Class	Index Number	Candidate Name

ANG MO KIO SECONDARY SCHOOL
MID-YEAR EXAMINATION 2016
SECONDARY TWO EXPRESS

MATHEMATICS **4048/01**
Paper 1

Thursday **12 May 2016** **1 hour 15 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, 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 of the marks for this paper is **60**.

For Examiner's Use
60

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1 The temperature at 0800 is $-6\,°C$. It rises to $26\,°C$ at 1600.

(a) Find the difference between the two temperatures.

Answer *(a)* ..... °C [1]

(b) Assuming that the temperature rises at a steady rate, find the time when the temperature is $8\,°C$.

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

2 13 students working 7 hours a day can complete a project in 40 days. How many days will 8 students working 5 hours a day need to complete the same project?

Answer ..... days [2]

3 Estimate the value of $\frac{276.93}{0.05039}$ to 1 significant figure.

Answer [2]

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4 (a) Express 250 g : 2 kg as a ratio in its simplest form.

....

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

(b) A speedboat travels at an average speed of 114 km/h. Find, in metres, the distance travelled by the speedboat in 36 seconds.

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

5 Solve the following simultaneous equations

$$2y - 3x = 5,$$
$$5x - 6y = 21.$$

Answer $x =$ ..... , $y =$ [3]

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6 Expand and simplify

(a) $(2x^2 + x - 1)(3x + 5)$,

.....

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

(b) $x(3x - 1) - (2x + 3)^2$.

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

7 The numbers 198 and 972, written as the products of their prime factors, are $198 = 2 \times 3^2 \times 11$ and $972 = 2^2 \times 3^5$. Find,

(a) the highest common factor of 198 and 972,

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

(b) the smallest integer, k, such that $198k$ is a perfect cube,

Answer *(b)* $k =$ ..... [1]

(c) the smallest positive integer value of n for which $198n$ is a multiple of 972.

Answer *(c)* $n =$ [1]

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8 y is inversely proportional to the square of x. Given that $y = 10$ for a particular value of x, find the value of y when this value of x is halved.

.....

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

9 Simplify

(a) $\dfrac{4x^2y^3}{3z^4} \div \dfrac{2x^4y^2}{9yz^2}$,

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

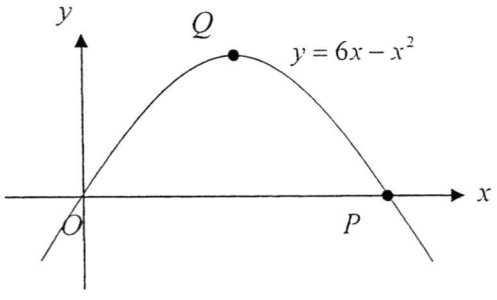
(b) $\dfrac{9m^2 - 1}{3m^2 - 5m - 2}$.

Answer *(b)* [3]

10 The diagram below shows the graph of $y = 6x - x^2$. The graph passes through the origin and cuts

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the x-axis again at point P.



(a) Write down the coordinates of P.

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

(b) Write down the equation of the line of symmetry of the graph.

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

(c) Find the coordinates of the maximum point Q.

Answer *(c)* $Q =$ (..... , ...) [1]

(d) Calculate the area of ΔOPQ.

Answer *(d)* ..... sq. units [1]

11 **(a)** The total cost of an advertisement in a newspaper is obtained by adding together a fixed charge of 50 cents and a charge of 12 cents per word.

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If an advertisement containing n words costs C cents to advertise, write down an algebraic expression for C in terms of n.

.....

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

(b) Solve the equation $4x-3(x+1)=2(x-1)-16$.

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

12 Factorise completely

(a) $3x^2-9xz+9xy-27yz$.

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

(b) $20x^3y-5xy$.

Answer *(b)* [2]

13 Express $\frac{8}{(x-2)^2}+\frac{5}{4-2x}$ as a single fraction in its simplest form.

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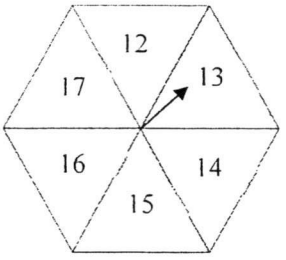
Answer ..... [3]

14 A customer bought a LCD TV at $4250 on hire purchase by paying a down payment of 10% of the selling price and the remaining to be paid in monthly installments over 2 years at a simple interest of 4.2% per annum. Calculate the monthly installment, giving your answer to the nearest 10-cents.

Answer $ [3]

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15 The diagram shows a spinner divided into 6 equal sectors.



When the pointer is spun, find the probability that the pointer will stop at the sector with

(a) a prime number,

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

(b) a single digit number.

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

16 Solve the following equations

(a) $3p^2 = 12p$,

Answer *(a)* $p =$ ..... or ..... [2]

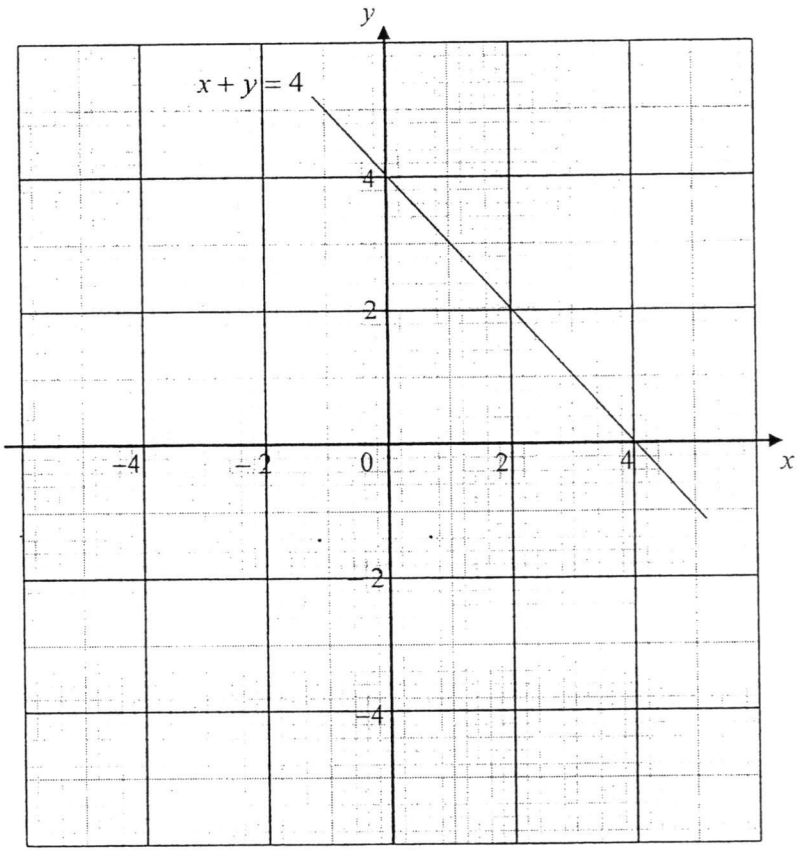
(b) $4x^2 - 5 = x(x-14)$.

Answer *(b)* $x =$ ..... or ..... [3]

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17 The diagram shows the graph of the straight line $x + y = 4$.

Answer (a)(ii)



(a) The table below shows corresponding x and y values for the equation $2y - x = 2$.

x	-2	0	4
y	m	1	3

(i) Find the value of m.

Answer (a)(i) $m =$ ..... [1]

(ii) Draw and label the graph of $2y - x = 2$ for $-2 \le x \le 4$ on the same axes above. [1]

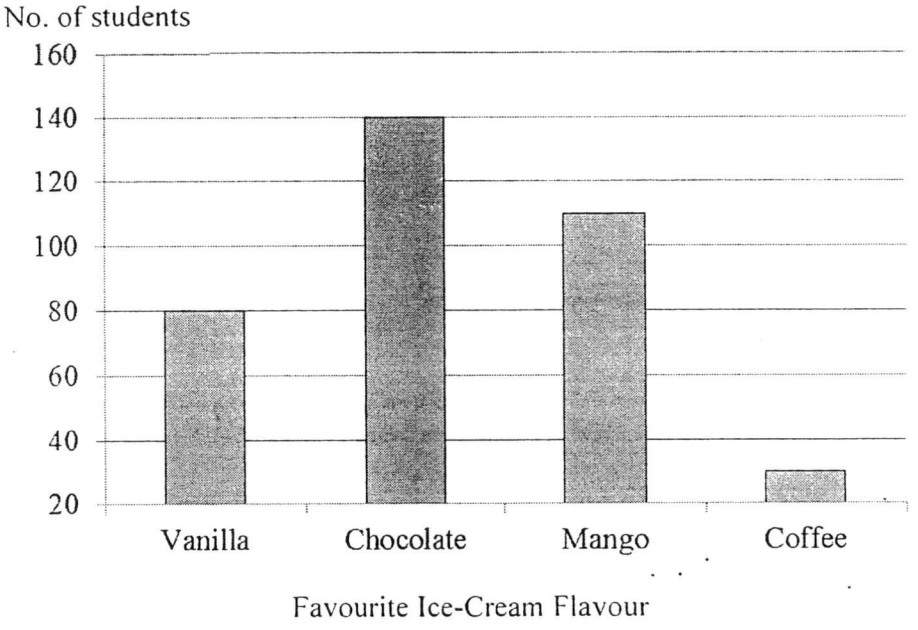
(b) Use your graph to solve the simultaneous equations

$$x + y = 4,$$
$$2y - x = 2.$$

Answer (b) $x =$ ..... , $y =$ ..... [2]

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18 The bar graph below shows the survey result of a group of Secondary One Students on their preference of ice-cream flavour.



June observed the bar graph and claimed that the number of students who prefer Chocolate flavour is twice the number of students who prefer Vanilla flavour. State whether you agree or disagree with the statement. Explain clearly how you make your decision.

Answer ....., because .....

.....

..... [2]

END OF PAPER

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Class	Index Number	Name

ANG MO KIO SECONDARY SCHOOL
MID-YEAR EXAMINATION 2016
SECONDARY TWO EXPRESS

MATHEMATICS 4048/02
Paper 2

Tuesday 10 May 2016 1 hours 30 minutes

Additional Materials: Answer Paper
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 on both sides of the paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

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

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 60.

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Answer **all** the questions.

1 The amount of fertilizer that is absorbed by a plant, F, is directly proportional to the square root of the height increment of the plant, h. When the plant absorbs 1 ml of the fertilizer, the height increment of the plant is 0.0625 cm.

Calculate

(a) the amount of fertilizer needed for the plant to grow by 9 cm, [2]

(b) the height increment of the plant when 3 ml of fertilizer is absorbed. [2]

---

2 A shop sold a LCD TV at \$5280 after offering a discount of 12%. Despite offering the discount, the shop is still able to make a profit of 5%.

Calculate

(a) the price of the TV before discount, [2]

(b) the cost price of the TV. [2]

---

3 **(a)** Expand $\left(x+\frac{3}{x}\right)^2$. [2]

(b) **Hence**, find the value of $x^2+\frac{9}{x^2}$ if $x+\frac{3}{x}=4$. [2]

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4 Given that $\sqrt{\frac{z-y}{y}}=\frac{1}{x}$.

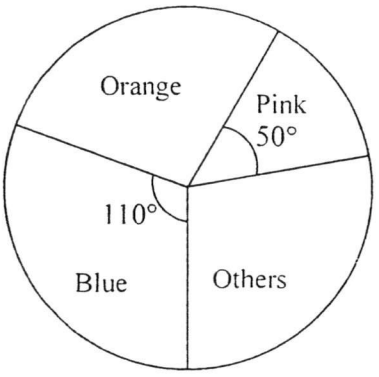
(a) Express y in terms of x and z. [3]

(b) **Hence**, find the value of y if $x = 1$ and $z = 2$. [1]

---

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5 The pie chart below shows the survey data of the favourite colours by a group of students.



(a) If 90 students liked Blue more than Pink, find the total number of students who did the survey. [1]

(b) If there were 1.5 times as many students who liked Orange as compared to Pink, express the number of students who chose Others as a ratio of the total number of students. [2]

(c) If 20% of the students who liked Blue were females, how many male students liked Blue? [2]

---

6 A box contains 30 balls, of which 12 are yellow and 18 are green. A ball is drawn at random from the box.

(a) Find the probability of drawing a yellow ball. [1]

(b) Find the number of yellow balls to be removed so that the probability of drawing a green ball from the remaining balls in the box is $\frac{3}{4}$. [2]

---

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7 Gilbert cycled at a speed of $(x + 4)$ km/h for $2x$ hours. He then jogged at a speed of $(x - 7)$ km/h for x hours. The total distance travelled is 4 km.

(a) Find an expression for the distance he cycled. [1]

(b) Form an equation in x and shows that it reduces to $3x^2 + x - 4 = 0$. [2]

(c) Solve the equation $3x^2 + x - 4 = 0$. [2]

(d) Find the average speed for Gilbert's journey and state the reason why one of the values of x is rejected. [2]

---

8 The first three lines of a sequence are:

$$1^2 - 0^2 = 1 + 0 = 1$$
$$2^2 - 1^2 = 2 + 1 = 3$$
$$3^2 - 2^2 = 3 + 2 = 5$$

(a) The tenth line is $a^2 - b^2 = c + 9 = d$.
Write down the values of a, b, c and d. [2]

(b) Write down the n^{th} line, in terms of n. [1]

(c) One of the lines is written as $M^2 - N^2 = M + N = P$.

(i) Explain why P cannot be 106. [1]

(ii) Find the value of M and the value of N when $P = 109$. [2]

---

9 Given that $x = -1$ is one of the solutions to the equation $2x^2 + ax - 4 = 0$, find

(a) the value of a, [2]

(b) the other solution to the equation. [2]

---

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10 Jessica decided to change S$2500 for her holiday trip to Tokyo. The rate of exchange between the Singapore dollars and the Japanese Yen was S$100 = ¥8240.

(a) Calculate the amount that she has in Japanese Yen. [1]

(b) If Jessica spent ¥145,000 in Tokyo and she decided to change the remaining amount of Japanese Yen back to Singapore dollars, how much will she get back if the exchange rate was ¥8150 = S$90. [2]

(c) Calculate the amount of money lost in Singapore dollars (S$) after the trip. [2]

---

11 **Answer the whole of this question on a piece of graph paper**

The table below gives some values of x and the corresponding values of y, where $y = x^2 - 3x - 5$.

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

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

(b) Using a scale of 2 cm to 1 unit, draw a horizontal x-axis for $-2 \le x \le 5$.
Using a scale of 1 cm to 1 unit, draw a vertical y-axis for $-7 \le y \le 7$.
On your axes, plot the points given in the table and join them with a smooth curve. [3]

(c) Use your graph to find

(i) the minimum value of y, [1]

(ii) the values of x when $y = 2$, [1]

(iii) the coordinates of the points where the graph of $y = x^2 - 3x - 5$ cuts the x-axis. [2]

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12 The diagram below shows the ticket prices of Luge & Skyride at Sentosa Island.

Luge & Skyride Combo

The Skyride transports you to the top of the luge tracks, where you jump onboard and ride to the bottom of the track. "Once is never enough"

Luge & Skyride	S$18 / Person
Three Luge & Skyrides	S$25 / Person
Five Luge & Skyrides	S$38 / Person
Seven Luge & Skyrides	S$41 / Person
Child Doubling *(children under 6 years or less then 110cm may ride in tandem with a full paying adult)*	S$3 per ride

*Combo tickets are valid per person only, luge rides can not be shared.
Per person rate applies to ages 6 years and taller then 110cm riding solo.
Children under 110cm can ride tandem with a paying adult.

Family Combo Deals*

A family pass includes luge rides and skyrides to be shared amongst family members.
**At least one family member must be aged 15 years or younger.*

Four ride family pass *(Share 4 luge rides & 4 skyrides)*	S$48
Eight ride family pass *(Share 8 luge rides & 8 skyrides)*	S$68
Twelve ride family pass *(Share 12 luge rides & 12 skyrides)*	S$88
Child Doubling *(children under 6 years or less than 110cm may ride in tandem with a full paying adult)*	S$3 per ride

(a) What is the cost of taking a luge and skyride for an adult and a child who is less than 110 cm? [1]

(b) Mr and Mrs Toh plan to bring their two children on a luge and skyride.

(i) Referring to the **Luge & Skyride Combo**, calculate the total cost for the family of four, given that the older child is 153 cm tall and the younger child is 105 cm. [2]

(ii) Mr Toh wants each family member to ride the luge and skyride twice. Is it more worthwhile to buy the "Eight ride family pass" from the **Family Combo Deals** or to buy individual tickets from the **Luge & Skyride Combo** for each member? Explain your answer clearly. [3]

END OF PAPER

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2E EM P1 MYE 2016 Answer Scheme

Qn	Answers	Marking Scheme	Marker's Remark
1(a)	$26-(-6)=32°C$	B1	
1(b)	Rate of temp increase $=\frac{32}{8}=4°C/h$ Temp rise from $-6 \rightarrow 8°C = 14°C$ Time taken $=\frac{14}{4}=3.5$ hours $\Rightarrow$ Time = 1130	M1 A1	
2	13 students → 7 × 40 = 280 hours 1 student → 280 × 13 hours 8 students → (280 × 13) ÷ 8 = 455 hours No. of days = 455 ÷ 5 = 91 days	 M1 A1	
3	$\frac{276.93}{0.05039} \approx \frac{280}{0.050}$ $= 5600$ = 6000 (1 significant figure)	M1 A1	
4(a)	250 g : 2 kg 250 g : 2000 g 5 : 40 1 : 8	 M1 A1	
4(b)	$114 \text{ km/h} = \frac{114 \times 1000}{60 \times 60} \text{ m/s}$ Distance travelled $=\frac{114000}{3600} \times 36$ $= 1140$ m	M1 A1	
5	$2y-3x=5$ .....(1) $5x-6y=21$ .....(2) (1) × 3: $6y-9x=15$ .....(3) (2) + (3): $-4x=36$ $x=-9$ Subst into (1): $2y-3(-9)=5$ $2y=5-27=-22$ $y=-11$	 M1 A1 A1	
OR (alternate method)	$2y-3x=5$ .....(1) $5x-6y=21$ .....(2) From (1): $2y=3x+5$ subst into (2) $5x-3(3x+5)=21$ M1 $-4x=36$ $x=-9$ A1		

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	$2y = 5 - 27 = -22$ $y = -11$ A1		
6(a)	$(2x^2 + x - 1)(3x + 5)$ $= 6x^3 + 10x^2 + 3x^2 + 5x - 3x - 5$ $= 6x^3 + 13x^2 + 2x - 5$	 M1 A1	
6(b)	$x(3x-1) - (2x+3)^2$ $= 3x^2 - x - (4x^2 + 12x + 9)$ – expand $(2x+3)^2$ $= 3x^2 - x - 4x^2 - 12x - 9$ – changing of signs $= -x^2 - 13x - 9$	 M1 M1 A1	
7(a)	$\text{HCF} = 2 \times 3^2 = 18$	B1	
7(b)	$k = 2^2 \times 3 \times 11^2 = 1452$	B1	
7(c)	$n = 2 \times 3^3 = 54$	B1	
8	$y = \frac{k}{x^2}$ when $y = 10, 10 = \frac{k}{x^2}$ new $y = \frac{k}{\left(\frac{x}{2}\right)^2} = \frac{4k}{x^2}$ $= 4 \times 10 = 40$	 M1 A1	www.exampaper.biz
OR	$y = \frac{k}{x^2}$ when $y = 10, k = 10x^2$ new $y = \frac{k}{\left(\frac{x}{2}\right)^2} = \frac{4k}{x^2}$ M1 $= \frac{4 \times 10x^2}{x^2}$ $= 4 \times 10 = 40$ A1		
9(a)	$\frac{4x^2y^3}{3z^4} \div \frac{2x^4y^2}{9yz^2}$ $= \frac{4x^2y^3}{3z^4} \times \frac{9yz^2}{2x^4y^2}$ $= \frac{6y^2}{x^2z^2}$	 M1 A1	
9(b)	$\frac{9m^2 - 1}{3m^2 - 5m - 2}$ $= \frac{(3m+1)(3m-1)}{(3m+1)(m-2)}$ – by difference of 2 squares – by cross method $= \frac{3m-1}{m-2}$	 M1 M1 A1	

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10(a)	$6x - x^2 = 0$ $x(6-x) = 0$ $x = 0$ or $x = 6$ $P = (6, 0)$	 B1	www.exampaper.biz
10(b)	$x = 3$	B1	
10(c)	$y = 6(3) - (3)^2 = 9$ $Q = (3, 9)$	 B1	
10(d)	$\frac{1}{2}(6)(9)$ $= 27 \text{ units}^2$	 B1	
11(a)	$C = 50 + 12n$	B1	
11(b)	$4x - 3(x+1) = 2(x-1) - 16$ $4x - 3x - 3 = 2x - 2 - 16$ $-x = -15$ $x = 15$	 M1 A1	
12(a)	$3x^2 - 9xz + 9xz - 27yz$ $= 3x(x - 3z) + 9y(x - 3z)$ $= (3x + 9y)(x - 3z)$ $= 3(x + 3y)(x - 3z)$	 M1 M1 A1	
12(b)	$20x^3y - 5xy$ $= 5xy(4x^2 - 1)$ $= 5xy(2x + 1)(2x - 1)$	 M1 A1	
13	$\frac{8}{(x-2)^2} + \frac{5}{4-2x}$ $= \frac{8}{(x-2)^2} + \frac{5}{-2(x-2)}$ $= \frac{8(2) - 5(x-2)}{2(x-2)^2}$ $= \frac{16 - 5x + 10}{2(x-2)^2}$ $= \frac{26 - 5x}{2(x-2)^2}$	 M1 M1 A1	
14	Loan taken up $= 0.9 \times 4250 = \$3825$ Total interest for 2 years $= (3825 \times 0.042) \times 2$ $= \$321.30$ Monthly installment $= \frac{3825 + 321.30}{24}$ $= \$172.80$	 M1 M1 A1	

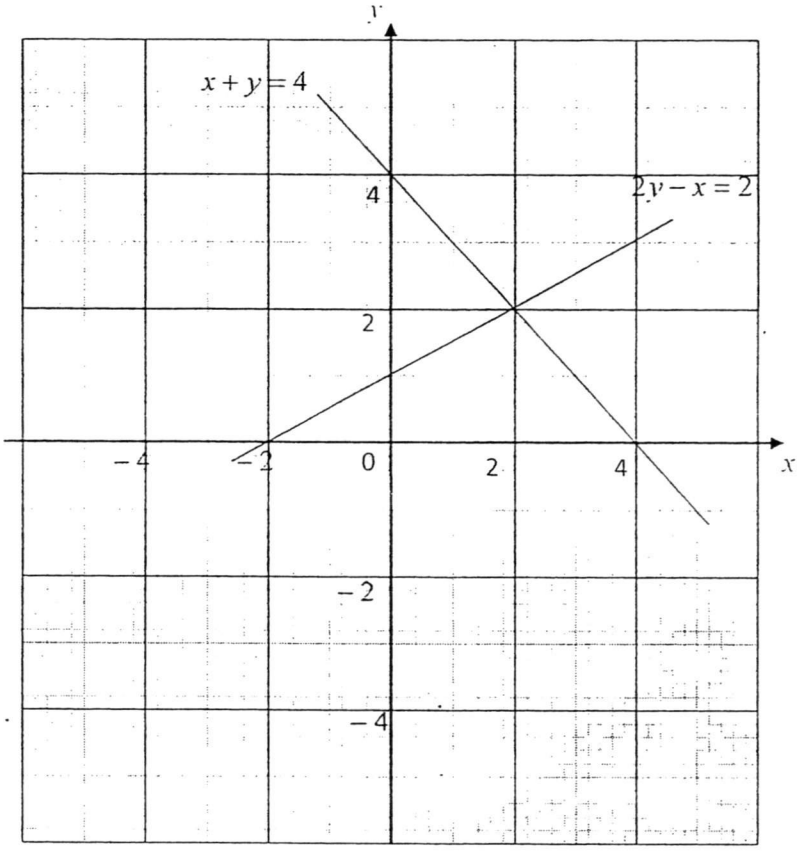
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15(a)	$\frac{2}{6} = \frac{1}{3}$	B1	
15(b)	0	B1	
16(a)	$3p^2 = 12p$ $3p^2 - 12p = 0$ $3p(p-4) = 0$ $p = 0$ or $p = 4$	 M1 A1	
16(b)	$4x^2 - 5 = x(x-14)$ $4x^2 - 5 = x^2 - 14x$ $3x^2 + 14x - 5 = 0$ $(3x-1)(x+5) = 0$ $x = \frac{1}{3}$ or $x = -5$	 M1 M1 A1	www.exampaper.biz
17(a)	$m = 0$	B1	
17(b)	Correct graph drawn (see attached)	B1	
17(c)	$x = 2$ $y = 2$	A1 A1	
18	I disagree, because the vertical axis does not start at 0. Or I disagree, because the number of students who preferred chocolate is 140 instead of 160.	B1, B1	

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17(b)



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2E EM P2 MYE 2016 Answer Scheme

Qn	Answers	Marking Scheme	Marker's Remark
1(a)	$F = k\sqrt{h}$ $1 = k\sqrt{0.0625}$ $k = 4$ $\Rightarrow F = 4\sqrt{h}$ when $h = 9$ $F = 4\sqrt{9} = 12$ ml	M1 A1	
1(b)	$F = 4\sqrt{h}$ when $F = 3$ $3 = 4\sqrt{h}$ $h = (0.75)^2$ $= 0.5625$ cm	M1 A1	
2(a)	$\frac{5280}{88} \times 100$ = \$6000	M1 A1	
2(b)	$\frac{5280}{105} \times 100$ = \$5028.57 * No A1 if answer is rounded off to \$5029 or \$5028.60	M1 A1	
3(a)	$\left(x + \frac{3}{x}\right)^2 = x^2 + 2(x)\left(\frac{3}{x}\right) + \left(\frac{3}{x}\right)^2$ $= x^2 + 6 + \frac{9}{x^2}$	M1 A1 or B2	
3(b)	$\left(x + \frac{3}{x}\right)^2 = x^2 + 6 + \frac{9}{x^2}$ $4^2 = x^2 + \frac{9}{x^2} + 6$ $x^2 + \frac{9}{x^2} = 16 - 6 = 10$	M1 A1	

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4(a)	$\sqrt{\frac{z-y}{y}} = \frac{1}{x}$ $\frac{z-y}{y} = \frac{1}{x^2}$ $y = x^2(z-y)$ $y = x^2 z - x^2 y$ $y(1+x^2) = x^2 z$ $y = \frac{x^2 z}{1+x^2}$	M1 M1 A1	
4(b)	$y = \frac{1(2)}{1+1} = 1$	B1	
5(a)	$60° \rightarrow 90$ students $360° \rightarrow \frac{90}{60} \times 360$ $= 540$ students	B1	
5(b)	Students who chose Orange $\rightarrow 1.5 \times 50 = 75°$ Others : Total $360 - 110 - 50 - 75 : 360$ $125 : 360$ $25 : 72$	M1 A1	
5(c)	80% of $110 = 88°$ $60° \rightarrow 90$ students $88° \rightarrow \frac{90}{60} \times 88$ $= 132$ male students	M1 A1	
6(a)	$\frac{12}{30} = \frac{2}{5}$	B1	
6(b)	Let no. of yellow balls to be removed $= x$ $\frac{18}{30-x} = \frac{3}{4}$ $72 = 90 - 3x$ $3x = 18$ $x = 6$ $\Rightarrow 6$ yellow balls to be removed.	M1 A1	
7(a)	$2x(x+4)$ km	B1	
7(b)	$2x(x+4) + x(x-7) = 4$ $2x^2 + 8x + x^2 - 7x - 4 = 0$ $3x^2 + x - 4 = 0$ (shown)	M1 M1	

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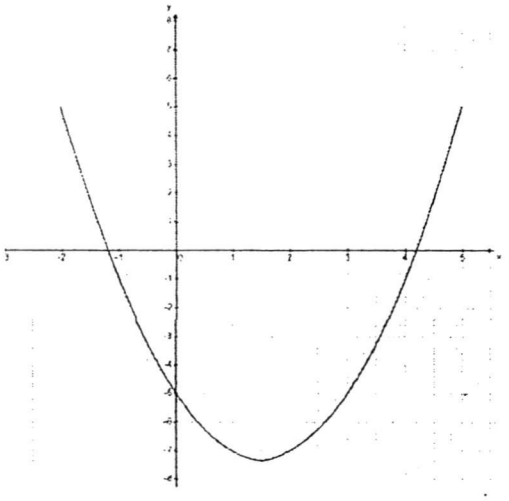
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7(c)	$3x^2 + x - 4 = 0$ $(3x+4)(x-1) = 0$ $x = -1\frac{1}{3}$ or $x = 1$	 M1 A1	
7(d)	Ave speed $= \frac{4}{2(1)+1} = 1.33$ km/h $x = -1\frac{1}{3}$ is rejected because time cannot be a negative value. * No B1 if speed is given as a fraction.	 B1 B1	
8(a)	$a = 10,\ b = 9$ $c = 10,\ d = 19$	B1 B1	
8(b)	$n^2 - (n-1)^2 = n + (n-1) = 2n - 1$	B1	
8c(i)	P must be odd and 106 is not an odd number	B1	
8c(ii)	$2n - 1 = 109$ $2n = 110$ $n = 55$ $\Rightarrow M = 55,\quad N = 54$	 M1 A1	
9(a)	$x = -1$, $2(-1)^2 - a - 4 = 0$ $-a - 2 = 0$ $a = -2$	 M1 A1	
9(b)	$2x^2 - 2x - 4 = 0$ $(x+1)(2x-4) = 0$ $x = -1$ or $x = 2$ The other solution is $x = 2$	 M1 A1	
10(a)	S$100 → ¥8240 S$2500 → $\frac{8240}{100} \times 2500$ $= ¥206\,000$	 B1	
10(b)	Amount of ¥ to change back to S$ $= 206\,000 - 145\,000 = ¥61\,000$ ¥8150 → S$90 ¥61000 → $\frac{90}{8150} \times 61000$ = S$673.62	 M1 A1	
10(c)	Using the original rate, ¥61000 → $\frac{100}{8240} \times 61000$ = S$740.29 Amount lost = 740.29 – 673.62 = S$66.67	 M1 A1	

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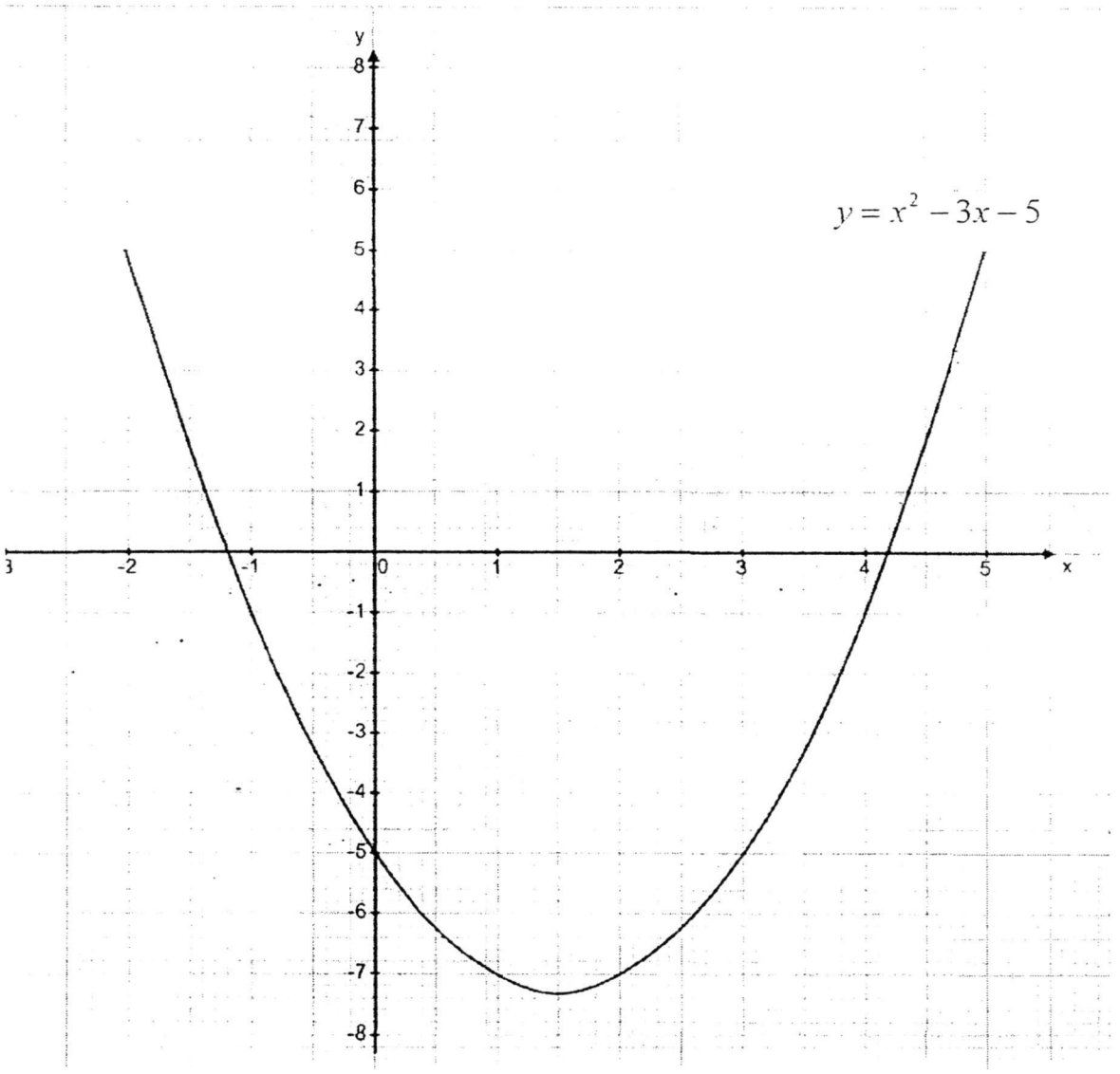
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11(a)	$b = -7$	B1	
11(b)	Refer to graph Correct scale and label – 1 mark Correct points plotted – 1 mark Smooth curve joining all points – 1 mark	M3	
			
11(c)(i)	Min $y = -7.3$ (accept -7.5 to -7.1)	B1	
11(c)(ii)	$x = -1.65$ (accept -1.75 to -1.55), $x = 4.5$ (accept 4.4 to 4.6)	B1	
11(c)(iii)	$(-1.2, 0)$ and $(4.2, 0)$ x-coordinate $\pm$ 0.1	B1, B1	
12(a)	$18 + 3 = \$21$	B1	
12(b)	$3(18) + 3 = \$57$	B2	
12(c)	Eight ride family pass: Total cost = \$68 Individual passes: Total cost $= 2(57) = \$114$ It is more worthwhile to get a eight ride family pass as it is cheaper.	M1 M1 A1	
OR	Eight ride family pass (+ child doubling): Total cost = 68 + 6 = \$74 Individual passes: Total cost $= 2(57) = \$114$ It is more worthwhile to get a eight ride family pass as it is cheaper.	M1 M1 A1	
OR	Eight ride family pass (+ child doubling): Total cost = 68 + 6 = \$74 Individual passes: Total cost $= 2(57) = \$114$ It is more worthwhile to get a eight ride family pass as at least one of the adults gets to ride more than 2 times.	M1 M1 A1	

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Q11(b)



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