

(ii) the smallest positive integer value of n for which $2520n$ is a multiple of 3375,

Answer (b)(ii) n = ... [1]

(iii) the smallest positive integer k such that $\frac{2520}{k}$ is a perfect square.

Answer (b)(iii) k = ... [1]

Name: _____ ( ) Class: _____

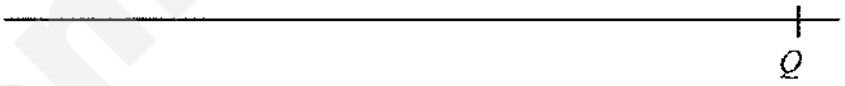
20 **(a)** Using ruler, set square, protractor and compasses only, construct

(i) a trapezium $PQRS$ such that PQ is parallel to SR, $PQ = 9.4$ cm, $QR = 5.2$ cm, $RS = 3.8$ cm and $\angle PQR = 80°$, [2]

(ii) the angle bisector of $\angle PQR$ such that it cuts PS at point T, [1]

(iii) the perpendicular bisector of QR such that it cuts PS at point U. [1]

Answer for (a)(i), (a)(ii), (a)(iii)



(b) Measure and write down the length of TQ.

Answer (b) TQ =..... cm [1]

(c) Measure the smallest interior angle of trapezium $PQRS$.

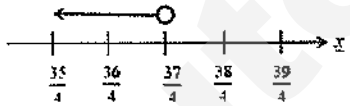
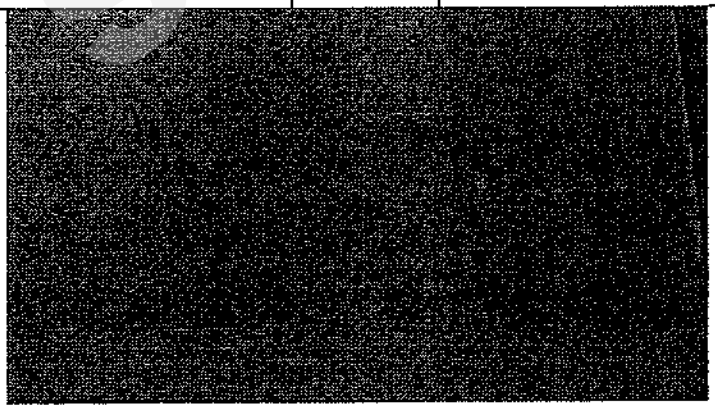
Answer (c) ..... ° [1]

- End of Paper -

Name: _____ ( ) Class: _____

End of Year Examination
Secondary 1 Express Mathematics Paper 1

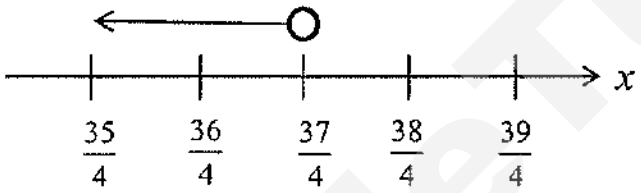
Answer Key

1	π, $3\sqrt{5}$	2	$\dot{9}.\dot{4}3$, 3π, $942\frac{1}{3}\%$, $\frac{471}{50}$	3(a)	10 cm
3(b)	200	4	3.2	5(a)	0.0015
5(b)	\$1800	6	$x=\frac{1}{4}$ or 0.25	7(a)	4, 10, 20, 34
7(b)(i)	50	7(b)(ii)	$2n^2$	8	$\frac{67}{156}$
9	$c=\frac{7}{4}$ or 1.75	10(i)	$\frac{1}{w}$	10(ii)	$\frac{100x}{w}$
11	108°	12(a)	$(x+2)(y+3)$	12(b)	$x-4y$
13(a)	$x<\frac{37}{4}$ or $x<9\frac{1}{4}$	13(b)		13(c)	7
14(a)	\$0.80	14(b)	30	14(c)	6
15(a)	$(5\pi+14)$ cm	15(b)	63.7 cm^2 (3 s.f.)	16(a)	16436.875 cm^3 or 16400 cm^3 (3 s.f.)
16(b)	131 gold sheets	17(a)	24	17(b)	4 hot dogs, 3 can fruit juice and 2 slices of cakes
18(a)	58°	18(b)	238°	18(c)	119°
18(d)	20°	19(a)(i)	$180=2^2\times3^2\times5$	19(a)(ii)	9, 45
19(b)(i)	15	19(b)(ii)	75	19(a)(iii)	70
20(a)					
20(b)	$TQ=6.9\pm0.1$ cm	20(c)	$48\pm1°$		

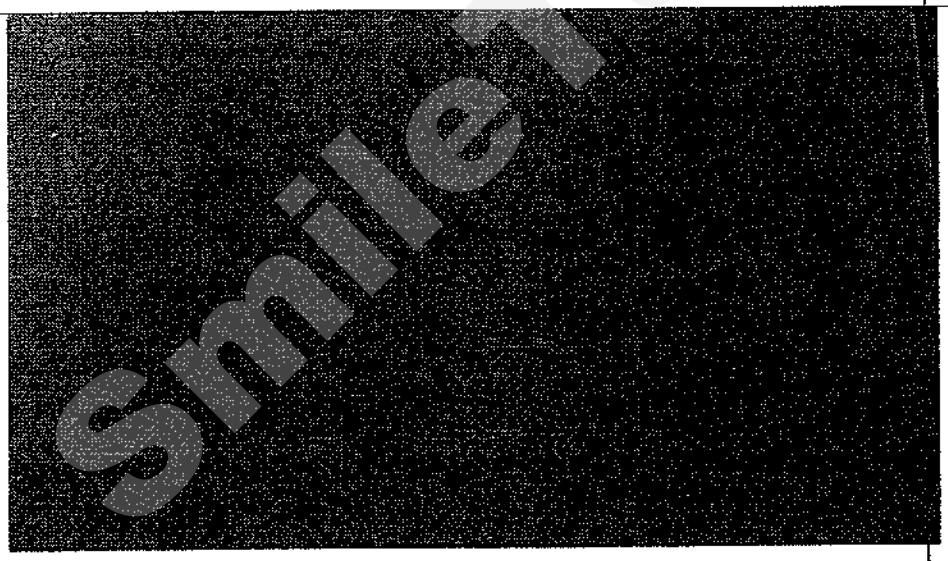
Fairfield Methodist School (Secondary)
Secondary 1 Express
Paper 1
Mathematics
End-of-Year Examination 2015

No	Working	Description	Marks Allocation
1	π, $3\sqrt{5}$		B1
2	$942\frac{1}{3}\% = 9.42333...$ $3\pi = 9.424777961$ $\frac{471}{50} = 9.42$ $9.4\dot{3}\dot{3} = 9.43434343...$ Descending order: $9.4\dot{3}\dot{3}, 3\pi, 942\frac{1}{3}\%, \frac{471}{50}$		B1
3(a)	Radius of circle, $r = \sqrt{108\pi \div \pi} = 10.39230...$ $=10$ cm		B1
3(b)	200		B1
4	$\frac{20.14 \times (2.04)^3}{\sqrt{2512}}$ $= \frac{20 \times 2^3}{\sqrt{2500}}$ $= \frac{20 \times 8}{50}$ $=3.2 = 3$	No working but correct answer, award A1	M1 A1
5(a)	$\frac{3}{20}\% = 0.0015$		B1
5(b)	Sale price = \$1440 Marked price = $\$1440 \times \frac{100}{80}$ = \$1800 Or 80% -------- \$1440 100% ------- $\frac{\$1440}{80} \times 100 = \$1800$		B1
6	$9x - (2x - 6) = 8 - x$. $9x - 2x + 6 = 8 - x$ $7x + x = 8 - 6$ $8x = 2$ $x = \frac{1}{4}$ or 0.25	Expansion of bracket; must be correct for both terms	M1 A1
7(a)	4, 10, 20, 34	All correct	B1
7(b)(i)	50		B1
7(b)(ii)	$2n^2$		B1

No	Working	Description	Marks Allocation
8	$-\frac{7}{3}\div\left[\left(-\frac{1}{5}-\frac{2}{3}\right)\times 15\right]-\left(-\frac{1}{4}\right)$ $=-\frac{7}{3}\div\left[\left(\frac{-3-10}{15}\right)\times 15\right]+\frac{1}{4}$ $=-\frac{7}{3}\div[(-13)]+\frac{1}{4}$ $=\frac{7}{3}\times\frac{1}{13}+\frac{1}{4}$ $=\frac{7}{39}+\frac{1}{4}$ $=\frac{67}{156}$	**[Convert division to multiplication and reciprocate fraction Or simplify inner bracket correctly]**	M1 A1
9	Given that $\frac{a}{b}=\sqrt{\frac{b^2-2c}{2}}$, find the value of c when $a=-1$ and $b=2$. $\frac{-1}{2}=\sqrt{\frac{2^2-2c}{2}}$ $-\frac{1}{2}=\sqrt{\frac{4-2c}{2}}$ $-\frac{1}{2}=\sqrt{2-c}$ $\frac{1}{4}=2-c$ $2-c=\frac{1}{4}$ $-c=\frac{1}{4}-2$ $c=\frac{7}{4}$ *or* 1.75 Or $\frac{-1}{2}=\sqrt{\frac{2^2-2c}{2}}$ $-\frac{1}{2}=\sqrt{\frac{4-2c}{2}}$ $\frac{1}{4}=\frac{4-2c}{2}$ $2=4(4-2c)$ $2=16-8c$ $8c=14$ $c=\frac{14}{8}=\frac{7}{4}$ or 1.75 Or $\frac{-1}{2}=\sqrt{\frac{2^2-2c}{2}}$ $-\frac{1}{2}=\sqrt{\frac{4-2c}{2}}$ $\frac{1}{4}=\frac{4-2c}{2}$ $1=2(4-2c)$ $1=8-4c$ $4c=7$ $c=\frac{7}{4}$ or 1.75	Remove square root	M1 A1
10 (i)	w cents buys 1 litres 1 cent buys $\frac{1}{w}$ litres		B1
10(ii)	100 cents buys $\frac{100}{w}$ *litres* 1 dollars buys $\frac{100}{w}$ *litres* x dollars buys $\frac{100x}{w}$ litres		B1

No	Working	Description	Marks Allocation
11	Ratio of interior angle: 2: 3: 3: 4: 4: 4 20 units represent $(6-2)\times 180° = 720°$ 1 unit represent $36°$ Largest exterior angle $= 180° - 2(36°) = 108°$		M1 M1 A1
12(a)	$y(x+2) + 3(x+2)$ $=(x+2)(y+3)$		B1
12(b)	$3(x-2y) - 2[(3x-y) - 2x]$ $= 3x - 6y - 2[3x - y - 2x]$ $= 3x - 6y - 2\,[x - y]$ $= 3x - 6y - 2x + 2y$ ← $= x - 4y$	Expand the brackets correctly for 2nd bracket	M1 A1
13(a)	$x - 8 < 29 - 3x$ $x + 3x < 29 + 8$ $4x < 37$ $x < \frac{37}{4}$ or $x < 9\frac{1}{4}$	Collecting the like terms correctly	M1 A1
13(b)			B1
13©	7	FT1 (if reasonable)	B1
14(a)	\$0.80		B1
14(b)	30		B1
14©	6		B
15(a)	Perimeter = Arc PQ + PR + RQ $= \frac{1}{2}\pi(10) + 6 + 8$ $=(5\pi + 14)$ cm	Method for arc PQ	M1 A1
15(b)	Area = Area of semicircle + Area of triangle $= \frac{1}{2}\pi(5)^2 + \frac{1}{2}(8\times 6)$ $=63.269$ $= 63.3$ cm^2 (3 s.f.) If answer left in terms of $\frac{25}{2}\pi + 24$ cm^2, accept answer.	Mtd for area of semicircle If answer not rounded off to 3 s.f. correctly, no marks	M1 A1

No	Working	Description	Marks Allocation
16(a)	Volume of prism/figure = Area of trapezium × height/length $=[\frac{1}{2}(20+22.5)\times 17]\times 45.5$ $=16436.875$ or $16400\ cm^3$ (3 s.f.)	Formula for trapezium	M1 A1
16(b)	Volume on 1 metal sheet = 297 mm × 210 mm × 2 mm = 29.7 cm × 21 cm × 0.2 cm = $124.74\ cm^3$ No. of gold sheets = Volume of figure ÷ Volume of 1 metal sheet = 16436.875 ÷ 124.74 = 131.769 = 131 sheets	If work out volume of 1 metal sheet or show divison of Vol. of prism by volume of 1 metal sheet give method marks	M1 A1
17(a)	3 | 96 72 48 8 | 32 24 16 4 3 2 ∴ Greatest no. of student= HCF of 96, 72 and 48 = 3×8 = 24		M1 A1
17(b)	Each student received 4 hot dogs, 3 can fruit juice and 2 slices of cakes		B1
18(a)	$\angle EHG = 180° - \angle HGE - \angle HEG$ (Angle sum of triangle and $\angle HEG = 61°$, as Alt angle, FG // EH) $\angle EHG = 180° - 61° - 61°$ $= 58°$		M1 A1
18(b)	Reflex $\angle FGH = 360° - 61° - 61°$ (angles at a pt) $= 238°$		B1
18©	$\angle FED = \angle GFE$ (Alt angles, FG//EH) $= 58°$ $\angle KFE = (180° - 58°) \div 2$ (Base angle of isos. Δ) $= 61°$ $\angle KFG = 61° + 58°$ $= 119°$	Find angle KFE	B1 B1
OR 18(c)	$\angle FED = \angle GFE$ (Alt angles, FG//EH) $= 58°$ $\angle FDE = (180° - 58°) \div 2 = 61°$ (Base angle of isosceles triangle) $\angle KFG = 180° - 61° = 119°$ (interior angles, FG//DE)	Find angle FDE	B1 B1

No	Working	Description	Marks Allocation
18(d)	$\angle DEK = 81° - 61° = 20°$ (Ext. angle of Δ) Or $\angle DEK = \angle FED - \angle FEK$ $= 58° - 38° = 20°$		B1
19(a)(i)	2 | 180 2 | 90 3 | 45 3 | 15 5 | 5 1 $\therefore 180 = 2^2 \times 3^2 \times 5$		B1
19(a)(ii)	9, 45		B1
19(b)(i)	15		B1
19(b)(ii)	Smallest integer, $n = 75$		B1
19(b)(iii)	Smallest integer, $k = 70$		B1
20(a)(i) 20(a)(ii) 20(a)(iii)		B1 for parallel lines for trapezium B1 for trapezium B1 for (ii) B1 for (iii)	
20(b)	$TQ = 6.9 \pm 0.1$ cm		B1
20 (c)	$48 \pm 1°$		B1

NAME: _____ ( ) CLASS: _____

FAIRFIELD METHODIST SCHOOL (SECONDARY)

END-OF-YEAR EXAMINATION 2015
SECONDARY 1 EXPRESS

MATHEMATICS

Paper 2

Date: 8 October 2015 **Duration: 1 hour 30 minutes**

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class 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/tape.

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.

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.

The total number of marks for this paper is 60.

For Examiner's Use	
Paper 2	/ 60

Setter: Mr Kua KT

This question paper consists of 13 printed pages including the cover page.

[Turn over]

Name: _____ ( ) Class: _____

Answer **all** the questions.

1 La Paz, the capital city of Bolivia, is located at an altitude of 3640 m above sea level while Baku, the capital city of Azerbaijan, is located at an altitude of 28 m below sea level.

(a) Represent the altitude of Baku using a negative number.

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

(b) Hence, find the difference in altitude between La Paz and Baku.

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

---

2 Suzy's monthly income consists of a basic salary of $700 and a commission of 5.5% on her sales for the month. If Suzy's income is $1690 for a particular month, find her sales for that month.

Answer $ ..... [3]

3 The rates of exchange between American dollars (US$), Singapore dollars (S$) and Korean won (₩) are US$1 = S$1.2647 and S$100 = ₩83917.

Convert the following into Singapore dollars, giving your answer correct to the nearest cent.

(a) US$365

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

(b) ₩20 000

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

Name: _____ ( ) Class: _____

4 The first three figures of a sequence are as shown below.

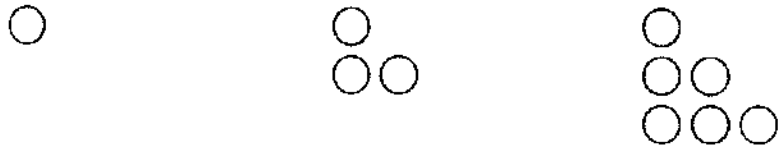


Figure 1 Figure 2 Figure 3

(a) Draw Figure 4 of the sequence in the space below.

Answer (a)

Figure 4 [1]

(b) Complete the table below.

Answer (b)

Figure Number, n	**Number of Circles at Base of the Figure, n**	**Total Number of Circles, T_n**
1	1	$1 = 1 = \frac{1\times 2}{2}$
2	2	$1+2 = 3 = \frac{2\times 3}{2}$
3	3	$1+2+3 = 6 = \frac{3\times 4}{2}$
4		
⋮	⋮	⋮
n		

[2]

(c) Find the total number of circles in Figure 100.

Answer (c) ..... circles [1]

5 A survey was conducted among 240 students to find out the mode of transport that they used to travel to school. The results of the survey are shown below.

Mode of Transport	Number of Students
By parent's car	70
By bus and/or MRT	100
By foot, i.e. walking	30
Others	40

(a) The results of the survey are to be represented in the form of a pie chart. Complete the table below, showing your workings clearly.

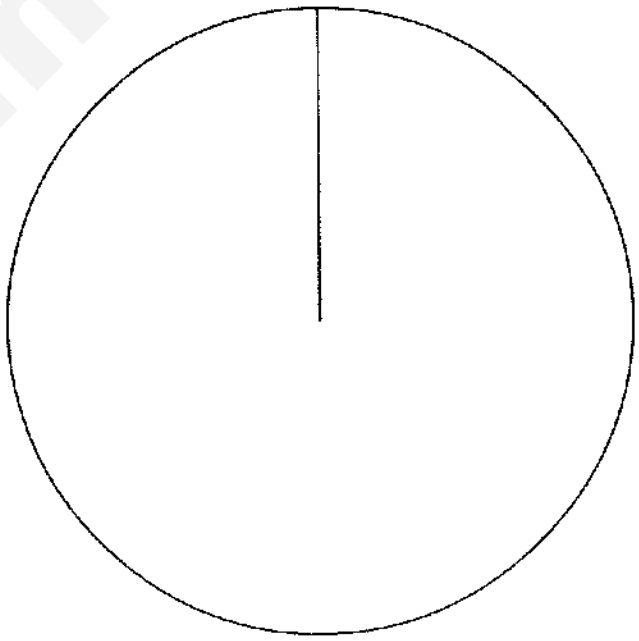
Answer (a)

Mode of Transport	Angle of Sector in a Pie Chart
By parent's car	
By bus and/or MRT	
By foot, i.e. walking	
Others	

[2]

(b) Hence, represent the results of the survey in the pie chart below.

Answer (b)

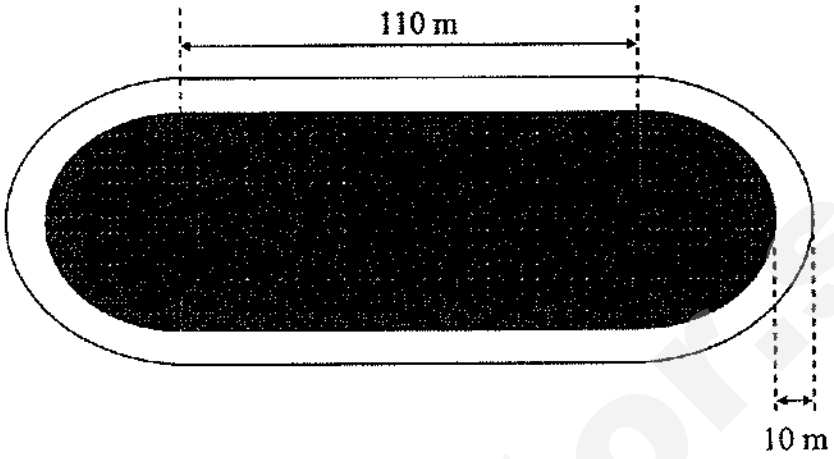


[2]

Mode of Transport

Name: _____ ( ) Class: _____

6 The diagram below shows a rectangular football field with a semi-circular patch of recreational ground of radius 35 m at each end of the field. A running track with a uniform width of 10 m is built around the football field and the two semi-circular patches of recreational ground.



(a) Find the perimeter of the shaded region. (Take π to be 3.142)

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

6 (b) Find the area of the running track. (Take π to be 3.142)

Answer (b) ..... m^2 [3]

Name: _____ ( ) Class: _____

7 Smartphone price plans usually include a fixed monthly component and a variable component depending on the monthly usage. Two student price plans offered by a local telecommunication company are shown in the table below.

Student Price Plan	A	B
Monthly subscription	$28	$42
Contract duration	24 months	
Free local incoming calls	Unlimited	
Free local outgoing calls *	150 minutes	100 minutes
Free local data bundle #	1 GB	3 GB

* If outgoing calls exceed the free minutes provided, excess usage is charged at $0.002/second.

\# If data usage exceeds free data bundle provided, excess usage is charged at $10/GB and capped at $30 monthly.

(a) Jinny made 120 minutes of local outgoing calls and used 2 GB of local data in June 2015. Calculate her phone bill for the month of June 2015 if

(i) she had signed up for Student Price Plan A,

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

(ii) she had signed up for Student Price Plan B.

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

(b) Other than the monthly subscription fee, list 1 other factor Jinny should consider when deciding which plan to sign up for.

Answer (b)

..... [1]

8 Express each of the following as a fraction in its simplest form.

(a) $\frac{2a+3b}{4} - \frac{a-2b}{3}$

Answer (a) ..... [3]

(b) $\frac{5(x+4)}{6} + \frac{x+2}{3} + 1$

Answer (b) ..... [3]

Name: _____ ( ) Class: _____

9 Luis has some two-dollar, five-dollar and ten-dollar notes in his wallet. The number of two-dollar notes is thrice the number of ten-dollar notes. There are 2 more five-dollar notes than ten-dollar notes in his wallet.

(a) Given that Luis has x ten-dollar notes in his wallet, write down an expression, in terms of x, for the number of five-dollar notes he has in his wallet.

Answer (a) ..... five-dollar notes [1]

(b) Luis gave his sister, Lucy, 4 two-dollar notes for her daily allowance.

(i) Write down an expression, in terms of x, for the number of two-dollar notes Luis has in his wallet after giving Lucy her daily allowance.

Answer (b)(i) ..... two-dollar notes [1]

Luis has \$44 left in his wallet after giving Lucy her daily allowance.

(ii) Form an equation, in terms of x, to represent the above information, and show that it can be simplified to $21x + 2 = 44$.

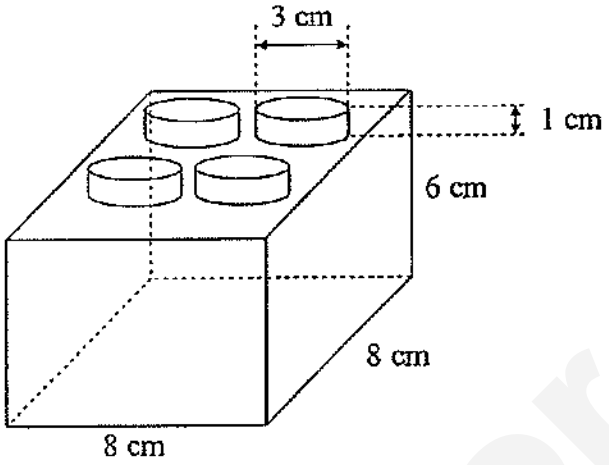
Answer (b)(ii)

[2]

(c) Solve the equation in **(b)(ii)** to find the value of x.

Answer (c) x = ... [2]

10 The diagram below shows a model of a Lego block. The model is made up of a cuboid measuring 8 cm by 8 cm by 6 cm, and 4 identical cylinders each with a base diameter of 3 cm and height of 1 cm.



(a) Find the total volume of the model.

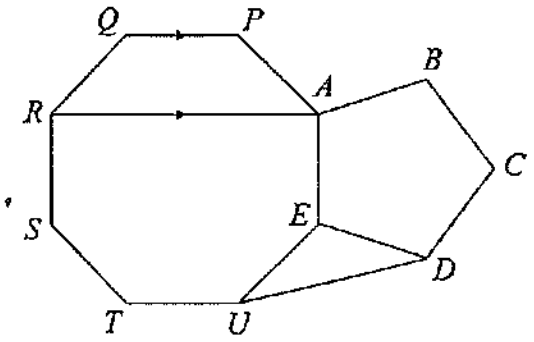
Answer (a) ..... cm^3 [3]

(b) Find the total surface area of the model.

Answer (b) ..... cm^2 [3]

Name: _____ ( ) Class: _____

11 In the figure, $ABCDE$ is a regular pentagon and $APQRSTUE$ is a regular octagon. The two polygons share a common side AE, and QP is parallel to RA.



(a) By stating your reason(s) clearly, find

(i) $\angle PQR$,

Answer (a)(i) $\angle PQR$ = ... ° [2]

(ii) $\angle EDU$.

Answer (a)(ii) $\angle EDU$ = ... ° [3]

(b) Show that $\angle SRA$ is a right angle.

Answer (b)

[2]

Name: _____ ( ) Class: _____

12 Answer the whole of this question on a sheet of graph paper.

The total fare for a taxi ride can be represented by the equation

$$y = 0.50x + 3.2$$

where y represents the total fare in dollars, and x represents the distance travelled by the taxi in kilometres.

The table below shows some values of x and y.

x	0	2	5	8
y	3.2	4.2	p	7.2

(a) Find the value of p. [1]

(b) Using a scale of 1 cm to represent 1 km, draw a horizontal x-axis for $0 \le x \le 8$.

Using a scale of 2 cm to represent \$1, draw a vertical y-axis for $0 \le y \le 8$.

Plot the pairs of values in the table above and draw the graph of $y = 0.50x + 3.2$. [3]

(c) From your graph,

(i) find the total fare for a taxi ride of 7 km, [1]

(ii) find the distance travelled by a taxi when the total fare is \$5.20. [1]

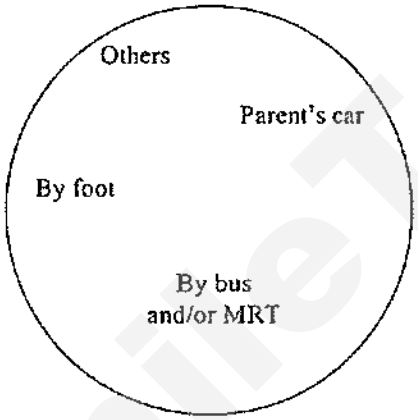
(d) What does the gradient of the graph represent? [1]

(e) Explain why the fare can never be less than \$3.20. [1]

- End of Paper -

Fairfield Methodist School (Secondary)
Secondary 1 Express
Paper 2
Mathematics
End-of-Year Examinations 2015

Qn No.	Workings	Description	Mark Allocation
1(a)	–28		B1
1(b)	Difference in altitude = 3640 – (–28) ≒ 3668 m		B1
2	Commission earned = 1690 – 700 = \$990 5.5% rep \$990 1% rep \$ $\frac{990}{5.5}$ 100% rep \$ $\frac{990}{5.5} \times 100$ = \$18000		M1 M1 A1
3(a)	US\$1 = S\$1.2647 US\$365 = S\$1.2647 ×365 = S\$461.62 (to nearest cent)	A1 cannot be awarded if answer is not given to nearest cent	M1 A1
3(b)	S\$100 = ₩83917 ₩1 = S\$ $\frac{100}{83917}$ ₩20000 = S\$ $\frac{100}{83917} \times 20000$ = S\$23.83 (to nearest cent)	A1 cannot be awarded if answer is not given to nearest cent	M1 A1
4(a)	○ ○○ ○○○ ○○○○		B1
4(b)	<u>1st row</u> 4 , $1 + 2 + 3 + 4 = 10 = \frac{4 \times 5}{2}$ <u>2nd row</u> n , $1 + 2 + 3 + \ldots + n = \frac{n \times (n+1)}{2}$	B2 if all correct B1 if 1 or 2 incorrect B0 if > 2 incorrect	B2
4(c)	$\frac{100 \times (100+1)}{2}$ = 5050 circles		B1

Qn No.	Workings	Description	Mark Allocation
5(a)	Angle of sector representing By parent's car $\frac{70}{240}\times 360° = 105°$ By bus and/or MRT $\frac{100}{240}\times 360° = 150°$ By foot $\frac{30}{240}\times 360° = 45°$ Others $\frac{40}{240}\times 360° = 60°$	B2 if all correct B1 if 1 or 2 incorrect B0 if >2 incorrect	B2
5(b)		B2 if angles of all 4 sectors correct B1 if angles of 2 sectors incorrect B0 if angles of >2 sectors incorrect	B2
6(a)	Required perimeter $= (110\times 2)+[2\times\frac{1}{2}\times 2\pi(35)]$ $= 220 + 70(3.142)$ $= 439.94$ m **or** 440 m (to 3 s.f.)		M1 A1
6(b)	Area of curved parts of track $= 2[\frac{1}{2}\pi(45^2)-\frac{1}{2}\pi(35^2)]$ $= 800(3.142)$ $= 2513.6\ m^2$ Area of straight parts of track $= 2\times(110\times 10)$ $= 2200\ m^2$ Area of running track $= 2513.6 + 2200$ $= 4713.6\ m^2$ **or** $4710\ m^2$ (to 3 s.f.)		M1 M1 A1

Qn No.	Workings	Description	Mark Allocation
7(a)(i)	Phone bill under Student Price Plan A $= 28 + (2-1)(10)$ $= \$38$		M1 A1
7(a)(ii)	Phone bill under Student Price Plan B $= 42 + (120-100)(60)(0.002)$ $= 42 + 2.40$ $= \$44.40$		M1 A1
7(b)	She should consider whether she makes more outgoing calls or uses more data when making her decision.	Accept any other logical answers.	B1
8(a)	$\frac{2a+3b}{4} - \frac{a-2b}{3}$ $= \frac{3(2a+3b)}{12} - \frac{4(a-2b)}{12}$ $= \frac{3(2a+3b)-4(a-2b)}{12}$ $= \frac{6a+9b-4a+8b}{12}$ $= \frac{2a+17b}{12}$	Change to common denominator Expand $3(2a+3b)$ or $-4(a-2b)$ correctly	M1 M1 A1
8(b)	$\frac{5(x+4)}{6} + \frac{x+2}{3} + 1$ $= \frac{5(x+4)}{6} + \frac{2(x+2)}{6} + \frac{6}{6}$ $= \frac{5(x+4)+2(x+2)+6}{6}$ $= \frac{5x+20+2x+4+6}{6}$ $= \frac{7x+30}{6}$	Change to common denominator Expand $5(x+4)$ or $2(x+2)$ correctly	M1 M1 A1
9(a)	$x + 2$		B1
9(b)(i)	$3x - 4$		B1
9(b)(ii)	$x(10) + (x+2)(5) + (3x-4)(2) = 44$ $10x + 5x + 10 + 6x - 8 = 44$ $21x + 2 = 44$ (Shown)	B1 for forming equation correctly B1 for correct simplification	B1 B1

Qn No.	Workings	Description	Mark Allocation
9(c)	$21x + 2 = 44$ $21x = 42$ $\therefore x = 2$	 $44 - 2$ simplified correctly 	 M1 A1
10(a)	Volume of cuboid $= 8 \times 8 \times 6$ $= 384\ cm^3$ Volume of 4 cylinders $= 4 \times [\pi(\frac{3}{2})^2(1)]$ $= 9(3.142)$ $= 28.278\ cm^3$ Total volume $= 384 + 28.278$ $= 412.278\ cm^3$ **or** $412cm^3$ (to 3 s.f.)		 M1 M1 A1
10(b)	Total surface area of the model = surface area of cuboid + curved surface area of 4 cylinders $= 2(8 \times 8) + 4(8 \times 6) + 4[\pi(3)(1)]$ $= 128 + 192 + 12(3.142)$ $= 357.704\ cm^2$ **or** $358cm^2$ (to 3 s.f.)	Mark awarded for correct total S.A of cuboid (320) Mark awarded for correct total S.A of cuboid (37.704)	 M1 M1 A1
11(a)(i)	$\angle PQR$ $= \frac{(8-2) \times 180°}{8}$ (sum of int. $\angle$ s of octagon) $= \frac{1080°}{8}$ $= 135°$		 M1 A1
11(a)(ii)	$\angle AEU = \angle PQR$ $= 135°$ $\angle AED$ $= \frac{(5-2) \times 180°}{5}$ $= \frac{540°}{5}$ $= 108°$		

Qn No.	Workings	Description	Mark Allocation
11(a)(ii)	$\angle DEU = 360° - \angle AEU - \angle AED$ ($\angle$s at a pt.) $= 360° - 135° - 108°$ $= 117°$ Since $EU = AE$ and $ED = AE$, $EU = ED$ $\angle EDU$ $= \frac{180° - 117°}{2}$ (base $\angle$s of isos. Δ) $= \frac{63°}{2}$ $= 31.5°$		M1 M1 A1
11(b)	$\angle ARQ$ $= 180° - \angle PQR$ (int. $\angle$s, $PQ \parallel AR$) $= 180° - 135°$ $= 45°$ $\angle ARS$ $= \angle QRS - \angle ARQ$ $= 135° - 45°$ $= 90°$ (Proved)		B1 B1
12(a)	When x = 5, y = p: $(p) = 0.50(5) + 3.2$ $p = 2.5 + 3.2$ $= 5.7$		B1
12(b)-12(c)	Refer to next page.		
12(d)	The gradient of the graph represents the taxi fare charged per kilometer travelled by the taxi.		B1
12(e)	The fare can never be less than \$3.20 because the distance travelled by the taxi will always start from zero, at which point the (starting) fare will be \$3.20.		B1

聖嬰中學

HOLY INNOCENTS' HIGH SCHOOL

Name of Student

Class

Index Number

60

END–OF–YEAR EXAMINATION 2015
SECONDARY 1 EXPRESS
MATHEMATICS PAPER 1

4048/01

Date: 8 Oct 2015

Duration: 1 h 30 min

Students answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index 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 paper clips, glue or correction tape/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 the question.

Omission of essential working will result in loss of marks.

The total of the marks for this paper is **60**

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.

Set by: Ms Cheryl Chew

Vetted by: Mdm Hayati

Ms Goh Lay Ching

This document consists of 13 printed pages (including cover page).

120

Answer **all** the questions.

1 By rounding each number to the nearest whole number, estimate the value of

$$\frac{\sqrt{9.3}}{\sqrt[3]{26.9}}.$$

Answer ..... [2]

---

2 **(a)** The number of spectators at a football match is 149 500 when rounded off to 4 significant figures.

What is the smallest number of spectators that were present?

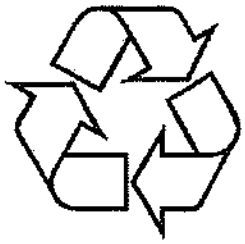
(b) Arrange the following numbers in ascending order.

$$30\%, \quad -0.3, \quad \frac{16}{50}, \quad 0.\dot{3}, \quad 0.33.$$

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

(b) ..... [1]

3 For the following diagram,



write down

(a) the number of lines of symmetry,

(b) the order of rotational symmetry.

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

(b) ..... [1]

---

4 Consider the following numbers.

$$-8,\ \frac{\pi}{5},\ \frac{9}{\sqrt{3}},\ \sqrt{5},\ \sqrt[3]{8},\ 125.$$

Write down

(a) all irrational number(s),

(b) all perfect cube number(s),

(c) all prime number(s).

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

(b) ..... [1]

(c) ..... [1]

[2]

5 **(a)** Solve the inequality $-2x \geq -27 + x$.

(b) Hence write down the largest prime number x that satisfies the inequality

$$-2x \geq -27 + x.$$

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

(b) ..... [1]

---

6 **(a)** **(i)** Express 56 as a product of its prime factors.

(ii) Find the smallest integer, n, such that $56n$ is a perfect square.

(b) p leaves a remainder of 1 when divided by 2, 3 or 7.

Find the smallest integer value of p.

Answer *(a)(i)* 56 = ... [1]

(ii) n = ... [1]

(b) ..... [2]

7 Susan has a mass of $3x$ kg and Charlene has a mass that is 6 kg less than Susan. The mass of Kelly is half of the total mass of Susan and Charlene.

Write an expression, in terms of x, for

(a) Charlene's mass,

(b) the average mass of the 3 girls.

Answer *(a)* .....kg [1]

(b) .....kg [2]

---

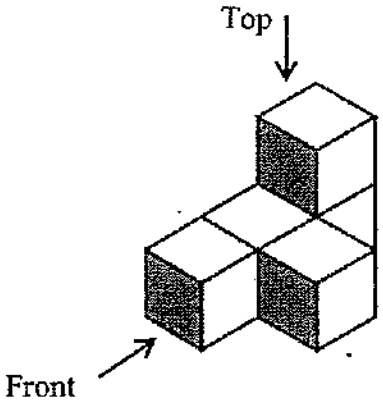
8 **(a)** Simplify $a \times a + 3a \times b - 2b \times a$.

(b) Factorise $5x^2y^2 - 20xy^2$ completely.

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

(b) ..... [1]

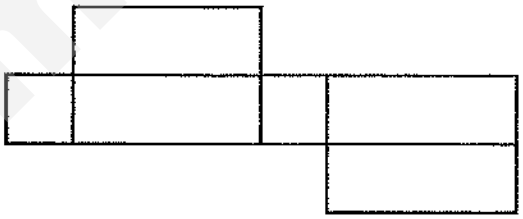
9 **(a)** The solid shown below is made up of cubes.
Draw the front view and top view of the solid in the answer space below.



Answer (a) [2]

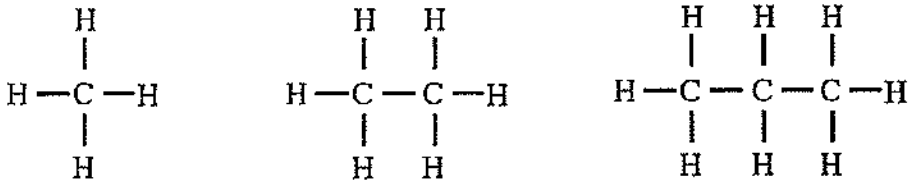
Front View | Top View

(b) Draw a sketch of the solid that can be formed by the net shown below.



Answer (b) [1]

10 The first three members of a family of hydrogen, H, and carbon, C, compounds have bonding structures as shown below.



1st Member $n = 1$

2nd Member $n = 2$

3rd Member $n = 3$

(a) Draw the bonding structure for the 4th member of the family.

Answer (a) [1]

The table below shows the number of carbon atoms and hydrogen atoms in each member of the family of chemical compounds.

n	Number of Carbon atoms	Number of Hydrogen atoms
1	1	4
2	2	6
3	3	8
...	...	...
n	n	T_n

(b) Find the number of hydrogen atoms in the structure for the 10th member of the family.

(c) Find the general term, T_n, for the number of hydrogen atoms for the n^{th} member of the family.

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

(c) ..... [1]

11 In June, Sarah spent 20% of her income and saved the rest.
Sarah's monthly income is $2000.

(a) Find the amount she spent in the month of June.

(b) In July, Sarah increased her expenditure and spent 30% of her income.
Find the percentage increase in her expenditure from June to July.

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

(b) .....% [2]

---

12 The sum of exterior angles of a polygon with n sides is $\frac{1}{3}$ the sum of its interior angles.

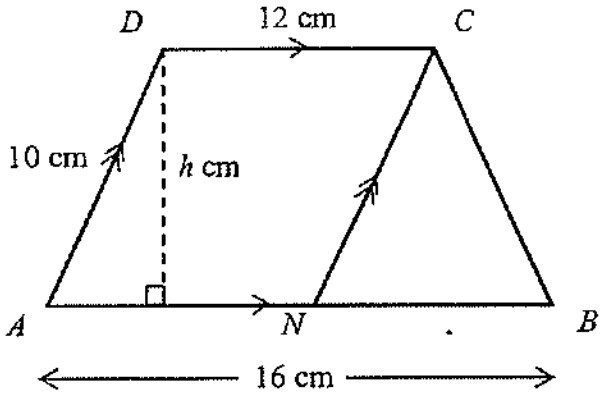
(a) Find the value of n.

(b) Name this polygon.

Answer *(a)* ..... [3]

(b) ..... [1]

13 In the diagram, $ABCD$ is a trapezium with $DC = 12$ cm, $AD = 10$ cm and $AB = 16$ cm. DC is parallel to AB and AD is parallel to NC.



Given that the area of trapezium $ABCD = 112$ cm^2, calculate

(a) the value of h,

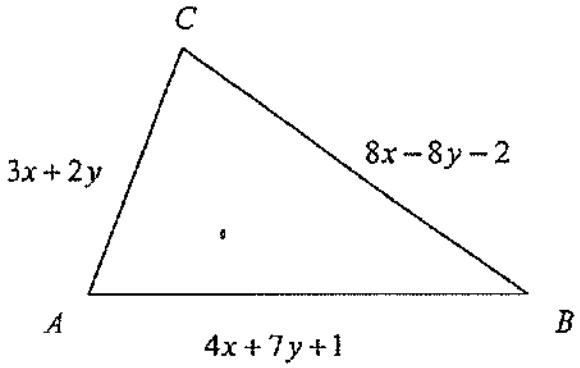
(b) the area of parallelogram $ANCD$.

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

(b) ..... cm^2 [2]

124

14 The lengths of three sides of triangle ABC are $(3x+2y)$ cm, $(8x-8y-2)$ cm and $(4x+7y+1)$ cm.



(a) Write down and simplify, an expression in terms of x and y, for the perimeter of the triangle.

(b) It is given that $x = 4\frac{1}{2}$ and $y = 1$.

(i) Find the perimeter of the triangle.

(ii) What type of triangle is triangle ABC?

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

(b) (i) ..... cm [1]

(ii) ..... [1]

For Examiner's Use

15 The charges for printing and framing photographs at Filmhub and Picturehub are given in the table below.

	Filmhub	**Picturehub**
Printing service	\$0.15 per photograph	\$0.18 per photograph
Framing service	\$3 per photograph	\$2.80 per photograph

(a) Calculate

(i) the amount you need to pay to print 80 photographs at Filmhub,

(ii) the number of photographs you can frame at Picturehub with \$392.

(b) You need to print and frame 50 photographs.

Find the amount you would save if you use the services at Picturehub instead of Filmhub.

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

(ii) ..... [2]

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

125

16 **(a)** Subtract $(2+x+4y)$ from $(5x-2y)$.
Leave your answer in its simplest form.

(b) Simplify

(i) $-\frac{x}{2}+3y-2(4y-x)$,

(ii) $\frac{3(x-3)}{2}-\frac{2x}{5}$.

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

(b) *(i)* ..... [2]

(ii) ..... [2]

For Examiner's Use

17 In a quadrilateral $ABCD$, $AB = 6.5$ cm, $BC = 4.8$ cm and $CD = 8.5$ cm.
It is also given that $\angle ABC = 115°$, $\angle BCD = 98°$.
The side AB is drawn in the answer space below.

(a) Using a ruler and compasses, construct quadrilateral $ABCD$. [2]

(b) Measure and write down $\angle DAB$.

(c) On the same diagram, construct and label clearly

(i) the perpendicular bisector of AD, [1]

(ii) the angle bisector of $\angle ADC$. [1]

(d) Mark the point M where the two bisectors meet.
Measure the length of AM.

Answer (a), (c) and (d)

A B

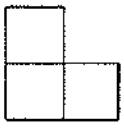
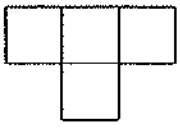
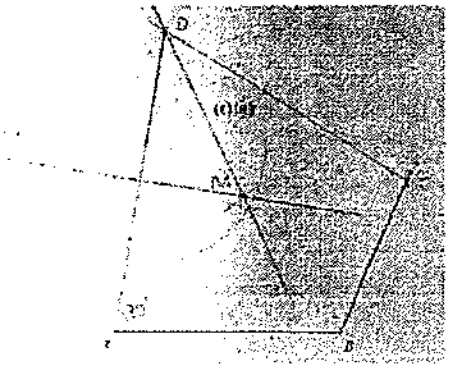
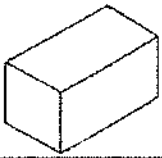
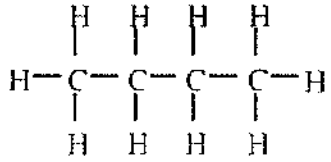
Answer (b) $\angle DAB$ = ... [1]

(d) .....cm [1]

126

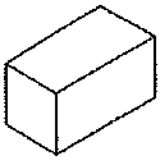
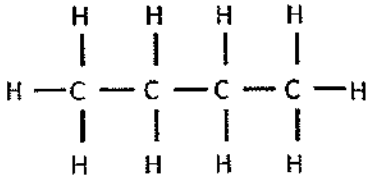
END OF PAPER

Answer Key

1	1	10b	22
2a	149 450	10c	$2n+2$
2b	$-0.3,\ 30\%,\ \frac{16}{50},\ 0.33,\ 0.\dot{3}$	11a	\$400
3a	0	11b	50%
3b	3	12a	8
4a	$\frac{\pi}{5},\ \frac{9}{\sqrt{3}},\ \sqrt{5}$	12b	Octagon
4b	$-8,\ 125$	13a	$h=8$
4c	$\sqrt[3]{8}$	13b	96cm^2
5a	$x \le 9$	14a	$(15x+y-1)$cm
5b	7	14b	$67\frac{1}{2}$ cm
6ai	$2^3 \times 7$	14c	Isosceles triangle or Acute-angled triangle.
6aii	14	15ai	\$12
6b	43	15aii	140
7a	$3x-6$	15b	\$8.50
7b	$3x-3$	16a	$4x-6y-2$
8a	a^2+ab	16bi	$\frac{3x}{2}-5y$
8b	$5xy^2(x-4)$	16bii	$\frac{11x-45}{10}$
9a	Front View  Top View 	17a	
9b			
10a		17b	81°
		17d	5.4 cm

Mark Scheme for 2015 Sec 1 Express EOY Mathematics Paper 1

Qn	Answer	Marks	Remarks
1a	$\frac{\sqrt{9.3}}{\sqrt[3]{26.9}}$ $=\frac{\sqrt{9}}{\sqrt[3]{27}}$ $=1$	M1 A1	
2a	149 450	B1	
2b	$-0.3,\ 30\%,\ \frac{16}{50},\ 0.33,\ 0.\dot{3}$	B1	
3a	0	B1	
3b	3	B1	
4a	$\frac{\pi}{5},\ \frac{9}{\sqrt{3}},\ \sqrt{5}$	B1	
4b	$-8,\ 125$	B1	
4c	$\sqrt[3]{8}$	B1	
5a	$-2x \geq -27 + x$ $-3x \geq -27$ $x \leq \frac{-27}{-3}$ $x \leq 9$	M1 A1	Award M1 if student wrote $27 \geq 3x$ instead
5b	7	B1	
6ai	$56 = 2^3 \times 7$	B1	
6aii	$n = 2 \times 7$ $= 14$	B1	
6b	$\text{LCM} = 2 \times 3 \times 7$ $= 42$ $p = 42 + 1$ $= 43$	M1 A1	
7a	$3x - 6$	B1	
7b	$\text{Kelly's weight} = \frac{3x + 3x - 6}{2}$ $= (3x - 3)\text{ kg}$ $\text{Average weight} = \frac{3x + 3x - 6 + 3x - 3}{3}$ $= (3x - 3)\text{ kg}$	M1 A1	
8a	$a \times a + 3a \times b - 2b \times a$ $= a^2 + ab$	B1	
8b	$5x^2y^2 - 20xy^2$ $= 5xy^2(x - 4)$	B1	

9a	Front View  Top View 	B1 (each)	Award mark for front view even if student did not shade the squares. Do not award marks if rectangles instead of squares are drawn
9b		B1	Do not accept plane figure 
10a		B1	
10b	$2(10)+2=22$	B1	
10c	$2n+2$	B1	
11a	Amount spent in June $= \frac{20}{100} \times 2000$ $= \$400$	B1	
11b	July's expenditure $= \frac{30}{100} \times 2000$ $= \$600$ Percentage increase in expenditure from June to July $= \frac{600-400}{400} \times 100\%$ $= 50\%$	M1 A1	
12a	sum of interior angles $= 360° \times 3$ $= 1080°$ $(n-2) \times 180° = 1080°$ $n = \frac{1080}{180} + 2$ $= 8$	M1 M1 A1	
12b	Octagon	B1	
13a	$\frac{1}{2} \times (12+16) \times h = 112$ $h = 8$	M1 A1	

13b	Area of parallelogram $ANCD = 12 \times 8$ $= 96\,\text{cm}^2$	M1 A1	
14a	Perimeter $= 3x + 2y + 8x - 8y - 2 + 4x + 7y + 1$ $= (15x + y - 1)\text{cm}$	M1 A1	
14b	Perimeter $= 15(4\frac{1}{2}) + 1 - 1$ $= 67\frac{1}{2}\,\text{cm}$	B1	
14c	Isosceles triangle or Acute-angled triangle.	B1	Do not award mark for spelling error
15ai	Amount I need to pay $= 80 \times \$0.15$ $= \$12$	M1 A1	
15aii	Number of photographs $= \frac{\$392}{\$2.80}$ $= 140$	M1 A1	
15b	Amount saved per photograph $= (\$0.15 + \$3) - (\$0.18 + \$2.80)$ $= \$0.17$ Total amount saved for 50 photographs $= 50 \times \$0.17$ $= \$8.50$ *Alternative method:* Amount cost at Filmhub $= 50 \times (\$0.15 + \$3)$ $= \$157.50$ Amount cost at Picturehub $= 50 \times (\$0.18 + \$2.80)$ $= \$149$ Total amount saved $= \$157.50 - \$149$ $= \$8.50$	M1 A1 M1 A1	
16a	$5x - 2y - (2 + x + 4y)$ $= 5x - 2y - 2 - x - 4y$ $= 4x - 6y - 2$	M1 A1	
16bi	$-\frac{x}{2} + 3y - 2(4y - x) = -\frac{x}{2} + 3y - 8y + 2x$ $= \frac{3x}{2} - 5y$	M1 A1	Do not accept $1\frac{1}{2}x - 5y$

16bii	$\frac{3(x-3)}{2} - \frac{2x}{5} = \frac{15x-45-4x}{10}$ $= \frac{11x-45}{10}$	M1 A1	Award mark for common denominator
17a	Refer to the last page.	B1 (BC) B1 (CD) B1 (perpen. Bisector) B1 (Angle Bisector)	
17b	81°	B1	Accept $81° \pm 1°$
17d	5.4 cm	B1	Accept (5.4 ± 0.1) cm

聖 嬰 中 學

HOLY INNOCENTS' HIGH SCHOOL

Name of Student

Class | Index Number

END-OF-YEAR EXAMINATION 2015
SECONDARY 1 EXPRESS
MATHEMATICS PAPER 2

4048/01

Date: 2 Oct 2015

Duration: 1 h 30 min

Additional Materials: **5 sheets of Writing Paper**
1 sheet of Graph Paper

READ THESE INSTRUCTIONS FIRST

Write your name, class and index 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 paper clips, glue or correction tape/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 the question.

Omission of essential working will result in loss of marks.

The total of the marks for this paper is **60**

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.

Set by: Mdm Hayati

Vetted by: Ms Goh Lay Ching

This document consists of 8 printed pages (including cover page).

129

Answer **all** the questions.

1 In an election, 87% of the people who were eligible to vote cast their votes.

There were 3 candidates in the election
The table below illustrates the number of votes received by each candidate.

Candidates	Number of votes received
Candidate X	x
Candidate Y	49 938
Candidate Z	21 402

(a) The number of votes for the 3 candidates, X, Y, Z, were in the ratio 4 : 7 : 3.
Calculate the value of x. [2]

(b) Calculate the total number of people who were eligible to vote. [2]

(c) Jane drew a pictogram to represent the results of the election.

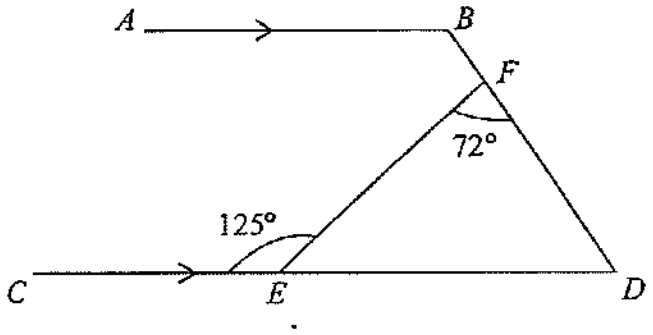
Candidate X	☒☒☒☒
Candidate Y	☒☒☒☒☒☒☒
Candidate Z	☒☒☒
☒ represents 7000 votes	

(i) Explain why the pictogram may be considered misleading. [1]

(ii) Amy wants to represent the data using a pie chart instead.

Explain why using a pie chart is a better representation of the data? [1]

2 **(a)** In the diagram, the line AB is parallel to CED.
$\angle CEF = 125°$ and $\angle EFD = 72°$.



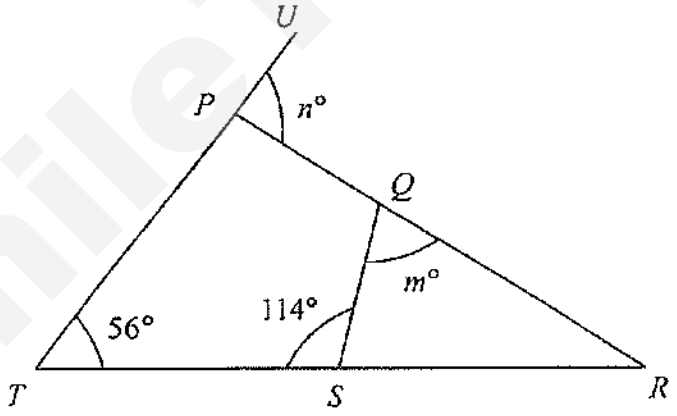
Calculate

(i) $\angle EDF$, [1]

(ii) reflex $\angle ABD$. [2]

(b) In the diagram TSR, TPU and PQR are straight lines.
$\angle PTS = 56°$ and $\angle TSQ = 114°$.

Find the value of $m + n$. [2]



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3 Shirley opened a saving account by investing $2400.
The account pays simple interest at the rate of 4.8% per year.

(a) Calculate the total amount in Shirley's account after 3 years. [2]

(b) Karen deposited $P in her saving account.
This account pays simple interest at the rate of 4% per year.
At the end of 3 years, the amount of interest Karen received is twice as much as the interest Shirley received.

Calculate the value of P. [3]

130

4 **(a)** A submarine is 68 m below sea level.

(i) A jet fighter which is 354 m above sea level dropped a bomb to hit the submarine.

Find the vertical distance travelled by the bomb. [1]

(ii) A falcon is midway between the submarine and the jet fighter.

Find the distance of the falcon above sea level. [2]

(b) A rectangular room measures 6 m by 5.5 m.
A contractor wants to tile the floor with identical square tiles to fit the room.

(i) Find the largest possible length of each tile. [2]

(ii) Find the maximum number of tiles needed. [1]

---

5 **(a)** Evaluate

$$\sqrt{7^2 + 2 \times (-8.2) \times \frac{3}{4}},$$

giving your answer correct to 2 significant figures. [2]

(b) Solve

(i) $\frac{1}{3}(x+6) = 3 - (2-x)$, [2]

(ii) $\frac{10}{2x+5} - 3 = 0$. [2]

6 Jessie bought a few books during her trip to Melbourne.
The diagram below shows the receipt issued by the book store.
Some of the printouts on the receipt have faded and they are indicated by the black boxes.
You have to help Jessie recover the details of her purchases.

All purchases are made in Australian Dollar (AUD).

FAVOURED BOOK COMPANY
One Emporium Melbourne Store
VIC, 3000

ITEM	QTY	PRICE AUD	DISC AUD	TOTAL
ART OF CHARLIE CHAN	1	29.90		29.90
YOU SAY, I SAY	1	15.40	[redacted]	11.55
STYLISTICS	1	30.80	15.40	15.40
		[Total Discount =	19.25]	

ITEMS PURCHASED: 3

TOTAL AUD [redacted]

10% GST INCLUDED IN TOTAL [redacted]

27/8/2015 17:19 001 Slip: 123456789
TEMP100001 Trans: 456123
You were served by Jasnina DAVIS

(a) Find total amount, in AUD, in Jessie's receipt. [1]

(b) Find the percentage discount given to the book "You Say, I Say" [2]

(c) The total amount is inclusive of 10% GST.
Calculate the GST amount, in AUD. [2]

(d) On 27 Aug 2015 the rate of exchange between Australian Dollar (AUD) and Singapore Dollar (SGD) was 1 AUD = 1.18 SGD.

Calculate the total amount of the purchases in SGD. [1]

(e) Jessie claims that the original price of the book "Stylistics" is 50% more than the book "You Say, I Say".

Do you agree with Jessie? Justify your answer with clear working. [2]

131

7 **(a)** During the 2015 SEA Games, Singapore national swimmer Quah Zheng Wen set a new national record of 25.27 s in the 50 m backstroke event.

Express his speed in km/h, giving your answer correct to 2 decimal places. [2]

(b) Kelly makes a trip from office A to office B for a meeting.
The distance between office A and office B is 250 km.

(i) Kelly travels x km for the first part of her trip at an average speed of 60 km/h before she stops to have her lunch.

Write down an expression, in terms of x, for the time taken, in hours, to travel the first part of her trip. [1]

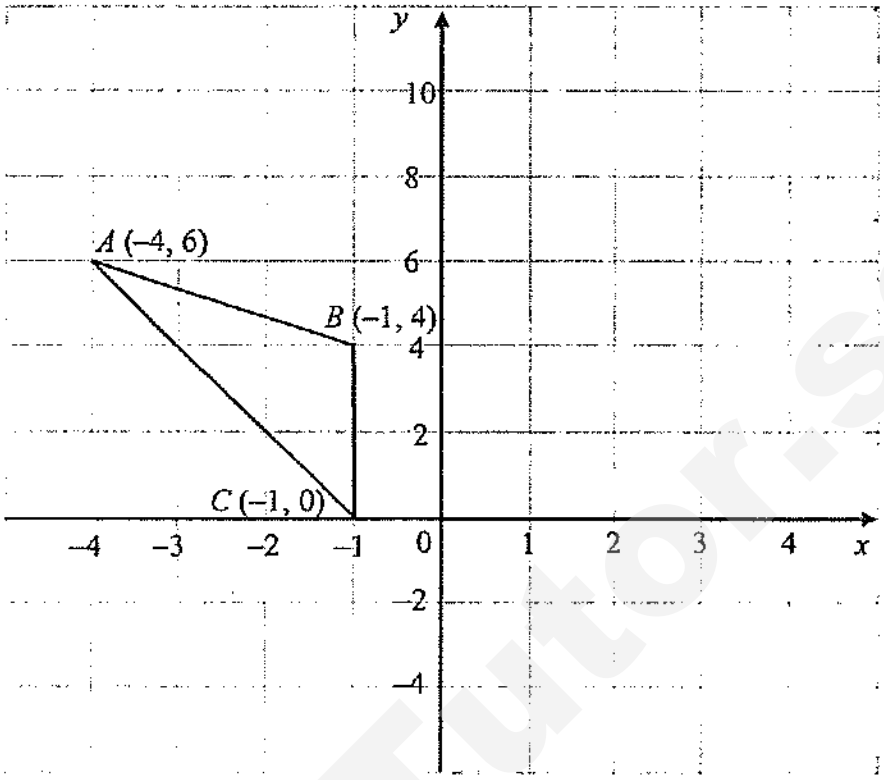
(ii) After her lunch, Kelly continues the second part of her trip, travelling the remaining distance at an average speed of 80 km/h to office B.

Write down an expression, in terms of x, for the time taken, in hours, to travel the second part of her trip. [1]

(iii) Given that the total time taken for the whole trip is $3\frac{1}{2}$ hours, form an equation in x and solve it. [3]

(iv) Find the time taken, in hours, for the second part of her trip. [1]

8 (a) The diagram shows a triangle ABC.
A is $(-4, 6)$, B is $(-1, 4)$ and C is $(-1, 0)$.



(i) Write down the gradient of the line AB. [1]

(ii) $ABDC$ is a parallelogram.
Write down the coordinates of point D. [1]

(iii) A point E lies on the x-axis such that triangle EBC has the same area as triangle ABC.
Write down one possible coordinates of the point E. [1]

(b) **Answer the whole of this question on a sheet of graph paper.**

(i) The variables x and y are connected by the equation $2x + y = 3$.
Some corresponding values of x and y are given in the table below.

x	-2	0	1	p	4
y	7	3	1	0	-5

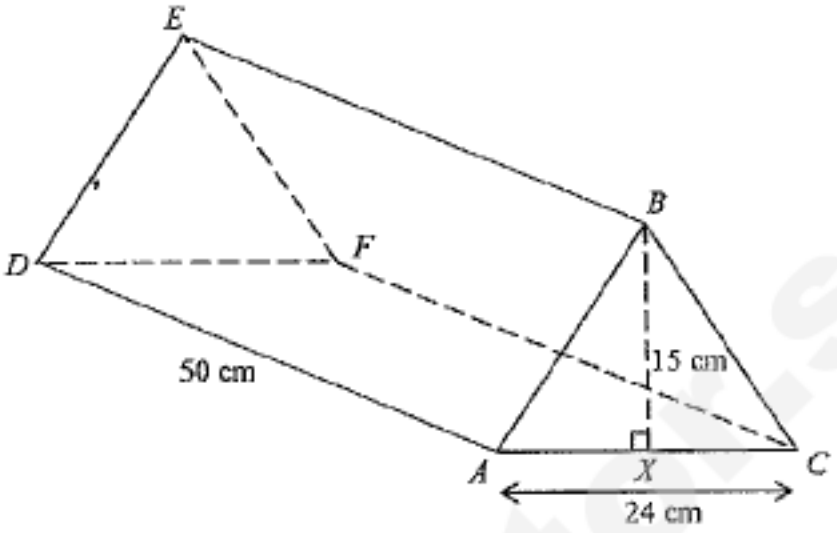
Find the value of p. [1]

(ii) Using a scale of 2 cm to 1 unit on x-axis and 1 cm to 1 unit on y-axis, plot the points in the table.
Draw and label clearly the graph $2x + y = 3$. [2]

(iii) On the same axes, draw the graph $y = -2$.
Write down the x-coordinate of the point where the two graphs intersect. [2]

130

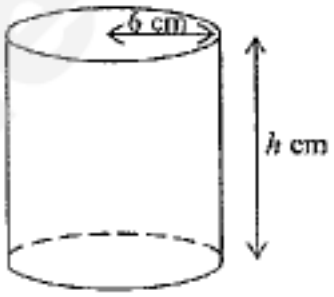
9 The diagram shows a solid prism whose cross-section is a triangle ABC.
$AC = 24$ cm, $BX = 15$ cm and $AD = 50$ cm.



[Take $\pi = 3.142$]

(a) Find the volume of the prism. [2]

(b) The solid prism was melted and recast into 5 identical cylindrical solids with radius 6 cm and height h cm.
One such cylindrical solid is shown in the diagram below.



Show that the height, h, of each cylindrical solid, when rounded to the nearest whole number, is 16 cm. [2]

(c) **(i)** Kevin wanted to paint the external surfaces of the 5 cylindrical solids using spray paint.

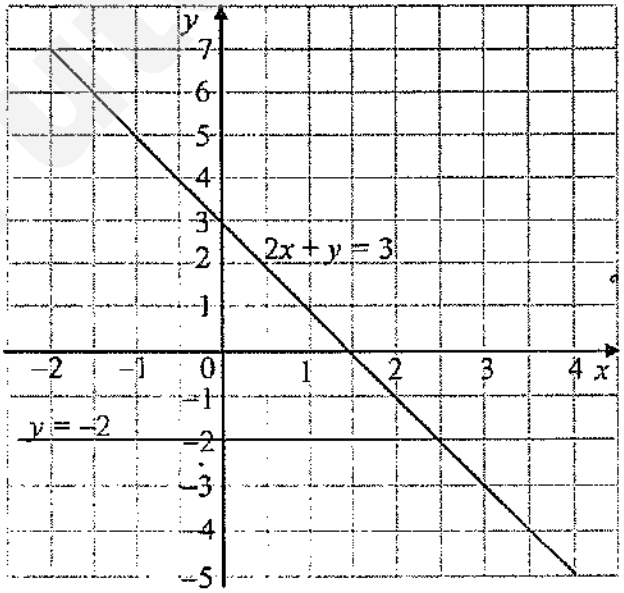
Using the value of h in part (b), find the total area of the surfaces to be painted. Leave your answer in terms of π. [2]

(ii) One can of spray paint covers an area of 600 cm^2.

Given that a can of spray paint costs $5.50, calculate the amount of money Kevin would have to spend on painting. [2]

END OF PAPER

Answer Key

1(a)	$x = 28\,536$	7(a)	7.12 km/h (correct to 2 dp)
1(b)	Total number of people eligible to vote = 114 800	7(b)(i)	$\frac{x}{60}$ h
1(c)(i)	The symbols to represent the number of votes are unequal in size. The pictogram seems to show that Candidate Y received a lot more votes than the actual number of votes.	7(b)(ii)	$\frac{250-x}{80}$ h
		7(b)(iii)	$\frac{x}{60}+\frac{250-x}{80}=3\frac{1}{2}$ $x = 90$
1(c)(ii)	Pie chart is able to show proportion of each candidate in comparison with the total number of votes.	7(b)(iv)	2 hours
		8(a)(i)	Gradient of $AB = -\frac{2}{3}$
2(a)(i)	$\angle EDF = 53°$	8(a)(ii)	$D\ (2, -2)$
2(a)(ii)	Reflex $\angle ABD = 233°$	8(a)(iii)	$E(-4, 0)$ or $E(2, 0)$
2(b)	$m + n = 170$	8(b)(i)	$p = 1\frac{1}{2}$
3(a)	Total amount = \$2745.60	8(b)(ii)	
3(b)	P = \$5760		
4(a)(i)	Vertical distance = 422 m		
4(a)(ii)	Dist above sea level = 143 m		
4(b)(i)	Largest length = 50 cm		
4(b)(ii)	Max number of tiles = 132		
5(a)	6.1 (correct to 2 sig fig)		
5(b)(i)	$x = 1\frac{1}{2}$		
5(b)(ii)	$x = -\frac{5}{6}$		
6(a)	Total amount = 56.85 AUD		
6(b)	% discount = 25%		
6(c)	GST = 5.17 AUD		
6(d)	67.08 SGD		
6(e)	I don't agree with Jessie's claim. If "Stylistics" is 50% more than "You Say, I Say" then its price should be $= \frac{150}{100} \times 15.40$ = 23.10 AUD and not 30.80 AUD. OR If "Stylistics" is 50% more than "You Say, I Say" then its price should be $\frac{15.40}{15.40} \times 100\% = 100\%$ more than the price of "You Say, I Say".	8(b)(iii)	$x = 2\frac{1}{2}$
		9(a)	Volume of prism = 9000 cm^3
		9(b)	$\pi \times 6^2 \times h = 1800$ $h = \frac{1800}{36\pi} \approx 16$ cm
		9(c)(i)	Total surface area $= 1320\pi$
		9(c)(ii)	Cost = \$38.50

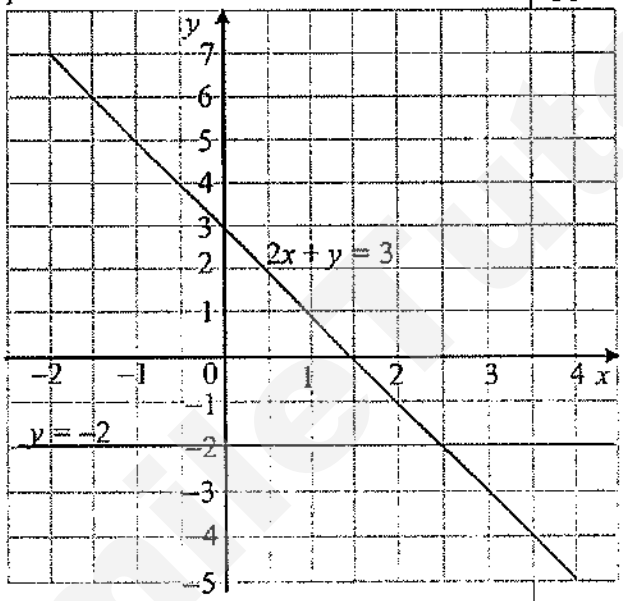
End-of-Year Examination 2015 Marking Scheme
Sec 1 Express Mathematics Paper 2

Question No.	Marking Point	Mark Awarded	Total Marks	Remarks
1 (a)	$x = \frac{49938}{7} \times 4$ $= 28\,536$	M1 A1	2	Alternative method $x = \frac{21402}{3} \times 4$ $= 28\,536$
(b)	Total number of votes received $= 28\,536 + 49\,938 + 21\,402$ $= 99\,876$ No of ppl eligible to vote $= \frac{99876}{87} \times 100$ $= 114\,800$	M1 A1	2	
(c) (i)	The symbols to represent the number of votes are unequal in size. The pictogram seems to show that Candidate Y received a lot more votes than the actual number of votes.	B1	1	
(ii)	Using pie chart is a better representation as pie chart is able to show proportion of each candidate in comparison with the total number of votes	B1	1	
2 (a) (i)	$\angle EDF = 125° - 72°$ $= 53°$ (exterior $\angle$ of Δ)	B1	1	
(ii)	$\angle ABD = 180° - 53°$ $= 127°$ Reflex $\angle ABD = 360° - 127°$ $= 233°$	M1 A1	2	
(b)	$180 - n + 180 - m + 56 + 114 = 360$ $170 - n - m = 0$ $m + n = 170$	M1 A1	2	
3 (a)	Interest $= 2400 \times \frac{4.8}{100} \times 3$ $= \$345.60$ Total amount $= 2400 + 345.60$ $= \$2745.60$	M1 A1	2	

134

Question No.	Marking Point	Mark Awarded	Total Mark	Remarks
3 (b)	$P \times \frac{4}{100} \times 3 = 2(345.60)$	M1		M1 for forming equation correctly.
	$P = \frac{691.2 \times 100}{12}$	M1		
	$= \$5760$	A1	3	
4 (a) (i)	Vertical distance $= 354 - (-68)$ $= 422$ m	B1	1	
(ii)	Dist above sea level $= 354 - \left(\frac{422}{2}\right)$	M1		M1 for $\left(\frac{422}{2}\right)$
	$= 143$ m	A1	2	
(b) (i)	6 m $= 600$ cm $= 2^3 \times 3 \times 5^2$			
	5.5 m $= 550$ cm	M1		M1 for prime factorisation
	$= 2 \times 5^2 \times 11$			
	HCF $= 2 \times 5^2 = 50$ cm	A1	2	
	Largest length $= 50$ cm			
(ii)	No of tiles $= \frac{600}{50} \times \frac{550}{50}$			
	$= 12 \times 11$			
	$= 132$	B1	1	
5 (a)	6.058	B1		
	≈ 6.1 (correct to 2 sig fig)	B1	2	
(b) (i)	$\frac{1}{3}x + 2 = 3 - 2 + x$	M1		M1 for correct expansion
	$\frac{2}{3}x = 1$			
	$x = 1\frac{1}{2}$	A1	2	
(ii)	$10 = 3(2x + 5)$	M1		M1 for eliminating the denominator
	$10 = 6x + 15$			
	$x = -\frac{5}{6}$	A1	2	

Question No.		Working Point	Marks Awarded	Total Marks	Remarks
6	(a)	Total amount $= 29.90 + 11.55 + 15.40$ $= 56.85$ AUD	B1	1	
	(b)	Discount $= 15.40 - 11.55 = 3.85$ % discount $= \frac{3.85}{15.4} \times 100\%$ $= 25\%$	M1 A1	2	Alternative method Discount $=19.25 - 15.40$ $= 3.85$ AUD
	(c)	GST $= \frac{10}{110} \times 56.85$ $= 5.17$ AUD	M1 A1	2	
	(d)	1 AUD $= 1.18$ SGD 56.85 AUD $= 56.85 \times 1.18$ SGD $= 67.083$ ≈ 67.08 SGD	B1	1	
	(e)	50% more than "You Say, I Say" $= \frac{150}{100} \times 15.40$ $= 23.10$ AUD The price of "Stylistics" is 30.80 AUD not 23.10 AUD. Therefore the price of "Stylistics" is not 50% more than "You Say, I Say". I don't agree with Jessie's claim.	B1 B1	2	The price of "Stylistics" is 15.40 AUD more than "You Say, I Say". Compare to "You Say, I Say", "Stylistics" is $\frac{15.40}{15.40} \times 100\% = 100\%$ more than the price of "You Say, I Say"
7	(a)	Speed $= \frac{50}{25.27}$ m/s $= \frac{50 \times 3600}{25.27 \times 1000}$ $= 7.123$ ≈ 7.12 km/h (correct to 2 dp)	M1 A1	2	M1 for converting m to km or s to hr
	(b) (i)	Time taken $= \frac{x}{60}$ h	B1	1	
	(ii)	Time taken $= \frac{250 - x}{80}$	B1	1	
	(iii)	$\frac{x}{60} + \frac{250 - x}{80} = 3\frac{1}{2}$ $\frac{4x + 3(250 - x)}{240} = 3\frac{1}{2}$ $4x + 750 - 3x = 840$ $x = 90$	M1✓ M1 A1	3	M1 for forming correct equation 135

Question No.			Working / Answer	Mark Scheme	Total Marks	Remarks
7		(iv)	Time $= \frac{250-90}{80} = 2$ h	B1	1	
8	(a)	(i)	Gradient of $AB = -\frac{2}{3}$	B1	1	
		(ii)	$D(2, -2)$	B1	1	
		(iii)	$E(-4, 0)$ or $E(2, 0)$	B1	1	B1 for either one of the coordinates
	(b)	(i)	$p = 1\frac{1}{2}$	B1	1	
		(ii)	Draw axes and plot all points correctly Draw straight line graph through all points	P1 C1	2	
						
		(iii)	The line $y = -2$ drawn correctly. $x = 2\frac{1}{2}$	B1 B1	2	
9	(a)		Cross sectional area $= \frac{1}{2} \times 24 \times 15$ $= 180$ cm^2 Volume $= 180 \times 50$ $= 9000$ cm^3	M1 A1	2	
	(b)		Volume of each solid $= \frac{9000}{5} = 1800$ $\pi \times 6^2 \times h = 1800$ $h = \frac{1800}{36\pi}$ $= 15.91$ ≈ 16 (nearest whole number)	M1 A1	2	

Question No.	Marking Point	Marks Awarded	Total Marks	Remarks
9 (c) (i)	Total surface area $= 5(2\times\pi\times6^2+2\times\pi\times6\times16)$ $= 5(72\pi+192\pi)$ $= 1320\pi$	M1 A1	 2	M1 for correct area of 2 circles or curved surface area
(ii)	No of bottle $= \frac{1320\pi}{600}$ $= 6.91$ ≈ 7 bottles Cost $= 7\times5.5$ $= \$38.50$	M1 A1	 2	

36

Class	Register Number	Name

南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2015
Secondary One

INTEGRATED MATHEMATICS 1 hour 15 minutes
Paper 1
Monday **12 October 2015** **0845 - 1000**

READ THESE INSTRUCTIONS FIRST

INSTRUCTIONS TO CANDIDATES

1. Write your name, register number and class in the spaces at the top of this page.
2. Answer all the questions.
3. Write your answers and working in the spaces provided on the question paper.
4. **All working must be written in dark blue or black ink.**
5. **Omission of essential working will result in loss of marks.**
6. Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
7. The use of calculators is NOT allowed for this paper.

INFORMATION FOR CANDIDATES

1. The number of marks is given in brackets [ ] at the end of each question or part question.
2. The total number of marks for this paper is 50.
3. You are reminded of the need for clear presentation in your answers.

137

1. Arrange the following in ascending order:

$$0.\dot{2}\dot{1} \quad , \quad \frac{1}{5} \quad , \quad \frac{21}{100} \quad , \quad -0.21 \quad , \quad -0.2\dot{1}$$

Answer: _____ [2]

2. Alex reads $\frac{3}{5}$ of a book on Monday and $\frac{1}{3}$ of the remaining pages on Tuesday.

If he has 64 pages left to read after Tuesday, how many pages does the book have ?

Answer: _____ pages [2]

3. Evaluate the following:

(a) $2-3[5-(-8)]\times 7-(6+4)$

(b) $-\frac{5}{2}+2\left(-\frac{1}{4}\right)^2+\frac{2}{3}\div\left(-\frac{14}{9}\right)$

Answer: (a) _____ [2]

(b) _____ [2]

138

4. Even numbers are arranged in a table comprising three columns C1 to C3 for the 1st to 4th rows as shown below:

	C1	C2	C3
1st row	2	4	6
2nd row	8	10	12
3rd row	14	16	18
4th row	20	22	24
5th row	a	...	...
...	...	...	...
nth row	...	k	...
...	...	...	...
100th row	...	...	x

(a) Write down the value of a.

(b) The number k is in the nth row of column C2. Write down and simplify an equation connecting n and k.

(c) The number x is in the 100th row of column C3. Calculate the value of x.

Answer: (a) a = _____ [1]

(b) _____ [2]

(c) x = _____ [1]

5. (a) Express 48 as the product of its prime factors.

(b) What is the smallest natural number, n, for which $48n$ is a multiple of 315?

(c) Find the smallest value of m such that the product $48m$ is a perfect cube.

(d) Using your result in (c), evaluate $\sqrt[3]{48m}$.

Answer: (a) 48 = _____ [1]

(b) n = _____ [2]

(c) m = _____ [2]

(d) _____ [1]

139

6. **(a)** Estimate the value of $\frac{5.112 \times 39.998}{0.199}$ correct to 1 significant figure.

Show all workings clearly.

(b) Use your result in (a) to estimate the value of $\frac{0.5112 \times 0.39998}{1.99}$.

(c) Using as much of the information below as necessary, evaluate $\sqrt{0.00486}$.

[$\sqrt{48.6} = 6.97$, $\sqrt{4.86} = 2.20$]

Answer: (a) _____ [2]

(b) _____ [2]

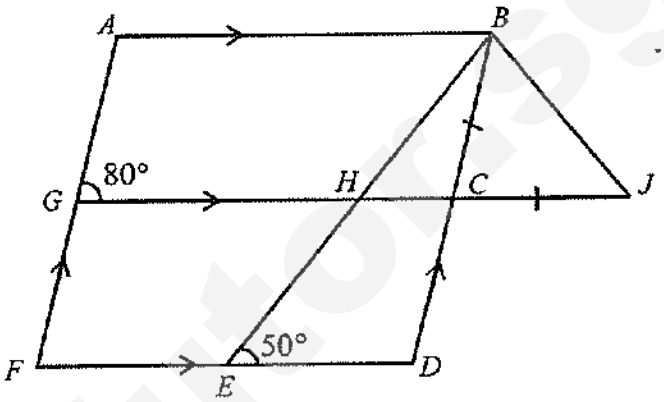
(c) _____ [2]

7. In the diagram, $ABDF$ is a parallelogram. GJ is a straight line parallel to AB and FD that cuts DB at C. BE is a straight line that cuts GJ at H. ΔBCJ is an isosceles triangle with $BC = JC$. $\angle AGH = 80°$ and $\angle BED = 50°$. Calculate the following angles, stating your reasons clearly.

(a) $\angle BDE$

(b) $\angle BHG$

(c) $\angle BJC$



Answer: (a) $\angle BDE =$ _____ [2]

(b) $\angle BHG =$ _____ [2]

(c) $\angle BJC =$ _____ [2]

140

8. Expand and simplify each of the following expressions:

(a) $(2x+3y)^2$

(b) $2r[1-3s-2(r-s+1)-r]$

(c) $3(2x-y)(x+y)-(x+2y)(x-2y)$

Answer: (a) _____ [1]

(b) _____ [2]

(c) _____ [3]

9. Factorise the following completely:

(a) $12u^2+9u-3$

(b) $16x^2-25$

(c) $3ac+ad-6bc-2bd$

Answer: (a) _____ [2]

(b) _____ [2]

(c) _____ [3]

10. **(a)** Simplify the following, giving your answer as a single fraction in its simplest form:

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

(b) Solve $\frac{3}{x-4}=-\frac{2}{1+2x}$.

(c) A company has x male employees and y female employees. The average yearly income of 1 employee is \$30 000. If the average yearly income of 1 female employee is $\$(x-5000)$, write down an algebraic expression in a single fraction that represents the average yearly income of 1 male employee.

Answer: (a) _____ [3]

(b) x = _____ [2]

(c) _____ [3]

- End of Paper -

2015 Sec 1 EOY P1 Marking Scheme

No.	Solution
1	$-0.2\dot{1}, -0.21, \frac{1}{5}, \frac{21}{100}, 0.\dot{2}\dot{1}$
2	$\frac{1}{3}$ of the remaining $\frac{2}{5}$ of the book = $\frac{2}{15}$ By Tuesday, he has read $\frac{3}{5}+\frac{2}{15}=\frac{11}{15}$ of the book. 64 pages represents $\frac{4}{15}$ of the book. No. of pages the book has = $64 \div 4 \times 15 = 240$
3a	$2-3[5-(-8)]\times 7-(6+4)$ $=2-3(13)\times 7-10$ $=2-273-10$ $=-281$
3b	$-\frac{5}{2}+2\left(-\frac{1}{4}\right)^2+\frac{2}{3}\div\left(-\frac{14}{9}\right)$ $=-\frac{5}{2}+2\left(\frac{1}{16}\right)+\frac{2}{3}\times\left(-\frac{9}{14}\right)$ $=-\frac{19}{8}-\frac{3}{7}$ $=-\frac{157}{56}$ $=-2\frac{45}{56}$
4a	$a = 26$
4b	$k = 4+6(n-1)$ $= 6n-2$
4c	$x = 6+6(100-1)$ $= 600$ Or $x = 100\times 6 = 600$
5a	$48 = 2^4 \times 3$
5b	$315 = 3^2 \times 5 \times 7$ $n = 3\times 5\times 7 = 105$
5c	$m = 2^2 \times 3^2 = 36$
5d	$\sqrt[3]{48m} = \sqrt[3]{2^4\times 3\times 2^2\times 3^2}$ $= \sqrt[3]{2^6\times 3^3}$ $= 2^2\times 3$ $= 12$
6a	$\frac{5.112\times 39.998}{0.199} \approx \frac{5.1\times 40}{0.2}$ $= 1000$
6b	$\frac{0.5112\times 0.39998}{1.99}$ $= \frac{5.112\div 10\times 39.998\div 100}{0.199\times 10}$ ≈ 0.1
6c	$\sqrt{0.00486} = \sqrt{48.6\div 10000}$ $= 6.97\div 100$ $= 0.0697$
7a	$\angle GCB = 180°-80°$ (int $\angle$, $GA \parallel CB$) $= 100°$ $\angle BDE = 100°$ (corres. $\angle$, $GJ \parallel FD$)
7b	$\angle EHC = 180°-50°$ (supp $\angle$) $= 130°$ $\angle BHG = 130°$ (vert. opp. $\angle$)
7c	$\angle BCG = \angle BDE = 100°$ (corres. $\angle$, $GJ \parallel FD$) $\angle BJC = 100°\div 2$ (ext. $\angle$ = sum of opp. int. $\angle$) $= 50°$
8a	$(2x+3y)^2$ $= 4x^2+12xy+9y^2$
8b	$2r\{1-3s-2(r-s+1)-r\}$ $= 2r\{1-3s-2r+2s-2-r\}$ $= 2r\{-1-s-3r\}$ $= -2r-2rs-6r^2$
8c	$3(2x-y)(x+y)-(x+2y)(x-2y)$ $= 3(2x^2+2xy-xy-y^2)-(x^2-4y^2)$ $= 3(2x^2+xy-y^2)-x^2+4y^2$ $= 6x^2+3xy-3y^2-x^2+4y^2$ $= 5x^2+3xy+y^2$

9a	$12u^2+9u-3$ $=3(4u^2+3u-1)$ $=3(4u-1)(u+1)$ OR $12u^2+9u-3$ $=(4u-1)(3u+3)$ $=3(4u-1)(u+1)$
9b	$16x^2-25$ $=(4x)^2-5^2$ $=(4x-5)(4x+5)$
9c	$3ac+ad-6bc-2bd$ $=a(3c+d)-2b(3c+d)$ $=(a-2b)(3c+d)$
10a	$3-\frac{2(x-2)}{3}+\frac{x}{4}$ $=\frac{36-8(x-2)+3x}{12}$ $=\frac{36-8x+16+3x}{12}$ $=\frac{52-5x}{12}$
10 b	$\frac{3}{x-4}=-\frac{2}{1+2x}$ $3(2x+1)=-2(x-4)$ $6x+3=-2x+8$ $8x=5$
	$x=\frac{5}{8}$

10c)

Total yearly income of all the staff in \$ $= 30000(x+y)$

Total yearly income of female employees in \$
$= y(x-5000)$

Total yearly income of male employees in \$
$= 30000(x+y)-y(x-5000)$
$= 30000x+30000y-xy+5000y$
$= 30000x-xy+35000y$

Average yearly income of male employees in \$
$= \frac{30000x-xy+35000y}{x}$

Class	Register Number	Name

南洋女子中学校
NANYANG GIRLS' HIGH SCHOOL

End-of-Year Examination 2015
Secondary One

INTEGRATED MATHEMATICS — 1 hour 15 min
Paper 2
Thursday — 8 Oct 2015 — 1030 – 1145 hrs

READ THESE INSTRUCTIONS FIRST

INSTRUCTIONS TO CANDIDATES

1. Write your name, register number and class in the spaces at the top of this page.
2. Answer all the questions from number 1 to 10 before attempting the Bonus Question number 11.
3. Write your answers and working on the separate writing paper provided.
4. **All working must be written in dark blue or black ink.**
5. **Omission of essential working will result in loss of marks.**
6. Write your name, register number and class on each separate sheet of paper that you use and fasten the separate sheets together with the string provided. Do not staple your answer sheets together.
7. Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
8. The use of calculators is allowed for this paper.

INFORMATION FOR CANDIDATES

1. The number of marks is given in brackets [ ] at the end of each question or part question.
2. The total number of marks for this paper is 50.
3. You are reminded of the need for clear presentation in your answers.

Parent's Signature: Score:

_____ /50

This document consists of 5 printed pages.

Setter: CP and GT — NANYANG GIRLS' HIGH SCHOOL

1. **Answer the whole of this question on the piece of plain paper provided.**

Using only a ruler and a pair of compasses, construct

(a) ΔABC such that $AB = 12$ cm, $BC = 8$ cm and $AC = 10$ cm, [1]

(b) the angle bisector of $\angle BAC$, [1]

(c) the perpendicular bisector of BC. [1]

(d) a circle which passes through the vertices A, B and C. [2]

2. A building has a perimeter of 8 cm, with a gate of width 0.5 cm on a map. If the actual perimeter of the building is 0.56 km,

(a) find the scale of the map in the form $1 : r$. [1]

A model of the building is made to another scale of 1 : 5000. Calculate

(b) (i) the width of the gate in centimetres as represented by the second scale, [1]

(ii) the floor area of the building model in square centimetres if the actual floor area of the building is 16 000 m^2. [2]

3. In 2008, the price of a car was \$45 000. In 2015, the price of the same car is \$85 000.

(a) Calculate the percentage increase in the price of the car, leaving your answer to 1 decimal place. [2]

(b) In 2015, the dealer decides to cut down the price of the car by 5%. Calculate the new price of the car. [2]

4. (a) In the Lifeskills Camp, 6 litres of milo is given to a class of 30 students as supper. Find the additional volume of milo needed for a class of 35 if each student is to get the same amount of milo. [2]

(b) A small tap can fill up a tank with water in 5 hours. A big tap can fill up the same tank in 3 hours. If both taps were switched on at the same time, how long would it take to fill up 2 of such tanks? [2]

5. In an octagon, four of the interior angles are $2x°$ each and the other four angles are $(2x+15)°$, $(2x+25)°$, $(2x+35)°$ and $(3x-15)°$ respectively. Find

(a) the value of x, [3]

(b) the size of the smallest exterior angle. [2]

6. Given that $x^2+y^2=26$ and $xy=(-5)$, evaluate

(a) $\left(\frac{x-y}{2}\right)^2$, [2]

(b) $(x+y)^4$. [2]

7. Simplify $\sqrt{\frac{16x^4y^2}{25z^4}} \div \frac{12x+12y}{2x^2z^3} \times \left(\frac{3(x+y)}{-2xz}\right)^3$, giving your answer as a single fraction in its simplest form. [4]

8. Ann's car can travel x km on each litre of petrol. She travelled $(x+10)$ km on Monday.

(a) Write down, in terms of x, the number of litres of petrol she used on Monday. [1]

(b) Given that she travelled $(2x+15)$ km on Tuesday and used 1.25 litres of petrol more on Tuesday than on Monday, form an equation in x and solve it. [3]

(c) Calculate the total distance that she travelled on Monday and Tuesday. [1]

9.

Number of books borrowed	0	1	2	3	4	5
Number of students	7	x	6	2	4	5

The table above shows the number of books borrowed by the students of a class.

(a) If the mean is 2.25, form an equation in x and use it to find the value of x. [3]

(b) Find the largest possible value of x if the median number of books borrowed is 2. [2]

10. **In this question, take $\pi = 3.142$ and leave all your answers to 2 decimal places.**

[Volume of a cone with height h and base radius r is $\frac{1}{3}\pi r^2 h$,

Curved surface area of cone with slant height l and base radius r is πrl.]

[Volume and surface area of a sphere with radius r are $\frac{4}{3}\pi r^3$ and $4\pi r^2$ respectively.]

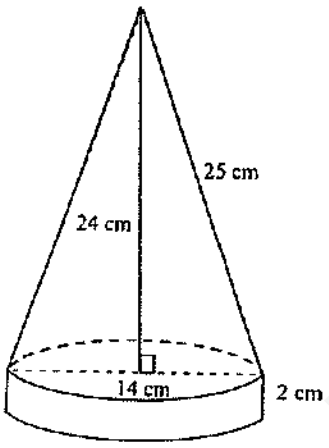


Figure 1

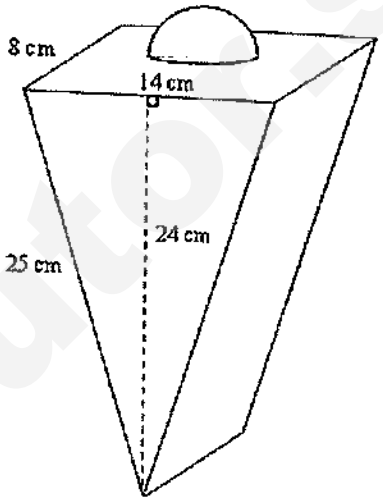


Figure 2

Figure 1 shows a solid object made up of a right cone with height 24 cm, and slant height 25 cm, and a cylinder with diameter 14 cm and height 2 cm. For the solid object in Figure 1, calculate .

(a) (i) the surface area, [2]

(ii) the volume. [2]

The object in Figure 1 is then melted down to form another solid object as shown in Figure 2. It is made up of a triangular prism and a hemisphere resting at the top of it. The triangular prism has thickness 8 cm and its triangular face has base 14 cm, perpendicular height 24 cm and slant height 25 cm. For the solid object in Figure 2, calculate

(b) (i) the radius of the hemisphere, [3]

(ii) the total surface area. [3]

Bonus Question

11. Without the use of calculator, evaluate $\dfrac{1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\frac{1}{6}+\ldots+\frac{1}{2005}-\frac{1}{2006}}{\frac{1}{1+2007}+\frac{1}{2+2008}+\ldots+\frac{1}{1003+3009}}$. [3]

END OF PAPER

145

1	Construction on separate piece
2a	0.56km = 56 000 cm $56000 \div 8 = 7000$ Scale of map = 1 : 7000
2 bi	$0.5 \times 7000 \div 5000$ $= 0.7$ cm
2 bi i	Conversion 1 cm^2 = 0.0001 m^2 On the scale model, 1 : 5000 1 cm^2 : 25 000 000 cm^2 Actual floor area of building 16 000 m^2 = 160 000 000 cm^2 Floor area of building model = $160\,000\,000 \div 25\,000\,000$ = 6.4 cm^2
3a	$\frac{85000-45000}{45000} \times 100$ $= 88.9\%$
3 b	0.95×85000 = \$80750
4a	Additional volume of milo $= \frac{35-30}{30} \times 6$ $= 1l$
4 b	Small tap fills up $\frac{1}{5}$ of the tank in 1 hr Big tap fills up $\frac{1}{3}$ of the tank in 1 hr With both taps switched on, $\frac{1}{5}+\frac{1}{3}=\frac{8}{15}$ of the tank is filled up in 1 hr. Time taken to fill up 2 of such tanks $= \frac{15}{8} \times 2$ = 3.75 hrs

5a	Sum of interior angles of an octagon $= 180°(8-2)$ $= 1080°$ $1080° = 4 \times 2x + 2x + 15° + 2x + 25°$ $1080° = 17x + 60°$ $17x = 1020°$ $x = 60$
5 b	Smallest exterior angle = $180° - [3 \times 60° - 15°]$ $= 15°$
6a	$\left(\frac{x-y}{2}\right)^2$ $= \frac{x^2-2xy+y^2}{4}$ $= \frac{26-2(-5)}{4}$ $= \frac{26+10}{4}$ $= 9$
6 b	$(x+y)^4$ $= [(x+y)^2]^2$ $= (x^2+2xy+y^2)^2$ $= (26+2(-5))^2$ $= 16^2$ $= 256$
7	$\sqrt{\frac{16x^4y^2}{25z^4}} \div \frac{12x+12y}{2x^2z^3} \times \left(\frac{3(x+y)}{-2xz}\right)^3$ $= \frac{4x^2y}{5z^2} \times \frac{2x^2z^3}{12(x+y)} \times \frac{27(x+y)^3}{-8x^3z^3}$ $= \frac{-9xy(x+y)^2}{20z^2}$

2015 Sec 1 EOY Paper 2 Solutions

8a i	$\frac{x+10}{x}$ litres
b	$\frac{x+10}{x}+1.25=\frac{2x+15}{x}$ $\frac{x+10+1.25x}{x}=\frac{2x+15}{x}$ $2.25x+10=2x+15$ $0.25x=5$ $x=20$
c	Total dist travelled = $20+10+2(20)+15$ = 85 km
9a	$2.25(7+x+6+2+4+5)=x+12+6+16+25$ $2.25(24+x)=x+59$ $54+2.25x=x+59$ $1.25x=5$ $x=4$
b	$7+x=5+2+4+5$ $x=9$
10 ai	Total surface area = surface area of cone + surface area of cylinder + base area Total surface area = $3.142\times7\times25+3.142\times14\times2+$ $3.142\times7\times7$ $=549.85+87.976+153.958$ $=791.78\ \text{cm}^2$
10 aii	Total vol = vol of cone + vol of cylinder Total Volume $=\frac{1}{3}\times3.142\times7\times7\times24+$ $3.14\times7\times7\times2$ $=1231.664+307.916$ $=1539.58\ \text{cm}^3$

10bi)

Vol of hemisphere + vol of prism = total vol from (ai)

Let the radius of the hemisphere be r

$\left(\frac{1}{2}\right)\left(\frac{4}{3}\right)(3.142)r^3+\left(\frac{1}{2}\right)(14)(24)(8)=1539.58$

$\left(\frac{2}{3}\right)(3.142)r^3+1344=1539.58$

$\left(\frac{2}{3}\right)(3.142)r^3=195.58$

$r^3=93.37046$

$r=4.54$ (to 3 sf)

10bii)

Surface area of hemisphere

$=\left(\frac{1}{2}\right)(4)(3.142)(4.54)^2$

$=129.52\text{cm}^2$

Suface area of top of pyramid without the area covered by hemisphere

$=(14\times8)-(3.142)(4.54^2)$

$=112-64.762$

$=47.238\ \text{cm}^2$

Surface area of the triangular faces

$=\left(\frac{1}{2}\right)(14)(24)(2)+(2)(8)(25)$

$=336+400$

$=736\ \text{cm}^2$

Total surface area

$=736+47.238+129.52$

$=912.76\text{cm}^2$ (to 2 dp)

11. $$\frac{1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}+\frac{1}{5}-\frac{1}{6}+\ldots+\frac{1}{2005}-\frac{1}{2006}}{\frac{1}{1+2007}+\frac{1}{2+2008}+\ldots+\frac{1}{1003+3009}}$$

$$=\frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\ldots+\frac{1}{2005}+\frac{1}{2006}-\left(\frac{1}{2}+\frac{1}{4}\ldots+\frac{1}{2006}\right)\times 2}{\frac{1}{2008}+\frac{1}{2010}+\ldots+\frac{1}{4012}}$$

$$=\frac{1+\frac{1}{2}+\ldots+\frac{1}{2005}+\frac{1}{2006}-\left(1+\frac{1}{2}+\frac{1}{3}\ldots+\frac{1}{1003}\right)}{\frac{1}{2}\times\left(\frac{1}{1004}+\frac{1}{1005}+\ldots+\frac{1}{2006}\right)}$$

$$=\frac{\frac{1}{1004}+\frac{1}{1005}+\ldots+\frac{1}{2006}}{\frac{1}{2}\times\left(\frac{1}{1004}+\frac{1}{1005}+\ldots+\frac{1}{2006}\right)}$$

$$=2$$

SWISS COTTAGE SECONDARY SCHOOL
SECONDARY ONE EXPRESS
SECOND SEMESTRAL EXAMINATIONS

Name: _____( ) Class: Sec 1E____

MATHEMATICS

Paper 1

4048/01
Monday 5 October 2015
1 hour 15 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

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.
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** in this paper.

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 number of marks for this paper is 50.

For Examiner's Use
50

This question paper consists of 10 printed pages. .

Setter: Mr Ngoh Kia Joon
Vetter: Miss Zoe Pow

[Turn over

148

Answer **all** the questions.

1 Showing your working clearly, evaluate $5-(\frac{2}{0.1}-14)^2$.

Answer ..... [2]

---

2 Represent the numbers -2.5, $\sqrt{4}$, 0.7 and $4\frac{1}{5}$ on the number line below.

Answer

[2]

---

3 **(a)** **(i)** Express 300 as a product of its prime factors.

Answer (a)(i) 300 =..... [2]

(ii) Given that $300k$ is a perfect square, write down the smallest possible integer value of k.

Answer (a)(ii) k =..... [1]

(b) Farmer Sam has 54 apples, 132 oranges and 30 pears. He wishes to distribute each type of fruits equally into boxes.

Find the largest number of boxes that farmer Sam needs.

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

---

4 (a) Express $\frac{4}{25}$ as a percentage.

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

(b) Jonathan spent 24 minutes running in a 2-hour gym session.

Express the time spent running as a percentage of the total time spent in the gym session.

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

---

5 Simplify the following expressions

(a) $4(2a-3)-11(2+a)$.

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

149

(b) $\frac{2(5m+n)}{5} - \frac{2m-n}{2}$.

Answer (b) ..... [3]

---

6 The following diagram shows a series of figures formed using dots.

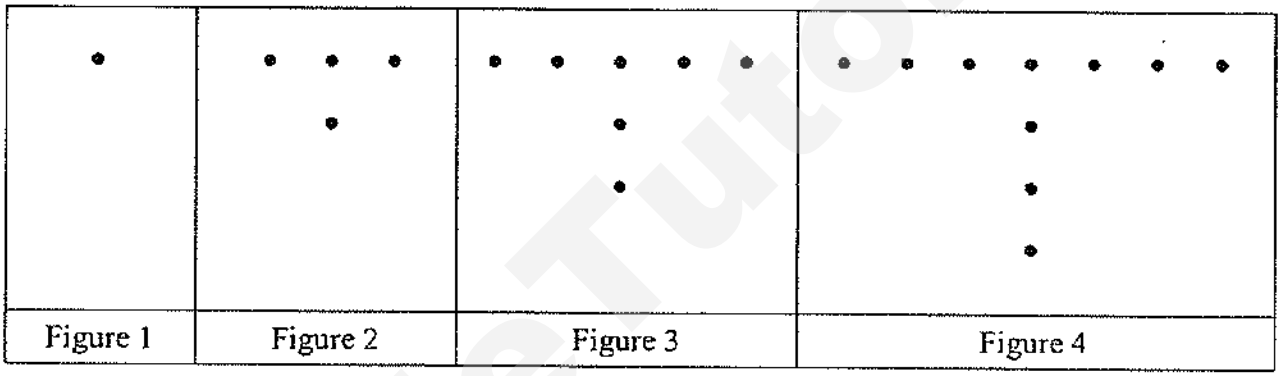


Figure 1	Figure 2	Figure 3	Figure 4

(a) Draw Figure 5 in the answer space below.

Answer

[1]

(b) Write down an expression, in terms of n, for the number of dots in Figure n.

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

(c) Use your answer to part (b) to find the number of dots in Figure 30.

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

---

7 Factorise the following expressions completely

(a) $6xy - 12y^2 + 3y$,

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

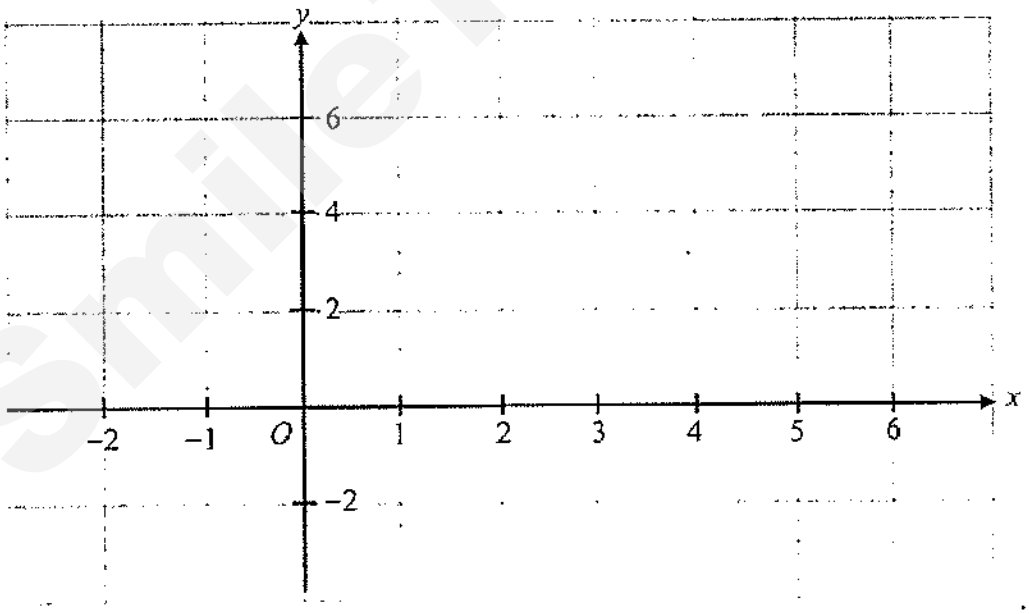
(b) $14 - 28y - a + 2ay$.

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

---

8 **(a)** Plot the points $A(-2, 1)$, $B(5, 1)$, $C(5, 6)$ and $D(0, 6)$ in the graph below. [2]

Answer



(b) Name the shape of figure $ABCD$.

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

150

9 Solve the following equations

(a) $7(2x-5)=4(x+1)$,

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

(b) $\frac{x-9}{2}+3=\frac{3x+1}{5}$.

Answer (b) ..... [3]

---

10 (a) Solve the inequality $4x+12<65$.

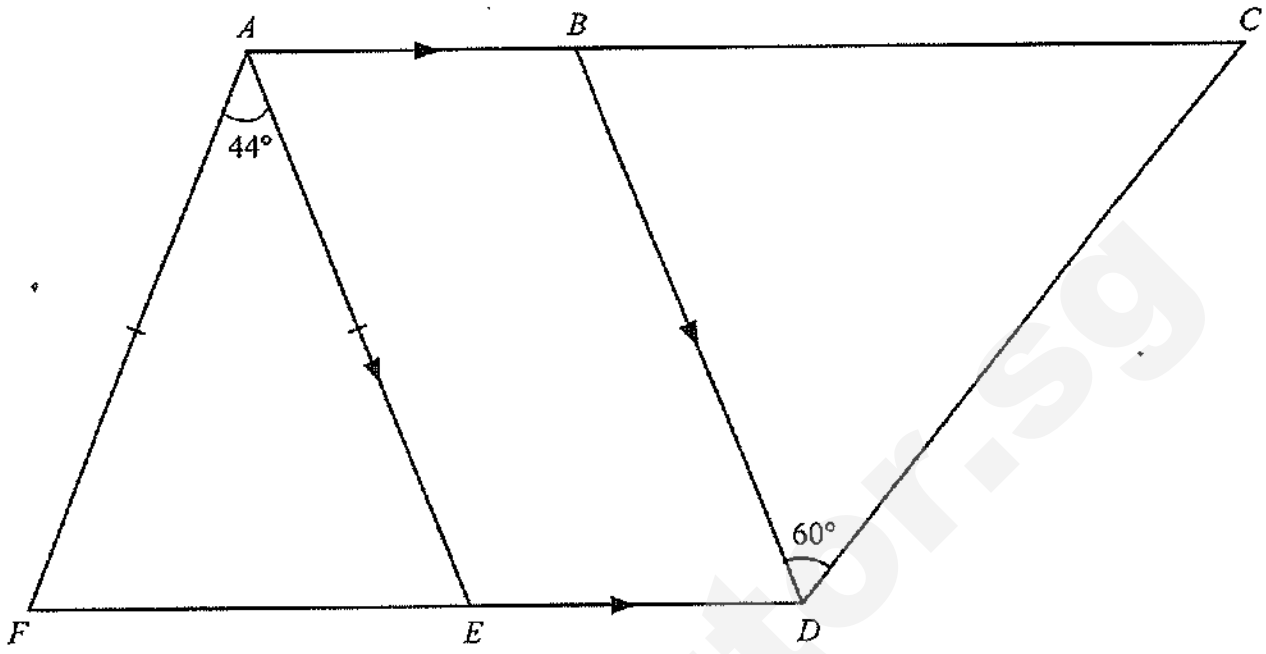
Answer (a) ..... [2]

(b) Hence, state the largest possible value of x if x is a prime number.

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

---

11 In the diagram below, AFE is an isosceles triangle, $ABDE$ is a parallelogram, AC and FD are straight lines, $\angle FAE = 44°$ and $\angle BDC = 60°$.



Giving your reasons, find

(a) $\angle AEF$,

Answer (a) .....° [1]

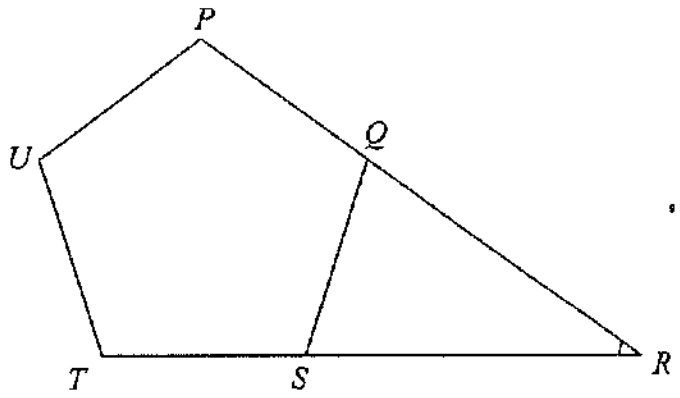
(b) $\angle DBC$,

Answer (b) .....° [2]

(c) $\angle BCD$.

Answer (c) .....° [1]

12 The diagram below shows a **regular** pentagon $PQSTU$ and triangle QRS. PQR and TSR are straight lines.



Find $\angle QRS$.

Answer .....° [3]

---

13 The table below shows the number of meals eaten in a day by a group of students.

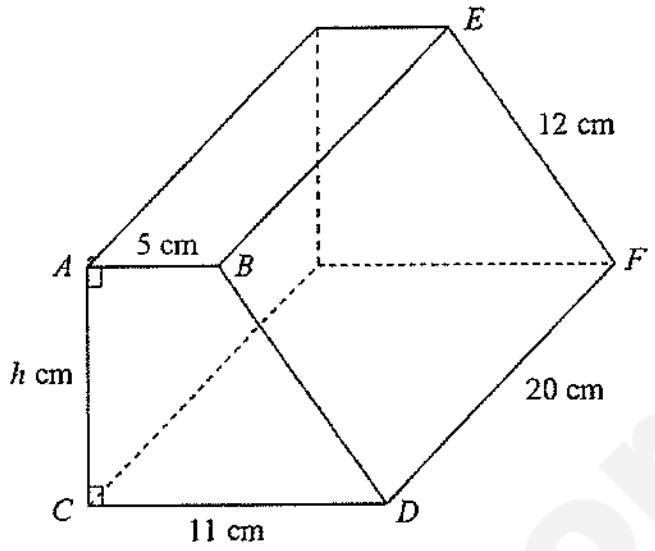
Number of meals	2	3	4	5	6
Number of students	6	11	x	1	2

Given that the mean number of meals eaten in a day is 3.5, find the value of x.

Answer x =..... [3]

---

14 The diagram below shows a trapezoidal prism. $AB = 5$ cm, $CD = 11$ cm, $DF = 20$ cm, $EF = 12$ cm and $AC = h$ cm.



(a) Show that the cross-sectional area of the trapezoidal prism is $8h$ cm^2.

Answer

[1]

(b) Given that the volume of the trapezoidal prism is 1600 cm^3, calculate the value of h.

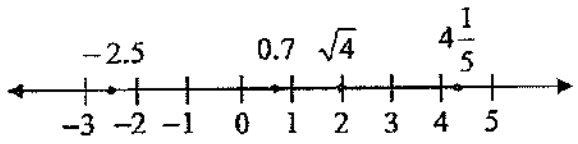
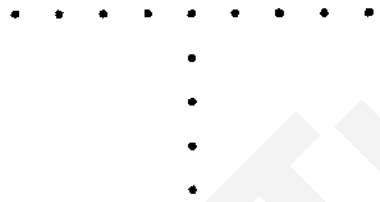
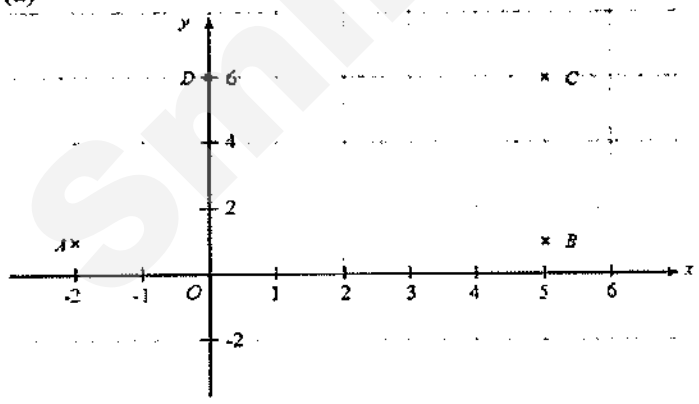
Answer (b) $h =$ ..... [2]

(c) Hence, find the total surface area of the trapezoidal prism.

Answer (c) .....cm^2 [3]

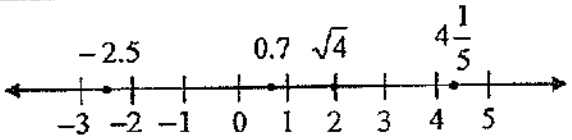
End of Paper

Answer Scheme for 2015 Sec 1 Express Maths SA2 P1

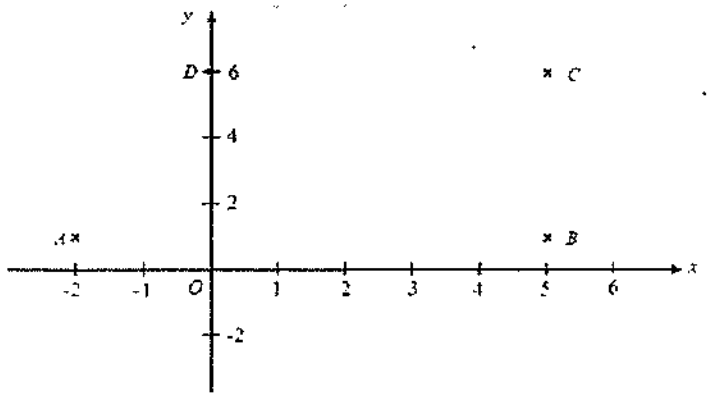
Qn No.	Solution
1	-31
2	
3	**(a)(i)** $588 = 2^2 \times 3 \times 5^2$ **(a)(ii)** 3 **(b)** Largest no. of boxes = 6
4	**(a)** 16% **(b)** 20%
5	**(a)** $-3a-34$ **(b)** $\frac{10m+9n}{10}$
6	**(a)**  **(b)** $3n-2$ **(c)** 88
7	**(a)** $3y(2x-4y+1)$ **(b)** $(14-a)(1-2y)$
8	**(a)**  **(b)** Trapezium
9	**(a)** $x = 3.9$ **(b)** $x = -17$
10	**(i)** $x < 13\frac{1}{4}$ **(ii)** $x = 13$

153

11	**(a)** $\angle AEF = 68°$ **(b)** $\angle BDE = 68°$ **(c)** $\angle BCD = 52°$
12	$\angle QRS = 36°$
13	$x = 16$
14	**(a)** Area of trapezium $= 8h \text{ cm}^2$ (Shown) **(b)** $h = 10$ **(c)** Total surface area $= 920 \text{ cm}^2$

Qn No	Solution	Marks
1	$5-(\frac{2}{0.1}-14)^2$ $=5-(6)^2$ $=5-36$ $=-31$	M1 M1 A1
2		B2'– 1 mistake deduct 1 mark
3	**(a)(i)** 2 | 300 2 | 150 3 | 75 5 | 25 5 | 5 1 $588=2^2\times3\times5^2$ **(a)(ii)** 3 **(b)** 2 | 54 132 30 3 | 27 66 15 9 22 5 Largest no. of boxes = 6	M1 A1 B1 M1 A1
4	**(a)** $\frac{4}{25}\times100$ $=16\%$ **(b)** 2 hours = 120 mins $\frac{24}{120}\times100$ $=20\%$	B1 M1 A1

154

5	**(a)** $4(2a-3)-11(2+a)$ $=8a-12-22-11a$ $-3a-34$ **(b)** $\frac{10m+2n}{5}-\frac{2m-n}{2}$ $=\frac{20m+4n}{10}-\frac{10m-5n}{10}$ $=\frac{20m+4n-(10m-5n)}{10}$ $=\frac{20m+4n-10m+5n}{10}$ $=\frac{10m+9n}{10}$	M1 A1 M1 (common denominator) M1 (expansion of -) A1
6	**(a)**  **(b)** $3n-2$ **(c)** $3(30)-2=88$	B1 B1 B1
7	**(a)** $6xy-12y^2+3y$ $=3y(2x-4y+1)$ **(b)** $14-28y-a+2ay$ $=14(1-2y)-a(1-2y)$ $=(14-a)(1-2y)$	B1 M1 (identical group) A1
8	**(a)**  **(b)** Trapezium	B2 (2 marks for 4 correct, 1 mark for 3 correct) B1

9	**(a)** $7(2x-5)=4(x+1)$ $14x-35=4x+4$ $10x=39$ $x=3.9$ **(b)** $\frac{x-9}{2}+3=\frac{3x+1}{5}$ $\frac{x-9+6}{2}=\frac{3x+1}{5}$ $5(x-3)=2(3x+1)$ $5x-15=6x+2$ $x=-17$	M1 (expansion) A1 M1 (Removal of denominator) M1 (Expansion) A1
10	**(i)** $4x+12<65$ $4x<65-12$ $4x<53$ $x<13\frac{1}{4}$ **(ii)** $x=13$	M1 A1 B1
11	**(a)** $\angle AE\hat{F}=\frac{180-44}{2}$ (Base angle of isos. Δ) $=68°$ **(b)** $\angle AEF=\angle BDE$ (Corr. $\angle s$, $AE \parallel BD$) $\angle BDE=\angle DBC$ (Alt $\angle s$, $AE \parallel BD$) $=68°$ **(c)** $\angle BCD=180-68-60$ (Angle sum of triangle) $=52°$	B1 M1 A1 B1
12	1 interior angle $=\frac{(5-2)\times 180}{5}$ $=108°$ $\angle QSR=\angle SQR=180-108$ (Adj. angle on a str line) $=72°$ $\angle QRS=180-72-72$ ($\angle$s sum of triangle) $=36°$	M1 (formula for 1 int. angle) M1 (For finding both angles) A1

155

13	$\frac{(2\times 6)+(3\times 11)+4x+(5\times 1)+(6\times 2)}{6+11+x+1+2}=3.5$ $\frac{62+4x}{20+x}=3.5$ $62+4x=70+3.5x$ $0.5x=8$ $x=16$	M1 (Correct Formula) M1 (remove deno.) A1
14	**(a)** Area of trapezium $=\frac{1}{2}\times(5+11)\times h$ $=8h$ cm^2 (Shown) **(b)** $8h\times 20=1600$ $160h=1600$ $h=10$ **(c)** Area of trapezium $=8\times 10$ $=80$ cm^2 Area of sides $=(5+10+11+12)\times 20$ $=760$ cm^2 Total surface area $=760+2(80)$ $=920$ cm^2	B1 M1 (formation of formula) A1 M1 M1 A1

SWISS COTTAGE SECONDARY SCHOOL
SECONDARY ONE EXPRESS
SECOND SEMESTRAL EXAMINATIONS

Name: _____( ) Class: Sec 1E____

MATHEMATICS

Paper 2

4048/02
Wednesday 7 October 2015
1 hour 15 minutes

Additional materials: Graph Paper (1 sheet)

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

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.
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 number of marks for this paper is 50.

For Examiner's Use
50

This question paper consists of 9 printed pages.

Setter: Mr Wilson Wee
Vetter: Ms Zoe Pow

[Turn over

156

Answer **all** the questions.

1 **(a)** Calculate $\dfrac{9.52+\sqrt{24.03}}{\sqrt[3]{52}-1.28}$.

Write down the first five digits on your calculator display.

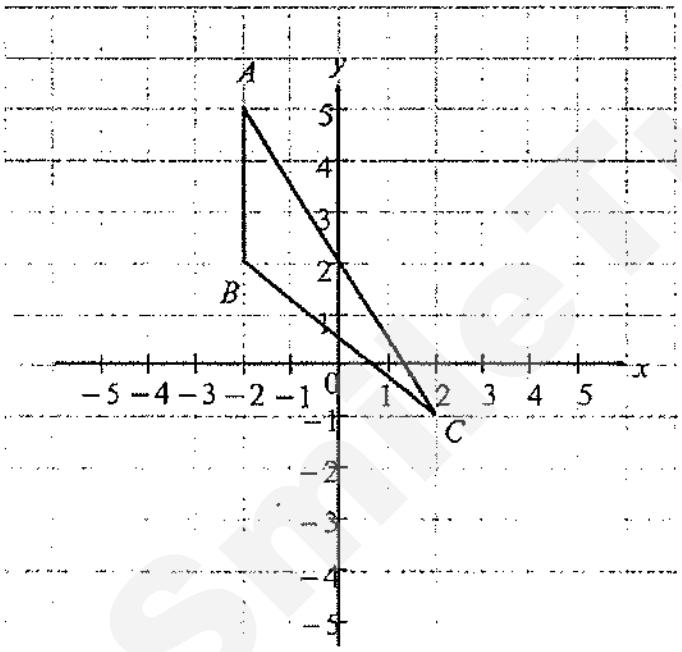
Answer (a) ..... [1]

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

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

---

2 The graph below shows triangle ABC.



Find

(a) the gradient of AC,

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

(b) the area of ΔABC.

Answer (b) ..... unit^2 [2]

---

3 The table shows the record of the scores of 20 students in a test.

24	18	28	33	25	29	25	22	30	18
26	36	30	30	26	28	23	19	31	39

The total score was 40 marks and the scores were tabulated in an ordered stem-and-leaf diagram below.

Answer (a)

Stem	Leaf
1	8
2	
3	

Key: 1 | 8 represents 18 marks

(a) Complete the stem-and-leaf diagram. [1]

(b) Find

(i) the modal score,

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

(ii) the median score.

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

(c) The passing mark for the test is 20. The scores of another 5 students were added to the record and the percentage of the number of students who passed dropped to 76%. How many of the newly added students passed the test?

Answer (c) ..... students [2]

4 The frequency table below shows the monthly salary of 30 workers in a company.

Answer (a)

Salary ($\$S$)	Mid-value (x)	Frequency (f)	fx
$1000 < S \leq 2000$		9	
$2000 < S \leq 3000$		14	
$3000 < S \leq 4000$		7	
		Total = 30	Total =

(a) Complete the table above. [2]

(b) Hence, calculate an estimate of the mean monthly salary.

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

---

5 The original price of a bicycle in January was \$212. In February, its price increased by 15%. In March, its price was 20% lesser than the price in February. Calculate the price of the bicycle in March.

Answer $ ..... [3]

---

6 Gopal sold x chicken pies at \$2 each and 32 muffins at \$1.50 each at his school's charity fair. At the end of the day, he received at least \$135.

(a) Write down an inequality in terms of x.

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

(b) Solve the inequality to find the minimum number of chicken pies sold.

Answer (b) ..... chicken pies [2]

---

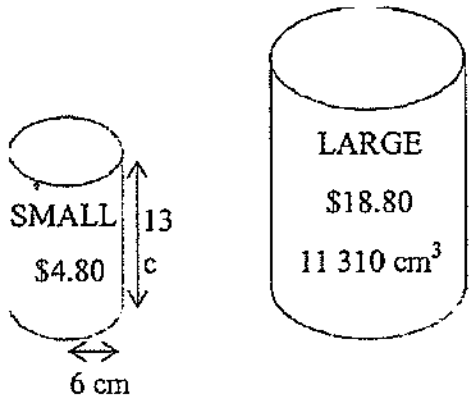
7 The ratio of the weights of Beatrice, Linda and Henry was 20 : 24 : 33. After 1 year, they weighed again and found that only Linda's weight was unchanged. The ratio of the weights of Beatrice, Linda and Henry became 7 : 8 : 13. Given that Linda weighs 48 kg, find the change in weight for Beatrice and Henry respectively.

Answer Beatrice: ..... kg

Henry: ..... kg [4]

---

8 Two different sizes of tins of fruit juice are shown below. The small tin has a radius of 6 cm and a height of 13 cm. The price of the fruit juice is given on the respective tins.



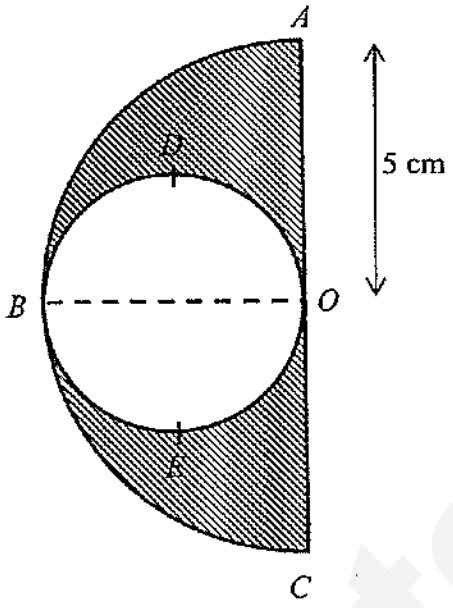
(a) Find the volume of the small tin.

Answer (a) ..... cm^3 [2]

(b) Which size of tin gives the better value?
You must show all your working clearly.

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

9 A piece of metal is cut into the shape as shown in the diagram below. $AOCB$ is a semicircle of radius 5 cm and $BDOE$ is an inscribed circle of the semicircle with OB as the diameter.



(a) Calculate the area of the shaded region.

Answer (a) ..... cm^2 [3]

(b) Calculate the perimeter of the shaded region.

Answer (b) ..... cm [3]

10 A lorry and a van were travelling towards each other at uniform speeds. They were 210 km apart at 1300 h and passed each other at 1430 h. The speed of the van was 75 km/ h. Find the speed of the lorry.

Answer ..... km/h [4]

---

11 (a) Tap *A* can fill a tank in 10 minutes.
What fraction of the tank is filled in 1 minute?

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

(b) Tap *B* can fill a tank in 5 minutes.
What fraction of the tank is filled in 1 minute?

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

(c) How long will it take to fill the tank when both taps *A* and *B* are turned on?

Answer (c) ..... min [2]

---

12 Answer the whole of this question on a piece of graph paper.

The table below shows some values for the equation $y = 2 - 2x$.

x	-2	-1	0	1	2
y	6	p	2	0	q

(a) Calculate the values of p and q. [2]

(b) Using a scale of 2 cm to 1 unit for the y-axis and 4 cm to 1 unit for the x-axis, draw the graph $y = 2 - 2x$ for $-2 \leq x \leq 2$. [3]

(c) Using your graph, find the value of x when $y = 3.5$. [1]

(d) On the same axes, draw the line $x = -1.5$. Find the coordinates of the point of intersection of the two lines. [2]

End of Paper

160

Answer Key for Math 1E SA2 P2 2015

<table>
<tr><th>Qn</th><th>Marking Point</th></tr>
<tr><td>1(a)</td><td>5.8805</td></tr>
<tr><td>1(b)</td><td>5.9</td></tr>
<tr><td></td><td></td></tr>
<tr><td>2(a)</td><td>$-1\frac{1}{2}$</td></tr>
<tr><td>2(b)</td><td>6 units^2</td></tr>
<tr><td></td><td></td></tr>
<tr><td>3(a)</td><td>
<table>
<tr><th>Stem</th><th>Leaf</th></tr>
<tr><td>1</td><td>8 8 9</td></tr>
<tr><td>2</td><td>2 3 4 5 5 6 6 8 8 9</td></tr>
<tr><td>3</td><td>0 0 0 1 3 6 9</td></tr>
</table>
Key: 1 | 8 represents 18 marks
</td></tr>
<tr><td>3(b)(i)</td><td>30 marks</td></tr>
<tr><td>3(b)(ii)</td><td>27 marks</td></tr>
<tr><td>3(c)</td><td>2</td></tr>
<tr><td></td><td></td></tr>
<tr><td>4(a)</td><td>
<table>
<tr><td>Salary ($S)</td><td>Mid-value ($x$)</td><td>Frequency ($f$)</td><td>$fx$</td></tr>
<tr><td>$1000 < S \leq 2000$</td><td>1500</td><td>9</td><td>13500</td></tr>
<tr><td>$2000 < S \leq 3000$</td><td>2500</td><td>14</td><td>35000</td></tr>
<tr><td>$3000 < S \leq 4000$</td><td>3500</td><td>7</td><td>24500</td></tr>
<tr><td></td><td></td><td>Total = 30</td><td>Total = 73000</td></tr>
</table>
</td></tr>
<tr><td>4(b)</td><td>$ 2433.33</td></tr>
<tr><td></td><td></td></tr>
<tr><td>5</td><td>$195.04</td></tr>
<tr><td></td><td></td></tr>
<tr><td>6(a)</td><td>$2x + 48 \geq 135$</td></tr>
<tr><td>6(b)</td><td>$x \geq 43.5$

Minimum number of chicken pies sold is 44.</td></tr>
<tr><td></td><td></td></tr>
<tr><td>7</td><td>Change in weight for Beatrice = 2 kg

Change in weight for Henry = 12 kg</td></tr>
<tr><td></td><td></td></tr>
</table>

8(a)	1470 cm^3
8(b)	Large tin is cheaper.
9(a)	19.6 cm^2
9(b)	41.4 cm
10	65 km/h
11(a)	$\frac{1}{10}$
11(b)	$\frac{1}{5}$
11(c)	$3\frac{1}{3}$ min
12(a)	$p = 4$ and $q = -2$
12(b)	
12(c)	$x = -0.75$
12(d)	$(-1.5, 5)$

Marking Scheme for Math 1E SA2 P2 2015

<table>
<tr><th>Qn</th><th>Marking Point</th><th>Marks Awarded</th><th>Remarks</th></tr>
<tr><td>1(a)</td><td>5.8805</td><td>B1</td><td></td></tr>
<tr><td>1(b)</td><td>5.9</td><td>B1</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>2(a)</td><td>Gradient $= -\frac{6}{4}$
$= -1\frac{1}{2}$</td><td>B1</td><td></td></tr>
<tr><td>2(b)</td><td>Area $= \frac{1}{2}\times 3\times 4$
$= 6$ units^2</td><td>M1
A1</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>3(a)</td><td>Stem | Leaf
1 | 8 8 9
2 | 2 3 4 5 5 6 6 8 8 9
3 | 0 0 0 1 3 6 9
Key: 1 | 8 represents 18 marks</td><td>B1</td><td></td></tr>
<tr><td>3(b)(i)</td><td>Modal score = 30 marks</td><td>B1</td><td></td></tr>
<tr><td>3(b)(ii)</td><td>Median score $= \frac{26+8}{2}$
= 27 marks</td><td>B1</td><td></td></tr>
<tr><td>3(c)</td><td>Number of students who passed the test
$= \frac{76}{100}\times 25$
= 19

New students who passed the test
= 19 – 7
= 2</td><td>M1

A1</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>4(a)</td><td>
<table>
<tr><th>Salary ($S)</th><th>Mid-value ($x$)</th><th>Frequency ($f$)</th><th>$fx$</th></tr>
<tr><td>$1000 < S \le 2000$</td><td>1500</td><td>9</td><td>13500</td></tr>
<tr><td>$2000 < S \le 3000$</td><td>2500</td><td>14</td><td>35000</td></tr>
<tr><td>$3000 < S \le 4000$</td><td>3500</td><td>7</td><td>24500</td></tr>
<tr><td></td><td></td><td>Total = 30</td><td>Total = 73000</td></tr>
</table>
</td><td></td><td>M1 – Correct values for Mid-value column

A1– Correct values for fx column</td></tr>
</table>

4(b)	Mean monthly salary $= \frac{73000}{30}$ $= \$\,2433.33$	**M1** **A1**	
5	Price in February $= \frac{115}{100} \times 212$ $= \$243.80$ Price in March $= \frac{80}{100} \times 243.80$ $= \$195.04$	**M1** **M1** **A1**	
6(a)	$2x + 48 \geq 135$	**B1**	
6(b)	$2x + 48 \geq 135$ $2x \geq 87$ $x \geq \frac{87}{2}$ $x \geq 43.5$ Minimum number of chicken pies sold is 44.	 **M1** **A1**	
7	Beatrice : Linda : Henry Old ratio 20 : 24 : 33 New ratio 7 : 8 : 13 = 21 : 24 : 39 24 units ----- 48 kg 1 unit ----- $\frac{48}{24}$ = 2 kg Beatrice increased in weight by $21 - 20 = 1$ unit Henry increased in weight by $39 - 33 = 6$ units Change in weight for Beatrice= 2 kg Change in weight for Henry $= 6 \times 2$ $= 12$ kg	 **M1** **M1** **A1** **A1**	

8(a)	Volume of small tin $= \pi \times 6^2 \times 13$ $= 1470\ \text{cm}^3$	M1 A1	
8(b)	Price per cm^3 for small tin $= 480 \div 1470$ $= 0.33$ cents Price per cm^3 for large tin $= 1880 \div 11310$ $= 0.17$ cents Large tin is cheaper.	M1 A1	Find the price per unit volume for both tins.
9(a)	Area of semicircle $ABC = \frac{1}{2} \times \pi \times 5^2\ \text{cm}^2$ $= 39.27\ \text{cm}^2$ Area of circle $BEOD = \pi(2.5)^2\ \text{cm}^2$ $= 19.63\ \text{cm}^2$ Area of shaded region $= 39.27 - 19.63\ \text{cm}^2$ $= 19.6\ \text{cm}^2$	M1 M1 A1	
9(b)	Arc length of semicircle $ABC = \frac{1}{2} \times 2 \times \pi \times 5$ $= 15.71$ cm Circum. of circle $BEOD = 2 \times \pi \times 2.5$ $= 15.71$ cm Perimeter of the shaded region $= 15.71 + 15.71 + 5 + 5$ $= 41.4$ cm	M1 M1 A1	
10	Distance travelled by van $= 75 \times 1.5$ $= 112.5$ km Distance travelled by the lorry $= 210 - 112.5$ $= 97.5$ km Speed of the lorry $= 97.5 \div 1.5$ $= 65$ km/h	M1 M1 M1 A1	

163

11(a)	Tap A can fill $\frac{1}{10}$ of the tank in 1 min.	B1	
11(b)	Tap B can fill $\frac{1}{5}$ of the tank in 1 min.	B1	
11(c)	$\frac{1}{10}+\frac{1}{5}$ $=\frac{1}{10}+\frac{2}{10}$ $=\frac{3}{10}$ of the tank is filled up in 1 min if both taps are turned on. $\frac{3}{10}$ of tank ----- 1 min 1 tank ----- $\frac{10}{3}$ $=3\frac{1}{3}$ min	M1 A1	
12(a)	$p = 4$ and $q = -2$	B2	
12(b)	As drawn on attached graph.	B3	One mark for correct axes. One mark for all points correctly plotted. One mark for straight line drawn through all the points.
12(c)	$x = -0.75$	B1	
12(d)	As drawn on attached graph. $(-1.5, 5)$	B1 B1	Horizontal line drawn passing through the y-axis at -1.5.

164
End