NAME: _____ ( ) CLASS: _____

FAIRFIELD METHODIST SCHOOL (SECONDARY)

END-OF-YEAR EXAMINATION 2014
SECONDARY 2 EXPRESS

MATHEMATICS

Paper 1

Date: 7October 2014 **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.

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	%

Setter: Ms Michelle Tan

This question paper consists of 15 printed pages including the cover page.

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Name: _____ ( ) Class: _____

Answer **all** the questions.

1 Estimate the value of $\frac{1.9889 \times 7.002}{\sqrt[3]{511}}$, without the use of a calulator.

Answer..... [1]

---

2 Arrange the following numbers in ascending order.

$\frac{1}{6}$ $\quad -2 \quad$ $\sqrt[3]{-27}$ $\quad \pi \quad$ $0.\dot{1}\dot{6}$

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

---

3 Iris bought a digital camera at a discount of 20% and paid $560 for it. What was the original price of the digital camera?

Answer$..... [2]

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4 (a) Express 1440 as a product of its prime factors, giving your answer in index notation.

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

(b) Given that $4200 = 2^3 \times 3 \times 5^2 \times 7$, find the lowest common multiple of 1440 and 4200, giving your answer in index notation.

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

(c) Given that $4200k$ is a perfect square, write down the smallest possible integer value of k.

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

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Name: _____ ( ) Class: _____

5 The volume of air, V cm^3, inside a bicycle pump is inversely proportional to the cube root of the air pressure, P units. It is given that the air pressure is 1728 units when 15 cm^3 of air is pumped. Find

(a) an equation connecting V and P,

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

(b) the volume of air that is pumped when the pressure is 216 units,

Answer(b).....cm^3 [1]

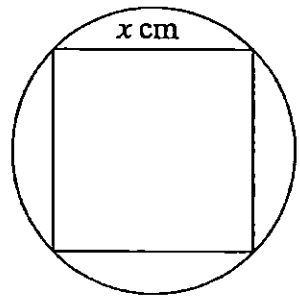
(c) the air pressure when 25 cm^3 of air is pumped.

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

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Name: _____ ( ) Class: _____

6 The diagram shows a square with length x cm, inscribed in a circle. Given that the radius of the circle is 8 cm, find the value of x.



Answer..... [2]

---

7 A solid paper weight in the shape of a hemisphere has a total surface area of 84.834 cm^2.
[Take π to be 3.142]

(a) Show that the radius of the hemispheric paper weight is 3 cm.

Answer (a) [2]

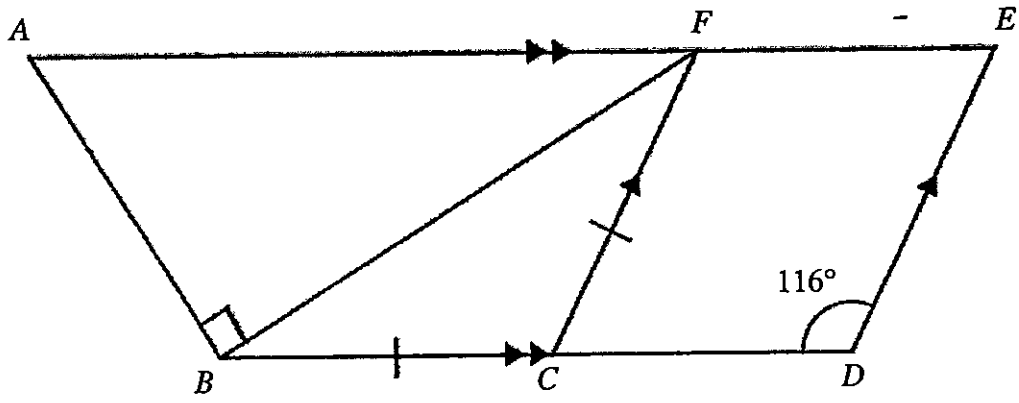
(b) Find the volume of the hemispheric paper weight.

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Answer(b).....cm^3 [1]

8 In the diagram, *ABDE* is a trapezium and *CDEF* is a parallelogram.

Given that $BC = CF$ and $\angle CDE = 116^\circ$, stating with reasons, find



(a) $\angle CBF$,

Answer(a) .....° [2]

(b) $\angle BFE$,

Answer(b).....° [1]

(c) $\angle BAF$.

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Name: _____ ( ) Class: _____

Answer(c).....°[1]

9 Simplify the following expressions.

(a) $\frac{5a^2b}{c^2} \div \frac{16b^3}{3abc}$

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

(b) $\frac{4x}{x^2-36} + \frac{1}{x-6} - \frac{x}{x+6}$

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

10 A truck and a car were 480 km apart. They started travelling towards each other at uniform speed at 1200 h and passed each other at 1430 h. The speed of the truck was 85 km/h. Find the speed of the car.

Answer .....km/h [2]

---

11 A car travels 504 km on 60 litres of petrol. The price of the petrol consumed was $79.56.

(a) Find the rate of petrol consumption in km/litre.

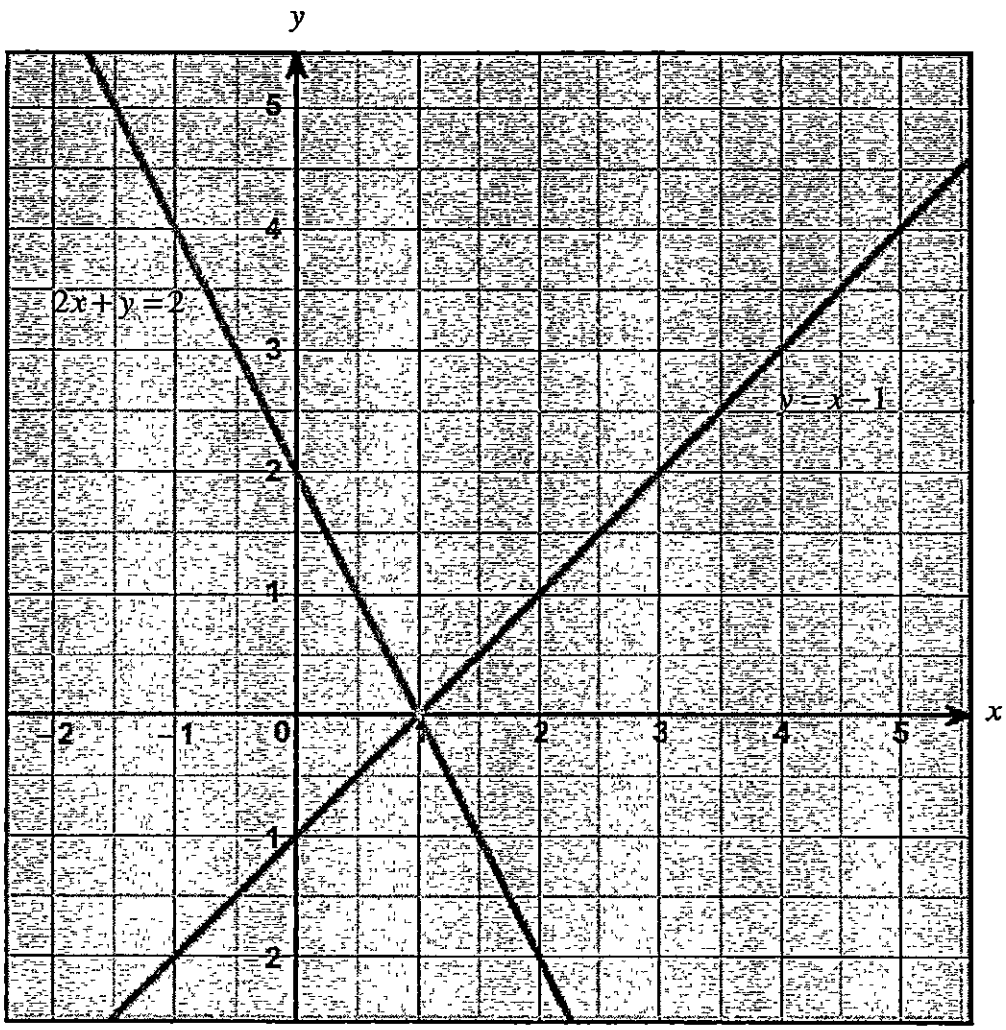
Answer (a) .....km/litre [1]

(b) What was the price of the petrol per litre? Leave your answer to the nearest cent.

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

12 The graph below shows the lines $y = x - 1$ and $2x + y = 2$.



(a) State the solution of the simultaneous equations $y = x - 1$ and $2x + y = 2$.

€ €
Answer(a)x = ... y = ... [1]

(b) On the same grid above, draw and label clearly the line $y = 4$. [1]

(c) Find the area of the polygon enclosed by the 3 lines, $y = x - 1$, $2x + y = 2$ and $y = 4$. Leave your answer in square units.

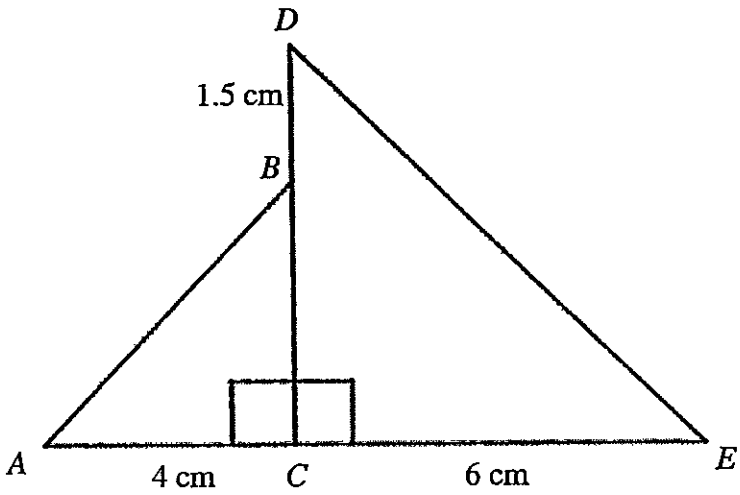
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Answer(c).....units^2 [1]

13 In the figure, ABC and EDC are similar triangles. $AC = 4$ cm, $BD = 1.5$ cm, $CE = 6$ cm.



(a) Find length BC.

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

(b) Calculate the value of $\cos \angle BAC$.

€

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

(c) Find $\angle CED$.

€

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Answer (c) .....° [1]

14 Factorise each of the following expressions completely.

(a) $a-14bc-2b+7ac$

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

(b) $4k^2-14kh+6h^2$

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

---

15 A bag contains 8 yellow balls, 5 white balls and 2 pink balls. One ball is drawn from the bag at random. Find the probability that

(a) the ball is yellow,

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

(b) the ball is non-white.

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

16 Solve the equation $\frac{1+2f}{3-2f}+\frac{5}{2f-3}=4$.

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Answerf =..... [3]

17 Solve the following simultaneous equations.

$$n+\frac{m}{2}=8$$

$$3n-\frac{m}{5}=7$$

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Answerm = ..., *n* =..... [3]

18 The stem and leaf diagram shows the heights of 16 students obtained during a health check.

Stem	Leaf
15	3 5 6 6
16	0 0 0 1 1 3 4 5 5 8
17	2 3

Key: 15|5 means 155 cm

From the data above, find

(a) **(i)** the median height,

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

(ii)the modal height,

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

(iii)the mean height.

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

(b) Shannon was absent on the day of the health check. When she returned, her height was taken and added into the data above. The new mean height was 161.5 cm. Find Shannon's height.

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

19 **(a)** Construct a quadrilateral $PQRS$, given that $PQ = 10$ cm, $\angle PQR = 105°$, $QR = 7$ cm, $PS = 9$ cm and the diagonal $QS = 11$ cm, using ruler, protractor and compasses only. [3]

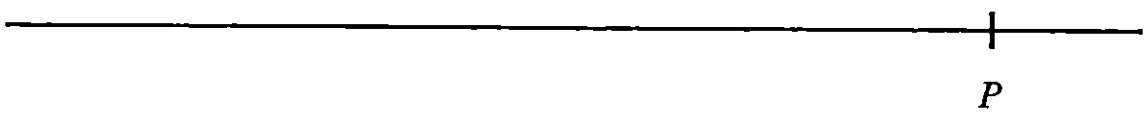
(b) On the same diagram, construct, using ruler and compasses only, the perpendicular bisector of RS. [1]

(c) On the same diagram, construct, using ruler and compasses only, the angle bisector of $\angle PQR$. [1]

(d) The perpendicular bisector of RS meets the angle bisector of $\angle PQR$ at point K. Measure and write down the length of KQ.

(e) Measure and write down the size of $\angle QPS$.

Answer (a), (b), (c)



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

(e).....° [1]

~End of Paper~

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Name: _____ ( ) Class: _____

Fairfield Methodist School (Secondary)
Sec 2 Express 2014 EOY Examination
Mathematics Paper 1
Answer Key

No.	Answer
1	$\frac{7}{4}$ or 1.75 or $1\frac{3}{4}$
2	$\sqrt[3]{-27}, -2, 0.16, \dot{\frac{1}{6}}, \pi$
3	\$700
4a	$2^5 \times 3^2 \times 5$
4b	$2^5 \times 3^2 \times 5^2 \times 7$
4c	$k = 42$
5a	$V = \frac{180}{\sqrt[3]{P}}$
5b	30 cm^3
5c	373.248
6	$x = 11.3$ cm
7b	56.556 cm^3
8a	32°
8b	148°
8c	58°
9a	$\frac{15a^3}{16bc}$
9b	$\frac{11x - x^2 + 6}{x^2 - 36}$
10	107 km/h
11a	8.4 km/litre
11b	\$1.33
12a	$x = 1, y = 0$
12c	12 $units^2$
13a	3 cm
13b	$\frac{4}{5}$
13c	36.9°
14a	$(a - 2b)(7c + 1)$
14b	$2(2k - h)(k - 3h)$
15a	$\frac{8}{15}$
15b	$\frac{2}{3}$
16	$f = 1.6$
17	$m = 10$ $n = 3$
18ai	161 cm
18aii	160cm
18aiii	162 cm
18b	153.5cm
19d	5.3 (+/-0.1)
19e	70° (+/-1°)

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NAME: _____ ( ) CLASS: _____

FAIRFIELD METHODIST SCHOOL (SECONDARY)

END-OF-YEAR EXAMIÑATION 2014
SECONDARY 2 EXPRESS

MATHEMATICS

Paper 2

Date: 8 October 2014 **Duration: 1 hour 30 minutes**

Candidates answer on Question Paper.

Additional Material : Graph paper (1 sheet)

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.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
Calculators should be used where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

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.

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

For Examiner's Use	
Paper 2	/ 60

Setter: Miss Lee CP

This question paper consists of 15 printed pages including the cover page.

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Name: _____ ( ) Class: _____

Answer **all** the questions.

1 The ratio of lengths of the 3 sides of triangle *DEF* is *DE* : *EF* : *FD* is 2 : 3 : 4. The length of *DE* is 5 cm. Find the perimeter of the triangle.

Answer .....cm [1]

---

2 Given that m is directly proportional to n^3. It is known that $m = 52$ for a particular value of n. Find the value of m when this value of n is halved.

Answer $m =$ ..... [2]

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Name: _____ ( ) Class: _____

3 Seven interior angles of a decagon are $(x + 22)°$ each, while the remaining interior angles are 144° each. Find the value of x.

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

---

4 **(a)** Factorize $2y^2 + 11y - 6$.

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

(b) Simplify $\frac{2y^2 + 11y - 6}{4y^2 - 1}$.

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

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5 The total cost of an advertisement in a newspaper is obtained by adding together a fixed charge of 90 cents and a charge of 25 cents per word.

Thomas does not want to spend more than $5.00 on the cost of an advertisement.

(a) Form an inequality in terms of x, where x is the number of words to represent the information.

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

(b) Solve the inequality in **(a)**.

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

(c) Hence, state the maximum number of words that Thomas can use.

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

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Name: _____ ( ) Class: _____

6 Given that $p = \sqrt{\frac{w}{2w-3x}}$, express w in terms of p and x.

Answer ..... [3]

---

7 Solve the following equations.

(a) $9x + 4 = 3x - (7 - 2x)$

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

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Name: _____ ( ) Class: _____

7 **(b)** $(z-6)^2 = 121$

Answer(b) $z =$..... or ..... [2]

---

8 A map is drawn to a scale of 1 : 600 000.

(a) Find the actual distance, in kilometres, represented by 8 centimetres on the map.

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

(b) A city covers an area of 900 square kilometres. Find, in square centimetres, the area representing the city on the map.

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

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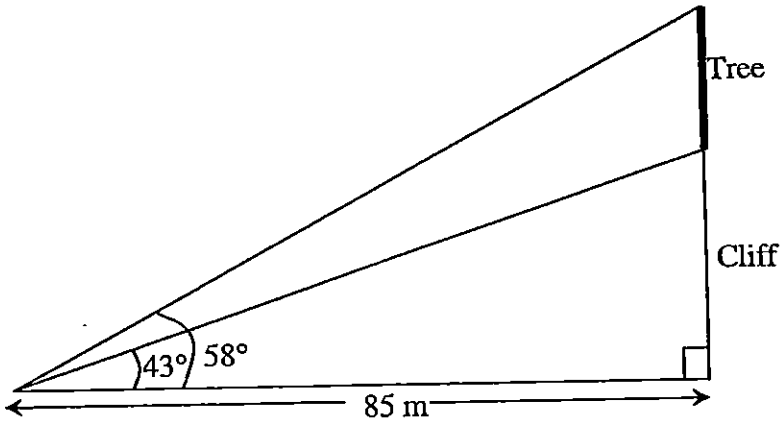
9 If $2(x-y)^2 = 128$ and $xy = 20$, find the value of $5(x+y)^2$.

Answer ..... [3]

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Name: _____ ( ) Class: _____

10 A tree stands on top of a cliff. At a distance of 85m from the foot of the cliff which is at ground level, the angles of elevation of the top of the tree and the top of the cliff are 58° and 43° respectively. Find the height of the tree.



Answer .....m [3]

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Name: _____ ( ) Class: _____

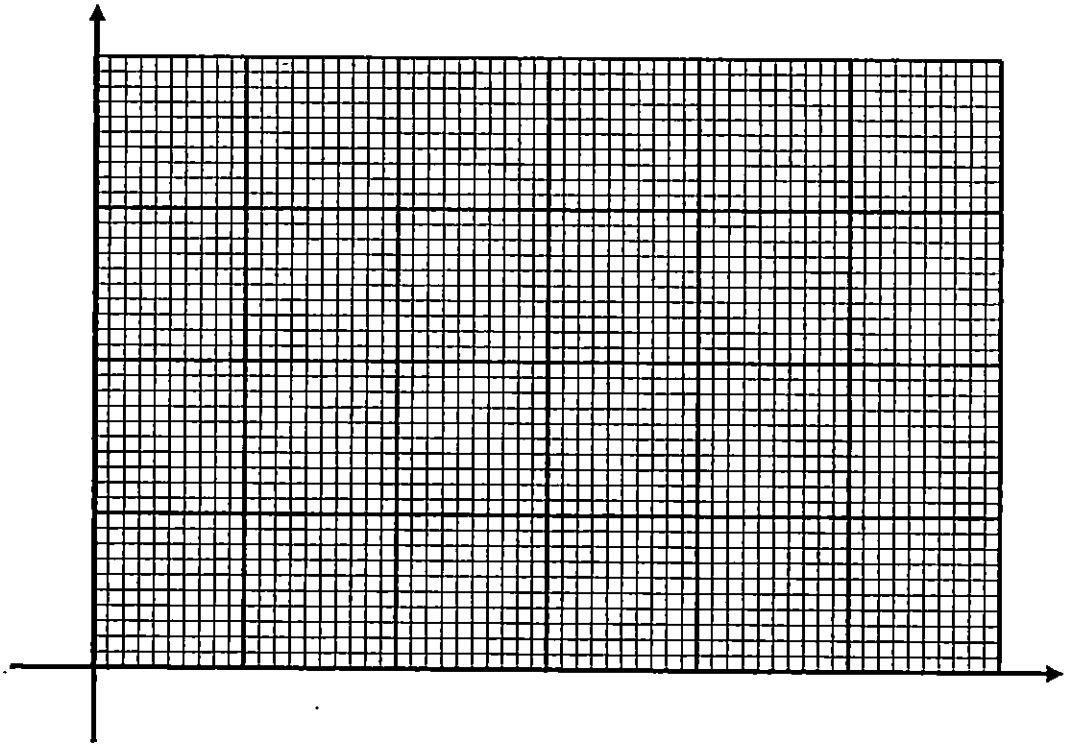
11 **(a)** The table below that show the distribution of masses of 55 rubber balls. Complete the table below. [1]

Masses (m) in grams	**Mid-value**	**Frequency, f**
$20 < m \leq 30$		5
$30 < m \leq 40$		10
$40 < m \leq 50$		15
$50 < m \leq 60$		18
$60 < m \leq 70$		7

(b) Draw a histogram to represent the distribution. [2]

Answer

Frequency



Mass (m) in grams

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Name: _____ ( ) Class: _____

11 (c) Calculate an estimate for the mean mass of the rubber balls.

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

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Name: _____ ( ) Class: _____

12 The numbers are written out in five columns to make the following pattern.

	C_1	C_2	C_3	C_4	C_5
Row 1	2	3	4	5	6
Row 2	7	8	9	10	11
Row 3	12	13	14	15	16
Row 4	17	18	19	20	21
Row n			k	x	
Row $n+1$			y	z	

The four numbers, k, x, y and z are next to each other in the pattern as shown in the diagram.

(a) **(i)** Using the patterns in the table above, express x in terms of k, y in terms of k and z in terms of k.

Answer (a)(i) $x =$ .....

$y =$ .....

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

(ii) Find and simplify $xy - kz$.

Answer (a)(ii)

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

It is noticed that the products $2\times8=16$ and $3\times7=21$ both lie in column C_5.

(iii) Explain why xy and kz lie in the same column.

Answer(a)(iii).....

..... [1]

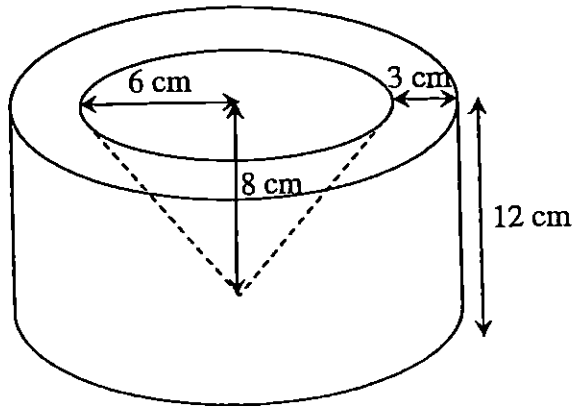
(b) The number k is in Row n of Column C_3. Find an expression for k in terms of n.

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

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Name: _____ ( ) Class: _____

13 A solid metal ornament consists of a cylinder with a base radius of 9 cm and a height of 12 cm where a right cone with a base radius of 6 cm and a vertical height of 8 cm is sculpted out from it.



(a) Calculate the total volume of solid, leaving your answer in terms of π.

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

(b) If every part of the surface area of the ornament is to be painted in blue.

(i) Show that the curved surface area of the cone is 60π cm^2.

Answer (b)(i) [2]

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13 (b) (ii) Calculate the surface area that is required to be painted.

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

(c) If the solid metal ornament is later melted and its metal is used to make a sphere, find the radius of the sphere.

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

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Name: _____ ( ) Class: _____

14 In 2010, Mr Tan changed 2100 Vietnamese Dong(VND) into Singapore dollars (S$) when the rate of exchange was x VND = S$1.00

(a) Write down an expression, in terms of x, for the number of Singapore dollars he received.

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

In 2012, he again changed 2100 VND into Singapore dollars. The exchange rate was $(x + 3)$ VND = S$1.00.

(b) Write down an expression, in terms of x, for the number of Singapore dollars he received this time.

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

(c) Given that he received S$9.00 less in 2012 than he received in 2010.

(i) Form an equation in x and show that it reduces to $x^2 + 3x - 700 = 0$.

Answer (c)(i) [2]

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14 (c) (ii) Solve the equation $x^2 + 3x - 700 = 0$.

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

(d) Find the exchange rate in 2012.

Answer (d) S$ 1.00 = ...VND [1]

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

The variables x and y are connected by the equation $y = 1 + 5x - x^2$. The table below shows the corresponding values of x and y for the equation.

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

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

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

(c) Using your graph, find the value(s) of x when $y = 3$. [1]

(d) State the equation of the line of symmetry. [1]

~ End of Paper ~

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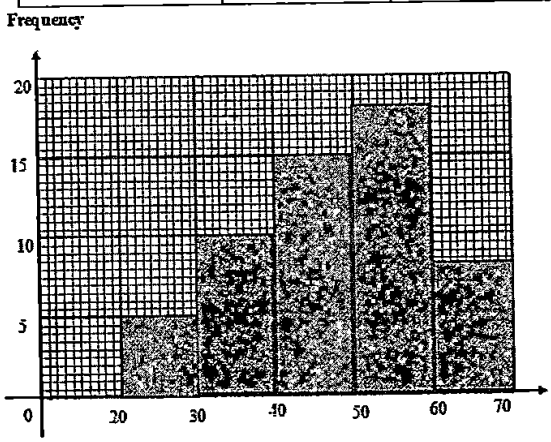
Fairfield Methodist School (Secondary)
End of Year Examination
Sec 2 Express 2014
Mathematics
Paper 2
Answer Key

1	22.5 cm	2	$m=\frac{13}{2}$ or 6.5	3	122
4(a)	$(2y-1)(y+6)$	4(b)	$\frac{y+6}{2y+1}$	5(a)	$0.9+0.25x\le 5$ or $90+25x\le 500$
5(b)	$x\le 16.4$	5(c)	16 words	6	$w=\frac{3p^2x}{2p^2-1}$
7(a)	$x=-\frac{11}{4}$ or -3.25	7(b)	z = 17 or z = - 5	8(a)	48 km
8(b)	25 cm^2	9	720	10	56.8 m (3 s.f.)

11(a)

Masses (m) in grams	Mid-value	Frequency, f
$20<m\le 30$	25	5
$30<m\le 40$	35	10
$40<m\le 50$	45	15
$50<m\le 60$	55	18
$60<m\le 70$	65	7

11(b)



11(c) 47.2 (3 s.f.) or $47\frac{2}{11}$

12(a)(i)	$x=k+1, y=k+5, z=k+6$	12(a)(ii)	5	12(a)(iii)	The difference between them is 5
12(b)	$k=5n-1$ or $4+5(n-1)$	13(a)	$876\pi\ cm^3$	13(b)(i)	$60\pi\ cm^2$
13(b)(ii)	1260 cm^2 (3 s.f.) or 1263.084 cm^2	13(c)	8.69 cm	14(a)	$S\$\frac{2100}{x}$
14(b)	$S\$\frac{2100}{x+3}$	14(c)(i)	$\frac{2100}{x}-\frac{2100}{x+3}=9$	14(c)(ii)	$x=25$ or $x=-28$
14(d)	28 *VND*	15(a)	$p=-5$	15(c)	$x=0.45$ or $x=-4.6$ (± 0.1)
15(d)	$x=2.5$				

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