

# 2017 SECONDARY 1

Express Exam Paper

## Mathematics (Set B)

1	CHIJ St Joseph	SA1	
2	CHIJ St Theresa		SA2
3	Chung Cheng Main		SA2
4	Chung Cheng Yishun	SA1	
5	Clementi Town	SA1	
6	Fairfield Methodist		SA2
7	Fuhua Sec	SA1	
8	Gan Eng Seng		SA2
9	Geylang Methodist	SA1	
10	Pasir Ris Crest		SA2
11	Swiss Cottage		SA2
12	Xinmin Sec	SA1	
13	Commonwealth		SA2
14	Methodist Girl	SA1	
15	St Joseph		SA2
16	Tanjong Katong	SA1	



Index Number	Class	Name
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# CHIJ ST JOSEPH'S CONVENT SEMESTRAL ASSESSMENT 1



## MATHEMATICS

Paper 1

4048/01

Monday, 8 May 2017  
1 hour

Secondary 1 Express

Additional Materials: NIL

### READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on the cover page in the spaces provided.

Write in dark blue or black pen.

You may use a soft 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 or units may result in loss of marks. Working(s) in pencil will not be awarded marks.

The total number of marks for this paper is 40.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .**

The number of marks is given in brackets [ ] at the end of each question or part question.

FOR EXAMINER'S USE
40

This document consists of **9** printed pages.

Setter : Mrs Goh Boon Hong

[Turn over

Answer **all** questionsFor  
Examiner's  
Use

1. Arrange the following numbers in ascending order.

$$\frac{49}{50} \quad 0.98^2 \quad 0.989 \quad 0.\dot{9}8$$

Answer ..... [1]  
smallest biggest

2. The following is a set of numbers provided.

$$-2, 0, 1, \sqrt{2}, \frac{1}{8}, \pi$$

Write down all the

(a) Integer(s),

Answer ..... [1]

(b) whole number(s),

Answer ..... [1]

(c) natural number(s),

Answer ..... [1]

(d) irrational number(s).

Answer ..... [1]



3. Find the fraction exactly halfway between  $\frac{1}{8}$  and  $\frac{2}{5}$ .

Give your answer in its simplest form.

Answer ..... [1]

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4. (a) Simplify  $0.1 : 0.35$ .

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

- (b) Express the ratio of 45 cm to 4 m in its simplest form.

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

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5. If  $A : B = 2 : 5$  and  $B : C = 3 : 11$ , find the ratio  $A : B : C$ .

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

6. (a) The certificate of entitlement (COE) of a car costs \$ 52 503.

Round off \$52 503 to 2 significant figures.

Answer \$ ..... [1]

- (b) Express 0.089351 correct to

(i) 3 significant figures,

Answer ..... [1]

(ii) 2 decimal places.

Answer ..... [1]

- 
7. Find the sum of all the prime numbers between 1 and 10.

Answer ..... [1]

- 
8. The maximum speed of a car on the expressway is 90 km/h.

Express 90 km/h in m/s.

Answer ..... m/s [1]

9. (a) By rounding each number to 1 significant figure, estimate the value of

$$\frac{495 \times 7.4}{689.11 - 158.93}.$$

You must show your working .

Answer ..... [2]

- (b) Calculate the value of  $\frac{495 \times 7.4}{689.11 - 158.93}$ .

Leave your answer in 3 significant figures.

Answer ..... [1]

- 
10. The fish costs  $x$  cents per 100 grams. John buys some fishes and it costs him  $y$  dollars.

Express, in terms of  $x$  and  $y$ , for the number of grams of fishes that John buy.

Answer ..... grams [2]

11. Expand

(a)  $a(3a + 2)$ ,

Answer ..... [1]

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

Answer ..... [2]

---

12. Given that  $x = 3$ ,  $y = -2$  and  $z = -7$ , find the value of

(a)  $x + 2y - \frac{2z + 3}{y}$ ,

Answer ..... [2]

(b)  $x(y^2 + x) - xyz$ .

Answer ..... [2]

**13. (a)** Add  $5x+3$  to  $-8x+1$ .

*Answer* ..... [1]

**(b)** Subtract the product of  $2x$  and  $-x+4$  from  $5x^2-9x+3$ .

*Answer* ..... [2]

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**14. Simplify**

**(a)**  $3xy+8+2yx+3$ ,

*Answer* ..... [1]

**(b)**  $-5+\frac{1}{2}xy^2+5xy-3xy-12-\frac{7}{2}xy^2$ .

*Answer* ..... [1]

**15.** The price of an admission ticket to a carnival is \$9.

**(a)** Write down an expression for the cost of  $x$  tickets.

*Answer* \$..... [1]

**(b)** Find the maximum number of tickets that can be bought with \$59.

*Answer* ..... tickets [2]

16. (a) Solve the inequality  $\frac{2x-4}{3} \leq \frac{3x+1}{2} - 1$ .

Answer ..... [3]

(b) Illustrate the solution on a number line.

Answer:



[1]

End of Paper

Index Number	Class	Name
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# CHIJ ST JOSEPH'S CONVENT SEMESTRAL ASSESSMENT 1



**MATHEMATICS**

Paper 2

**4048/02**

Monday, 8 May 2017  
1 hour 30 minutes

Secondary 1 Express

Additional Materials: NIL

## READ THESE INSTRUCTIONS FIRST

Write your index number, class and name on the cover page in the spaces provided.

Write in dark blue or black pen.

You may use a soft 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 or units may result in loss of marks. Working(s) in pencil will not be awarded marks.

The total number of marks for this paper is 60.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .**

The number of marks is given in brackets [ ] at the end of each question or part question.

<b>FOR EXAMINER'S USE</b>
<b>60</b>

This document consists of **14** printed pages.

**Setter : Mrs Goh Boon Hong**

**[Turn over**



Answer **all** questionsExaminer's  
Use

1. (a) Calculate  $\frac{99.11 + \sqrt{3.23^2 + 4}}{(-2)^2 \times 11.5}$ .

Write down the first five digits on the calculator display of your answer.

Answer ..... [1]

(b) Write down your answer to **part (a)** correct to 3 significant figures.

Answer ..... [1]

---

2. An integer, when corrected to 3 significant figures, is 726 000. Write down

(a) the largest possible value of the integer,

Answer ..... [1]

(b) the smallest possible value of the integer.

Answer ..... [1]

Turn over

3. (a) Express 2250 as a product of its prime factors.

Answer 2250 = ..... [1]

- (b) Find the smallest value of  $k$  such that  $2250k$  is a perfect cube.

.

Answer  $k$  = ..... [2]

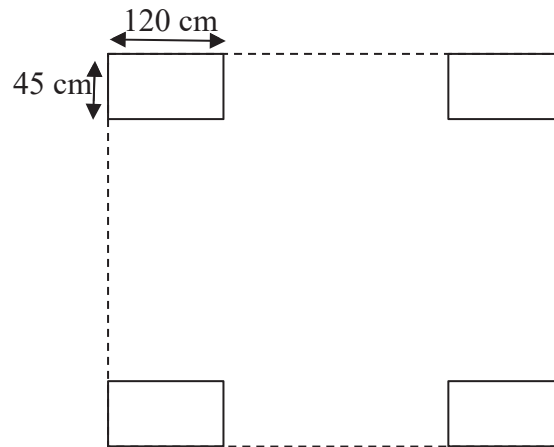
4. On a particular morning, the temperature at the top of Mount Everest was  $-41^{\circ}\text{C}$  and the temperature at the foot of the mountain was  $5^{\circ}\text{C}$ .
- (a) Find the difference between the two temperatures.

Answer .....  $^{\circ}\text{C}$  [1]

- (b) The height of Mount Everest from the foot to the top of the mountain is 8850 metres. Given that the temperature changes uniformly with height, calculate the temperature at 6900 metres above the foot of the mountain. Give your answer correct to 3 significant figures.

Answer .....  $^{\circ}\text{C}$  [2]

5. The length of a rectangular table is 120 cm and the width of the rectangular table is 45 cm. These tables were arranged side by side so that it will form a square.



Find

- (a) the length of a side of the smallest square,

Answer ..... cm [2]

- (b) the number of tables used to form the square in part (a).

Answer ..... tables [2]

6. A group of children plan to donate 105 packets of drinks, 147 packets of rice and 231 packets of biscuits to an old folks home. The packets of drinks, packets of rice and packets of biscuits are packed equally into gift bags without leftovers. Find
- (a) the maximum number of gift bags,

Answer .....bags [2]

- (b) the number of packets of biscuits in each gift bag.

Answer ..... packets [1]

7. James ran 15 km from his house for 1 hour 30 minutes. He rested for 50 minutes before walking home. His walking speed was 40% less than his running speed. Calculate
- (a) his running speed, in km/h,

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

- (b) his walking time, in minutes,

Answer ..... minutes [2]

- (c) his average speed, in m/s, for the whole journey.

Answer .....m/s [3]

8. Mr. Chai withdraws \$30 000 from his saving account.  $\frac{1}{4}$  of the money is given to his wife and the rest is divided among his three children Judy, Jane and Annie in the ratio 4 : 3 : 1 respectively.

(a) Judy saves  $\frac{1}{3}$  of her money. Calculate the amount of money she saves.

Answer \$..... [3]

- (b) Annie receives an additional \$2000 from her mother. Find the ratio of money received by Jane to Annie now.

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

9. A standard triathlon is made up of a swim, a bicycle ride and a run. The running distance is  $\frac{1}{9}$  of the whole journey, the cycling distance is 5 times of the running distance and the running distance is 1.5 km. Find
- (a) the distance covered in the triathlon,

Answer ..... km [1]

- (b) the fraction of the race which a competitor has to swim.

Answer ..... [2]



10. Factorise completely

(a)  $9a^4b + 15a^3b^3c - 3a^3$ ,

Answer ..... [1]

(b)  $4x^2 - xy - y + 4x$ ,

Answer ..... [2]

(c)  $zy + 15x - 3xz - 5y$ .

Answer ..... [2]

11. Solve

(a)  $-9(2x-3)=3,$

Answer  $x = \dots\dots\dots$  [2]

(b)  $\frac{1}{4}x-1=\frac{1}{5}x-\frac{1}{8},$

Answer  $x = \dots\dots\dots$  [2]

(c)  $\frac{2x}{3}-\frac{5x+2}{4}=\frac{1}{5}.$

Answer  $x = \dots\dots\dots$  [3]

12. The table below shows the monthly subscription of three price plans offered by S1 Telecommunications Company.

Price Plans	Combo A	Combo B	Combo C
Monthly Subscription	\$42.90	\$62.90	\$82.90
FREE Outgoing Calls	200 min	300 min	400 min
FREE Data Bundled	2 Gigabytes (GB)	3 Gigabytes (GB)	4 Gigabytes (GB)
Excess Data Charges	\$10.70 per GB capped at \$181.90/mth		
Local Talktime Rate (Outgoing call): 12¢ per minute.			

- (a) Joan subscribes to Combo A plan. She makes a total of 300 min of outgoing local calls. Find the amount she needs to pay if she does not use more than the free data bundled provided.

Answer \$..... [2]

- (b) Adeline subscribes to Combo B plan. She made a total of 500 min outgoing local calls and her bill is \$97.60. Find, giving your answer in Gigabytes, her total data usage.

Answer .....GB [2]

- (c) On average Cathy makes a total of 350 min of outgoing calls and uses 19 GB of data monthly. If Cathy is looking for the cheapest price plan, which price plan should she choose? Show all your workings clearly.

Answer Combo ..... [4]

13. It is given that  $4(2x-1)+6(3x+2)=0$ , find the value of  $52x+17$ .

Answer  $52x+17 = \dots\dots\dots$  [2]

14. Simplify

(a)  $\frac{-2(5x+3y)}{3} + \frac{3(2x-y)}{2},$

Answer ..... [3]

(b)  $-3\left(\frac{2x-5}{7}\right) + x.$

Answer ..... [3]




## Answer Key Sec 1 Express SA1 Paper 1 2017

1a	$0.98^2, \frac{49}{50}, 0.989, 0.9\dot{8}$	B1	Generally well done. Students need to express numbers back in their original form given in question.
2a	-2, 0, 1	B1	Generally poorly done as students were unsure of the definitions of the numbers. Students must know these definitions well as it is a fundamental skill which may affect later topics (e.g. set notation).
2b	0, 1	B1	
2c	1	B1	
2d	$\sqrt{2}, \pi$	B1	
3	$\left(\frac{1}{8} + \frac{2}{5}\right) \div 2$ $= \left(\frac{5}{40} + \frac{16}{40}\right) \div 2$ $= \frac{21}{40} \div 2$ $= \frac{21}{80}$	B1	Generally poorly done. Students must learn to interpret questions and learn to represent them using a mathematical expression.
4a	0.1 : 0.35 10 : 35 2 : 7	B1	Students must remember to leave their answers as natural numbers (and not fractions/decimals/mixed numbers) and also note that their final answer should not have any units.
4b	45 : 400 9 : 80	M1 A1	
5	$A : B = 2 : 5$ and $B : C = 3 : 11$ $A : B = 6 : 15$ and $B : C = 15 : 55$ $A : B : C = 6 : 15 : 55$	M1 A1	Generally well done.
6a	\$53 000	B1	Common error: \$52.
6bi	0.0894	B1	Common error: 0.0893, 0.894.
6bii	0.09	B1	Well done.
7	$2 + 3 + 5 + 7$ $= 17$	B1	Common error: Students thought 1 or 9 are prime numbers.

8	$\frac{90 \text{ km}}{1 \text{ h}}$ $= \frac{90 \times 1000 \text{ m}}{1 \times 3600 \text{ sec}}$ $= 25 \text{ m/s}$	B1	Generally well done.
9a	$\frac{495 \times 7.4}{689.11 - 158.93}$ $= \frac{500 \times 7}{700 - 200}$ $= 7$	M1 A1	Common error: Some students unable to see this as an estimation question and calculated first then rounded off. Other students rounded off wrongly e.g. $\frac{5 \times 7}{7 - 2}$ or $\frac{500 \times 7.0}{700.00 - 200.00}$ .
9b	6.91	B1	Generally well done, with few giving 6.90.
10	$x \text{ cents} \text{ ----- } 100 \text{ grams}$ $\frac{x}{100} \text{ dollars} \text{ --- } 100 \text{ grams}$ $1 \text{ dollars} \text{ ----- } \frac{10000}{x}$ $y \text{ dollars} \text{ ----- } \frac{10000y}{x}$	M1 A1	<p><u>Alternative working</u></p> $\text{\$}y = 100y \text{ cents}$ $x \text{ cents} \text{ ----- } 100 \text{ g}$ $100y \text{ cents} \text{ ----- } \frac{100}{x} \times 100 \text{ g}$ $= \frac{10000y}{x} \text{ g}$ <p>Common error: Students did not simplify answer and leave as <math>\frac{100}{x} \times 100y</math>.</p>
11a	$a(3a + 2)$ $= 3a^2 + 2a$	B1	Generally well done.
11b	$(2x + 3y)(2x - 3y)$ $= 4x^2 - 6xy + 6xy - 9y^2$ $= 4x^2 - 9y^2$	M1 A1	Common error: Students did not multiply terms correctly and get wrong terms (e.g. $2x^2$ , $3y^2$ etc) or did not simplify ( $-6xy + 6xy$ ).
12a	$x + 2y - \frac{2z + 3}{y}$ $= (3) + 2(-2) - \frac{2(-7) + 3}{-2}$ $= 3 - 4 - \frac{-14 + 3}{-2}$ $= -6\frac{1}{2}$	M1 A1	Common error: 0m if students did not show first step of working (i.e. substitution of numbers to replace variables).
12b	$x(y^2 + x) - xyz$ $= (3)[(-2)^2 + 3] - (3)(-2)(-7)$ $= -21$	M1 A1	Common error: 0m if students did not show first step of working (i.e. substitution of numbers to replace variables). Many students did not put brackets for $(-2)^2$ .



13a	$5x + 3 + (-8x + 1)$ $= 5x + 3 - 8x + 1$ $-3x + 4$	B1	Generally well done. Few had careless mistakes of leaving out negative sign.
13b	$5x^2 - 9x + 3 - 2x(-x + 4)$ $= 5x^2 - 9x + 3 + 2x^2 - 8x$ $= 7x^2 - 17x + 3$	M1  A1	Generally poorly done. Common errors: Students either minus from the wrong term or they did not put bracket for the later term or they did not apply the negative sign to every term in the bracket.
14a	$3xy + 8 + 2yx + 3$ $= 5xy + 11$	B1	Generally well done. Some did not simplify $3xy$ and $2yx$ .
14b	$-5 + \frac{1}{2}xy^2 + 5xy - 3xy - 12 - \frac{7}{2}xy^2$ $= -3xy^2 + 2xy - 17$	B1	Generally well done.
15a	\$9x	B1	Generally well done.
15b	number of tickets = $\frac{59}{9}$ $= 6\frac{5}{9}$  maximum number of tickets = 6	M1  A1	Generally well done.
16a	$\frac{2x-4}{3} \leq \frac{3x+1}{2} - 1$ $\frac{2x-4}{3} \leq \frac{3x+1}{2} - \frac{2}{2}$ $\frac{2x-4}{3} \leq \frac{3x+1-2}{2}$ $\frac{2x-4}{3} \leq \frac{3x-1}{2}$ $2(2x-4) \leq 3(3x-1)$ $4x-8 \leq 9x-3$ $-5x \leq 5$ $x \geq -1$	M1,  M1  A1	Generally poorly done. Common error: Some students attempted cross-multiplication, which could result in error. Some students just removed the denominator.
16b		B1	Common error: Students forget to shade the circle as inequality includes $-1$ .

## Answer Key Sec 1 Express SA1 Paper 2 2017

1a	2.2371	B1	Generally well done.																					
1b	2.24	B1	Generally well done.																					
2a	726499	B1	Common error: Some students unable to determine largest/smallest integer.																					
2b	725500	B1																						
3a	$2250 = 2 \times 3^2 \times 5^3$	B1	Some did not present as prime factors																					
3b	$2250k = 2^3 \times 3^3 \times 5^3$ $2 \times 3^2 \times 5^3 k = 2^3 \times 3^3 \times 5^3$ $k = \frac{2^3 \times 3^3 \times 5^3}{2 \times 3^2 \times 5^3}$ $k = 2^2 \times 3$ $k = 12$	M1 A1	Common error: Some students thought it was a perfect square question while some had misleading/contradictory working.																					
4a	$5^\circ\text{C} - (-41^\circ\text{C})$ $= 46^\circ\text{C}$	B1	Common error: $-46^\circ\text{C}$ .																					
4b	$8850m \text{ ----- } 46^\circ\text{C}$ $1m \text{ ----- } \frac{46}{8850}^\circ\text{C}$ $6900m \text{ ----- } \frac{46}{8850} \times 6900m$ $\qquad\qquad\qquad = 35.864^\circ\text{C}$ Temperature at 6900 m $= -35.864^\circ\text{C} + 5^\circ\text{C}$ $\qquad\qquad\qquad = -30.864^\circ\text{C}$ $\qquad\qquad\qquad \approx -30.9^\circ\text{C}$	M1 A1	Alternative M1 working $\frac{8850}{46} = 192.3$ $\frac{6900}{192.3} \approx 35.9$  Many scored M1 only. Common error: Many used 41 to calculate instead of 35.9.																					
5	<table><tr><td>5</td><td>45,</td><td>120</td></tr><tr><td>3</td><td>9,</td><td>24</td></tr><tr><td>3</td><td>3,</td><td>8</td></tr><tr><td>2</td><td>1,</td><td>8</td></tr><tr><td>2</td><td>1,</td><td>4</td></tr><tr><td>2</td><td>1,</td><td>2</td></tr><tr><td></td><td>1,</td><td>1</td></tr></table> LCM $= 2^3 \times 3^2 \times 5$ $= 360$  Hence, the shortest length of a side of the square is 360 cm.	5	45,	120	3	9,	24	3	3,	8	2	1,	8	2	1,	4	2	1,	2		1,	1	M1 A1	Common error: Some did not show working clearly or thought it was a HCF question.  Note: did not accept trial & error
5	45,	120																						
3	9,	24																						
3	3,	8																						
2	1,	8																						
2	1,	4																						
2	1,	2																						
	1,	1																						

5b	Total number of table used = $\frac{360}{120} \times \frac{360}{45}$ $= 3 \times 8$ $= 24$			M1  A1	Accepted $129600 \div 5400$ too but students urged to learn fastest method.
6a	3	105, 147, 231		M1  A1	Generally well done.
	7	35, 49, 77			
		5, 7, 11			
	HCF = $3 \times 7$ $= 21$  Maximum number of gifts bags = 21				
6b	number of packets of biscuits  in each gift bag = $\frac{231}{21}$ $= 11$			B1	Generally well done. Students urged to show working.
7a	running speed = $\frac{15}{1.5}$ $= 10 \text{ km/h}$			M1 A1	Common error: Some thinks that 1h30min is 1.3 hr
7b	Walking speed = $0.6 \times 10$ $= 6 \text{ km/h}$  Walking time = $\frac{15}{6}$ $= \frac{5}{2} \text{ hour}$ $= 2.5 \text{ hours}$			M1  A1	Common error: Some students took 0.4 instead of 0.6.
7c	Average speed = $\frac{15+15}{1.5+\frac{5}{6}+2\frac{1}{2}}$ $= \frac{30}{4\frac{5}{6}}$ $= \frac{180}{29} \text{ km / h}$ $= \frac{180 \times 1000 \text{m}}{29 \times 3600 \text{sec}}$ $= 1.7241 \text{ m/s}$ $\approx 1.72 \text{ m/s}$			M1  M1  A1	Common error: Many did not add in rest time or added 10km/h to 6km/h to find avg speed

8a	<p>Total amount of money distributed to children</p> $= \frac{3}{4} \times \$30000$ $= \$22500$ <p>8 units ----- \$22500</p> $1 \text{ unit } \frac{\$22500}{8}$ $= \$2812.50$ <p>4 units ----- \$2812.50 <math>\times</math> 4</p> $= \$11250$ <p>Judy saves <math>\frac{1}{3} \times \\$11250</math></p> $= \$3750$	<p>M1</p> <p>M1</p> <p>A1</p>	<p>Students must be reminded to show <math>\times/\div</math> working clearly.</p> <p>Common error: missed out a zero behind i.e. 22500 was written as 2250 etc.</p>
8b	<p>3 units ----- \$2812.50 <math>\times</math> 3</p> $= \$8437.50$ <p>Money received by Annie \$2812.50 + 2000</p> $= \$4812.50$ <p>Money received by Jane: Money received by Annie</p> $8437.50 : 4812.50$ $= 135:77$	<p>M1</p> <p>A1</p>	<p>Generally well done.</p> <p>Students must remember to express all answers involving money to their nearest cents and not leave as \$4812.5.</p>
9a	<p><math>\frac{1}{9}</math> unit ----- 1.5km</p> <p>1 unit ----- 1.5km <math>\times</math> 9</p> $= 13.5\text{km}$	B1	Generally well done.
9b	<p>running <math>\swarrow \searrow</math></p> $\frac{1}{9} \quad \frac{8}{9}$ <p>Cycle <math>\swarrow \searrow</math> swim</p> $\frac{5}{9} \quad \frac{3}{9}$ <p>fraction of the race which a competitor has to swim <math>= 1 - \frac{1}{9} - 5 \times \frac{1}{9}</math></p> $= \frac{3}{9}$ $= \frac{1}{3}$	<p>M1</p> <p>A1</p>	<p>Generally well done.</p> <p>Common error: Students must remember to express fraction in simplest form.</p>
10a	$9a^4b + 15a^3b^3c - 3a^3$ $= 3a^3(3ab + 5b^3c - 1)$		<p>Quite poorly done.</p> <p>Common error: Students must remember to identify</p>

		B1	all common terms, i.e. took out 3a only. Some students had difficulty identifying the last term.
10b	$4x^2 - xy - y + 4x$ $= x(4x - y) + 4x - y$ $= (4x - y)(x + 1)$	M1 A1	Quite poorly done.  Common error: Students had problem identifying this kind of question needs to be solved by
10c	$zy + 15x - 3xz - 5y$ $= zy - 3xz + 15x - 5y$ $= z(y - 3x) + 5(3x - y)$ $= z(y - 3x) - 5(y - 3x)$ $= (z - 5)(y - 3x)$	M1 A1	“factorisation by grouping”. Students also tend to get the signs wrong especially if the 3 <sup>rd</sup> term is -ve
11a	$-9(2x - 3) = 3$ $-18x + 27 = 3$ $-18x = -27 + 3$ $-18x = -24$ $x = \frac{-24}{-18}$ $x = \frac{4}{3}$ $x = 1\frac{1}{3}$	M1 A1	Common error: Students had missing “+” and “-” signs in their working. They have to be more careful in their working.
11b	$\frac{1}{4}x - 1 = \frac{1}{5}x - \frac{1}{8}$ $\frac{1}{4}x - \frac{1}{5}x = -\frac{1}{8} + 1$ $\frac{5}{20}x - \frac{4}{20}x = \frac{7}{8}$ $\frac{x}{20} = \frac{7}{8}$ $x = 17.5$	M1 A1	Generally well done.  Common error: Students made careless mistakes involving subtraction of fractions. i.e. $-\frac{1}{8} + 1 = -\frac{9}{8}$

11c	$\frac{2x}{3} - \frac{5x+2}{4} = \frac{1}{5}$ $\frac{8x}{12} - \frac{3(5x+2)}{12} = \frac{1}{5}$ $\frac{8x-3(5x+2)}{12} = \frac{1}{5}$ $\frac{8x-15x-6}{12} = \frac{1}{5}$ $\frac{-7x-6}{12} = \frac{1}{5}$ $5(-7x-6) = 12$ $-35x-30 = 12$ $-35x = 42$ $x = -\frac{6}{5}$ $x = -1\frac{1}{5}$	<p>M1</p> <p>M1</p> <p>A1</p>	<p>Generally well done.</p> <p>Common error: Students forget to multiply the negative sign to the 2<sup>nd</sup> term of the numerator.</p>
12a	<p>Amount she needs to pay = <math>\\$42.90 + (300 - 200) \times \\$0.12</math></p> <p>= \$54.90</p>	<p>M1</p> <p>A1</p>	<p>Generally well done.</p> <p>Common error: found the extra call charge but did not add in subscription</p>
12b	<p>Total data usage = <math>\frac{\\$97.60 - \\$62.90 - (500 - 300) \times \\$0.12}{10.7}</math></p> <p>= 4GB</p>	<p>M1</p> <p>A1</p>	<p>Generally well done.</p> <p>Common error: Students did not show how to get 1GB from \$10.70.</p>
12c	<p>Combo Plan A</p> <p><math>\\$42.90 + (350 - 200) \times 0.12 + (19 - 2) \times 10.70</math></p> <p>= \$242.80</p> <p>Combo Plan B</p>	<p>M1</p>	<p>Common error: Students tend to leave out a component of cost when calculation. A few students unnecessarily added in the cost of "use of excess data of \$181.90" for all the plans.</p>

	$\$62.90 + (350 - 300) \times 0.12 + (19 - 3) \times 10.70$ $= \$240.10$ <p>Combo Plan C</p> $\$82.90 + (19 - 4) \times 10.70$ $= \$243.40$ <p>She should choose Combo Plan B</p>	M1	
		M1	
		A1	
13	$4(2x - 1) + 6(3x + 2) = 0$ $8x - 4 + 18x + 12 = 0$ $26x + 8 = 0 \quad \text{OR } x = -\frac{4}{13}$ $2(26x + 8) = 0$ $52x + 16 = 0$ $52x + 17 = 1$	M1	Common error: Students committed basic mistakes of balancing equations (e.g. add/subtract/multiply/divide wrongly)
		A1	
14a	$\frac{-2(5x+3y)}{3} + \frac{3(2x-y)}{2}$ $= \frac{-4(5x+3y)}{6} + \frac{9(2x-y)}{6}$ $= \frac{-20x-12y}{6} + \frac{18x-9y}{6}$ $= \frac{-20x-12y+18x-9y}{6}$ $= \frac{-2x-21y}{6}$	M1	Common error: Students committed mistakes of multiplying the numerator twice. i.e.
		M1	$\frac{-4(10x+6y)}{6} + \frac{9(6x-3y)}{6}$
		A1	Some students had their denominators just disappearing in their working. Few students missed out the term “y” in their final answer.

14b	$-3\left(\frac{2x-5}{7}\right) + x$ $= -\frac{3(2x-5)}{7} + \frac{7x}{7}$ $= \frac{-3(2x-5) + 7x}{7}$ $= \frac{-6x + 15 + 7x}{7}$ $= \frac{x + 15}{7}$	M1  M1  A1	<p>Common error: Some students had their denominators just disappearing in their working. Some students multiplied 3 to the denominator. Some students just added x to the numerator without changing it into a fraction with a common denominator.</p> <p>Took <math>-\frac{3(2x-5)}{7}</math> as</p> $-\frac{(2x-5)}{21}$
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Answer **all** the questions.

1      (a)      Calculate  $\frac{15.5^3}{6.13 - 2.39}$ .

Write down the first five digits of your answer.

*Answer* ..... [1]

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

*Answer* ..... [1]

---

2      The angles, in degrees, of a quadrilateral  $ABCD$  are represented by these expressions:  
Angle  $A = 2(3x + 20)$ , angle  $B = 2(x + 10)$ , angle  $C = 10(x - 2)$  and  
angle  $D = 80 - 2x$ .

(a)      Calculate the value of  $x$ .

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

(b)      What is the name of the quadrilateral?

*Answer* ..... [1]

---

- 3 Express  $\frac{2a+b}{4} - \frac{5b-3a}{3}$  as a single fraction in its simplest form.

*Answer* ..... [3]

---

- 4 (a) Simplify  $2(3m + 2n) - 5(m + 2n)$ .

*Answer* ..... [2]

- (b) Petrol costs  $p$  cents per litre.  
 John buys some petrol and it costs him  $s$  dollars.  
 Find an expression, in terms of  $p$  and  $s$ , for the number of litres that John buys.

*Answer* ..... litres [2]

---

**5** The first four terms of a sequence are 40, 33, 26, 19.

**(a)** Write down the 6th term of the sequence.

*Answer* ..... [1]

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

*Answer* ..... [1]

**(c)** Find the 55th term of the sequence.

*Answer* ..... [1]

---

**6** **(a)** Solve  $6x \leq 50$ .

*Answer* ..... [1]

**(b)** Hence, find

**(i)** the greatest integer value of  $x$  if  $x$  is a prime number,

*Answer*  $x =$  ..... [1]

**(ii)** the sum of all the positive odd integers which satisfy  $6x \leq 50$ .

*Answer* ..... [1]

---

- 7 (a) Express 140% as a mixed number in its simplest form.

*Answer* ..... [1]

- (b) Express 4.06 as a percentage.

*Answer* ..... % [1]

- (c) Express 6 hours : 1200 seconds as a ratio in its simplest form.

*Answer* ..... : ..... [1]

---

- 8 (a) Convert 36 km/h to m/s.

*Answer* ..... m/s [1]

- (b) Convert 1200 m/s to km/h.

*Answer* ..... km/h [1]

---

- 9** A car leaves Town *A* for Town *B*, which are 540 km apart, at an average speed of 90 km/h. At the same time, a truck leaves Town *B* for Town *A* and travels along the same road at half the speed of the car.

**(a)** If the car meets the truck in  $y$  hours, find the distance travelled, in terms of  $y$ , by

**(i)** the car,

*Answer* ..... km [1]

**(ii)** the truck.

*Answer* ..... km [1]

**(b)** **(i)** Write down an equation, in terms of  $y$ , and show that it simplifies to  $135y = 540$ .

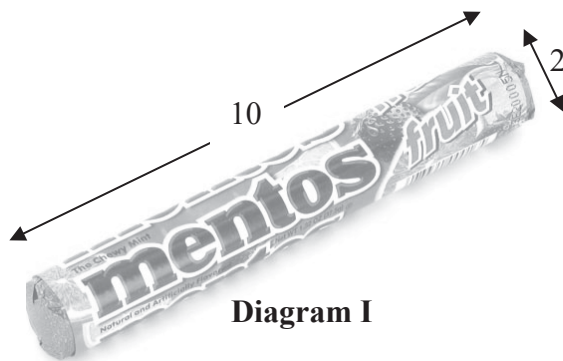
*Answer*

[1]

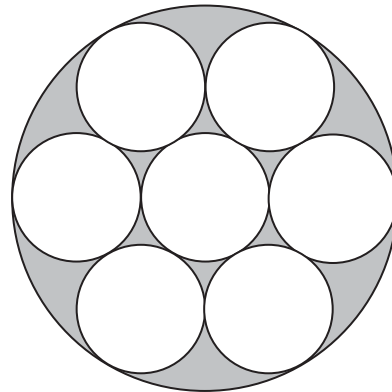
**(ii)** Solve the equation to find the distance travelled by the truck when the two vehicles meet.

*Answer* ..... km [2]

- 10 **Diagram I** shows a stick of Mentos which is in the shape of a cylinder. The cylinder has diameter 2 cm and height 10 cm.



**Diagram I**



**Diagram II**

**Diagram II** shows the top view of a container holding seven sticks of Mentos. The container is in the shape of a cylinder and the seven sticks of Mentos, just fit into the container.

- (i) Show that the volume of the inside of the cylindrical container is  $90\pi \text{ cm}^3$ .

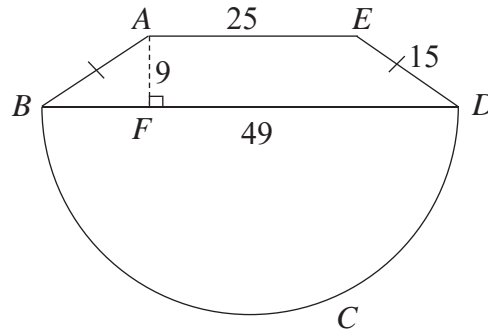
*Answer*

[2]

- (ii) Calculate the percentage of the volume of the container that is **not** occupied by the sticks of Mentos.

*Answer* ..... % [2]

- 11** The figure shows the side view of a light bulb.  
 It is made up of a trapezium  $ABDE$  and a semicircle  $BCD$ .  
 $AB = ED = 15$  cm,  $AE = 25$  cm,  $AF = 9$  cm and  $BD = 49$  cm.



Calculate

- (a)** the perimeter of the figure,

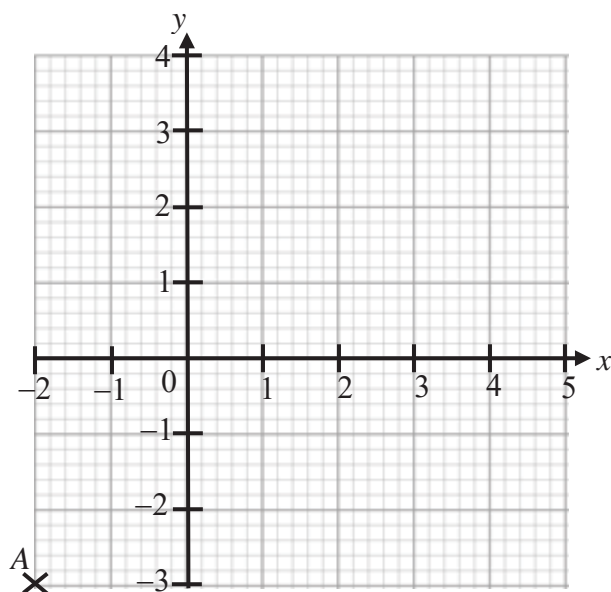
*Answer* ..... cm [2]

- (b)** the area of the figure.

*Answer* .....  $\text{cm}^2$  [2]



12



- (a) Write down the coordinates of point A.

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

- (b) B is the point (1, 4) and C is the point (5, 4).  
Write down the equation of line BC.

*Answer* ..... [1]

- (c) Calculate the area of triangle ABC.

*Answer* ..... units<sup>2</sup> [1]

- (d) Find the coordinates of the point D such that ABCD is a parallelogram.

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

- (e) Calculate the area of parallelogram ABCD.

*Answer* ..... units<sup>2</sup> [1]

- 13 A computer shop offers discounts to customer who pays \$18 to become a member.

Item	Members' discount
Tablet	20% off
Power Bank	10% off
Folio Case	5% off

Ying wants to buy a tablet which costs \$950.

The salesman suggests that she joins as a member.

- (a) How much less does she pay in total if she joins as a member and buys the tablet?

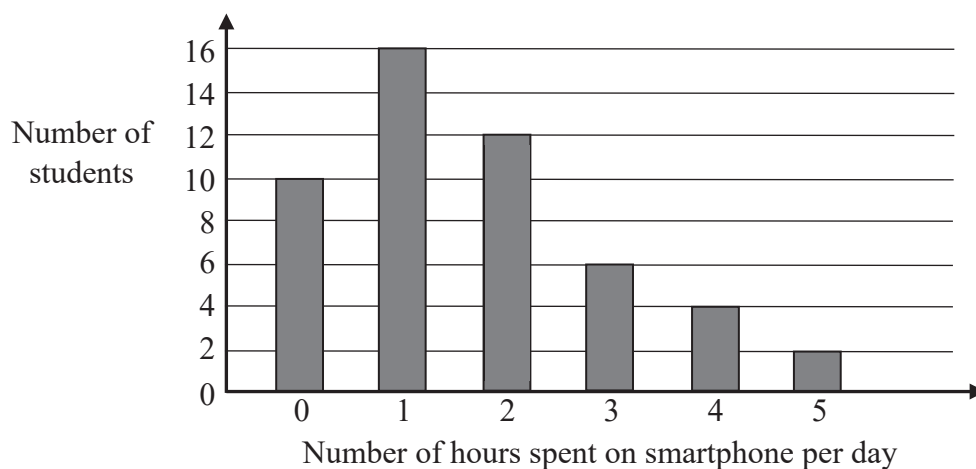
Answer \$ ..... [2]

After she joins as a member and bought the tablet, the salesman offers Ying a further 15% discount on the members' price for a power bank and folio case.

- (b) Write down a formula for the total amount,  $T$ , that she needs to pay for a power bank and folio case.  
Use  $p$  and  $c$  to represent the original price of a power bank and a folio case respectively.

Answer  $T =$  ..... [2]

- 14 The bar chart shows the results of a survey on the number of hours spent on smartphone per day by a group of students.



- (a) Find the number of students who took part in the survey.

Answer ..... students [1]

- (b) Find the number of students who did not use smartphone at all.

Answer ..... students [1]

- (c) Find the ratio of the number of students who spent 1 hour on smartphone per day to the number of students who spent 4 hours on smartphone per day.

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

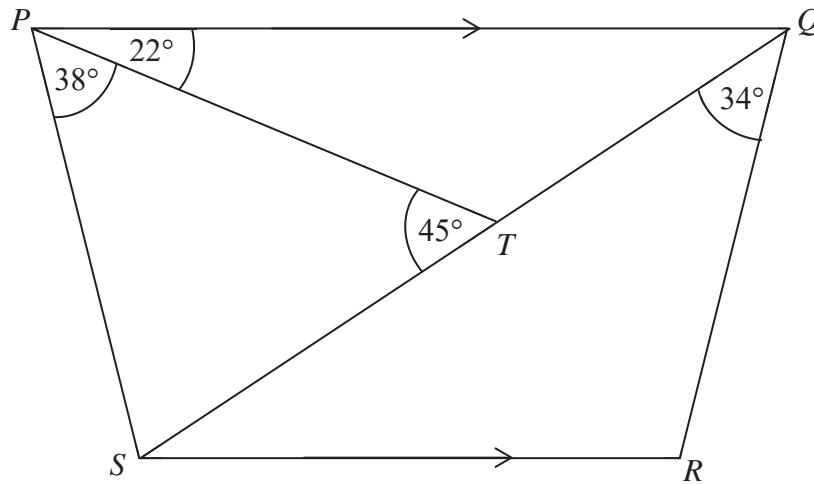
- (d) Find the percentage of students who spent more than 2 hours on smartphone per day.

Answer ..... % [2]

~ END OF PAPER 1 ~

- 1 (a)** In 2017, the cash price of a television is \$3159.  
Elyon buys this television on hire purchase.  
He pays a deposit of \$1053 followed by 24 monthly instalments of \$90.
- (i)** What percentage of \$3159 is \$1053? [1]
- (ii)** What is the total amount that Elyon will pay for the television? [2]
- (iii)** Find the additional cost of buying the television on hire purchase as a percentage of the cash price. [2]
- (b)** Kenny buys an identical television.  
To pay for it, he borrows the whole cost of \$3159 for 2 years at simple interest of 2.5% per annum.  
Find the total amount that Kenny pays for the television. [2]
- (c)** The price of the television in 2017 is 4% more than the price in 2016.  
Calculate the price in 2016. [2]
- (d)** By selling an article for \$264, a shopkeeper will incur a loss of 4% on its cost.  
At what price must he sell the article in order to make a profit of 8% on its cost? [3]
-

2 (a)



$PQRS$  is a trapezium.  $QTS$  is a straight line.

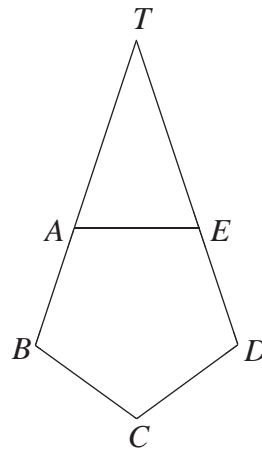
Angle  $SQR = 34^\circ$ , angle  $PTS = 45^\circ$ , angle  $SPT = 38^\circ$  and angle  $TPQ = 22^\circ$ .

Calculate the reflex angle  $QRS$ .

Give a reason for each step of your working.

[4]

(b)  $ABCDE$  is a regular 5-sided polygon.



(i) Find  $\angle ABC$ .

[2]

(ii) Given that  $BA$  produced meets  $DE$  produced at  $T$ , find  $\angle ATE$ .

[3]

(c) Stephen designed a badge for his youth club.

It has four sides.

None of the sides are parallel.

It has one pair of equal angles.

It has 2 pairs of equal sides.

Its diagonals cross at right angles.

What shape is the badge?

[1]

- 3 (a) Sue is thinking of having a water meter.  
These are the two ways she can pay for the water she uses.

<p style="text-align: center;"><b>Water Meter</b></p> <p>A charge of \$27.60 per year <b>plus</b> \$1.19 for every cubic metre of water used</p>	<p style="text-align: center;"><b>No Water Meter</b></p> <p>A charge of \$107 per year</p>
--	--

Sue uses an average of 150 litres of water each day.  
She wants to pay as little as possible for the water she uses.  
Should Sue have a water meter?  
Justify your answer with calculations. [2]

- (b) The picture shows the dimensions of a label taken from a cylindrical tin of dog & cat food. The label covers all the curved surface of the tin with no overlap.  
Calculate the volume of the tin. [3]



Label is taken from [https://www.ebay.com/sch/i.html?\\_nkw=label+dog+food](https://www.ebay.com/sch/i.html?_nkw=label+dog+food)

- (c) David is playing with 595 one-centimetre cubes.
- (i) He uses some of the cubes to make a cuboid measuring 9 cm by 8 cm by 7 cm.  
Calculate the total surface area of the cuboid. [2]
- (ii) David uses all 595 cubes to make a cuboid.  
All the sides of the cuboid are longer than 1 cm.  
Find the dimensions of the cuboid. [2]
- (iii) David makes the largest cube possible using some of the 595 cubes.  
How many cubes does he have left over? [2]

- 4 (a) Jenna takes 9 minutes and Luke takes 15 minutes to complete one lap around the path. They run in the same direction and maintain the same lap times. How many more laps will Jenna have completed than Luke when they next meet again at the starting line? [2]
- (b) Farrah's mobile phone passcode is a four-digit number.  
All four digits are different.  
The first digit is an even prime number.  
The second and third digits have a sum of 8 and a product of 15.  
The fourth digit is double the third digit.  
What is Farrah's passcode? [2]
- (c) (i) Express 6804 as the product of its prime factors. [1]
- (ii) Given that  $\frac{6804}{x} = y^2$ , where  $x$  and  $y$  are integers and  $y$  is as large as possible, find the values of  $x$  and  $y$ . [1]
- (iii) The lowest common multiple of two numbers is 6804.  
The highest common factor of these two numbers is 567.  
Both numbers are greater than 567.  
  
Find the two numbers. [2]
-

5 (a) Solve the equation  $\frac{2x-1}{5} + \frac{4x+5}{10} = \frac{5}{2}$ . [3]

(b) Answer the whole of part (b) on a sheet of graph paper.

The variables  $x$  and  $y$  are connected by the equation  $2y = x - 1$ .

Some corresponding values of  $x$  and  $y$  are given in the table below.

$x$	-3	-1	1	3	5
$y$	-2	$p$	0	1	$q$

(i) Find the value of  $p$  and of  $q$ . [2]

(ii) Using a scale of 2 cm to represent 1 unit on each axis, draw a horizontal  $x$ -axis for  $-3 \leq x \leq 5$  and a vertical  $y$ -axis for  $-4 \leq y \leq 4$ .

On your axes, plot the points given in the table and join them with a straight line. [2]

(iii) Write down the coordinates of the point where this line crosses the  $y$ -axis. [1]

(iv) Find the gradient of this line. [1]

~ End of Paper 2 ~





1(a) 995.68      **cao**      **B1**

1(b) 1000       **$\sqrt{\text{B1}}$**

2(a)  $2(3x + 20) + 2(x + 10) + 10(x - 2) + 80 - 2x = 360$  **M1**  
 $16x + 120 = 360$   
 $16x = 240$   
 $x = 15$  **A1**

2(b) Parallelogram      **correct spelling**      **B1**

3  $\frac{2a+b}{4} - \frac{5b-3a}{3} = \frac{3(2a+b)}{12} - \frac{4(5b-3a)}{12}$  **M1**  
 $= \frac{6a+3b-20b+12a}{12}$  **M1**  
 $= \frac{18a-17b}{12}$  or better **A1**

4(a)  $2(3m+2n) - 5(m+2n) = 6m+4n-5m-10n$  **M1**  
 $= m-6n$  **A1**

4(b)  $\frac{100s}{p}$  **B2**

$\$ \frac{p}{100}$ <b>OR</b> 100s cents seen	<b>OR</b>
	<b>B1</b>

5(a) 5      **B1**

5(b)  $47 - 7n$       **B1**

5(c) -338      **B1**

**6(a)**  $x \leq \frac{50}{6}$  or better **B1**

**6(b)(i)** 7 **B1**

**6(b)(ii)**  $1 + 3 + 5 + 7 = 16$  **B1**

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**7(a)**  $\frac{140}{100} = 1\frac{2}{5}$  **B1**

**7(b)**  $4.06 \times 100\% = 406 (\%)$  **B1**

**7(c)**  $21600 : 1200 = 18 : 1$  **B1**

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**8(a)**  $36 \times \frac{1000}{60 \times 60} = 10 \text{ (m/s)}$  **B1**

**8(b)**  $1200 \times \frac{\frac{1}{\frac{1000}{1}}}{60 \times 60} = 4320 \text{ (km/h)}$  **B1**

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**9(a)(i)** 90y **B1**

**9(a)(ii)** 45y **B1**

**9(b)(i)**  $90y + 45y = 540$  **AG1**  
 $135y = 540$

**9(b)(ii)**  $y = 4$  **B1**  
 $45 \times 4 = 180 \text{ km}$  **B1**

---

10(a)	Diameter of cylinder = 6 cm Vol. of cylinder = $\pi \times 3^2 \times 10$ = $90\pi \text{ cm}^3$	soi	B1 AG1	
10(b)	Vol. of one stick of Mentos = $10\pi \text{ cm}^3$ Required % = $\frac{90\pi - 70\pi}{90\pi} \times 100\%$ = $22\frac{2}{9} (\%)$	soi	M1 A1	22.2(2...)
11(a)	Arc length of semicircle = $24.5\pi \text{ cm}$ Perimeter of the figure = $15 + 25 + 15 + 24.5\pi$ = 250 (cm) (3S.F.)		M1 A1	249.756616 249.789 ( $\pi = 3.142$ )
	<b>NB: No A1 if final answer is expressed as a multiple of <math>\pi</math></b>			
11(b)	Area of trapezium ABDE = $\frac{1}{2} \times 9 \times (25 + 49)$ = $333 \text{ cm}^2$ Area of the figure = $333 + \frac{1}{2} \pi \left(\frac{49}{2}\right)^2$ = 1280 ( $\text{cm}^2$ ) (3S.F.)		M1 A1	1275.970495 1275.99275 ( $\pi = 3.142$ )
	<b>NB: No A1 if final answer is expressed as a multiple of <math>\pi</math></b>			
12(a)	(-2, -3)		B1	
12(b)	$y = 4$		B1	
12(c)	$\frac{1}{2} \times (5 - 1) \times (4 - (-3)) = 14 (\text{unit}^2)$		B1	
12(d)	(2, -3)		B1	
12(e)	$4 \times 7 = 28 (\text{unit}^2)$		B1	



- 1(a)(i)**  $\frac{1053}{3159} \times 100 (\%) = 33\frac{1}{3} \%$  **B1** Accept 33.3% OR 33.3%  
OR 33.3(3..) %  
Ignore (%)  
**B0** for 33 OR  $33\frac{1}{3}$  without %
- 1(a)(ii)** Total amount = \$1053 + 24 × \$90 **M1** for 2160 soi  
= \$3213 **A1**
- 1(a)(iii)** Extra cost = \$3213 – \$3159  
= \$54  
Required % =  $\frac{54}{3159} \times 100\%$  **M1** if no % seen, award **SC1**  
= 1.709401709%  
= 1.71% (3S.F.) **A1** Accept  $1\frac{83}{117} \%$  oe  
**SC1** for 1.71 or better without %
- 1(b)** Simple Interest =  $\frac{\$3159 \times 2.5 \times 2}{100}$  **M1 OR**  
= \$157.95  
Total amount = \$3159 + \$157.95  
= \$3316.95 **A1**
- SC1 for**  
 $\frac{\$3159 \times 2.5}{100} = \$78.975$   
OR  
 $\frac{102.5}{100} \times \$3159 = \$3237.975$   
  
**M0A0 for**  
 $\frac{2.5}{100} \times \$1579.50$
- 1(c)** Price in 2016 =  $\frac{100}{104} \times \$3159$  **M1**  
= \$3037.50 **A1**
- 1(d)** 96% of the cost = \$264 **B1 soi**  
108% of the cost =  $\frac{264}{96} \times 108$  **M1**  
= \$297 **A1**

- 2(a)  $\angle PQT + 22^\circ = 45^\circ$  (ext.  $\angle$  of  $\Delta$ ) **M1**  
 $\angle PQT = 23^\circ$   
 $\text{their } 23^\circ + 34^\circ + \angle QRS = 180^\circ$  (int.  $\angle$ ,  $PQ \parallel SR$ ) **M1**  $\checkmark$  *their*  $23^\circ$   
 $\angle QRS = 123^\circ$   
 $\text{Reflex } \angle QRS + \text{their } 123^\circ = 360^\circ$  ( $\angle$ s at a pt.) **M1**  $\checkmark$  *their*  $123^\circ$   
 $\text{Reflex } \angle QRS = 237^\circ$  **A1**

**SC1 for correct numerical answer with degree unit with no supporting reason OR wrong reason given for each step of the working**

**SC2 for correct numerical answer with degree unit with at least one correct supporting reason**

- 2(b)(i)  $\angle ABC = \frac{3 \times 180^\circ}{5}$  **M1** **OR**  $1 \text{ ext. } \angle = \frac{360^\circ}{5}$   
 $= 108^\circ$  **A1**  $\angle ABC = 180^\circ - 72^\circ$   
 (adj.  $\angle$ s on a st. line)  
 $= 108^\circ$   
 2(b)(ii)  $\angle TAE + \text{their } 108^\circ = 180^\circ$  (adj.  $\angle$ s on a st. line) **M1**  $\checkmark$  *their*  $108^\circ$   
 $\angle TAE = 72^\circ$   
 $\angle TEA = \text{their } 72^\circ$  (base  $\angle$ s of an isos.  $\Delta$ )  
 $\angle ATE + \text{their } 72^\circ + \text{their } 72^\circ = 180^\circ$  ( $\angle$  sum of an isos.  $\Delta$ ) **M1**  $\checkmark$  *their*  $72^\circ$   
 $\angle ATE = 36^\circ$  **A1**
- 2(c) A Kite **B1**

- 3(a) \ **With water meter**  
 On average, total amount pays by Sue =  $\$27.60 + \$1.19 \times 0.15 \times 365$  **M1**  
 $= \$92.75$

Thus, Sue should have a water meter because it is \$14.25 cheaper assuming Sue uses an average of 150 litres of water each day for 365 days. **A1**

- 3(b)  $2\pi r = 23$   
 $r = \frac{23}{2\pi} \text{ cm}$  **M1**  
 Volume of the tin =  $\pi \left( \frac{23}{2\pi} \right)^2 10.5$  **M1**  
 $= 442.0130657 \text{ cm}^3$   
 $= 442 \text{ cm}^3$  (3S.F.) **A1** Accept 442.(0...)  
**NB: A0** if no units seen





**5(a)**  $\frac{2x-1}{5} + \frac{4x+5}{10} = \frac{5}{2}$   
 $\frac{4x-2}{10} + \frac{4x+5}{10} = \frac{25}{10}$  or better **M1**  
 $4x-2+4x+5=25$  or better **M1**  
 $x = 2\frac{3}{4}$  o.e. **A1**

**5(b)** refer to the graph paper

---

~ End of Paper 2~

5(b)(i)  $p = -1$  B1

$q = 2$  B1

(b)(iii)  $(0, -0.5)$  B1

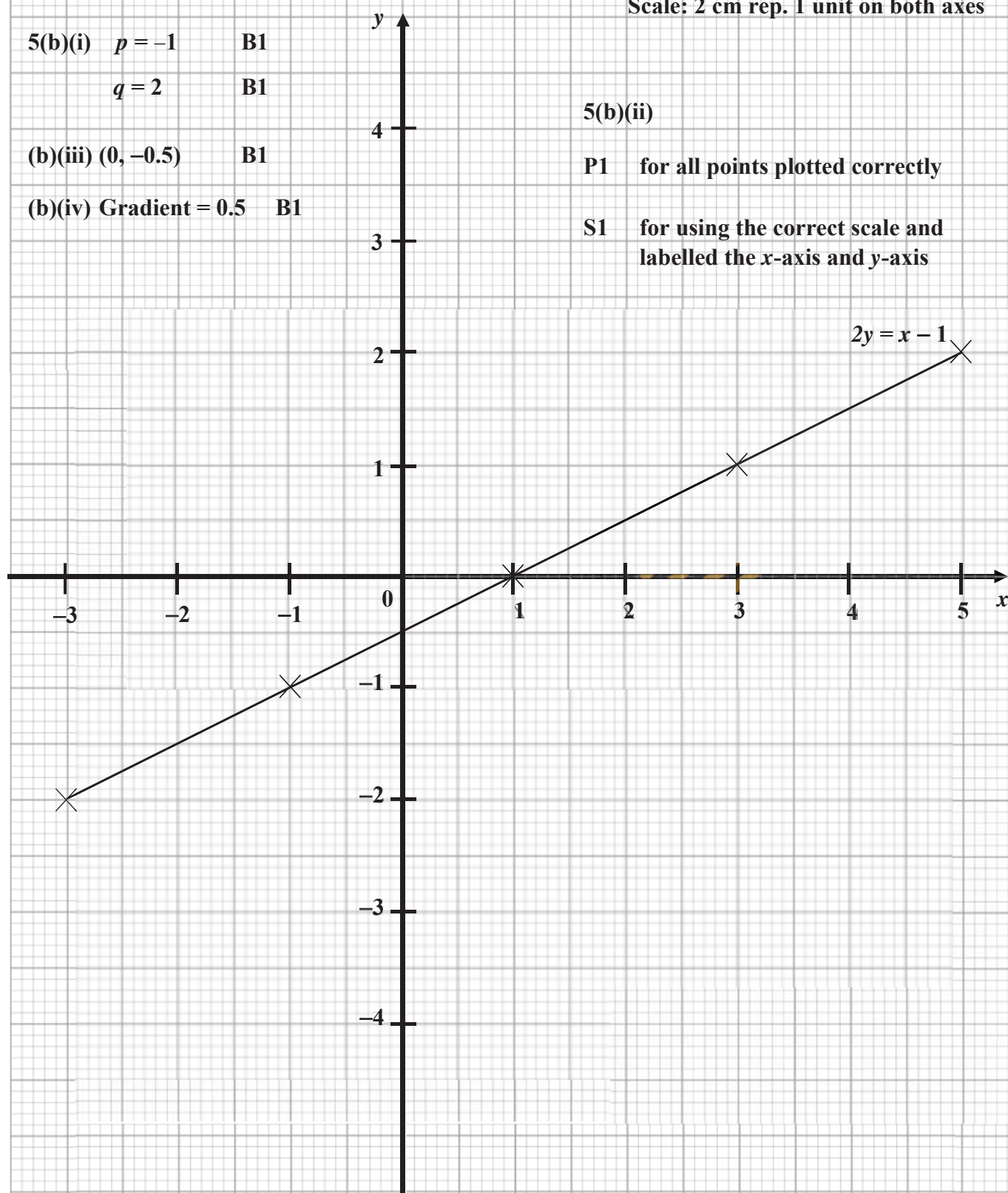
(b)(iv) Gradient = 0.5 B1

Scale: 2 cm rep. 1 unit on both axes

5(b)(ii)

P1 for all points plotted correctly

S1 for using the correct scale and  
labelled the  $x$ -axis and  $y$ -axis





Calculator Model:

Name:	Class	Class Register Number
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**CHUNG CHENG HIGH SCHOOL (MAIN)**

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## END – OF – YEAR EXAMINATION 2017 SECONDARY 1

**Mathematics**

**Wednesday, 4 October 2017**

**2 hours 30 minutes**

Additional Materials: **Writing paper**  
**Graph paper**

### READ THESE INSTRUCTIONS FIRST

**Do not open this booklet until you are told to do so.**

Write your name, class and index number 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, graphs or rough working.

Do not use highlighters or correction fluid.

Answer **all** questions in Sections A and B.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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 100.

Section A : Answer the questions in the space provided.

Section B : Answer the questions on the writing paper provided.

For Examiner's Use	
Section A	/ 40
Section B	/ 60
<b>Total</b>	<b>/ 100</b>

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

**Section A:** Answer **all** the questions.

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

*Answer:*  $x = \dots\dots\dots$  [2]

- 2 (a) Express 200 as a product of its prime factors, in index notation.
- (b) Hence, find the smallest integer  $k$  such that  $200k$  is a cube number.

*Answer:* (a)  $\dots\dots\dots$  [1]

(b) smallest integer  $k = \dots\dots\dots$  [1]

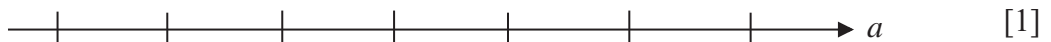
- 3      0.25% of the cost price of a branded pen is 1 cent. A bookshop decides to sell the pens in bundles of 3, and wish to earn a profit of at least \$2 per bundle sold.

(a)      Show that the cost price of a pen is \$4. [1]

(b)      Given that the selling price is \$ $a$ , form an inequality in terms of  $a$ . Solve this inequality.

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

(c)      Illustrate the answer from (b) on the number line below.



- 4 (a) Without the use of calculator, evaluate  $\sqrt[3]{-64} - 3\sqrt{16}$ .

- (b) Evaluate  $\sqrt{\frac{4.6^2 + 8.3^2 - \left(6\frac{1}{2}\right)^2}{2 \times 4.6 - 8.3}}$  using a calculator, leaving your answer in 3 decimal places.

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

(b) ..... [1]

- 5 (a) The population figure for Town Amber is reported in the news as 5 010 000. Given that this figure is an estimated value, state the greatest and the least possible values of the actual population figure.
- (b) Why do you think the figure reported was an estimated value?

Answer: (a) Greatest possible value = ..... [1]

Least possible value = ..... [1]

(b) .....

..... [1]

6 Simplify the following:

(a) (i)  $m(1+n)-m$  ,

(ii)  $\left(\frac{x}{4}\right)\left(\frac{-2}{x}\right)+2x+0.5$  .

(b) Subtract  $a^2+2$  from the sum of  $-2a+c+3$  and  $2a-4c$  .

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

(ii)..... [2]

(b) ..... [3]



- 7 (a) Consider the following numbers

$$\sqrt{2}, -3, 5, 0, 1\frac{1}{3}, 0.\dot{3}$$

Write down all the

- (i) prime numbers ,
- (ii) integers ,
- (iii) rational numbers.

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

(ii) ..... [1]

(iii) ..... [1]

- (b) Given that  $1 \leq x \leq 4$  ,  $-2 \leq y < 3$  , where  $x$  and  $y$  are integers, find the

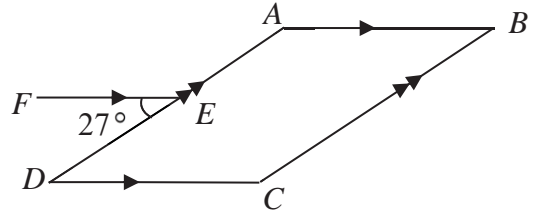
- (i) smallest  $\frac{1}{x}$  ,
- (ii) greatest  $x - 2y$  ,
- (iii) the possible values of  $y$  such that  $y^2$  is the greatest.

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

(ii) ..... [1]

(iii)  $y = \dots\dots\dots$  or  $y = \dots\dots\dots$  [2]

- 8 In the diagram,  $ABCD$  is a parallelogram and  $FE$  is parallel to  $AB$ .  
 Given that angle  $DEF = 27^\circ$ , find
- (i) reflex angle  $EAB$ ,
  - (ii) angle  $ABC$ .

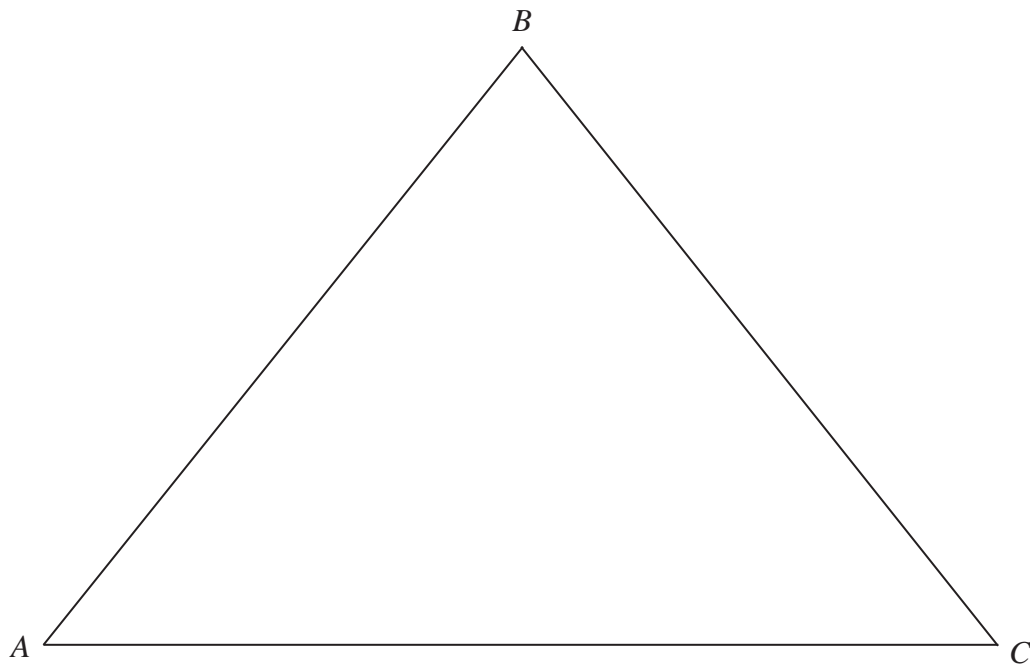


Answer: (i) Reflex Angle  $EAB = \dots\dots\dots^\circ$  [3]

(ii) Angle  $ABC = \dots\dots\dots^\circ$  [2]

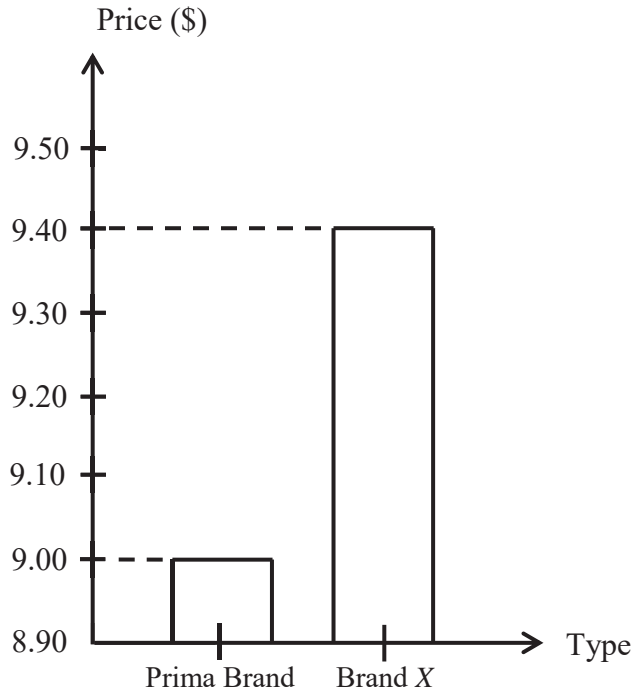
9 The diagram shows a triangle  $ABC$ .

- (a) Construct the perpendicular bisector of  $AC$ . [1]
- (b) Construct the angle bisector of angle  $ACB$ . [1]
- (c) Given that Point  $X$  is equidistant from Point  $A$  and  $C$ , and also equidistant to the line  $AC$  and  $BC$ , mark and label Point  $X$ . [1]
- (d) Measure and write down the length of  $CX$ .



Answer : (d)  $CX = \dots\dots\dots$  cm [1]

- 10** In a newspaper advertisement, Company Prima states that the price of their flour is much cheaper than Brand X in the market using a bar graph shown below.
- State the price of Brand X flour.
  - Find the ratio of Prima brand price as compared to Brand X price.
  - State one aspect of the graph that may be misleading and explain how this may lead to a misinterpretation of the graph.



*Answer :* (a) Price of Brand X = \$ ..... [1]

(b) Ratio = ..... [1]

(c) ..... [2]

*End of Section A*

**Section B:** Answer **all** the questions.

- 11** The lights of a musical fountain flash at regular intervals.  
The red, blue and green lights flash at every 6, 8 and 30 seconds respectively.  
The three lights flash together at 2100. At what time do they next flash together? [3]

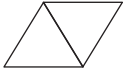
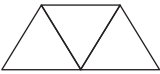
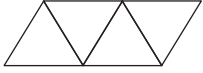
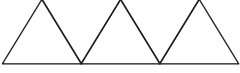

- 12** Answer the whole of this question on a piece of graph paper.

A line is represented by an equation  $y = 3x + 2$ .

$x$	-2	-1	0	1
$y = 3x + 2$		-1	2	

- (a) Copy and complete the table of values shown above. [2]
- (b) Using a scale of 4 cm to represent 1 unit, draw the horizontal  $x$ -axis for  $-2 \leq x \leq 1$ .  
Using a scale of 2 cm to represent 1 unit, draw the vertical  $y$ -axis for  $-4 \leq y \leq 6$ .  
On your axes, plot the points given and draw the graph of  $y = 3x + 2$ . [3]
- (c) From your graph, find the value of  $y$  when  $x = -1.25$ . [1]
- (d) Given that  $(r, 0.2)$  lies on the graph, find the value of  $r$  from the graph. [1]
- (e) If another line of equation  $y = mx + 4$  is drawn such that it is parallel to  $y = 3x + 2$ , state the value of  $m$ . [1]
- 13** (a) (i) Factorise  $pr + ps$  completely. [1]
- (ii) Hence, find the value of  $64(512) + 64(488)$  without the use of a calculator. [2]
- (b) Evaluate  $\frac{(2b)^2 + c}{a}$  given  $a = 2, b = -3, c = 1$ , showing all your working clearly. [2]
- 14** (a) Solve  $\frac{2}{3} = \frac{5(2-x)}{x}$ . [3]
- (b) The sum of 3 consecutive even numbers is equal to 96. By forming an algebraic equation, find the largest number. [2]

- 15** A series of figures made up of toothpicks form a sequence. They are represented in a table as shown below.

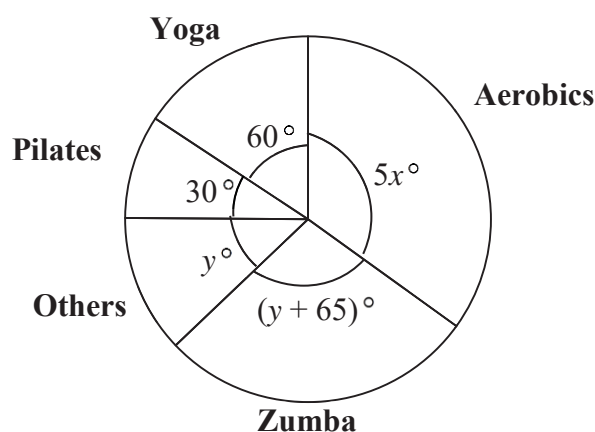
Figure Number ( $n$ )	Diagram	Number of triangles formed ( $x$ )	Number of toothpicks ( $y$ )
1		2	5
2		3	7
3		4	9
4		5	11
5		6	13
.			
.			
.			
$n$	?	?	?

- (a) Write down the value of  $x$  and  $y$  for line 6. [2]
- (b) State the geometrical shape formed by the perimeter of the figure for all even  $n$ . [1]
- (c) Given that the number of triangles formed in each figure is  $x$  and the figure number is represented by  $n$ , write an equation that connects  $x$  and  $n$  together. [1]
- (d) Hence, find the number of triangles in the 2017<sup>th</sup> figure. [1]
- (e) Given that the number of toothpicks needed for each figure is  $y$ , and the figure number is represented by  $n$ , write an equation that connects  $y$  and  $n$  together. [1]
- (f) Hence, find the number of toothpicks used in the 50<sup>th</sup> figure. [1]

- 16 (a) Express 10 km/h into m/s. [1]
- (b) Convert  $25\,000\text{ cm}^2$  into  $\text{m}^2$ . [1]
- (c) Ryan visited Australia as part of a school trip. He exchanged S\$720 into Australian money at a rate of S\$1 = A\$1.10. During the trip, he spent 90% of his money and changed the remaining amount back to Singapore dollars at a rate of S\$1 = A\$1.11. Find the amount left in Singapore dollars. [3]

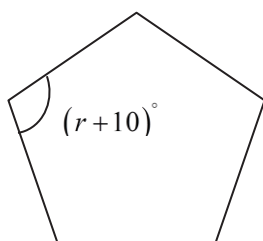
- 17 In a recent health study, 720 adults were asked to vote for their favourite exercise. The results are shown below.

- (a) How many adults voted for Yoga? [1]
- (b) Given that  $\frac{5}{8}$  of them **did not** vote for aerobics, find the value of  $x$ . [3]
- (c) Hence, find the value of  $y$ . [3]



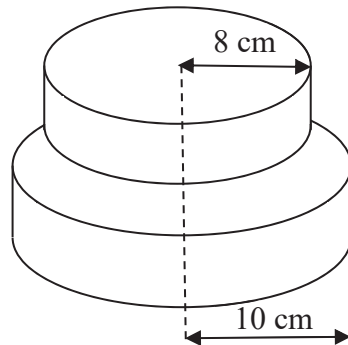
- 18 The picture below shows a regular pentagon.

- (a) (i) Find the value of an exterior angle. [1]
- (ii) Given that its interior angle is  $(r + 10)^\circ$ , find the value of  $r$ . [2]



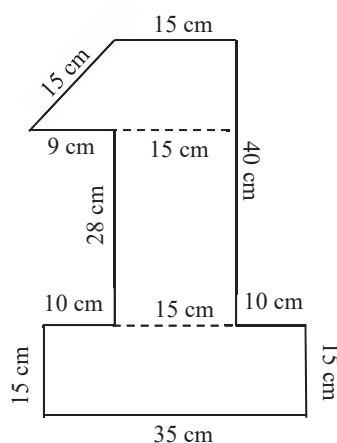
- (b) (i) An  $n$ -sided irregular polygon has an interior angle of  $70^\circ$ , and the remaining exterior angles of  $50^\circ$  each. Find the value of  $n$ . [3]
- (ii) What is the name of this polygon in (b)(i)? [1]

- 19 (a) The diagram shows a solid made up of 2 cylinders placed on top of each other.  
Given that the radius of the smaller and larger cylinder is 8 cm and 10 cm respectively, and each cylinder has height 6 cm, find



- (i) the total volume of this solid, [3]
- (ii) the total surface area. [3]
- (b) A bakery receives a special order of a cake for a 1 year old birthday party. The cake is to be baked in the shape of a big number '1'. The diagram below shows the top view of the cake, which is made up of a trapezium and 2 rectangles. The dimensions are as shown below. The cake has a uniform thickness of 7.5 cm and has mass 3 kg.

The cake is to be covered in cream, excluding the base.  
Assuming that the thickness of the cream is negligible, suggest a suitable price that the shop can charge for the cake.  
Justify your decision and show your calculations clearly. [7]



Top view of cake

Cost per kg of cake - \$35  
Cream charges - \$0.80 per 100 cm<sup>2</sup> of area covered  
Special order charge - \$20 per cake

*End of Section B*





# Answer Key

Section A		Section B	
Question	Answer	Question	Answer
1	$x = 3$	11	21 02 hr
2(a)	$200 = 2^3 \times 5^2$	12(a)	-4, 5
2(b)	5	12(c)	-1.75
3(b)	$a \geq 14$	12(d)	-0.6
4(a)	-16	12(e)	$m = 3$
4(b)	7.288	3(a)(i)	$p(r + s)$
5(a)	5014 999 ; 5005 000	3(a)(ii)	64 000
5(b)	It is not essential to report the exact figure of the population as the readers just need a quick overview of the population figure.	3(b)	$18\frac{1}{2}$
6(a)(i)	$mn$	14(a)	$x = 1\frac{13}{17}$
6(a)(ii)	$2x$	14(b)	34
6(b)	$-a^2 - 3c + 1$	15(a)	$x = 7$ and $y = 15$
7(a)(i)	5	15(b)	trapezium
7(a)(ii)	-3, 0, 5	15(c)	$n = x - 1$
7(a)(iii)	-3, 5, 0, $1\frac{1}{3}$ , $0.\dot{3}$	15(d)	2018
7(b)(i)	$\frac{1}{4}$	15(e)	$y = 2n + 3$
7(b)(ii)	8	15(f)	103
7(b)(iii)	-2 or 2	16(a)	$2\frac{7}{9}m/s$
8(i)	$207^\circ$	16(b)	$2.5m^2$
8(ii)	$27^\circ$	16(c)	S\$71.35
9(d)	7 cm	17(a)	120
10(a)	\$9.40	17(b)	27
10(b)	45:47	17(c)	35
10(c)	The graph is misleading and not reliable. This is because the price value on the y-axis started near the level of the Prima Brand, which misled consumers to think that the price of Prima brand is very low. OR the y-axis does not start from zero, which mislead consumers to think that Brand X is 5 times more than Prima Brand, however, it is only a difference of 40 cents.	18(a)(i)	$72^\circ$
		18(a)(ii)	98
		18(b)(i)	6
		18(b)(ii)	hexagon
		19(a)(i)	$3090cm^3$
		19(a)(ii)	$1310cm^2$
		19(b)	He should charge \$200 (can be any other value) since total cost is \$145.952. It is sensible for him to charge more than the cost calculated for the labour cost.

Calculator Model:

Name:	Class	Class Register Number
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**CHUNG CHENG HIGH SCHOOL (MAIN)**

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## END – OF – YEAR EXAMINATION 2017 SECONDARY 1

**Mathematics**

**Wednesday, 4 October 2017**

**2 hours 30 minutes**

Additional Materials: **Writing paper**  
**Graph paper**

### READ THESE INSTRUCTIONS FIRST

**Do not open this booklet until you are told to do so.**

Write your name, class and index number 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, graphs or rough working.

Do not use highlighters or correction fluid.

Answer **all** questions in Sections A and B.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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 100.

Section A : Answer the questions in the space provided.

Section B : Answer the questions on the writing paper provided.

For Examiner's Use	
Section A	/ 40
Section B	/ 60
<b>Total</b>	<b>/ 100</b>

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

**Section A:** Answer **all** the questions.

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

$$\frac{x}{3} + 5 = 2x$$

$$x + 15 = 6x$$

$$5x = 15$$

$$x = 3$$

*Answer:*  $x = \dots\dots\dots$  [2]

- 2 (a) Express 200 as a product of its prime factors, in index notation.
- (b) Hence, find the smallest integer  $k$  such that  $200k$  is a cube number.

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

(b)  $200k = 2^3 \times 5^2 \times k$

Thus, smallest integer  $k$  is 5.

*Answer:* (a)  $\dots\dots\dots$  [1]

(b) smallest integer  $k = \dots\dots\dots$  [1]

- 3 0.25% of the cost price of a branded pen is 1 cent. A bookshop decides to sell the pens in bundles of 3, and wish to earn a profit of at least \$2 per bundle sold.

(a) Show that the cost price of a pen is \$4.

[1]

$$\begin{aligned}\text{Cost price of 1 pen} &= \frac{100}{0.25} \times 1 \text{ cent} \\ &= 400 \text{ cents} \\ &= \$4 \text{ (shown)}\end{aligned}$$

- (b) Given that the selling price is \$ $a$ , form an inequality in terms of  $a$ . Solve this inequality.

Cost price of 1 bundle = \$12

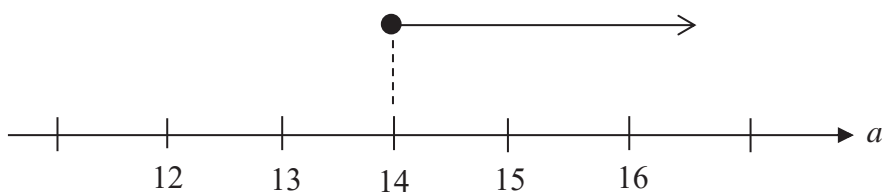
Total selling price for profit of \$2 = \$14

Since minimum profit is \$2,

$$a \geq 14$$

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

- (c) Illustrate the answer from (b) on the number line below.



[1]

coloured circle, arrow point to the right, ending value at 14

- 4 (a) Without the use of calculator, evaluate  $\sqrt[3]{-64} - 3\sqrt{16}$ .

- (b) Evaluate  $\sqrt{\frac{4.6^2 + 8.3^2 - \left(6\frac{1}{2}\right)^2}{2 \times 4.6 - 8.3}}$  using a calculator, leaving your answer in 3 decimal places.

$$\begin{aligned} \text{(a)} \quad \sqrt[3]{-64} - 3\sqrt{16} &= -4 - 3(4) \\ &= -4 - 12 \\ &= -16 \end{aligned}$$

$$\text{(b)} \quad \sqrt{\frac{4.6^2 + 8.3^2 - \left(6\frac{1}{2}\right)^2}{2 \times 4.6 - 8.3}} = 7.288 \text{ (3 dec. pl)}$$

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

(b) ..... [1]

- 5 (a) The population figure for Town Amber is reported in the news as 5 010 000. Given that this figure is an estimated value, state the greatest and the least possible values of the actual population figure.
- (b) Why do you think the figure reported was an estimated value?

(a) Greatest possible value = 5014 999

Least possible value = 5005 000

*Answer:* (a) Greatest possible value = ..... [1]

Least possible value = ..... [1]

(b) It is not essential to report the exact figure of the population as the readers just need a quick overview of the population figure. [1]

6 Simplify the following:

(a) (i)  $m(1+n)-m$  ,

(ii)  $\left(\frac{x}{4}\right)\left(\frac{-2}{x}\right)+2x+0.5$  .

(b) Subtract  $a^2+2$  from the sum of  $-2a+c+3$  and  $2a-4c$  .

(a) (i)

$$\begin{aligned} & m(1+n)-m \\ &= m+mn-m \\ &= mn \end{aligned}$$

(ii)

$$\begin{aligned} \left(\frac{x}{4}\right)\left(\frac{-2}{x}\right)+2x+0.5 &= -\frac{1}{2}+2x+0.5 \\ &= 2x \end{aligned}$$

(b)

$$\begin{aligned} & (-2a+c+3+2a-4c)-(a^2+2) \\ &= -3c+3-a^2-2 \\ &= -a^2-3c+1 \end{aligned}$$

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

(ii)..... [2]

(b) ..... [3]

- 7 (a) Consider the following numbers

$$\sqrt{2}, -3, 5, 0, 1\frac{1}{3}, 0.\dot{3}$$

Write down all the

- (i) prime numbers,
- (ii) integers,
- (iii) rational numbers.

$$(i) \quad \text{Prime numbers} = 5$$

$$(ii) \quad \text{Integers} = -3, 0, 5$$

$$(iii) \quad \text{Rational numbers} = -3, 5, 0, 1\frac{1}{3}, 0.\dot{3}$$

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

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

*(iii) ..... [1]*

- (b) Given that  $1 \leq x \leq 4$ ,  $-2 \leq y < 3$ , where  $x$  and  $y$  are integers, find the

- (i) smallest  $\frac{1}{x}$ ,
- (ii) greatest  $x - 2y$ ,
- (iii) the possible values of  $y$  such that  $y^2$  is the greatest.

$$(a) \text{ Smallest } \frac{1}{x} = \frac{1}{4}$$

$$(b) \text{ Greatest } x - 2y = 4 - 2(-2) = 8$$

$$(c) \text{ Possible } y \text{ is } \underline{-2} \text{ or } \underline{2}.$$

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

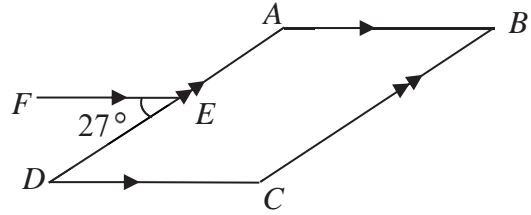
*(ii) ..... [1]*

*(iii)  $y = \dots\dots\dots$  or  $y = \dots\dots\dots$  [2]*



- 8 In the diagram,  $ABCD$  is a parallelogram and  $FE$  is parallel to  $AB$ .  
Given that angle  $DEF = 27^\circ$ , find

- (i) reflex angle  $EAB$ ,  
(ii) angle  $ABC$ .



- (i) Angle  $EDC = 27^\circ$  (alternate angles,  $FE$  parallel to  $DC$ )

$$\begin{aligned}\text{Angle } EAB &= 180^\circ - 27^\circ \text{ (interior angles, } AB \text{ parallel to } DC) \\ &= 153^\circ\end{aligned}$$

$$\begin{aligned}\text{Reflex angle } EAB &= 360^\circ - 153^\circ \quad \text{(angles at a point)} \\ &= 207^\circ\end{aligned}$$

- (ii) Angle  $ABC = 180^\circ - 153^\circ$  (interior angles,  $AD$  parallel to  $BC$ )  
 $= 27^\circ$

OR

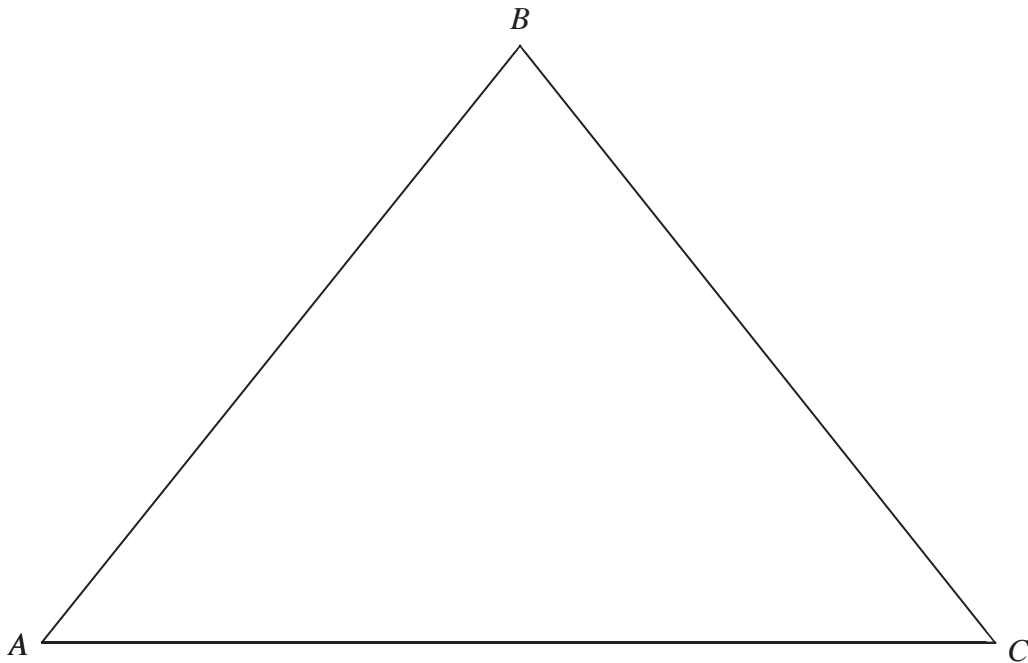
$$\text{Angle } ABC = 27^\circ \text{ (opposite angles of parallelogram)}$$

Answer: (i) Reflex Angle  $EAB = \dots\dots\dots^\circ$  [3]

(ii) Angle  $ABC = \dots\dots\dots^\circ$  [2]

9 The diagram shows a triangle  $ABC$ .

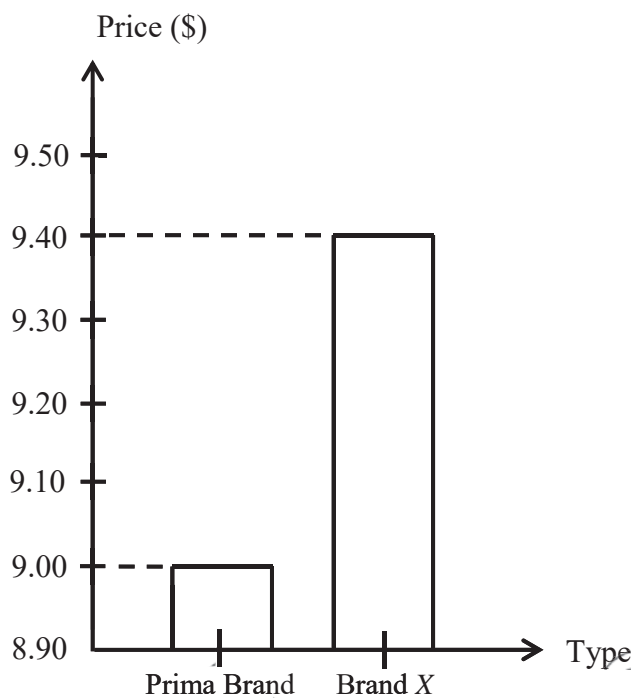
- (a) Construct the perpendicular bisector of  $AC$ . [1]
- (b) Construct the angle bisector of angle  $ACB$ . [1]
- (c) Given that Point  $X$  is equidistant from Point  $A$  and  $C$ , and also equidistant to the line  $AC$  and  $BC$ , mark and label Point  $X$ . [1]
- (d) Measure and write down the length of  $CX$ .



Answer : (d)  $CX = \dots\dots\dots$  cm [1]

- 10 In a newspaper advertisement, Company Prima states that the price of their flour is much cheaper than Brand X in the market using a bar graph shown below.

- (a) State the price of Brand X flour.  
 (b) Find the ratio of Prima brand price as compared to Brand X price.  
 (c) State one aspect of the graph that may be misleading and explain how this may lead to a misinterpretation of the graph.



Answer : (a) Price of Brand X = \$ .....9.40..... [1]

(b) Ratio = .....45 : 47..... [1]

- (c) The graph is misleading and not reliable. This is because the price value on the y-axis started near the level of the Prima Brand, which misled consumers to think that the price of Prima brand is very low. OR the y-axis does not start from zero, which misled consumers to think that Brand X is 5 times more than Prima Brand, however, it is only a difference of 40 cents.

[2]

*End of Section A***Section B:** Answer **all** the questions.**12** Answer the whole of this question on a piece of graph paper.

A line is represented by an equation  $y = 3x + 2$ .

$x$	-2	-1	0	1
$y = 3x + 2$		-1	2	

- (a) Copy and complete the table of values shown above. [2]
- (b) Using a scale of 4 cm to represent 1 unit, draw the horizontal  $x$ -axis for  $-2 \leq x \leq 1$ .  
Using a scale of 2 cm to represent 1 unit, draw the vertical  $y$ -axis for  $-4 \leq y \leq 6$ .  
On your axes, plot the points given and draw the graph of  $y = 3x + 2$ . [3]
- (c) From your graph, find the value of  $y$  when  $x = -1.25$ . [1]
- (d) Given that  $(r, 0.2)$  lies on the graph, find the value of  $r$  from the graph. [1]
- (e) If another line of equation  $y = mx + 4$  is drawn such that it is parallel to  $y = 3x + 2$ , state the value of  $m$ . [1]

- 11 The lights of a musical fountain flash at regular intervals.  
The red, blue and green lights flash at every 6, 8 and 30 seconds respectively.  
The three lights flash together at 2100. At what time do they next flash together? [3]

$$\begin{aligned}\text{LCM}(6, 8, 30) \\ &= 2 \times 3 \times 4 \times 5 \\ &= 120\end{aligned}$$

2	6	8	30
3	3	4	15
	1	4	5

$$120 \text{ s} = 2 \text{ minutes}$$

$$\text{Time that they shine together} = 2102 \text{ hours}$$

- 13 (a) (i) Factorise  $pr + ps$  completely . [1]
- (ii) Hence, find the value of  $64(512) + 64(488)$  without the use of a calculator. [2]
- (b) Evaluate  $\frac{(2b)^2 + c}{a}$  given  $a = 2$ ,  $b = -3$ ,  $c = 1$ , showing all your working clearly. [2]

**Solutions:**

(a)(i)  $pr + ps = p(r + s)$

(ii) 
$$\begin{aligned}pr + ps &= 64(512) + 64(488) \\ &= 64(512 + 488) \\ &= 64(1000) \\ &= 64000\end{aligned}$$

(b) When  $a = 2$ ,  $b = -3$ ,  $c = 1$ ,

$$\begin{aligned}\frac{(2b)^2 + c}{a} &= \frac{[2(-3)]^2 + 1}{2} \\ &= \frac{(-6)^2 + 1}{2} \\ &= \frac{36 + 1}{2} \\ &= 18\frac{1}{2}\end{aligned}$$

- 14 (a) Solve  $\frac{2}{3} = \frac{5(2-x)}{x}$ . [3]
- (b) The sum of 3 consecutive even number is equals to 96. By forming an algebraic equation, find the largest number. [2]

**Solutions:**

(a)

$$\begin{aligned}\frac{2}{3} &= \frac{5(2-x)}{x} \\ 2x &= 15(2-x) \\ 2x &= 30 - 15x \\ 17x &= 30 \\ x &= 1\frac{13}{17}\end{aligned}$$

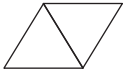
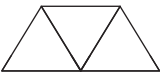
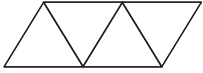
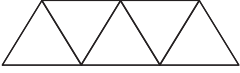

(b)

Let the 3 consecutive even numbers be  $x$ ,  $x + 2$  and  $x + 4$ .

$$\begin{aligned}x + x + 2 + x + 4 &= 96 \\ 3x + 6 &= 96 \\ 3x &= 90 \\ x &= 30\end{aligned}$$

The largest number is 34.

- 15** A series of figures made up of toothpicks form a sequence. They are represented in a table as shown below.

Figure Number ( $n$ )	Diagram	Number of triangles formed ( $x$ )	Number of toothpicks ( $y$ )
1		2	5
2		3	7
3		4	9
4		5	11
5		6	13
.			
.			
.			
$n$	?	?	?

- (a) Write down the value of  $x$  and  $y$  for line 6. [2]

$$x = 7 \quad \text{and} \quad y = 15$$

- (b) State the geometrical shape formed by the perimeter of the figure for all even terms. [1]

Geometrical shape = Trapezium

- (c) Given that the number of triangles formed in each figure is  $x$  and the figure number is represented by  $n$ , write an equation that connects  $x$  and  $n$  together. [1]

$$n = x - 1$$

- (d) Hence, find the number of triangles in the 2017<sup>th</sup> figure. [1]

$$2017 = x - 1$$

$$x = 2018$$

The number of triangles is 2018.

- (e) Given that the number of toothpicks needed for each figure is  $y$ , and the figure number is represented by  $n$ , write an equation that connects  $y$  and  $n$  together. [1]

$$y = 2n + 3$$

- (f) Hence, find the number of toothpicks used in the 50<sup>th</sup> figure. [1]

$$y = 2n + 3$$

$$\begin{aligned} y &= 2(50) + 3 \\ &= 103 \end{aligned}$$

Number of toothpicks is 103.

- 16 (a) Express 10 km/h into m/s. [1]

$$\begin{aligned} 10 \text{ km/h} \\ &= \frac{10000m}{3600s} \\ &= 2\frac{7}{9} m/s \end{aligned}$$

- (b) Convert 25 000 cm<sup>2</sup> into m<sup>2</sup>. [1]

$$\begin{aligned} 25000cm^2 &= \frac{25000}{10000} m^2 \\ &= 2.5m^2 \end{aligned}$$

- (c) Ryan visited Australia as part of a school trip. He exchanged S\$720 into Australian money at a rate of S\$1 = A\$1.10. During the trip, he spent 90% of his money and changed the remaining amount back to Singapore dollars at a rate of S\$1 = A\$1.11. Find the amount left in Singapore dollars. [3]

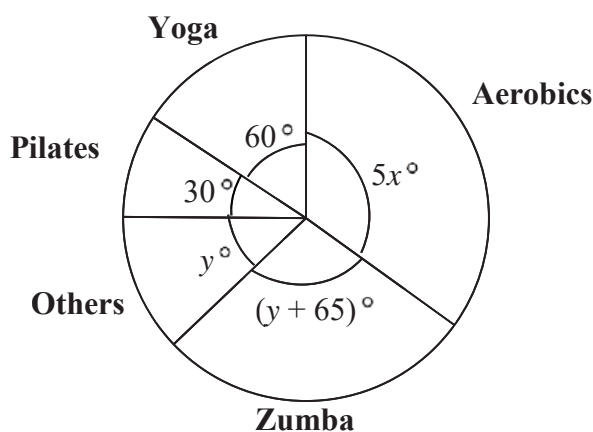
$$\begin{aligned} S\$720 &= A\$1.1 \times 720 \\ &= A\$792 \end{aligned}$$

$$\begin{aligned} \text{Amount of money left} \\ &= 10\% \times A\$792 \\ &= A\$79.20 \\ &= S\$(79.2 \div 1.11) \\ &= S\$71.35 \text{ (nearest cents)} \end{aligned}$$



- 17 In a recent health study, 720 adults were asked to vote for their favourite exercise. The results are shown below.

- (a) How many adults voted for Yoga? [1]
- (b) Given that  $\frac{5}{8}$  of them **did not** vote for aerobics, find the value of  $x$ . [3]
- (c) Hence, find the value of  $y$ . [3]



(a) Number of Yoga votes =  $\frac{60}{360} \times 720 = 120$

(b)

$$5x = 360 \times \frac{3}{8}$$

$$x = 27$$

(iii)

$$\frac{60 + 30 + y + y + 65}{360} = \frac{5}{8}$$

$$\frac{155 + 2y}{360} = \frac{5}{8}$$

$$1240 + 16y = 1800$$

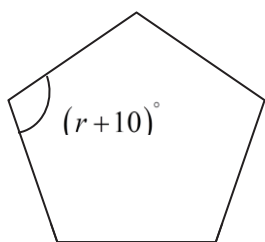
$$16y = 560$$

$$y = 35$$

18 The picture below shows a regular pentagon.

(a) (i) Find the value of an exterior angle. [1]

(ii) Given that its interior angle is  $(r+10)^\circ$ , find the value of  $r$ . [2]



$$\begin{aligned} \text{(a) (i) 1 exterior angle} &= \frac{360^\circ}{5} \\ &= 72^\circ \end{aligned}$$

$$\begin{aligned} \text{(ii) 1 interior angle} &= 180^\circ - 72^\circ \\ &= 108^\circ \end{aligned}$$

$$r + 10 = 108$$

$$r = 98$$

(b) (i) An  $n$ -sided irregular polygon has an interior angle of  $70^\circ$ , and the remaining exterior angles of  $50^\circ$  each. Find the value of  $n$ . [3]

(ii) What is the name of this polygon in (b)(i)? [1]

(b)(i)

$$70 + (130)(n-1) = (n-2)180$$

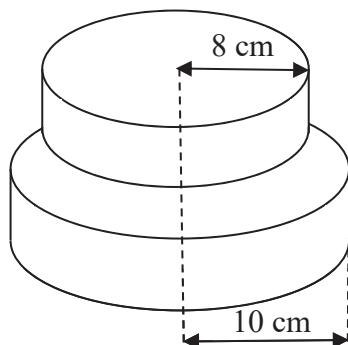
$$70 + 130n - 130 = 180n - 360$$

$$50n = 300$$

$$n = 6$$

(ii) This 6-sided polygon is called a hexagon.

- 19 (a) The diagram shows a solid made up of 2 cylinders placed on top of each other. Given that the radius of the smaller and larger cylinder is 8 cm and 10 cm respectively, and each cylinder has height 6 cm, find



- (i) the total volume of this solid,

[3]

$$\begin{aligned}
 \text{(i) Volume of solid} &= \pi(8)^2 6 + \pi(10)^2 6 \\
 &= 384\pi + 600\pi \\
 &= 3091.327... \\
 &= 3090\text{cm}^3 (3sf)
 \end{aligned}$$

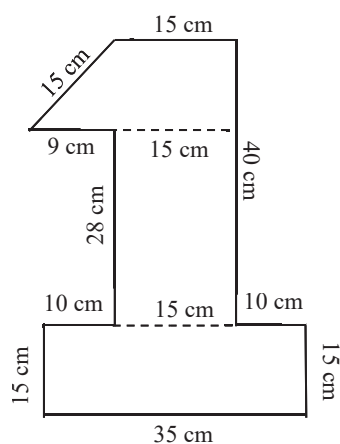
- (ii) the total surface area.

[3]

$$\begin{aligned}
 \text{(ii) Total Surface Area} &= 2\pi(8)(6) + 2\pi(10)(6) + 2\pi(10)^2 \\
 &= 96\pi + 120\pi + 200\pi \\
 &= 1306.902... \\
 &= 1310\text{cm}^2 (3sf)
 \end{aligned}$$

- (b) A bakery receives a special order of a cake for a 1 year old birthday party. The cake is to be baked in the shape of a big number '1'. The diagram below shows the top view of the cake, which is made up of a trapezium and 2 rectangles. The dimensions are as shown below. The cake has a uniform thickness of 7.5 cm and has mass 3 kg.

The cake is to be covered in cream, excluding the base.  
Assuming that the thickness of the cream is negligible, suggest a suitable price that the shop can charge for the cake.  
Justify your decision and show your calculations clearly. [7]



Top view of cake

Cost per kg of cake - \$35  
Cream charges - \$0.80 per 100 cm<sup>2</sup> of area covered  
Special order charge - \$20 per cake

### **Solutions**

Perimeter of base = 192 cm

Total surface covered in cream

$$\begin{aligned}
 &= 192(7.5) + \left[ \frac{1}{2}(15 + 24)(12) + (28)(15) + (15)(35) \right] \\
 &= 1440 + (234 + 420 + 525) \\
 &= 2619 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Total Cost} &= [2619/100] (0.8) + 35(3) + 20 \\
 &= 20.952 + 105 + 20 \\
 &= \$145.952
 \end{aligned}$$

He should charge \$200 since total cost is \$145.952. It is sensible for him to charge more than the cost calculated for the labour cost.

*End of Section B*





**Mid-Year Examination (2017)**  
**Secondary 1 Express**

**Candidate**

Name	Register No	Class

**MATHEMATICS**

**Date:** 5 May 2017  
**Duration:** 2 hours

<b>For examiner's use</b>
/ 100

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 an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

If working is needed for any question, it must be shown with the answer.

Omission of essential workings and units will result in loss of marks.

The use of an approved scientific calculator is expected, where appropriate.

Give your answer in the simplest form. Leave your answer in fraction where applicable or 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.

For  $\pi$ , use your calculator value, unless the question requires the answer in terms of  $\pi$ .

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 100.

Setter: Ms Marlinda Aziz

This paper consists of **12** printed pages, INCLUDING the cover page.

**[TURN OVER**

1. Express

- (a)  $\frac{5}{12}$  as a recurring decimal;  
(b) 2.625 as a fraction in its simplest form;  
(c) 7004.95 correct to 5 significant figures.

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

(b) ..... [1]

(c) ..... [1]

2. A list of numbers are shown below.

$$36, -0.025, \frac{3}{7}, \frac{-\sqrt{7}}{\sqrt{7}}, \frac{4\pi}{2}, 0.\dot{7}i$$

From the list, write down

- (a) a negative integer;  
(b) a perfect square;  
(c) irrational number(s);

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

(b) ..... [1]

(c) ..... [1]

3. Estimate the value of  $\frac{(49.97)^2 \times 4.1302}{\sqrt[3]{124.869}}$ , correct your answer to one significant figure.

Answer: ..... [2]

4. Subtract the product of  $5\frac{3}{4}$  and  $4\frac{4}{5}$  from 30.

Answer: ..... [2]

5. (a) Express 4692 as a product of its prime factors, leaving your answer in index notation.  
 (b) The LCM of 6, 15 and a number,  $x$  is 660. Find the smallest possible value of  $x$ .

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

(b) ..... [2]

6. Simplify the following expressions without using a calculator.  
 (a)  $4 \times 16 - 15 + 7 \times 23$ ;  
 (b)  $240 \div \{29 - [160 \div (8 \times 22 - 144)]\}$ .

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

(b) ..... [3]

7. Given that  $\sqrt{9.87} = 3.14$  and  $\sqrt{98.7} = 9.93$ , find the value of  $\sqrt{987}$  without the use of a calculator.

Answer: ..... [2]



8. (a) Write down all the multiple(s) of 17 between 30 and 50.  
 (b) Find the sum of all prime numbers between 21 and 40.  
 (c) Find the difference between the first two perfect squares that end with a 9.

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

(b) ..... [2]

(c) ..... [2]

9. The product of two consecutive odd numbers is 18 more than the square of the smaller number.  
 Find the two numbers.

Answer: ..... , ..... [3]

10. Arrange the following in descending order.

(a)  $\frac{17}{24}, \frac{5}{8}, \frac{2}{3}, \frac{11}{16}$ ;

(b)  $\frac{33}{100}, 1.73, 0.333, 1\frac{3}{4}, 0.\dot{3}$

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

(b) ..... [1]

11. When written as the product of their prime factors,

$$R = 2^5 \times 3 \times 7^2,$$

$$S = 2^3 \times 3^4 \times 5.$$

Find

(a)  $\sqrt{10S}$  ;

(b) the largest integer which is a factor for both  $R$  and  $S$ ;

(c) the smallest possible integer value of  $p$  such that  $R \times p$  is a multiple of 75.

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

(b) ..... [1]

(c) ..... [2]

12. Write an algebraic expression for each of the following.

(a) Seven times of  $x$  plus 3 times of  $y$ ;

(b) Twice of  $x^2$  minus 4 times the cube root of  $y$ ;

(c) Nine times the product of  $x$  and  $3h$  minus the quotient when  $k$  is divided by  $2y$ .

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

(b) ..... [1]

(c) ..... [2]

**13.** Without using a calculator, evaluate the following, giving your answer to the simplest form.

**(a)**  $112 \div 8 - 3 \times 4$ ;

**(b)**  $96 \div [(152 - 56) \div 6] + 27$ ;

**(c)** 
$$\frac{-7 + 1\frac{3}{5}}{-2\frac{3}{5} + \frac{2}{5} \times (-\frac{1}{4})}$$
.

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

(b) ..... [2]

(c) ..... [3]

14. Subtract the sum of  $(5x^2 - 7x + 4)$  and  $(2x - 5x^3 + 1)$  from  $(3x^2 - 1 + 5x)$ .

*Answer:* ..... [3]

15. (a) Given  $R = \frac{p^2 - 8}{\sqrt[3]{2q}}$ , find the value of  $R$  when  $p = -3$  and  $q = 4$ .

(b) Given  $\frac{5x + y}{3x - y} = \frac{2}{5}$ , find the value of  $\frac{2x}{y}$ .

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

(b) ..... [4]

16. Find the cube root of  $3^2 \times 27 \times 9^2$ .

*Answer:* ..... [2]

17. Rectangular tiles, each 30 cm long and 24 cm wide, are laid on a flat surface to form a square.  
Given the cost of each tile is \$4, find  
(a) the minimum area of the square formed;  
(b) the total cost of all the tiles that are used to form the square.

*Answer : (a)* .....cm<sup>2</sup> [3]

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

18. A farmer uses  $\frac{11}{18}$  of his field for growing rice and  $\frac{3}{7}$  of the remaining field for growing tomatoes.  
Of the area left, he uses  $\frac{1}{4}$  of it to grow spinach and the rest to grow sweet potatoes. Find the fraction of the field used for growing sweet potatoes.

*Answer:* ..... [3]

19. Simply each of the following.

(a)  $\frac{10x - y}{2} - \frac{x + y}{4};$

(b)  $\sqrt{\frac{121x^4}{49y^6}} \times \frac{3xy^2}{4z} \div \left(\frac{x}{y}\right)^2.$

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

(b) ..... [3]

20. Solve the following equations.

(a)  $5(x - 3) - 4(2x - 9) = 0;$

(b)  $\frac{5}{x} + \frac{2}{3x} = 1;$

(c)  $\frac{x - 14}{3} - \frac{x - 3}{4} = \frac{2x + 1}{5}.$

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

(b) ..... [2]

(c) ..... [3]

21. (a) One-quarter of a number added to 10 is equivalent to one-third of the number subtracted from 31. Find the number.
- (b) A man is three times as old as his son. In 13 years' time, the father will only be twice as old as his son. Find the son's present age.
- (c) The sum of two consecutive even numbers is 66. Find the product of these two numbers.

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

(b) ..... [2]

(c) ..... [3]

22. The daily production, correct to the nearest gram, of tidbits over a 5-day period is shown in the following table.

Day	Mon	Tue	Wed	Thu	Fri
Mass (g)	83	85	80	77	85

- (a) Find the greatest possible mass of all the tidbits produced over the 5-day period.  
 (b) All the tidbits are sold at \$1.20 per 10g over the weekend. Briefly explain if it is possible to collect \$50 from the sale.

Answer: (b)

[2]

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

23. Mrs Yong bought  $q$  concert tickets at a total cost of \$ $p$ . She kept  $r$  tickets and sold the remaining tickets to her friends at 2 for \$ $s$ . After including the cost of  $r$  tickets, Mrs Yong made a profit of \$ $Y$  in total.

- (a) Find an expression for  
 (i) the cost price of each ticket;  
 (ii) the amount Mrs Yong collected from the tickets she sold.  
 (b) Find the profit if  $s = 60$ ,  $q = 10$ ,  $p = 160$  and  $r = 4$ .

Answer : (a) (i) \$..... [1]

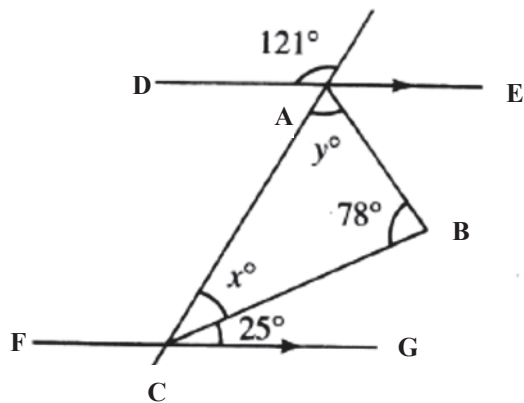
(ii) \$..... [2]

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

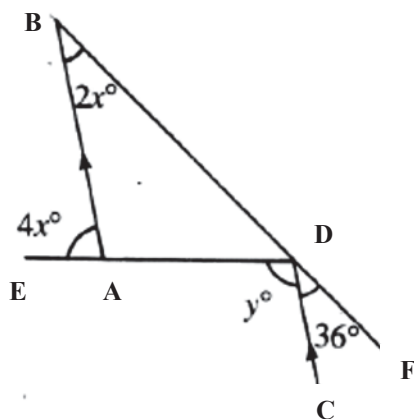


24. Calculate the value of the unknowns in the following figures. State your reasons clearly in your working steps.

(a)



(b)



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

$y$ : ..... [2]

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

$y$ : ..... [2]



**Marking Scheme**  
**Mid- Year Examination 2017**

No	Steps	Marks
1	(a) $0.41\dot{6}$ (b) $2\frac{5}{8}$ (c) 7005.0	B1 B1 B1
2	(a) $\frac{-\sqrt{7}}{\sqrt{7}}$ (b) 36 (c) $\frac{4\pi}{2}$	B1 B1 B1
3	$\frac{50^2 \times 4}{\sqrt[3]{125}}$ = 2000	M1 A1
4	$\frac{23}{4} \times \frac{24}{5} = 27\frac{3}{5}$ $30 - 27\frac{3}{5} = 2\frac{2}{5}$ <i>Accept: 2.4</i>	M1 A1
5	(a) $4692 = 2^2 \times 3 \times 17 \times 23$ (b) $6 = 2 \times 3$ $15 = 3 \times 5$ $660 = 2^2 \times 3 \times 5 \times 11$ $x = 2^2 \times 11$ $x = 44$	B2  } M1  A1
6	(a) $64 - 15 + 161 = 210$ (b) $240 \div \{29 - [160 \div (176 - 144)]\} = 240 \div [29 - (160 \div 32)]$ = 10	B1 M2 A1
7	$\sqrt{987} = \sqrt{9.87} \times \sqrt{100}$ $\sqrt{987} = 3.14 \times 10$ = 31.4	M1 A1
8	(a) 34 (b) $23 + 29 + 31 + 37 = 120$ (c) $49 - 9 = 40$	B1 M1: Prime numbers A1 B2

9	<p>Let the smaller number be <math>x</math>.</p> $x(x+2) = 18 + x^2$ $x^2 + 2x = 18 + x^2$ $x = 9$ $x + 2 = 11$ <p>The 2 numbers are 9 and 11.</p>	<p>M1: Formulate M1: Simplification</p> <p>A1- For both answers</p>
10	<p>(a) <math>LCM = 2^4 \times 3^3</math>  <math>= 432</math>  <math>\frac{306}{432}, \frac{270}{432}, \frac{288}{432}, \frac{297}{432}</math>  <math>\frac{17}{24}, \frac{11}{16}, \frac{2}{3}, \frac{5}{8}</math></p> <p>(b) <math>1\frac{3}{4}, 1.73, 0.\dot{3}, 0.333, \frac{33}{100}</math></p>	<p>B1</p> <p>B1</p>
11	<p>(a) <math>10S = 2^4 \times 3^4 \times 5^2</math>  <math>\sqrt{10S} = 2^2 \times 3^2 \times 5</math>  <math>= 180</math></p> <p>(b) <math>HCF = 24</math></p> <p>(c) <math>75 = 3 \times 5^2</math>  <math>p = 25</math></p>	<p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p>
12	<p>(a) <math>7x + 3y</math></p> <p>(b) <math>2x^2 - 4\sqrt[3]{y}</math></p> <p>(c) <math>27hx - \frac{k}{2y}</math>      <i>-1 for a wrong term</i></p>	<p>B1</p> <p>B1</p> <p>B2</p>
13a	$112 \div 8 - 3 \times 4$ $= 14 - 12$ $= 2$	<p>B1</p>
b	$96 \div [(152 - 56) \div 6] + 27$ $= 96 \div (96 \div 6) + 27$ $= 6 + 27$ $= 33$	<p>M1</p> <p>A1</p>

c	$\frac{-5\frac{2}{5}}{-\frac{13}{5} + \frac{2}{5} \times (-\frac{1}{4})}$ $\frac{-\frac{27}{5}}{-\frac{27}{10}}$ $= 2$	<p>M2: Correct numerator and denominator</p> <p>A1</p>
14	$5x^2 - 7x + 4 + 2x - 5x^3 + 1 = -5x^3 + 5x^2 - 5x + 5$ $3x^2 - 1 + 5x - (-5x^3 + 5x^2 - 5x + 5)$ $= 3x^2 - 1 + 5x + 5x^3 - 5x^2 + 5x - 5$ $= 5x^3 - 2x^2 + 10x - 6$	<p>M1</p> <p>M1: Simplification</p> <p>A1</p>
15a	$R = \frac{(-3)^2 - 8}{\sqrt[3]{2(4)}}$ $R = \frac{1}{2}$	<p>M1: Substitution</p> <p>A1</p>
15b	$5(5x + y) = 2(3x - y)$ $25x + 5y = 6x - 2y$ $7y = -19x$ $y = -\frac{19}{7}x$ $\frac{2x}{y} = \frac{2x}{(-\frac{19}{7}x)}$ $= -\frac{14}{19}$	<p>M1</p> <p>M1: Express y in terms of x.</p> <p>M1: Substitution</p> <p>A1</p>
16	$3^2 \times 3^3 \times 3^4 = 3^9$ $\sqrt[3]{3^9} = 3^3$ $= 27$	<p>M1</p> <p>A1</p>
17	$24 = 2^3 \times 3$ $30 = 2 \times 3 \times 5$ <p>(a) <math>\text{LCM} = 2^3 \times 3 \times 5</math></p> $= 120$ $\text{Area} = 120^2 \text{ cm}^2$ $= 14\,400 \text{ cm}^2$	<p>} M1</p> <p>M1: LCM</p> <p>A1</p> <p>M1</p>

	(b) Number of tiles = $\frac{120}{24} \times \frac{120}{30}$ $= 20$  Total cost = \$20 x 4 $= \$80$	A1
18	Fraction (Tomatoes) = $\frac{3}{7} \times \frac{7}{18}$ $= \frac{3}{18}$  Remaining land = $1 - \frac{11}{18} - \frac{3}{18}$ $= \frac{4}{18}$  Fraction (Sweet potatoes) = $\frac{3}{4} \times \frac{4}{18}$ $= \frac{3}{18}$	M1   M1   A1
19	$\frac{2(10x - y) - (x + y)}{4}$ (a) $= \frac{20x - 2y - x - y}{4}$ $= \frac{19x - 3y}{4}$  $\frac{11x^2}{7y^3} \times \frac{3}{4z} \times \frac{xy^2}{x^2}$ (b) $= \frac{33x^3y^4}{28x^2y^3z}$ $= \frac{33xy}{28z}$	M1: Common denominator   A1   M2   A1
20	(a) $5x - 15 - 8x + 36 = 0$ $-3x = -21$ $x = 7$  (b) $\frac{15}{3x} + \frac{2}{3x} = \frac{3x}{3x}$ or $\frac{15+2}{3x} = 1$ $3x = 17$ $x = 5\frac{2}{3}$	M1: Expand + Simplify  A1   M1: Common denominator  A1

	<p>(c) <math>\frac{20(x-14)}{60} - \frac{15(x-3)}{60} = \frac{12(2x+1)}{60}</math> or</p> $\frac{20(x-14) - 15(x-3)}{60} = \frac{12(2x+1)}{60}$ $20x - 280 - 15x + 45 = 24x + 12$ $19x = -247$ $x = -13$	<p>M1: Common denominator</p> <p>M1: Simplification</p> <p>A1</p>
21a	<p>Let the number be <math>x</math>.</p> $\frac{1}{4}x + 10 = 31 - \frac{1}{3}x$ $\frac{7}{12}x = 21$ $x = 36$	<p>M1: Formulate</p> <p>M1</p>
b	<p>Let the son/s present age be <math>x</math>.</p> $\frac{3x+13}{x+13} = 2$ $3x+13 = 2x+26$ $x = 13$ <p>Son's present age is 13 years old.</p>	<p>M1: Formulate</p> <p>A1</p>
c	<p>Let the first number be <math>x</math> and the second be <math>x+2</math>.</p> $x + x + 2 = 66$ $x = 32$ <p>Product = <math>32 \times 34</math> = 1088</p>	<p>M1: Formulate</p> <p>A1</p>
22	<p>(a) Greatest possible mass = <math>83.5 + 85.5 + 80.5 + 77.5 + 85.5</math> = 412.5 g</p> <p>(b) <math>412.5 \times \\$1.20 &lt; \\$50</math> Since <math>\\$49.50 &lt; \\$50</math>, it is not possible to collect \$50 from the sale.</p>	<p>M1 A1</p> <p>M1 A1</p>
23	<p>(ai) <math>\\$ \frac{p}{q}</math></p> <p>(aii) Tickets sold: <math>q - r</math></p> $\$ \text{collected} = \$s\left(\frac{q-r}{2}\right)$ <p>(b) <math>Y = \frac{s(q-r) - 2p}{2}</math></p> $Y = \frac{60(10-4) - 2(160)}{2}$ $Y = 20$	<p>B1</p> <p>M1 A1</p> <p>M1</p> <p>A1</p>

	<p>OR</p> $\$s\left(\frac{q-r}{2}\right) = \$60 \frac{(10-4)}{2}$ $= \$180$ <p>Profit = \$180 - \$160</p> $= \$20$	
24	<p>(a) <math>x = (180-121) - 25</math>  <math>= 34</math> (corr. <math>\angle s, DE \parallel FG</math>)</p> <p><math>y = 180 - 78 - 34</math>  <math>= 68</math> (<math>\angle</math> sum of a <math>\Delta</math>)</p> <p>(b) <math>2x = 36</math>  <math>x = 18</math> (corr. <math>\angle s, AB \parallel CD</math>)</p> <p><math>y = 180 - 4(18)</math>  <math>= 108</math> (angles on a str. Line)</p>	<p>B1 R1</p> <p>B1 R1</p> <p>B1 R1</p> <p>B1 R1</p> <p><i>Accept any logical method.</i></p>





Name: \_\_\_\_\_

Register Number: \_\_\_\_\_

Class: \_\_\_\_\_

Clementi Town Secondary School  
Mid-Year Examination 2017  
Secondary 1 Express



**MATHEMATICS**  
**Paper 1**

**03 May 2017**  
**1 hour**

Candidates answer on the Question Paper.

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**READ THESE INSTRUCTIONS FIRST**

Do not open the booklet until you are told to do so.

Write your name, register number and class on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

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 TO BE USED IN THIS PAPER.**

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
<b>50</b>

Answer **all** the questions.

- 1 Arrange the following numbers in ascending order.

$$\frac{3}{4}$$

$$0.\dot{7}\dot{5}$$

$$0.7\dot{5}$$

$$0.7$$

Answer ..... [1]

- 2 Given that  $126 = 2 \times 3^2 \times 7$  and  $1800 = 2^3 \times 3^2 \times 5^2$ , find

- (a) the highest common factor of 126 and 1800, giving your answers as the product of its prime factors,

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

- (b) the lowest common multiple of 126 and 1800, giving your answers as the product of its prime factors.

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

- 3 Express  $\frac{7}{12}$  as a recurring decimal.

Answer ..... [2]

**4 Express**

**(a)** 58.96 kg correct to the nearest kilogram,

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

**(b)** 2.1985 correct to 2 decimal places.

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

**5** Given that  $x = -3$  and  $y = -1$ , find the value of  $\frac{4}{3(x^2 + y^3)}$ .

*Answer* ..... [3]

**6** Given the following numbers

3, 6,  $\pi$ ,  $0.\dot{3}5$ , 9,  $\sqrt{4}$ ,  $\sqrt{2}$

write down

**(a)** all the prime numbers,

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

**(b)** all the irrational numbers,

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

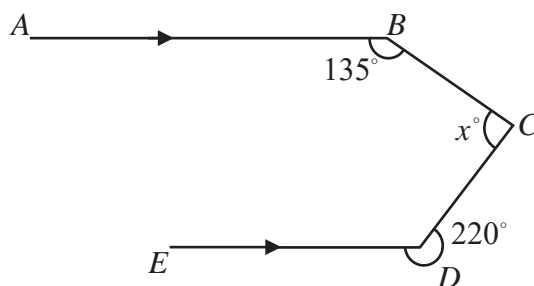
**(c)** all the perfect squares.

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

- 7 Evaluate  $\left(\frac{1}{3} - \frac{8}{9}\right) \div \frac{1}{6}$ , leaving your answer in its simplest form.

Answer ..... [3]

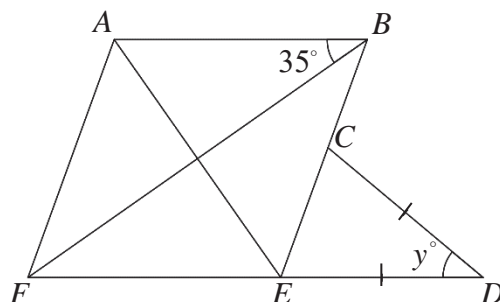
- 8 In the diagram,  $AB$  is parallel to  $ED$ .  
 $\angle ABC = 135^\circ$ , reflex  $\angle CDE = 220^\circ$  and  $\angle BCD = x^\circ$ .



Find the value of  $x$ , stating your reasons clearly.

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

- 9 In the figure below,  $ABEF$  is a rhombus,  $CDE$  is an isosceles triangle and  $FED$  is a straight line.  
 $\angle ABF = 35^\circ$  and  $\angle CDE = y^\circ$ .



Find the value of  $y$ , stating your reasons clearly.

Answer  $y = \dots\dots\dots$  [3]

- 10 Jack bought  $x$  books for \$12 each.  
 Jill bought  $x$  books for \$ $y$  more than the total amount that Jack paid.

- (a) Express, in terms of  $x$ , the price that Jack paid for the books altogether.

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

- (b) Express, in terms of  $x$  and  $y$ , the price that Jill paid for each book.

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

**11** Simplify the following.

**(a)**  $3x - y + 2x - 3y$

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

**(b)**  $\frac{3x+1}{4} - \frac{x-1}{2}$

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

- 12 (a)** By rounding off each number correct to 1 significant figure, estimate the value of

$$(28.95 + 5.51) \div 4.13 .$$

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

- (b)** Estimate the value of  $\sqrt{60} \div \sqrt[3]{7}$  .

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

- 
- 13 (a)** Expand and simplify  $2(3x + y) - 3(x - 2y)$ .

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

- (b)** Factorise completely  $3a(x + y) - 9b(x + y)$ .

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



**14** Solve the following equations.

**(a)**  $2(x - 1) = 5$

*Answer (a)*  $x = \dots\dots\dots$  [2]

**(b)**  $4(y - 1) = 3(2y - 4)$

*Answer (b)*  $y = \dots\dots\dots$  [2]

**15** Evaluate each of the following.

**(a)**     $3 \times [2 - (-5)]$

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

**(b)**     $(0.51 - 0.498) \times 0.3$

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

**16 (a)** Express 441 as a product of its prime factors.

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

**(b)** Hence, find the square root of 441.

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

**(c)** Find the smallest integer  $n$  such that  $35n$  is a multiple of 441.

*Answer (c)*  $n =$  ..... [2]

**~ END OF PAPER ~**



Name : \_\_\_\_\_

Register Number : \_\_\_\_\_

Class : \_\_\_\_\_

Clementi Town Secondary School  
Mid-Year Examination 2017  
Secondary 1 Express



**MATHEMATICS**  
**Paper 2**

**5 May 2017**  
**1 hour 30 minutes**

Additional Materials: Writing Papers

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**READ THESE INSTRUCTIONS FIRST**

Do not open the booklet until you are told to do so.  
Write your name, register number and class on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
You may use an HB 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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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.

---

This question paper consists of **4** printed pages, including this cover page.

Answer *all* questions

1 (a) Express 72 as a product of its prime factors. [2]

(b) Find the minimum value of  $k$  and of  $q$  such that  $72 \times 3k = q^3$ , where  $k$  and  $q$  are positive integers. [2]

2 (a) Factorise  $5a^2b + 15ab^2x$  completely. [1]

(b) Simplify  $\frac{(2m+1)}{3} - \frac{(1-3m)}{2}$ . [3]

3 The table below shows the temperatures of four countries at a particular time of a day.

Country	Temperature / °C
Singapore	34
Japan	6
Russia	-5
Bolivia	28

(a) Arrange the countries in order from coldest to hottest based on the given information. [1]

(b) Find the largest temperature difference amongst the four countries. [1]

(c) Find the average temperature of these four countries. [1]

(d) Given that Russia's temperature increased to 8°C the following week, find the increase in temperature. [1]

4 (a) In 2015, the amount of money donated to charity in Singapore was S\$8 600 000.

(i) What was the least possible amount of money donated if the figure has been rounded off to two significant figures? [1]

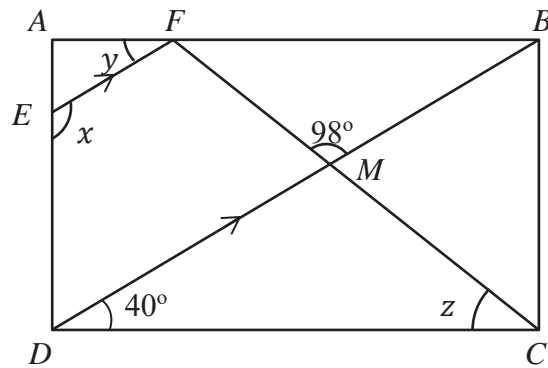
(ii) What was the least possible amount of money donated if the figure has been rounded off to three significant figures? [1]

(b) The population of Singapore in 2016 was 5 607 300 and it was assumed that each person donated an average amount of \$3.50.  
Calculate the total amount donated to charity in 2016.  
Give your answer correct to one significant figure. [2]

5 (a) Solve  $2 - \frac{2}{h} = 5$ . [3]

(b) Solve  $\frac{2}{k} = \frac{1}{2-k}$ . [3]

6



In the figure,  $ABCD$  is a rectangle,  $EF$  is parallel to  $DB$ , angle  $FMB = 98^\circ$  and angle  $BDC = 40^\circ$ .

(a) Find, giving reasons for each answer,

(i) angle  $x$ , [2]

(ii) angle  $y$ , [2]

(iii) angle  $z$ . [2]

(b) What is the special name for quadrilateral  $BDEF$ ? [1]

7 A wire of length 48 metres is bent to form a triangle  $PQR$ .

(a) Given the length of  $PQ$  is  $x$  metres, find, in terms of  $x$ ,

(i) the length of  $QR$  which is 2 metres less than twice the length of  $PQ$ , [1]

(ii) the length of  $PR$  which is 1 metre more than one third the length of  $PQ$ , [1]

(iii) the perimeter of the triangle, expressed in its simplest form. [2]

(b) Hence, find the value of  $x$ . [3]

- 8 (a) You are preparing a gift pack to be distributed to an old folks' home.  
You have purchased 180 packets of Milo drinks, 90 packets of Oreo biscuits and 60 pears.  
Each of the three items is packed equally into each gift pack.
- (i) What is the maximum number of gift packs that can be packed with these three items? [3]
- (ii) What is the quantity of each item in each gift pack? [1]
- (b) Clementi Town Secondary School's bell rings every 35 minutes.  
Clementi Primary School's bell rings every 30 minutes.  
If both schools start at 0745, what time will these two schools ring the bell together again? [3]

9

Theatre Type	Monday ~ Thursday	Friday ~ Sunday, Eve & Public Holiday
Standard	\$11	\$14
GVMax Dolby Atmos	\$13	\$16
D-Box	\$14	\$20

The above table shows the movie ticket prices for Golden Village Cinema based on the different theatres and the day of the week.

There is a 50% discount on the movie tickets for students from Monday to Thursday for all theatre types.

Mr. Goh, a teacher, brought his class of  $m$  students to attend a movie screening on Monday and Friday.

- (a) Find, in terms of  $m$ , the total cost of the movie tickets for the respective days
- (i) if there was one absentee, watching a standard movie on Monday, [2]
- (ii) if there were two absentees, watching GVMax Dolby Atmos movie on Friday. [1]
- (b) If the difference in the cost between (a)(i) and (a)(ii) is \$398.50, form an equation in terms of  $m$ . [1]
- (c) Find  $m$ . [3]

***End of Paper***



**CLEMENTI TOWN SECONDARY SCHOOL**  
**SECONDARY ONE MATHEMATICS 2017**  
**MID-YEAR EXAMINATION PAPER 1 ANSWERS**

Qn	Ans
1	$0.7, \frac{3}{4}, 0.7\dot{5}, 0.\dot{7}\dot{5}$
2(a)	$\text{HCF} = 2 \times 3^2$
2(b)	$\text{LCM} = 2^3 \times 3^2 \times 5^2 \times 7$
3	$7 \div 12 = 0.58333\dots$ $= 0.58\dot{3}$
4(a)	59 kg
4(b)	2.20
5	$\frac{4}{3((-3)^2 + (-1)^3)}$ $= \frac{4}{3(8)}$ $= \frac{1}{6}$
6(a)	$3, \sqrt{4}$
6(b)	$\pi, \sqrt{2}$
6(c)	9
7	$\left(\frac{1}{3} - \frac{8}{9}\right) \div \frac{1}{6}$ $= -\frac{5}{9} \div \frac{1}{6}$ $= -\frac{5}{9} \times 6$ $= -3\frac{1}{3}$

8	<p>Draw a line parallel to <math>AB</math> and cutting through <math>C</math> and label it <math>CF</math>.</p> $\angle BCF = 180^\circ - 135^\circ$ $= 45^\circ \text{ (interior angles, parallel lines)}$ $\angle DCF = \angle CDG$ $\angle DCF = 220^\circ - 180^\circ$ $= 40^\circ \text{ (alternate angles, parallel lines)}$ $x = 45 + 40$ $= 85 \text{ (Sum of adjacent angles)}$
9	$\angle ABE = 35^\circ \times 2$ $= 70^\circ \text{ (Property of rhombus)}$ $\angle CED = \angle ABE$ $= 70^\circ \text{ (Alternate angles, parallel lines)}$ $y = 180 - (70 \times 2)$ $= 40 \text{ (Isosceles triangle)}$
10(a)	$12x$
10(b)	$\frac{12x + y}{x}$
11(a)	$5x - 4y$
11(b)	$\frac{3x+1}{4} - \frac{x-1}{2}$ $= \frac{3x+1}{4} - \frac{2(x-1)}{4}$ $= \frac{3x+1-2(x-1)}{4}$ $= \frac{3x+1-2x+2}{4}$ $= \frac{x+3}{4}$
12(a)	$(28.95 + 5.51) \div 4.13$ $\approx (30 + 6) \div 4$ $= 9$

12(b)	$\sqrt{60} \div \sqrt[3]{7}$ $\approx \sqrt{64} \div \sqrt[3]{8}$ $= 8 \div 2$ $= 4$
13(a)	$2(3x + y) - 3(x - 2y)$ $= 6x + 2y - 3x + 6y$ $= 3x + 8y$
13(b)	$3a(x + y) - 9b(x + y)$ $= (x + y)(3a - 9b)$ $= 3(a - 3b)(x + y)$
14(a)	$2(x - 1) = 5$ $2x - 2 = 5$ $2x = 7$ $x = 3.5$
14(b)	$4(y - 1) = 3(2y - 4)$ $4y - 4 = 6y - 12$ $2y = 8$ $y = 4$
15(a)	$3 \times [-2 - (-5)]$ $= 3 \times [2 + 5]$ $= 3 \times 7$ $= 21$
15(b)	$(0.51 - 0.498) \times 0.3$ $= 0.012 \times 0.3$ $= 0.0012 \times 3$ $= 0.0036$
16(a)	$441 = 3^2 \times 7^2$
16(b)	$\sqrt{441} = 3 \times 7$ $= 21$
16(c)	$35 = 5 \times 7$ $\text{LCM of } 35 \text{ and } 441 = 3^2 \times 5 \times 7^2$ $n = 3^2 \times 7$ $= 63$

## 2017 Sec 1E MYE Marking Scheme (Paper 2)

1(a)	The prime factor of 72 is $2^3 \times 3^2$
1(b)	Value of k is 1 Value of q is 6
2(a)	$5ab(a + 3bx)$
2(b)	$\frac{13m - 1}{6}$
3(a)	Countries from coldest to hottest are Russia, Japan, Bolivia, Singapore
3(b)	Largest temperature difference = $39^\circ\text{C}$
3(c)	Average temp = $15.75^\circ\text{C}$
3(d)	Increase in Russia's temperature = $13^\circ\text{C}$
4(a)(i)	Least possible amount donated to charity in 2015 is \$8,550,000
4(a)(ii)	Least possible amount donated to charity in 2015 is \$8,595,000
4(b)	Total amount donated to charity in 2016 is \$20 000 000
5(a)	$h = -\frac{2}{3}$
5(b)	$k = 1\frac{1}{3}$
6(a)(i)	The value of $\angle x$ is $130^\circ$
6(a)(ii)	The value of $\angle y$ is $40^\circ$
6(a)(iii)	The value of $\angle z$ is $42^\circ$
6(b)	The quadrilateral is Trapezium
7(a)(i)	Length of $QR = (2x - 2)$ metres
7(a)(ii)	Length of $PR = (\frac{1}{3}x + 1)$ metres
7(a)(iii)	Perimeter of triangle $PQR$ $= 3\frac{1}{3}x - 1$ or $\frac{10x - 3}{3}$ m
7(b)	The value of $x$ is 14.7 m
8(a)(i)	The maximum number of gift packs is $2 \times 3 \times 5 = 30$
8(a)(ii)	There will be 2 pears, 3 Oreo biscuit and 6 Milo drinks
8(b)	The two schools' bells will ring together at 1115
9(a)(i)	$5\frac{1}{2}m + 5\frac{1}{2}$
9(a)(ii)	$16m - 16$
9(b)	398.50
9 (c)	$m = 40$



Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_



## FAIRFIELD METHODIST SCHOOL (SECONDARY)

### END-OF-YEAR EXAMINATION 2017 SECONDARY 1 EXPRESS

## MATHEMATICS

### Paper 1

Date: 11 October 2017

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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: Mrs Jessica Chak

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

Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

Answer **all** the questions.

- 1 Consider the following list of numbers:

$$0.245, \pi^2, \sqrt{\frac{1}{4}}, \sqrt[3]{-8}, \sqrt{8}, 0.\dot{1}\dot{2}$$

Write down all the irrational numbers.

Answer ..... [1]

- 2 If a number is a multiple of 2 and another number is a multiple of 3, then their sum is a multiple of 5.

Do you agree with the above statement? Explain with an example.

Answer .....

.....

..... [2]

- 3 Express  $\frac{11}{7}\%$  as a decimal number, correct to 5 decimal places.

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

Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

4 Evaluate  $\left\{ [(25 - 31) \times 9 - 8 \div 4] \times \frac{1}{2} \right\} + 7\frac{4}{5}$ .

Answer ..... [1]

---

5 Simplify  $750 \text{ ml} : 0.6 \text{ l} : \frac{2}{5} \text{ l}$  and express as a ratio in its simplest form.

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

---

6 Without the use of calculator and by rounding each number to 1 significant figure, estimate the value of  $\frac{39.93 \times 24.999}{50.449}$ . Show your working clearly.

Answer ..... [2]

---



Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

- 7 (a) Solve the inequality  $1 - 2x \geq 6$ .

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

- (b) Represent the solution in (a) on the number line below.

Answer (b) [1]



- (c) Find the greatest integer value of  $x$  which satisfies  $1 - 2x \geq 6$ .

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

- 
- 8 A National Day promotion at a shop gives an additional discount of 5.2% during the month of August, on top of the usual member's discount of 10%. The marked price of a shirt is \$39.90. Calculate the price of the shirt that a member of this shop paid on the 25 August 2017.

Answer \$..... [3]

Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

- 9 Jane bought 8 pens at \$ $x$  for 5 pens and  $(1 + 2y)$  rulers at \$2.00 for 5 rulers. Find the total cost of the stationery she bought. Express your answer as a single fraction.

Answer \$..... [2]

---

- 10 Consider the sequence  $\frac{1}{3}, \frac{1}{7}, \frac{1}{11}, \frac{1}{15}, \dots$

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

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

(b) Find, in terms of  $n$ , a formula for the  $n$ th term of the sequence.

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

---

- 11 The area of a rhombus is  $600 \text{ cm}^2$ . Given the length of a diagonal is 40 cm, calculate the length of the other diagonal.

Answer..... [2]

---

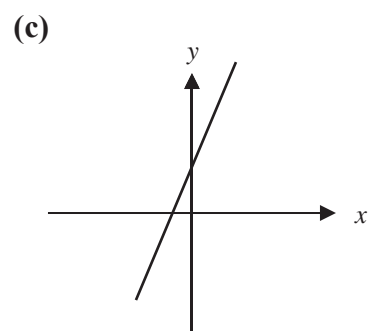
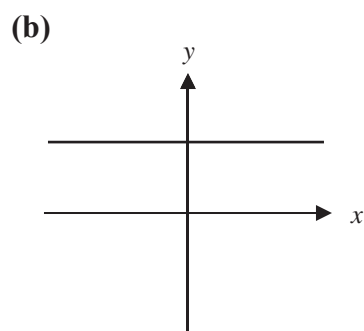
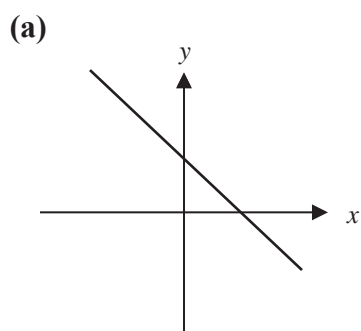
Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

12 Solve  $7 + 2(3x - 1) = 4 - (5 - 8x)$ .

Answer  $x = \dots\dots\dots$  [2]

13 Write down the most suitable name for each of the lines that are drawn for you.

$y = 1$	$y = 2x + 1$	$x = 1$	$y = -x + 2$
<b>Line A</b>	<b>Line B</b>	<b>Line C</b>	<b>Line D</b>



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

(b) Line ..... [1]

(c) Line ..... [1]

Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

- 14 (a) Given that  $862488 = 2^a \times 3^b \times 11^c$ , find the value of  $a$ ,  $b$  and  $c$ .

Answer (a)  $a = \dots\dots\dots$ ,  $b = \dots\dots\dots$ ,  $c = \dots\dots\dots$  [1]

- (b) Hence, state the HCF and LCM of the number 862488 and  $2^4 \times 5^2 \times 7 \times 11$  in **index notation**.

Answer (b) HCF =  $\dots\dots\dots$  [1]

LCM =  $\dots\dots\dots$  [1]

---

- 15 Four exterior angles of an  $n$ -sided polygon are  $28^\circ$ ,  $32^\circ$ ,  $37^\circ$  and  $55^\circ$ .  
The remaining  $(n - 4)$  exterior angles are each equal to  $13^\circ$ . Find the value of  $n$ .

Answer  $n = \dots\dots\dots$  [2]

Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

**16 (a)** Factorise the following expressions completely.

**(i)**  $2(3 + y) - x(3 + y)$

**(ii)**  $3at + 15bt - 10yb - 2ay$  *Answer (a)* ..... [1]

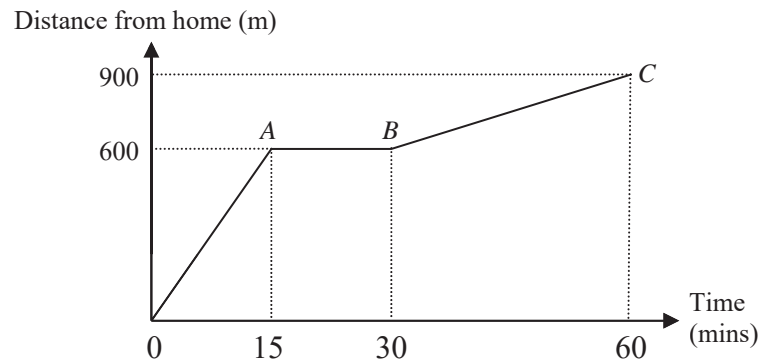
*Answer (b)* ..... [2]

**(b)** Given  $\frac{1}{x} = (a - 2)\left(\frac{1}{h} + \frac{1}{k}\right)$ , find the value of  $x$  when  $a = 5\frac{1}{2}$ ,  $k = 7.4$  and  $h = 8$ .

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

Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

- 17 The graph shows Shawn's journey to school (C). During the journey, he stopped for ice milo at a coffee shop (A), after which he left to make his way to school.



- (a) Using the graph, find

- (i) the time taken Shawn took to drink his ice milo,

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

- (ii) the distance between Shawn's home and school,

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

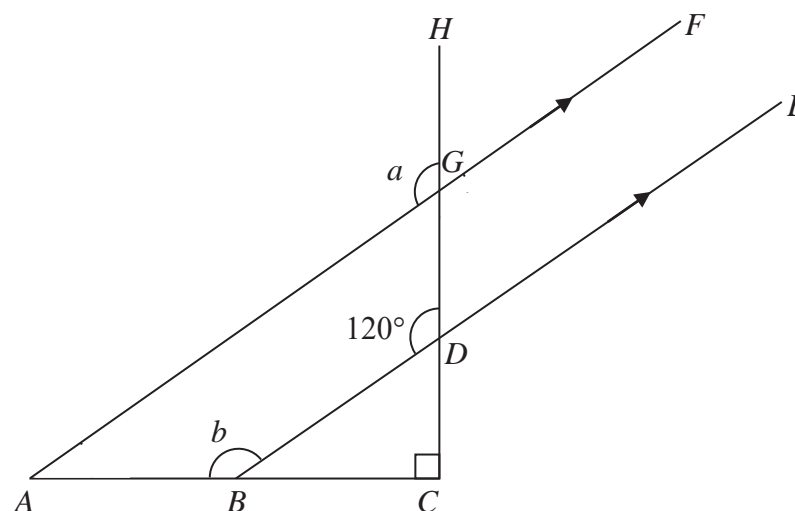
- (iii) his average speed from his home to coffee shop,

Answer (a)(iii)..... m/min [1]

- (b) State the gradient of the line segment, AB.

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

- 18** In the following diagram,  $HGDC$  is a straight line and line  $AGF$  is parallel to line  $BDE$ . Triangle  $ACG$  is a right-angled triangle.



By stating your reasons clearly, find

- (a)**  $\angle a$ ,

Answer (a)  $\angle a = \dots\dots\dots^\circ$  [1]

- (b)**  $\angle b$ ,

Answer (b)  $\angle b = \dots\dots\dots^\circ$  [2]

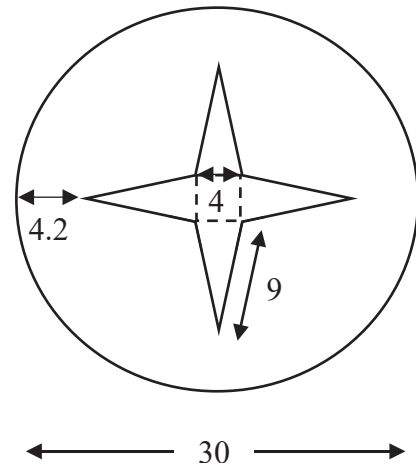
- (c)** reflex  $\angle GAC$ .

Answer (c)  $\angle GAC = \dots\dots\dots^\circ$  [2]

- 19** The figure shows a circular metallic disc with a star-shaped design removed from the middle.

The diameter of the disc is 30 cm.

The star-shaped design is made up of a square in the centre and 4 identical isosceles triangles are joined to each side of the square, with length 4 cm. The distance from the tip of the star is 4.2 cm from the edge of the circular disc. The length of each side of the star is 9 cm.



Find

- (a) the perimeter of the star,

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

- (b) the area of the star design,

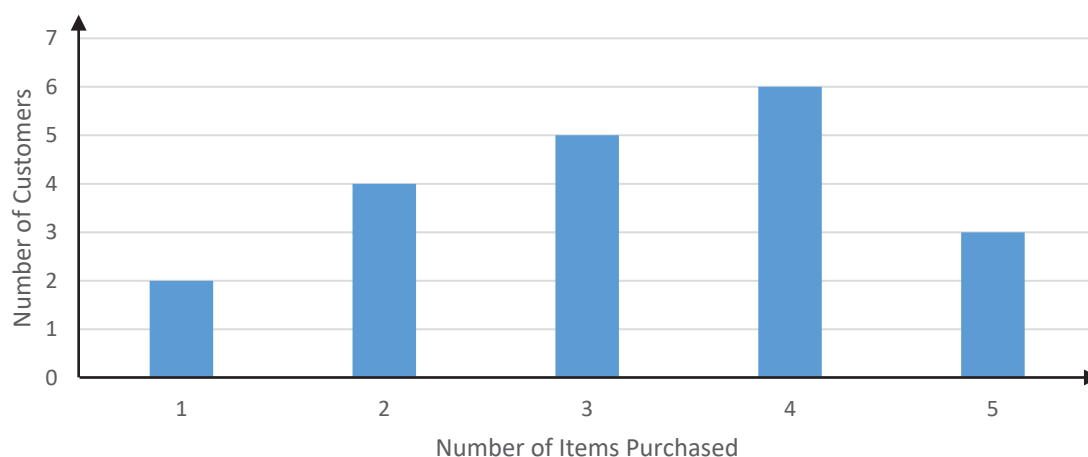
Answer (b) .....cm<sup>2</sup> [2]

- (c) the remaining area of the metal disc.

Answer (c) .....cm<sup>2</sup> [2]



**20** The bar chart below shows the number of items purchased by customers in a store.



**(a)** Calculate the total number of customers.

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

**(b)** Calculate the total number of items purchased.

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

**(c)** Find the percentage of customers who purchased more than 3 items.

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

**(d)** If the above information is to be represented in a pie chart, find the angle of the sector representing customers who purchased 3 items.

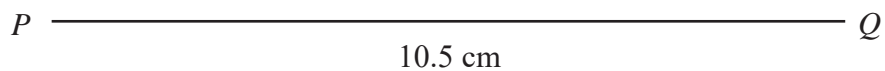
*Answer (d)* ..... ° [1]

Name: \_\_\_\_\_ ( ) Class: \_\_\_\_\_

- 21** Using ruler and compasses, construct the quadrilateral  $PQRS$  such that  $PQ = 10.5$  cm,  $\angle QPS = 60^\circ$ ,  $\angle PQR = 70^\circ$ ,  $PS = 8$  cm and  $QR = 5$  cm. [2]

- (a) On the same diagram, construct the
- (i) angle bisector of  $\angle QPS$ , [1]
  - (ii) perpendicular bisector of  $PQ$ . [1]
- (b) Label the point of intersection of the angle bisector and the perpendicular bisector in (a) as  $M$ . [1]

*Answer for (a)(i), (a)(ii), (b)*



- (c) Hence, measure and write down the length of  $RM$ .

*Answer (c)  $RM = \dots\dots\dots$ cm [1]*

**- End of Paper -**



NAME: \_\_\_\_\_ (     )

CLASS: \_\_\_\_\_



## FAIRFIELD METHODIST SCHOOL (SECONDARY)

### END-OF-YEAR EXAMINATION 2017 SECONDARY 1 EXPRESS

## MATHEMATICS

### Paper 2

Date: 12 October 2017

Duration: 1 hour 30 minutes

Additional Material: Graph paper (1 sheet)

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/tape.

Answer **all** questions.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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 2	/ 60

Setter: Mr Kua KT

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

Name: \_\_\_\_\_ (    )

Class: \_\_\_\_\_

Answer **all** the questions.

- 1 Factorise  $-36ab^2 - 54a^2b$  completely.

Answer ..... [1]

---

- 2 A seagull is flying at a height of 10 m above sea level, while a sea turtle is swimming at a depth of 35 m below sea level.

(a) Use a negative number to represent the depth the sea turtle is swimming at.

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

(b) Find the difference in altitude between the seagull and the sea turtle.

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

---

- 3 Every year, the value of a car depreciates by 15% of its value in the previous year. If the value of the car was \$112 710 in 2016, find its value in 2014.

Answer \$ ..... [2]

Name: \_\_\_\_\_ (     )

Class: \_\_\_\_\_

- 4**     Spencer takes a loan of \$250 000 from a bank to start a business venture. The bank charges him simple interest at a rate of 4.5% per annum.

- (a)**    If Spencer plans to repay his loan at the end of 5 years, find the total amount of interest he has to pay.

*Answer (a)*     \$ ..... [2]

- (b)**    Find the total amount Spencer has to pay back the bank at the end of 5 years.

*Answer (b)*     \$ ..... [1]

Name: \_\_\_\_\_ (     )

Class: \_\_\_\_\_

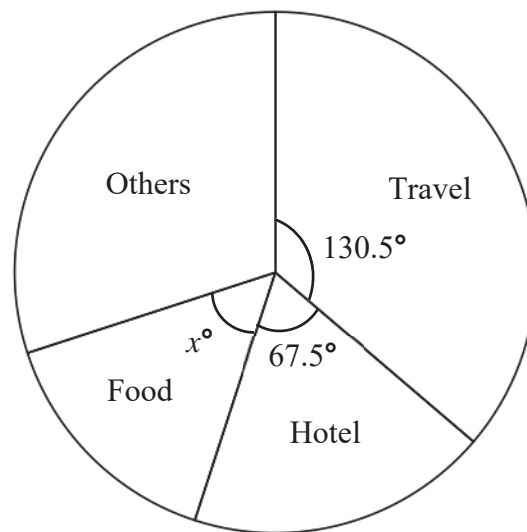
- 5**     **(a)**    The top speed of a Korea Train eXpress (KTX) train is 305 km/h.  
Express 305 km/h in m/s.

*Answer (a)*     ..... m/s    [2]

- (b)**    Caleb cycles the first part of a 120-km journey at an average speed of 35 km/h and walks the remaining distance at an average speed of 6 km/h. Given that he takes 5.5 hours for his entire journey, find the distance that Caleb cycles.

*Answer (b)*     ..... km    [3]

- 6 The pie chart below, which is not drawn to scale, shows the cost breakdown of a family's holiday.



- (a) Given that \$1012.50 was spent on hotel, find the total cost of the holiday.

Answer (a)      \$ ..... [2]

- (b) Given that \$202.50 more was spent on hotel than on food, find the value of  $x$ .

Answer (b)       $x =$  ..... [2]

- (c) Express the amount spent on travel as a percentage of the total cost.

Answer (c)      ..... % [1]



- 7     A family travels from Hong Kong to Singapore for a holiday. They exchange HK\$40 000 to Singapore dollars at an exchange rate of HK\$100 = S\$17.433.
- (a)   Find the amount of Singapore dollars the family receives, giving your answer correct to the nearest cent.

*Answer (a)*   S\$ ..... [2]

The family spend a total of S\$3800 in Singapore and convert the remaining Singapore dollars into Hong Kong dollars at the end of the trip at an exchange rate of HK\$100 = S\$17.442.

- (b)   Find the amount of Hong Kong dollars the family receives at the end of the holiday, giving your answer correct to the nearest dollar.

*Answer (b)*   HK\$ ..... [2]

**8** Consider the following number pattern:

$$1 + 3 = 4 = 2^2 = (1 + 1)^2$$

$$1 + 3 + 5 = 9 = 3^2 = (2 + 1)^2$$

$$1 + 3 + 5 + 7 = 16 = 4^2 = (3 + 1)^2$$

.  
.  
.

$$1 + 3 + 5 + 7 + \dots + p = q = r^2 = (s + 1)^2$$

**(a)** Write down the 4<sup>th</sup> line in the pattern.

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

**(b)** Given that  $q = 225$ , find the values of  $p$ ,  $r$  and  $s$ . Show your workings clearly.

*Answer (b)*      $p =$  ..... [1]

$r =$  ..... [1]

$s =$  ..... [1]

Name: \_\_\_\_\_ (     )

Class: \_\_\_\_\_

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

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

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

(b)  $\frac{4x-5}{3} - (x-6)$

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

Name: \_\_\_\_\_ (     )

Class: \_\_\_\_\_

**10**     Solve each of the following equations.

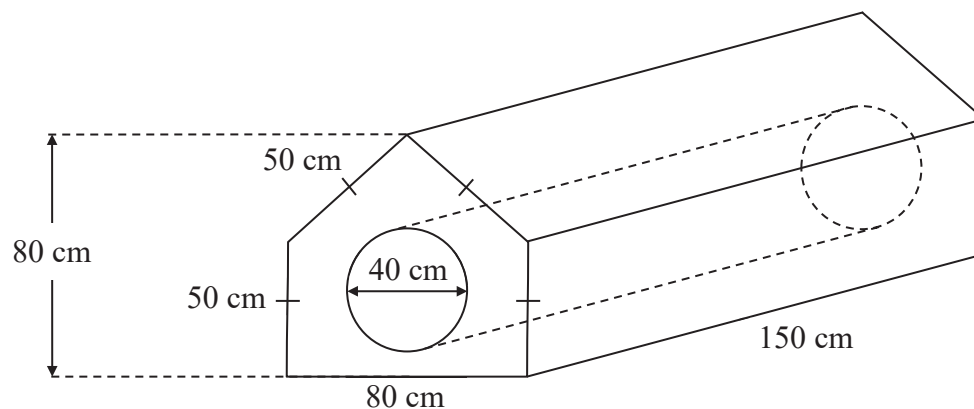
(a)      $\frac{2}{3}x - \frac{3}{4} = 2x + \frac{5}{8}$

*Answer (a)*      $x = \dots\dots\dots$      [2]

(b)      $1 + \frac{2}{y-3} = \frac{3}{4y-12}$

*Answer (b)*      $y = \dots\dots\dots$      [3]

- 11** The figure shows a solid pentagonal prism with a cylindrical hole of diameter 40 cm.



- (a) (i)** Show that the area of the cross section of the solid, correct to the nearest whole number, is  $3943 \text{ cm}^2$ .

*Answer (a)(i)*

[2]

- (ii)** Find the total volume of the solid.

*Answer (a)(ii)* .....  $\text{cm}^3$  [1]

Name: \_\_\_\_\_ (    )

Class: \_\_\_\_\_

- 11**    **(b)** Find the total surface area of the solid.

*Answer (b)* .....  $\text{cm}^2$  [3]

- (c)** Find the mass of the solid given that the density of the material is  $0.023 \text{ g/cm}^3$ .

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

- (d)** The solid is melted to form a cube. Find the length of each side of the cube.

*Answer (d)* ..... cm [2]

- 12 The table below shows the different entrance fees to an amusement park.

Day / Time		Per Adult	Per Child (below 13 years old)
Monday to Friday	Before 2 p.m.	\$35	\$15
	After 2 p.m.	\$18	\$8
Saturday and Sunday	Before 2 p.m.	\$45	\$25
	After 2 p.m.	\$25	\$13

During a school excursion, a group of teachers and Primary 2 students visited the amusement park at 10 a.m. on a Thursday.

- (a) Given that there are  $x$  students who went on the excursion, write down an expression, in terms of  $x$ , for the total entrance fees for the students.

Answer (a)     \$ ..... [1]

- (b) The number of teachers who went on the excursion is 224 fewer than the number of students. Write down an expression, in terms of  $x$ , for the total entrance fees for the teachers.

Answer (b)     \$ ..... [1]

- (c) The total amount spent on entrance fees for teachers and students is \$4160. Form an equation, in terms of  $x$ , to represent the above information, and show that it can be simplified to  $50x - 7840 = 4160$ .

Answer (c)

[2]

- (d) Hence, find the number of teachers who went on the school excursion.

Answer (d)     Number of teachers = ..... [2]

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

The cost of printing school T-shirts at a shop can be represented by the equation

$$y = 5x + 70$$

where  $y$  represents the total cost in dollars, and  $x$  represents the number of T-shirts printed.

The table below shows some values of  $x$  and  $y$ .

$x$	0	20	50	80
$y$	70	170	$p$	470

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

(b) Using a scale of 2 cm to represent 10 T-shirts, draw a horizontal  $x$ -axis for  $0 \leq x \leq 80$ .

Using a scale of 4 cm to represent \$100, draw a vertical  $y$ -axis for  $0 \leq y \leq 500$ .

Plot the pairs of values in the table above and draw the graph of  $y = 5x + 70$ . [3]

(c) From your graph,  
(i) find the total cost for printing 65 T-shirts, [1]

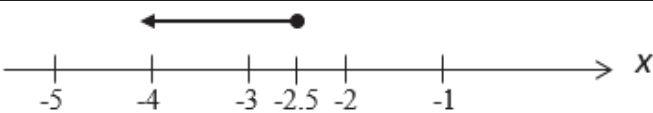
(ii) find the maximum number of T-shirts that can be printed if a customer has a budget of \$220. [1]

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

**- End of Paper -**





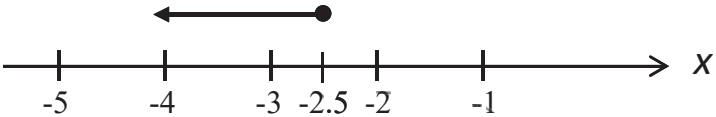
1	$\pi^2$ and $\sqrt{8}$			2	No For example: 4 is a multiple of 2 and 9 is a multiple of 3 but their sum is 13, which is not a multiple of 5.	
3	0.01571 (5 decimal places)					
4	$-20\frac{1}{5}$					
5	15 : 12 : 8			6	16	
7a	$x \leq -2.5$	7b				
7c	-3					
8	\$34.04 (nearest cent)					
9	$\frac{8x+2+4y}{5}$	10a	$\frac{1}{19}, \frac{1}{23}$	10b	$\frac{1}{4n-1}$	
11	Other diagonal = 30 cm			12	$x = 3$	
13a	Line D	13b	Line A		13c	Line B
14a	$2^3 \times 3^4 \times 11^3$ $a = 3, b = 4, c = 3$			14b	$\text{HCF} = 2^3 \times 1 \times 11 \times 1 \times 1 = 2^3 \times 11$ $\text{LCM} = 2^4 \times 3^4 \times 11^3 \times 5^2 \times 7$	
15	$n = 20$			16ai	$(3+y)(2-x)$	
16aii	$(a+5b)(3t-2y)$			16b	$x = \frac{592}{539}$ or 1.10 (3sf)	
17ai	15 mins			17aii	900 m	
17aiii	Speed = 40 m/min			17b	0	
18a	$\angle a = 120^\circ$			18b	$150^\circ$	
18c	$330^\circ$			19a	Perimeter = 72 cm	
19b	Area = $86.4 \text{ cm}^2$			19c	Remaining Area = 620 (3sf)	
20a	20 customers			20b	64 items	
20c	45%			20d	$90^\circ$	
21ai 21aii 21b						
21c	3.9 ( $\pm 0.1$ ) cm					

Name: \_\_\_\_\_ (     )

Class: \_\_\_\_\_

Fairfield Methodist School (Secondary)  
 Secondary 1 Express 2017  
 Mathematics End-of-Year Examination Paper 2  
 One-page Answer

<b>1</b>	$-18ab(2b + 3a)$	<b>12(a)</b>	$15x$
<b>2(a)</b>	$-35$	<b>12(b)</b>	$35(x - 224)$ or $35x - 7840$
<b>2(b)</b>	45 m	<b>12(d)</b>	16
<b>3</b>	\$156 000	<b>13(a)</b>	$p = 320$
<b>4(a)</b>	\$56 250	<b>13(b)</b>	
<b>4(b)</b>	\$306 250		
<b>5(a)</b>	$84\frac{13}{18} \text{ m/s}$ or 84.7 m/s (to 3 s.f.)		
<b>5(b)</b>	105 km		
<b>6(a)</b>	\$5400		
<b>6(b)</b>	$x = 54$		
<b>6(c)</b>	36.25% or $36\frac{1}{4}\%$		
<b>7(a)</b>	S\$6973.20 (to nearest cent)		
<b>7(b)</b>	HK\$18 193 (to nearest dollar)		
<b>8(a)</b>	$1 + 3 + 5 + 7 + 9 = 25 = 5^2 = (4 + 1)^2$	<b>13(c)(i)</b>	\$395
<b>8(b)</b>	$p = 29, r = 15, s = 14$	<b>13(c)(ii)</b>	30
<b>9(a)</b>	$\frac{8x+7}{12}$	<b>13(d)</b>	The gradient of the graph represents the cost per T-shirt printed.
<b>9(b)</b>	$\frac{x+13}{3}$		
<b>10(a)</b>	$x = -\frac{33}{32}$ or $-1\frac{1}{32}$		
<b>10(b)</b>	$y = \frac{7}{4}$ or $1\frac{3}{4}$ or 1.75		
<b>11(a)(ii)</b>	592 000 cm <sup>3</sup> (to 3 s.f.)		
<b>11(b)</b>	68 700 cm <sup>2</sup> (to 3 s.f.)		
<b>11(c)</b>	13 600 g (to 3 s.f.)		
<b>11(d)</b>	83.9 cm (to 3.s.f)		

Qn	Working	Marks Allocation
1	$\pi^2$ and $\sqrt{8}$	B1
2	No 4 is a multiple of 2 and 9 is a multiple of 3 but their sum is 13, which is not a multiple of 5.	B1 B1
3	$\frac{11}{7}\% = \frac{11}{7} \times \frac{1}{100} = 0.01571$ (5 decimal places)	B1
4	$-20\frac{1}{5}$ or $-20.2$	B1
5	$750 \text{ ml} : 0.6 \text{ l} : \frac{2}{5} \text{ l}$ $= 0.75 : 0.6 : 0.4$ (all in l) $= 750 : 600 : 400$ (all in ml) $= 15 : 12 : 8$	M1 for making all into same base for comparison A1
6	$\frac{39.93 \times 24.999}{50.449} = \frac{40 \times 20}{50}$ $= 16$	M1 for 1sf A1
7a	$1 - 2x \geq 6$ $-2x \geq 5$ $x \leq \frac{5}{-2}$ $x \leq -2.5$	B1
7b		FT1
7c	$-3$	FT1
8	Price after member's discount $= \frac{90}{100} \times \$39.90$ $= \$35.91$ Price after National Day special discount $= \frac{100 - 5.2}{100} \times \$35.91$ $= \$34.04$ (nearest cent)	M1 M1 A1
9	5 pens cost $\$x$ 8 pens cost $\$ \frac{8x}{5}$ 5 rulers cost $\$2$ $(1 + 2y)$ rulers cost $\$ \frac{2(1 + 2y)}{5}$ Total cost $= \frac{8x}{5} + \frac{2(1 + 2y)}{5} = \frac{8x + 2 + 4y}{5}$	M1 for either $\frac{8x}{5}$ or $\frac{2(1 + 2y)}{5}$ A1

Qn	Working	Marks Allocation
10a	$\frac{1}{19}, \frac{1}{23}$	Both correct for A1
10b	$\frac{1}{4n-1}$	B1
11	<p>Rhombus is made up of 4 identical right-angled triangles.  Area of each right-angled triangle = <math>600 \div 4 = 150 \text{ cm}^2</math></p> <p>Let the other diagonal be length <math>2d</math>.  Area of 1 right-angled triangle = <math>\frac{1}{2} \times 20 \times d</math></p> <p><math>150 = \frac{1}{2} \times 20 \times d</math>  <math>d = 15</math>  Other diagonal = <math>2d = 30 \text{ cm}</math></p>	<p>M1</p> <p>A1</p>
12	$7 + 2(3x - 1) = 4 - (5 - 8x)$ $7 + 6x - 2 = 4 - 5 + 8x$ $6 = 2x$ $x = 3$	<p>M1 for either correct expansion</p> <p>A1</p>
13a	Line D	A1
13b	Line A	A1
13c	Line B	A1
14a	$2^3 \times 3^4 \times 11^3$ $a = 3, b = 4, c = 3$	A1
14b	$\frac{2^3 \times 3^4 \times 11^3 \times 1 \times 1}{2^4 \times 1 \times 11 \times 5^2 \times 7}$ <p>HCF = <math>2^3 \times 1 \times 11 \times 1 \times 1 = 2^3 \times 11</math>  LCM = <math>2^4 \times 3^4 \times 11^3 \times 5^2 \times 7</math></p>	<p>A1</p> <p>A1</p>
15	<p>Sum of exterior angles = <math>360^\circ</math>  <math>28 + 32 + 37 + 55 + (n - 4)(13) = 360</math>  <math>152 + 13n - 52 = 360</math>  <math>n = 20</math></p>	<p>M1</p> <p>A1</p>
16ai	$2(3 + y) - x(3 + y)$ $= (3 + y)(2 - x)$	B1
16aii	$3at + 15bt - 10yb - 2ay$ $= 3t(a + 5b) - 2y(5b + a)$ $= (a + 5b)(3t - 2y)$	<p>M1</p> <p>A1</p>
16b	$\frac{1}{x} = \left(5\frac{1}{2} - 2\right)\left(\frac{1}{8} + \frac{1}{7.4}\right)$ $\frac{1}{x} = (3.5)\left(\frac{77}{296}\right)$ $\frac{1}{x} = \frac{539}{592} \text{ or } 0.91047 \text{ (5sf)}$ $x = \frac{592}{539} \text{ or } 1.10 \text{ (3sf)}$	M1

Qn	Working	Marks Allocation
		A1
17ai	15 mins	B1
17aii	900 m	B1
17aiii	Speed = $\frac{600}{15} = 40 \text{ m / min}$	B1
17b	0	B1
18a	$\angle a = 120^\circ$ (corr. angles, GF//DE)	B1
18b	$\angle DBC = 120^\circ - 90^\circ$ (ext. angle of triangle) $= 30^\circ$ $\angle b = 180^\circ - \angle DBC$ (adj. angles on str. line) $= 150^\circ$	M1  A1
18c	$\angle GAC = 30^\circ$ (corr. Angles, GF//DE) Reflex $\angle GAC = 360^\circ - 30^\circ$ (angles at a point) $= 330^\circ$	M1  A1
19a	Perimeter = $8 \times 9 = 72$	A1
19b	Area of star-shaped design $= \text{Area of square centre} + 4(\text{Area of each triangle})$ $= 4 \times 4 + 4\left(\frac{1}{2} \times 4 \times 8.8\right)$ $= 86.4$	M1 for finding height to be 8.8  A1
19c	Remaining Area = $\pi(15)^2 - 86.4$ or $= (3.142)(15)^2 - 86.4$ $= 620 \text{ (3sf)}$ $= 620.55$	FT1 A1
20a	20 customers	B1
20b	64 items	B1
20c	45%	B1
20d	$90^\circ$	B1

21c	3.9 ( $\pm 0.1$ ) cm	B1
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Fairfield Methodist School (Secondary)  
 Secondary 1 Express  
 Paper 2 Marking Scheme  
 Mathematics  
 End-of-Year Examinations 2017

Qn No.	Workings	Description	Mark Allocation
1	$-36ab^2 - 54a^2b$ $= -18ab(2b + 3a)$		B1
2(a)	-35		B1
2(b)	Difference in altitude $= 10 - (-35)$ $= 45 \text{ m}$		B1
3	Value of car in 2015 $= 112\,710 \times \frac{100}{85}$ $= \$132\,600$  Value of car in 2014 $= 132\,600 \times \frac{100}{85}$ $= \$156\,000$		M1       A1
4(a)	Interest per year $= 250\,000 \times \frac{4.5}{100}$ $= \$11\,250$  Total amount of interest to be paid $= 11\,250 \times 5$ $= \$56\,250$		M1       A1
4(b)	Total amount to pay back the bank $= 250\,000 + 56\,250$ $= \$306\,250$		B1
5(a)	$\frac{305 \text{ km}}{1 \text{ h}}$ $= \frac{305 \times 1000 \text{ m}}{1 \times 60 \times 60 \text{ s}}$ $= 84\frac{13}{18} \text{ m/s or } 84.7 \text{ m/s (to 3 s.f.)}$	M1 for converting either (i) km to m, or (ii) h to s correctly	M1       A1



Qn No.	Workings	Description	Mark Allocation
5(b)	<p>Let the distance cycled be <math>x</math> km. Then the distance walked will be <math>(120 - x)</math> km.</p> $\frac{x}{35} + \frac{120-x}{6} = 5.5$ $\frac{6x}{210} + \frac{35(120-x)}{210} = \frac{1155}{210}$ $6x + 4200 - 35x = 1155$ $-29x = -3045$ $x = 105$ <p><math>\therefore</math> Distance Caleb cycles = 105 km</p>	<p>M1 for either time cycled or walked in terms of <math>x</math></p> <p>Simplifying to either <math>-29x</math> or <math>-3045</math></p>	<p>M1</p> <p>M1</p> <p>A1</p>
6(a)	<p>Total cost of holiday</p> $= \frac{1012.50}{67.5} \times 360$ $= \$5400$		<p>M1</p> <p>A1</p>
6(b)	<p>Amount spent on food = <math>1012.50 - 202.50</math> = \$810</p> $x^\circ = \frac{810}{5400} \times 360^\circ$ $= 54^\circ$ <p><math>\therefore x = 54</math></p>		<p>M1</p> <p>A1</p>
6(c)	<p>Required percentage</p> $= \frac{130.5^\circ}{360^\circ} \times 100\%$ $= 36.25\% \text{ or } 36\frac{1}{4}\%$		B1
7(a)	<p>HK\$100 = S\$17.433 HK\$40 000 = S\$ <b>17.433</b> <math>\times</math> 400 = S\$6973.20 (to nearest cent)</p>	A1 cannot be awarded if answer is not given to nearest cent	<p>M1</p> <p>A1</p>
7(b)	<p>Singapore dollars remaining = <math>6973.20 - 3800</math> = S\$3173.20</p> <p>S\$17.442 = HK\$100 S\$1 = HK\$ <math>\frac{100}{17.442}</math></p> <p>S\$3173.20 = HK\$ <math>\frac{100}{17.442} \times 3173.20</math> = HK\$18 193</p>	A1 cannot be awarded if answer is not given to nearest dollar	<p>M1</p> <p>A1</p>

[illegible]

Qn No.	Workings	Description	Mark Allocation
10(a)	$\frac{2}{3}x - \frac{3}{4} = 2x + \frac{5}{8}$ $\frac{2}{3}x - 2x = \frac{3}{4} + \frac{5}{8}$ $\frac{2}{3}x - \frac{6}{3}x = \frac{6}{8} + \frac{5}{8}$ $-\frac{4}{3}x = \frac{11}{8}$ $-32x = 33$ $\therefore x = -\frac{33}{32} \text{ or } -1\frac{1}{32} \text{ or } -1.03125$	<p>Simplifying <math>\frac{2}{3}x - \frac{6}{3}x</math></p> <p>or <math>\frac{6}{8} + \frac{5}{8}</math> correctly</p>	<p>M1</p> <p>A1</p>
10(b)	$1 + \frac{2}{y-3} = \frac{3}{4y-12}$ $\frac{y-3}{y-3} + \frac{2}{y-3} = \frac{3}{4(y-3)}$ $\frac{y-3+2}{y-3} = \frac{3}{4(y-3)}$ $\frac{y-1}{y-3} = \frac{3}{4(y-3)}$ $\frac{4(y-1)}{4(y-3)} = \frac{3}{4(y-3)}$ $4(y-1) = 3$ $y-1 = \frac{3}{4}$ $\therefore y = 1 + \frac{3}{4}$ $= 1\frac{3}{4} \text{ or } \frac{7}{4} \text{ or } 1.75$	<p>Simplifying LHS of equation into a single fraction correctly</p> <p>Converting both sides of equation to common denominator</p>	<p>M1</p> <p>M1</p> <p>A1</p>
11(a)(i)	<p>Area of cross section</p> $= (50 \times 80) + \left[ \frac{1}{2} \times 80 \times (80 - 50) \right]$ $- \pi(20)^2$ $= 4000 + 1200 - 400\pi$ $= 3943.36$ $= 3943 \text{ cm}^2 \text{ (Shown)}$ <p>(to nearest whole number)</p>		<p>M1</p> <p>AG1</p>
11(a)(ii)	<p>Total volume of solid</p> $= 3943.36 \times 150$ $= 591\,504$ $= 592\,000 \text{ cm}^3 \text{ (to 3 s.f.)}$	<p>Award B1 if answer of more than 3 s.f. is given, but minus 1m overall for accuracy</p>	<p>B1</p>

Qn No.	Workings	Description	Mark Allocation
11(b)	<p>Total area of lateral faces  <math>= (50+50+50+50+80) \times 150</math>  <math>= 280 \times 150</math>  <math>= 42\,000 \text{ cm}^2</math></p> <p>Total surface area  <math>= 42\,000 + (2 \times 3943.36)</math>  <math>+ \pi(40)(150)</math>  <math>= 49\,886.72 + 6000\pi</math>  <math>= 68\,736.27</math>  <math>= 68\,700 \text{ cm}^2</math> (to 3 s.f.)</p>	<p>M1 for correct curved surface area of cylindrical hole</p> <p>Award A1 if answer of more than 3 s.f. is given</p>	<p>M1</p> <p>M1</p> <p>A1</p>
11(c)	<p>Mass of solid  <math>= 591\,504 \times 0.023</math>  <math>= 13\,604.592</math>  <math>= 13\,600 \text{ g}</math> (to 3 s.f.)</p>	<p>Award A1 if answer of more than 3 s.f. is given</p>	<p>M1</p> <p>A1</p>
11(d)	<p>Length of each side of cube  <math>= \sqrt[3]{591\,504}</math>  <math>= 83.943</math>  <math>= 83.9 \text{ cm}</math> (to 3 s.f.)</p>	<p>Award A1 if answer of more than 3 s.f. is given</p>	<p>M1</p> <p>A1</p>
12(a)	$15x$		B1
12(b)	$35(x - 224)$ or $35x - 7840$	No B1 awarded if expansion is wrong	B1
12(c)	$15x + 35(x - 224) = 4160$ $15x + 35x - 7840 = 4160$ $\therefore 50x - 7840 = 4160$ (Shown)	Forming equation correctly	<p>M1</p> <p>AG1</p>
12(d)	$50x - 7840 = 4160$ $50x = 4160 + 7840$ $50x = 12000$ $x = 240$ $\therefore \text{Number of teachers} = 240 - 224$ $= 16$		<p>M1</p> <p>A1</p>

Qn No.	Workings	Description	Mark Allocation
13(a)	When $x = 50$ , $y = p$ : $(p) = 5(50) + 70$ $p = 250 + 70$ $= 320$		B1
13(b)	Refer to next page.		
13(c)(i)	Cost for printing 65 T-shirts $= \$395$	No B1 awarded if answer is not read off from graph	B1
13(c)(ii)	Max. number of T-shirts printed $= 30$	No B1 awarded if answer is not read off from graph	B1
13(d)	The gradient of the graph represents the cost per T-shirt printed.		B1





1 Using a calculator, evaluate

$$\frac{1}{3} \times 2 + \frac{956 \times \sqrt{2017.2017 - 33.55} + \left(\frac{3}{4}\right)^2}{22.34 + 23.4^4}.$$

- (a) Write down the exact value given on the calculator.  
 (b) Express the answer correct to 4 significant figures.

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

(b) ..... [1]

2 Consider the following list of numbers:

$$1, 17, \sqrt{\frac{2}{3}}, \frac{25}{5}, 16, -7, \frac{3\pi}{2}, 4.3\dot{2}1, \sqrt[3]{9}, \sqrt{\frac{6^4}{16}}$$

List down all

- (a) the prime numbers,  
 (b) the irrational numbers,  
 (c) the perfect squares.

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

(b) ..... [1]

(c) ..... [1]

3 Arrange the numbers in ascending order.

$$-2\pi, -6.3, -6\frac{1}{3}, -6.3\dot{4}, -\sqrt[3]{254}$$

Answer ..... [1]

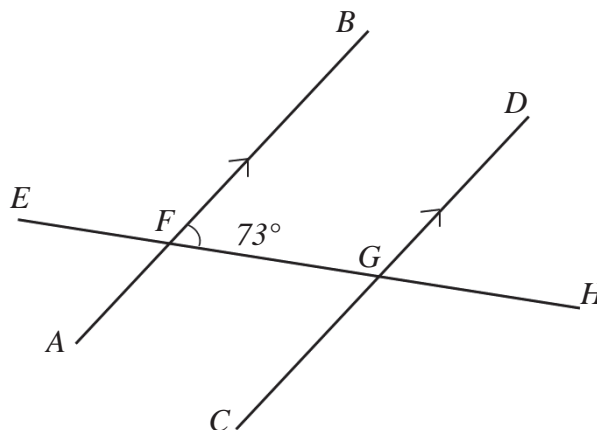


- 4 The melting point and boiling point of oxygen is  $-218.4^{\circ}\text{C}$  and  $-183^{\circ}\text{C}$  respectively.
- (a) Find the difference between these two temperatures.
- (b) Find the temperature that is half way between the boiling point and melting point of oxygen.

Answer (a) .....  $^{\circ}\text{C}$  [1]

(b) .....  $^{\circ}\text{C}$  [1]

- 5 In the diagram below,  $AB$  and  $CD$  are parallel,  $EFGH$  is a straight line, and  $\angle BFG = 73^{\circ}$ .



Calculate with reasons

- (a)  $\angle EFA$ ,  
 (b)  $\angle CGF$ ,  
 (c)  $\angle DGH$ .

Answer (a) .....  $^{\circ}$  [1]

(b) .....  $^{\circ}$  [1]

(c) .....  $^{\circ}$  [1]

For  
Examiner's  
Use

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Examiner's  
Use

- 6 Without using a calculator, evaluate

$$\sqrt{8\frac{1}{3} - 1\frac{2}{9}} \times \sqrt{1.5 + (-2)^2 - \left(-\frac{13}{2}\right) + 4}.$$

Answer ..... [3]

- 7 Simplify the following.

(a)  $1.3ab^3 - 3ba^3 - \frac{11}{3}ab(2a^2 - 6b^2)$

(b)  $5(x - y) + \frac{250}{32}\{5 + 60[4x - 2(6y + 2x)] - \sqrt{25}\}$

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

(b) ..... [3]

- 8** A soccer field has a length of  $(15x + 11)$  m and a breadth of  $8x$  m.  
Given that the breadth is  $\frac{1}{3}$  of the length.

- (a) Write down an equation in terms of  $x$ , connecting the length and breadth of the soccer field.
- (b) Hence, find the value of  $x$ .

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

(b) ..... [2]

- 9** A rectangular board measures 592 cm by 368 cm.  
It is divided into small squares of equal size.
- (a) Find the largest possible length of the side of a square.
- (b) Hence, find the least number of squares.

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

(b) ..... [2]

- 10 Express  $\frac{5x-3}{4} + \frac{3x-1}{3} - \frac{5(x-2)+2}{6}$  as a single fraction in its simplest form.

Answer ..... [3]

- 11 Written as the product of its prime factor,  $825 = 3 \times 5^2 \times 11$ .
- (a) Express 1870 as a product of its prime factors.
  - (b) Find the highest common factor of 825 and 1870.
  - (c) State the smallest integer value of  $p$  such that  $825p$  is a perfect square.
  - (d) State the smallest integer value of  $q$  such that  $\sqrt{825q}$  is a perfect cube. Leave your answer in index notation.

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

(b) ..... [1]

(c) ..... [1]

(d) ..... [1]

- 12** The Lorentz factor or Lorentz term is the factor by which time, length, and relativistic mass change for an object while that object is moving.

The Lorentz factor  $\gamma$  is defined as  $\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$ , where

$v$  is the relative velocity between inertial reference frames, and  $c$  is the speed of light in a vacuum.

- (a) Given that  $v = 253\,000\,000$  m/s and  $c = 300\,000\,000$  m/s, find the value of the Lorentz factor.
- (b) Find the relative velocity,  $v$ , if the Lorentz factor is given as 17.3, and  $c = 300\,000\,000$  m/s.

Give your answers to 3 significant figures.

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

(b) ..... m/s [2]

- 13** Alex has a box of lollipops. When he tries to pack them into packets of 5, 8, or 14, there are 3 lollipops left.

Find the minimum number of lollipops in the box.

Answer ..... [2]

**14** Solve the following equations.

**(a)**  $2[18 - 3(2x - 6)] = 7(2x - 3)$

**(b)**  $y - 2 = \frac{3y - 7}{7}$

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

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

**15 (a)** Factorise  $13(b - c) - 2a(-c + b)$ .

**(b)** Hence, solve without a calculator,  
 $67.8(295 - 121) - (-2 \times 16.1)(-121 + 295)$ .

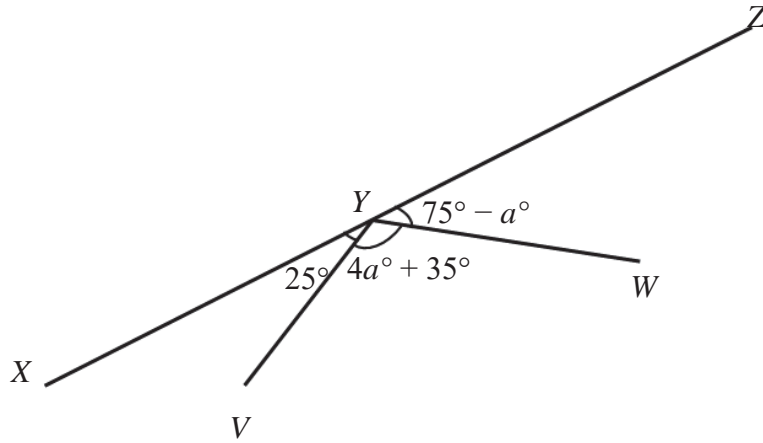
Answer (a) ..... [1]

(b) ..... [2]

**16** In the given figure below,  $XYZ$  is a straight line.

(a) Form an equation in terms of  $a$ .

(b) Hence, find  $\angle WYX$ .



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

(b) .....° [3]

End of Paper ☺

Class	Index No.
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## Secondary One Express

Mid-Year Examination 2017

# 1E

[illegible]

**MATHEMATICS**  
**PAPER 2**

Additional Material: Writing Paper (3)

**DATE:** 4 May 2017

**TIME: 07 50 – 09 20**

**DURATION:** 1 hour 30 min

## READ THESE INSTRUCTIONS FIRST

Write your class, index number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

The use of an approved scientific calculator is expected, where appropriate.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to 3 significant figures. Give answers in degrees to one decimal place.

For  $\pi$ , use either your calculator value of 3.142, unless the question requires the answer in terms of  $\pi$ .

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**.

PARENT'S SIGNATURE		FOR EXAMINER'S USE	
	Units		<b>/ 50</b>
	Statements/Accuracy		
	Poor Presentation		

Setter: Mrs You CG

Vetter: Ms Winnifred Lim

**This question paper consists of 4 printed pages including this page.**

**[Turn Over**



Answer **all** the questions.

1 (a) Given that  $x = \frac{2}{3}$  and  $y = -5$ , find the exact value of  $\frac{2[y^2 - 2(5 - y) + 3xy]}{7x^2}$ . [2]

(b) Express  $\frac{2(x+4)}{7} + x - \frac{x-1}{3}$  as a single fraction. [3]

---

2 (a) Mrs You has 3 school-going children. The product of their 4 ages is 29799.

(i) Express 29 799 in its index notation. [1]

(ii) Hence, write down the possible ages of Mrs You and each of her 3 children. [2]

(b) Uniformed groups of Fuhua Secondary School will form one marching contingent for the Annual Speech Day. It is stated that there must not be any empty spaces within the marching contingent. However, it has not been decided if the participants of the contingent are to march in 4s, 5s or 6s. If 144 members from the Uniformed groups are available for selection, calculate

(i) the maximum possible size of the marching contingent, [2]

(ii) the number of members who will be put on reserve. [1]

---

3 It is given that  $\frac{3}{2}(6a - b) - \frac{ab}{3} - 3(3a - b) = \frac{b(x - 2a)}{y}$ , where  $x$  and  $y$  are integers.

(a) Find the value of  $x$  and of  $y$ . [5]

(b) Is  $xy$  a prime or a composite number? Explain your answer. [1]

(c) Using your answer in (a), find the greatest whole number that will divide  $x$  and  $y$ . [1]

---

4 Due to a shortage of square tiles, an interior designer attempted to use rectangular tiles, each 30 cm long and 24 cm wide, to join together to form a square tile. Given that the cost of each rectangular tile is \$12.50, find

(a) the minimum area, in  $\text{m}^2$ , of 1 square tile formed, [2]

(b) the total cost of all the tiles that are used to form 1 square tile, [1]

(c) the total cost to lay a square floor of area  $576 \text{ m}^2$ . [3]

If square tiles of sides 30 cm were available at \$15.50 each, will it be cheaper to use rectangular tiles or square tiles to lay the floor of the same area? Justify your answer with relevant working and conclusion. [3]

[Turn over]

5 (a) Solve the equation  $1.4p - 5.4 = 3\left(\frac{2}{7}p + 1\right)$ . [3]

(b) If  $R = \frac{x^3 - ay}{3}$ , find the value of  $y$  when  $a = -5$ ,  $x = \frac{1}{2}$  and  $R = 10$ . [3]

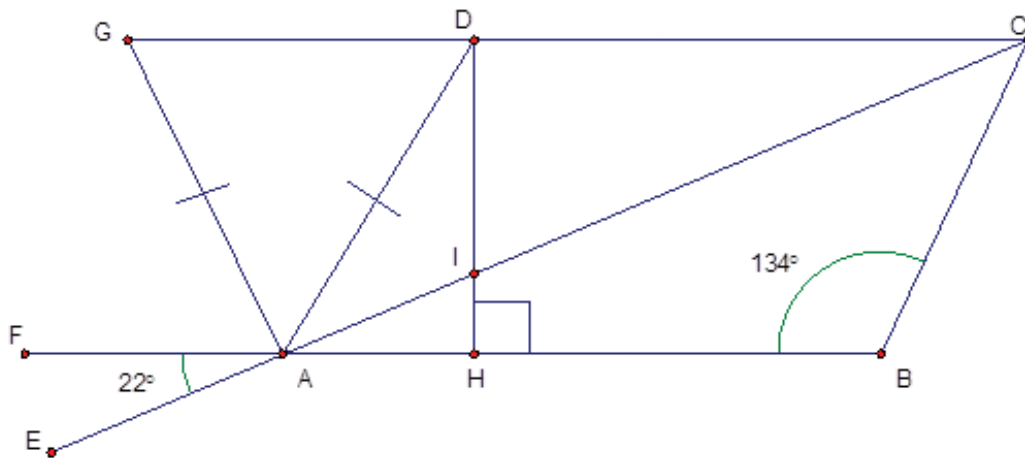
- (c) Mavis picks a number  $A$ . She adds 5 to it then multiplies the sum by 2.  
If 104 is divided by the result, the final answer will be  $-4$ .

By forming an algebraic equation, find the number that Mavis picked. [3]

- 6 The figure shows a parallelogram  $ABCD$ .  $GDC$ ,  $EAC$  and  $FAB$  are straight lines such that triangle  $ADG$  is an isosceles triangle.  $H$  is a point on  $AB$  such that  $DH$  meets  $AC$  at  $I$ .

Given that  $\angle EAF = 22^\circ$  and  $\angle ABC = 134^\circ$ , find

- (a)  $\angle ADH$ , [2]  
 (b)  $\angle DIC$ , [2]  
 (c)  $\angle GAB$ . [3]



- 7 Mrs Tan wants to bring her entire family of 5 to watch a musical at the Esplanade on a Friday as a holiday treat. Her children are 12, 9 and 2 years old respectively.

In order to budget for the trip, she researches the price of the tickets, the parking fee as well as buffet prices.

The information she needs can be found in the list below.

<b>Musical Ticket Pricing</b> <i>(Excludes Booking Fee)</i> VIP Reserve: S\$ 168 A Reserve: S\$ 138 B Reserve: S\$ 108 C Reserve: S\$ 88	
<b>Esplanade Parking Fee</b>	
MON – FRI Before 6 PM	\$2.00 /hr from 6 am to 6 pm Everyday inclusive of Public Holidays
MON – FRI After 6 PM	\$6.00 /entry from 6 pm to 10pm, \$2.00 /entry from 10pm to 6 am the following day everyday inclusive of Public Holidays
SAT	Charges same as Weekdays
SUN / PUBLIC HOLIDAYS	Charges same as Weekdays
High Tea Buffet Mondays to Fridays / Saturdays & Sundays: Adult: \$42 ++ / \$45 ++ Child: \$25 ++ / \$28 ++ (Age: 5 to 12 years old)	
Dinner Buffet Sundays to Thursdays / Fridays & Saturdays: Adult: \$70 ++ / \$80 ++ Child: \$38 ++ / \$40 ++ (Age: 5 to 12 years old)	

- (a) Find the amount of money she needs to pay for 5 ‘B Reserve’ tickets. [1]
- (b) Mrs Tan plans to arrive at the Esplanade at 4.30 pm, have a nice high tea buffet with her family, then take a stroll along the bay before going for the musical from 7.00 pm to 9.30 pm.

Suggest a sensible amount for her total budget using estimation skills and mathematical concepts. Justify the decision you make and show your calculations clearly. [6]

**End of Paper**

*“Doing your best means never stop trying.” – Benjamin Franklin*



## Mark Scheme

<b>1a</b>	0.808670657	A1	
<b>b</b>	0.8087	A1	Allow ECF
<b>2a</b>	$17, \frac{25}{5}$	B1	
<b>b</b>	$\frac{3\pi}{2}, \sqrt[3]{9}, \sqrt{\frac{2}{3}}$	B1	
<b>c</b>	$1, 16, \sqrt{\frac{6^4}{16}}$	B1	
<b>3</b>	$-6.3\dot{4}, -6\frac{1}{3}, -\sqrt[3]{254}, -6.3, -2\pi$	B1	
<b>4a</b>	35.4 °C	B1	
<b>b</b>	-200.7 °C	B1	
<b>5a</b>	$\angle EFA = 73^\circ$ (vert. opp angle)	B1	No mark if no reason
<b>b</b>	$\angle CGF = 73^\circ$ (alt. angles or corr., $AB \parallel CD$ )	B1	
<b>c</b>	$\angle DGH = 73^\circ$ ( $AB \parallel CD$ , corr. Angle) or vert. opp	B1	
<b>6</b>	$\sqrt{8\frac{1}{3} - 1\frac{2}{9}} \times \sqrt{1.5 + (-2)^2 - \left(-\frac{13}{2}\right) + 4}$ $= \sqrt{\frac{25}{3} - \frac{11}{9}} \times \sqrt{1.5 + 4 + \frac{13}{2} + 4}$ $= \sqrt{\frac{25 \times 3 - 11}{9}} \times \sqrt{16}$ $= \sqrt{\frac{64}{9}} \times 4$ $= \frac{8}{3} \times 4$ $= 10\frac{2}{3}$	<p>M1</p> <p>M1</p> <p>A1</p>	<p>Change to improper fraction <b>or</b> change <math>(-2)^2</math> to <math>+4</math></p> <p>Must show <math>\sqrt{\frac{64}{9}}</math></p> <p>At least 1 M1 to gain the final A1 (Must not have any mathematical error)</p>

<b>7a</b>	$1.3ab^3 - 3ba^3 - \frac{11}{3}ab(2a^2 - 6b^2)$ $= 1.3ab^3 - 3a^3b - \frac{22}{3}a^3b + 22ab^3$ $= 23.3ab^3 - 10\frac{1}{3}a^3b$	B1 B1	Expand with correct sign.
<b>b</b>	$5(x-y) + \frac{250}{32} \{5 + 60[4x - 2(6y + 2x)] - \sqrt{25}\}$ $= 5x - 5y + \frac{250}{32} \{5 + 60[4x - 12y - 4x] - 5\}$ $= 5x - 5y + \frac{250}{32} [60(-12y)]$ $= 5x - 5y + \frac{250}{32} [-720y]$ $= 5x - 5y - 5625y$ $= 5x - 5630y$	B1  B1 B1	Expand inner bracket with correct sign.  Simplify to -720y or remove all brackets
<b>8a</b>	$8x = \frac{1}{3}(15x + 11)$	B1	
<b>b</b>	$8x = 5x + \frac{11}{3}$ $3x = \frac{11}{3}$ $x = \frac{11}{9}$	B1 B1	
<b>9a</b>	HCF = 16 Largest possible length of a square = 16 cm	B1 B1	
<b>b</b>	No. of sq = $(592 \times 368) / 16^2$ = 851	M1 A1	
<b>10</b>	$\frac{5x-3}{4} + \frac{3x-1}{3} - \frac{5(x-2)+2}{6}$ $= \frac{3(5x-3) + 4(3x-1) - 2[5(x-2)+2]}{12}$ $= \frac{15x-9+12x-4-2(5x-10+2)}{12}$ $= \frac{15x-9+12x-4-10x+16}{12}$ $= \frac{17x+3}{12}$	M1  M1 A1	Combining into a single fraction, or fractions with common denominator Remove all brackets
<b>11</b>	$1870 = 2 \times 5 \times 11 \times 17$	B1	
<b>a</b>	$HCF = 5 \times 11$		
<b>b</b>	$= 55$	B1	
	$p = 3 \times 11 = 33$	B1	
<b>c</b>	$q = 3^5 \times 5^4 \times 11^5$	B1	

<b>d</b>			
<b>12</b>	1.860843116 or 1.86 (to 3 sf)	B1	Show sub.
<b>a</b>		B1	
<b>b</b>	299498394.5 or $2.99 \times 10^8$ m/s	B1	Show sub.
		B1	
<b>13</b>	$LCM = 5 \times 2^3 \times 7$		
<b>a</b>	$= 280$	B1	
	min. no. = 283	B1	
<b>14</b>	$2[18 - 3(2x - 6)] = 7(2x - 3)$		
<b>a</b>	$2(18 - 6x + 18) = 14x - 21$		
	$2(36 - 6x) = 14x - 21$		
	$72 - 12x = 14x - 21$	B1	Remove brackets
	$-26x = -93$		
	$x = 3\frac{15}{26} \text{ or } \frac{93}{26}$	B1	
<b>b</b>	$y - 2 = \frac{3y - 7}{7}$		
	$7y - 14 = 3y - 7$	B1	Remove fraction
	$4y = 7$		
	$y = 1\frac{3}{4} \text{ or } \frac{7}{4}$	B1	
<b>15</b>	$13(b - c) - 2a(-c \pm b)$		
<b>a</b>	$= (b - c)(13 - 2a)$	B1	
<b>b</b>	$67.8(295 - 121) - (-2 \times 16.1)(-121 + 295)$		
	$= (295 - 121) \times [67.8 - (-2 \times 16.1)]$		
	$= (174) \times (67.8 + 32.2)$	M1	
	$= 174 \times 100$		
	$= 17400$	A1	
<b>16</b>			
<b>a</b>	$25 + (4a + 35) + (75 - a) = 180$	B1	
<b>b</b>	$135 + 3a = 180$		
	$3a = 45$	B1	
	$a = 15$	B1	
	Angle WYX = $4(15) + 35 + 25$		
	$= 120^\circ$	B1	





Answer **all** the questions.

1 (a) Given that  $x = \frac{2}{3}$  and  $y = -5$ , find the exact value of  $\frac{2[y^2 - 2(5 - y) + 3xy]}{7x^2}$ . [2]

(b) Express as a single fraction.

$$\frac{2(x+4)}{7} + x - \frac{x-1}{3} \quad [3]$$


---

(a)

$$\frac{2[y^2 - 2(5 - y) + 3xy]}{7x^2} = \frac{2\left[(-5)^2 - 2(5 - (-5)) + 3\left(\frac{2}{3}\right)(-5)\right]}{7\left(\frac{2}{3}\right)^2} \quad \text{M1 - Substitution}$$

$$= -\frac{51}{14}$$

$$= -3\frac{3}{14}$$

A1

$$\frac{2(x+4)}{7} + x - \frac{x-1}{3} = \frac{3(2x+8) + 21x - 7(x-1)}{21}$$

M1 – common denominator

M1 – Expansion and simplify numerator

(b)

$$= \frac{6x + 24 + 21x - 7x + 7}{21}$$

$$= \frac{20x + 31}{21}$$

A1

- 
- 2 (a) Mrs You has 3 school-going children. The product of herself and her 3 children is 29799.
- (i) Find the age of Mrs You. [2]
- (ii) Find the possible ages of the 3 children. [1]
- (b) Uniform groups of Fuhua Secondary School will form one marching contingent for the Annual Speech Day. It is stated that there must not be any empty spaces within the marching contingent. However, it has not been decided if the participants of the contingent are to march in 4s, 5s or 6s. If 144 members from the Uniform groups are available for selection, calculate
- (i) the maximum possible size of the marching contingent, [2]
- (ii) the number of member who will be put on reserve. [1]
- 

3

(a) (i)

$$29799 = 3^2 \times 7 \times 11 \times 43 \quad \text{A1}$$

Therefore, Mrs You is 43 years old. Her children are 7, 9 and 11 years old.

(b)

A1 – for 3 ages

A1 - 9 years old)

$$4 = 2^2$$

$$5 = 5$$

$$6 = 2 \times 3$$

$$\text{LCM} = 2^2 \times 3 \times 5 = 60 \quad \text{A1 - LCM}$$

$$\text{Maximum no. of members in the marching contingent} = 120 \quad \text{A1}$$

$$\text{No. of member on reserve} = 144 - 120 = 24 \quad \text{A1}$$

---

3 It is given that  $\frac{3}{2}(6a-b) - \frac{ab}{3} - 3(3a-b) = \frac{b(x-2a)}{y}$ , where  $x$  and  $y$  are integers.

- (a) Find the value of  $x$  and of  $y$ . [5]  
 (b) Is  $xy$  a prime or a composite number? Explain your answer. [1]  
 (c) Using your answer in (a), find the greatest whole number that will divide  $x$  and  $y$ . [1]
- 

(a)

$$\frac{3}{2}(6a-b) - \frac{ab}{3} - 3(3a-b)$$

$$= 9a - \frac{3}{2}b - \frac{ab}{3} - 9a + 3b \quad \text{M1 – expansion of 2 brackets}$$

$$= \frac{3b}{2} - \frac{ab}{3} \quad \text{M1 – simplifying like terms}$$

$$= \frac{3(3b) - 2ab}{6} \quad \text{M1 – common denominator}$$

$$= \frac{9b - 2ab}{6}$$

$$= \frac{b(9-2a)}{6} \quad \text{M1 – factorisation} \quad \text{Or M1- also award for those who expanded the RHS and compared the terms.}$$

$$= \frac{b(x-2a)}{y}$$

$$\therefore x = 9 \quad y = 6 \quad \text{A1 for both correct answers}$$

(b)  $xy = 54$ .

It is not a prime number because it has **more than 2 factors**.

A1 – need to show  $xy$  so that it answers to the context of the question.

(c)  $x = 3^2$

$$y = 3 \times 2$$

$$\text{HCF} = 3$$

Largest whole number that will divide  $x$  and  $y = 3$  A1

- 4 Due to a shortage of square tiles, Mr Lim, an interior designer attempted to use rectangular tiles, each 30 cm long and 24 cm wide, to join together to form a square tile. Given that the cost of each rectangular tile is \$12.50, find

(a) the minimum area of 1 square tile formed in square metres. [2]

(b) the total cost of all the tiles that are used to form 1 square tile. [1]

(c) the total cost to lay a square floor of area 576 m<sup>2</sup>. [3]

If 30 cm square tiles were available at \$15.50 each. Is it cheaper to use rectangular tiles or square tiles to lay the floor of the same area? Justify your answer with relevant working and conclusion. [3]

(a)

$$30 = 2 \times 3 \times 5$$

$$24 = 2^3 \times 3$$

$$\text{LCM} = 2^3 \times 3 \times 5 = 120 \text{ cm} = 1.2 \text{ m} \quad \text{M1 - LCM}$$

$$\text{Min. Area of 1 square tile formed} = 1.2^2 = 1.44 \text{ m}^2 \quad \text{A1}$$

(b)

$$\text{No. of tiles used} = \frac{120}{30} \times \frac{120}{24} = 4(5) = 20$$

$$\text{Cost to form one square tile} = 20 (\$12.50) = \$250 \quad \text{A1}$$

$$\text{(c) Length of floor} = \sqrt{576} = 24 \quad \text{M1}$$

$$\text{No. of square tiles needed} = \left( \frac{24}{1.2} \right)^2 = 400 \quad \text{M1}$$

$$\text{Total Cost} = 400 (250) = \$100\,000 \quad \text{A1}$$

$$\text{No. of 30 cm square tiles} = \left( \frac{24}{0.3} \right)^2 = 6400 \quad \text{M1}$$

$$\text{Total Cost} = 6400(15.50) = \$99\,200 \quad \text{M1}$$

$$\text{Difference} = 100\,000 - 99\,200 = 800$$

It is cheaper to use the square tiles for an area of 576 m<sup>2</sup> by \$800.

A1 – justification of that it is cheaper to use square tiles for the same area. Justify with either actual cost or the difference in the value.

5

(a) Solve the equation  $1.4p - 5.4 = 3\left(\frac{2}{7}p + 1\right)$ . [3]

(b) If  $R = \frac{x^3 - ay}{3}$ , find the value of  $y$  when  $a = -5$ ,  $x = \frac{1}{2}$  and  $R = 10$ . [3]

(c) Mavis picks of a number  $A$ . She adds 5 to it then multiples the sum by 2. [3]  
If 104 is divided by the results, the final answer will be  $-4$ .

Using algebraic method, find the number that Mavis picked.

(a)

$$1.4p - 5.4 = 3\left(\frac{2}{7}p + 1\right)$$

$$1.4p - 5.4 = \frac{6}{7}p + 3 \quad \text{M1 - expansion}$$

$$1.4p - \frac{6}{7}p = 3 + 5.4$$

$$\frac{19}{35}p = \frac{42}{5} \quad \text{M1 - simplifying like terms}$$

$$p = \frac{42}{5} \div \frac{19}{35}$$

$$= 15\frac{9}{19} \quad \text{A1}$$

$$R = \frac{x^3 - ay}{3}$$

$$10 = \frac{\left(\frac{1}{2}\right)^3 - (-5)y}{3} \quad \text{M1 - Substitution}$$

(b)  $30 = \frac{1}{8} + 5y$

$$\frac{239}{8} = 5y \quad \text{M1 - multiply both side by 3 and } -1/8 \text{ to achieve this line}$$

$$\frac{239}{40} = y$$

$$y = 5\frac{39}{40} \quad \text{A1}$$

$$\frac{104}{2(A+5)} = -4$$

M1 – Form Equation

$$104 = -8(A+5)$$

(c)  $104 = -8A - 40$

$$144 = -8A$$

$$A = \frac{144}{-8}$$

M1 – solving for A

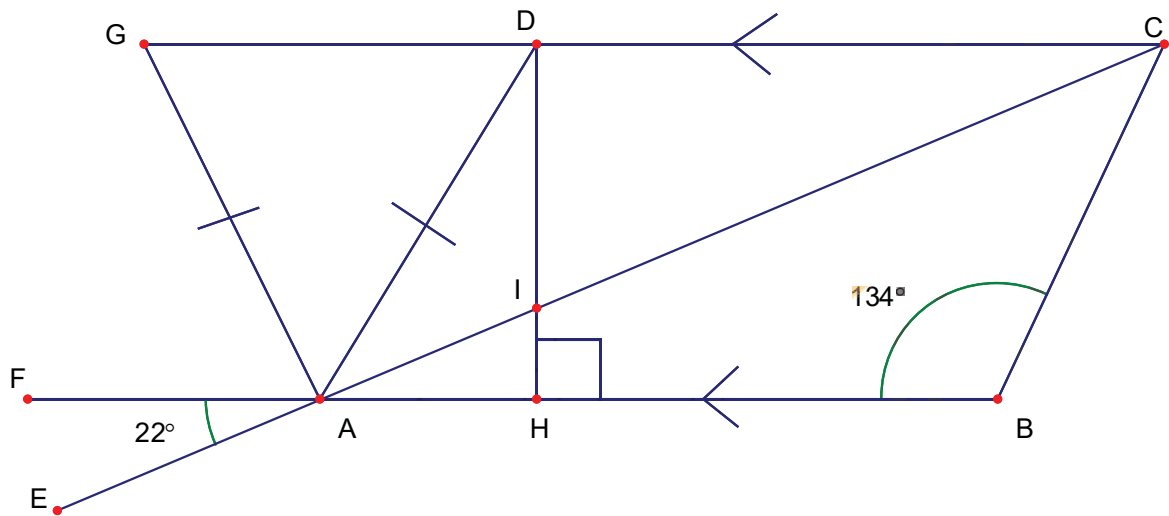
$$= -18$$

The number Mavis picked is -18

A1 – must have statement

- 7 The figure shows a parallelogram  $ABCD$ .  $GDC$ ,  $EAC$  and  $FAB$  are straight lines such that triangle  $ADG$  is an isosceles triangle.  $H$  is a point on  $AB$  such that  $DH$  meets  $IAC$  at  $F$ . Given that  $\angle EAF = 22^\circ$  and  $\angle ABC = 134^\circ$ , find

- (a)  $\angle ADH$  [2]  
 (b)  $\angle DIC$  [2]  
 (c)  $\angle GAB$  [3]



- (a)  $\angle ADC = 180^\circ - 134^\circ = 46^\circ$  (int  $\angle$ s,  $AD \parallel BC$ ) M1  
 $\angle ADH = 180^\circ - 90^\circ - 46^\circ = 44^\circ$  (  $\angle$  sum of  $\Delta$ ) A1

- (b)  $\angle CAB = 22^\circ$  ( vert opp  $\angle$ s) M1  
 $\angle AIH = 180^\circ - 22^\circ - 90^\circ = 68^\circ$   
 $\angle DIC = 68^\circ$  ( vert opp  $\angle$ s) A1

- (c)  $\angle GDA = 180^\circ - 44^\circ - 90^\circ = 46^\circ$  (adj  $\angle$ s of a str. line)  
 $\angle GAD = 180^\circ - 2(46^\circ) = 88^\circ$  ( base  $\angle$ s of isos triangle) M1  
 $\angle DAB = 180^\circ - 134^\circ = 46^\circ$  (Int  $\angle$ s,  $AB \parallel CD$ ) M1  
 $\angle GAB = 46^\circ + 88^\circ = 134^\circ$  A1

- 8 Mrs Tan wants to bring her entire family of 5 to watch a musical at the Esplanade on Friday the 13th as a holiday treat. Her children are 12, 9 and 2 years old respectively.

In order to budget for the trip, she researches the price of the tickets, the parking fee as well as buffet high tea.

The information she needs can be found in the list below.

<b><u>Musical Ticket Pricing</u></b> <i>(Excludes Booking Fee)</i> VIP Reserve: S\$ 168 A Reserve: S\$ 138 B Reserve: S\$ 108 C Reserve: S\$ 88	
<b><u>Esplanade Parking Fee</u></b>	
MON – FRI Before 6 PM	\$2.00 /hr from 6 am to 6 pm Everyday inclusive of Public Holidays
MON – FRI After 6 PM	\$6.00 /entry from 6 pm to 10pm, \$2.00 /entry from 10pm to 6 am the following day everyday inclusive of Public Holidays
SAT	Charges same as Weekdays
SUN / PUBLIC HOLIDAYS	Charges same as Weekdays
High Tea Buffet Monday to Friday / Saturday & Sunday: Adult: \$42 ++ / \$45 ++ Child: \$25 ++ / \$28 ++ (Age: 5 to 12 years old)	
Dinner Buffet Sunday to Thursday / Friday & Saturday: Adult: \$70 ++ / \$80 ++ Child: \$38 ++ / \$40 ++ (Age: 5 to 12 years old)	

- (a) Find the amount of money she needs to pay for 5 ‘B Reserve’ tickets. [1]
- (b) Mrs Tan plans to arrive at the Esplanade at 4.30 pm, have a nice buffet dinner with her family, then take a stroll along the bay before going for the musical from 7.00 pm to 9.30 pm. [6]

Suggest a sensible amount for her total budget using estimation skills and mathematical concepts. Justify the decision you make and show your calculations clearly.



(a)

Cost of 5 tickets =  $108 (5) = \$ 540$       A1

(b)

Parking Charges =  $2 (2) + 6 = \$ 10$       M1

Estimate cost of 1 Adult  $\approx \$50$       M1 – estimation

Estimate cost of 1 child  $\approx \$ 30$       M1 – estimation

Estimated cost of the high tea  $\approx 2(50) + 2(30) = \$160$       M1 – only 2 child required to pay

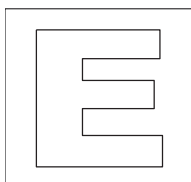
Amount of budget =  $\$10 + \$160 + 540 = \$710$       A1

She should budget \$ XXX\*\* in order to **cover all the cost required for the trip.**

A1 – justify the answer. It is not sufficient to just state the budget without justification.

\*\*Accept variety of answer greater than \$710.





**GAN ENG SENG SCHOOL**  
**End-of-Year Examination 2017**



**CANDIDATE  
NAME**

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**CLASS**

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**INDEX  
NUMBER**

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**MATHEMATICS**

Paper 1

**09 October 2017**  
**1 hour**

**Sec 1 Express**

Candidates answer on the Question Paper.

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**READ THESE INSTRUCTIONS FIRST**

Write your class, index number and name on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
You may use a soft pencil for any diagrams or graphs.  
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

Answer **all** questions.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

**THE USE OF ELECTRONIC CALCULATORS IS NOT ALLOWED.**

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.

Give answers in degrees to one decimal place.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 50.

	For Examiner's Use
Total	50

Answer **all** the questions

For  
Examiner's  
Use

**1** Consider the following numbers and expressions

$$4, \sqrt{3}, \frac{\pi}{\pi}, -3, \sqrt{49},$$

Write down **all**

- (a) the perfect square(s),
- (b) the prime number(s),
- (c) the irrational number(s).

Ans: (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ [1]

**2** Evaluate the following.

$$1\frac{2}{3} \div \left( 2\frac{1}{3} - \sqrt[3]{27} \right)$$

Ans: \_\_\_\_\_ [3]

- 3 (a) Given  $x = 60$  and  $y = 2 \times 3^2 \times 5^3 \times 7^2$ , find the lowest common multiple of  $x$  and  $y$  in index notation.

Ans: \_\_\_\_\_ [2]

- (b) Given  $2 \times 3^2 \times 4 \times 5^3 \times k$  is a perfect cube, find the smallest value of  $k$ .

Ans: \_\_\_\_\_ [1]

- 4 Estimate the value of  $\frac{\sqrt{63} - 4.03}{99.68}$ .

Ans: \_\_\_\_\_ [2]

- 5 (a) Express  $\frac{2a+b}{3} + \frac{a-b}{5}$  as a single fraction.

For  
Examiner's  
Use

Ans: \_\_\_\_\_ [2]

- (b) Find the value of  $\frac{xy+y}{y-x}$  when  $x = -1$  and  $y = 2$ .

Ans: \_\_\_\_\_ [2]

- 6 The price of a plate of chicken chop is twice the price of a bowl of fishball noodles. The bowl of fishball noodles costs \$2 more than a can of soft drink, which costs \$ $p$ .
- (a) Express the price of a bowl of fishball noodles in terms of  $p$ .
- (b) Hence, express the price a plate of chicken chop in terms of  $p$ .

Ans: (a) \$ \_\_\_\_\_ [1]

(b) \$ \_\_\_\_\_ [1]

- 7 Factorise the expression  $2ab + 4a - 4ab$  completely.

Ans: \_\_\_\_\_ [2]

- 8 Solve the equation  $\frac{2}{y} = \frac{4}{3y-1}$ .

Ans:  $y =$  \_\_\_\_\_ [2]

- 9 (a) Given that  $5c = 2d$ , write down the ratio  $c : d$ .  
(b) Hence, find the ratio of  $c^3 : d^2$ .

For  
Examiner's  
Use

Ans: (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [1]

- 10 Find the smallest integer that satisfies the inequality  $3q > 5 - q$ .

Ans: \_\_\_\_\_ [2]



- 11** The general term of a sequence is  $T_n = n(n+1)$ .
- (a) Write down the first 4 terms of the sequence
  - (b) The first 4 terms of another sequence are 1, 3, 6, 10.
    - (i) Suggest a formula for the general term of the new sequence.
    - (ii) Find the 10<sup>th</sup> term of the new sequence

Ans: (a) \_\_\_\_\_ [2]

(b)(i) \_\_\_\_\_ [1]

(ii) \_\_\_\_\_ [1]

**12** Amelia is currently subscribed to a mobile data plan from telco M2 which charges her a constant rate according to how much data she uses. In a month, she used 4 Giga Bytes (GB) of data and was billed a fee of \$30. (1GB = 1000MB)

- (a) What is the cost of data per GB for the data plan from M2?
- (b) Another telco Songtel offers a different data plan which charges 0.7 cents/MB of data for the first 3GB, and 0.8 cents/MB for any additional data used. Her current data plan is up for renewal. If she continues to use 4GB of data per month, should she continue her plan with M2 or should she switch to Songtel? Explain your answer with relevant data.

Ans: (a) \$ \_\_\_\_\_/GB [1]

(b) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

- 13** Aloysius made a custom guitar for \$1500. He sells it to Zachary at a profit of 40%. Zachary in turn sells it to a purchaser for \$2625.
- (a) How much did Zachary pay Aloysius for the guitar?
- (b) Find Zachary's percentage profit.

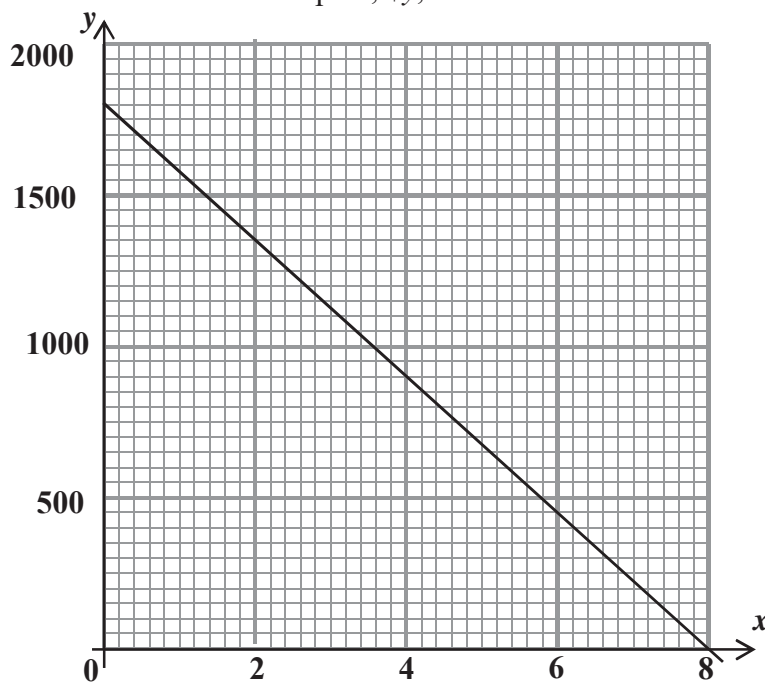
*For  
Examiner's  
Use*

Ans: (a) \_\_\_\_\_ [1]

(b) \_\_\_\_\_% [2]

- 14 Kaisah bought the new uPhone X for \$1800. She pays for it by monthly instalments. The total amount still needed to be paid, \$ $y$ , after  $x$  months is shown in the graph.

For  
Examiner's  
Use



- (a) State what the  $x$ -intercept and the  $y$ -intercept represent in the question.

Ans: \_\_\_\_\_

\_\_\_\_\_ [2]

- (b) Find the gradient of the graph.

Ans: \_\_\_\_\_ [1]

- (c) What does the gradient of the graph represent?

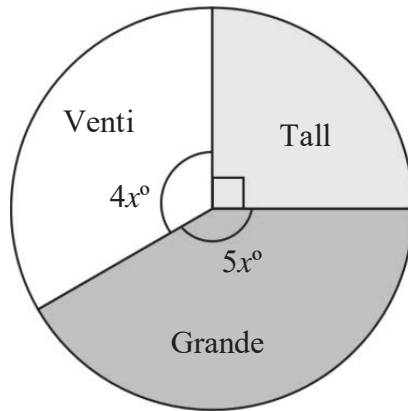
Ans: \_\_\_\_\_ [1]

- (d) State the amount of money that is left to pay in the 6<sup>th</sup> month.

Ans: \$ \_\_\_\_\_ [1]

- 15** The café Moonbucks sells its coffee in three sizes, Tall, Grande and Venti. The pie chart represents the number of cups for each size sold on a particular day. The total number of cups sold was 120. Find

*For  
Examiner's  
Use*



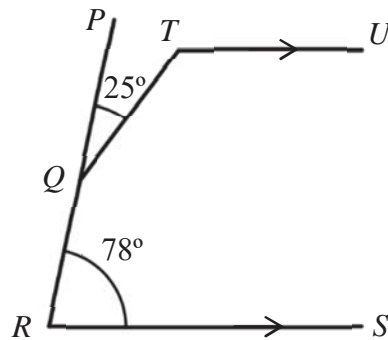
- (a) the value of  $x$ ,  
 (b) the percentage of Grande cups of coffee sold.

Ans: (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ % [2]

- 16 In the diagram below,  $TU$  is parallel to  $RS$ , and  $PQR$  is a straight line.  $\angle QRS = 78^\circ$  and  $\angle PQT = 25^\circ$ . Find reflex  $\angle QTU$ , stating your reasons clearly.

For  
Examiner's  
Use



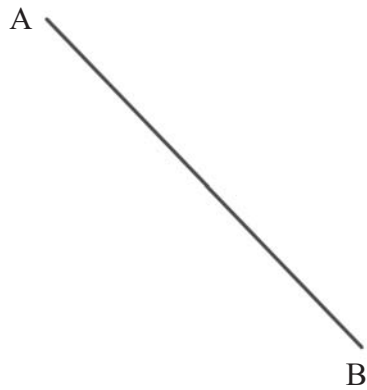
Ans: \_\_\_\_\_  $^\circ$  [3]

- 17 (a) Construct  $\triangle ABC$  with  $AB = 6$  cm,  $BC = 9$  cm, and  $AC = 7.5$  cm.

$AB$  has already been drawn.

- (b) Construct

- (i) The perpendicular bisector of  $AB$ .  
(ii) The bisector of angle  $ABC$ .



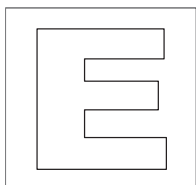
Ans: (a) Draw in space above [1]

(b)(i) Draw in space above [1]

(ii) Draw in space above [1]

**END OF PAPER**

For  
Examiner's  
Use



**GAN ENG SENG SCHOOL**  
**End of Year Examination 2017**



**CANDIDATE  
NAME**

**CLASS**

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**INDEX  
NUMBER**

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**MATHEMATICS**

Paper 2

**10 October 2017**  
**1 hour 15 minutes**

**Sec 1 Express**

Additional Materials: Writing Paper  
Graph Paper

---

**READ THESE INSTRUCTIONS FIRST**

Write your class, index number and name on all the work you hand in.  
Write in dark blue or black pen on both sides of the paper.  
You may use a soft pencil for any diagrams or graphs.  
Do not use staples, paper clips, highlighters, glue or correction fluid/tape.

Answer **all** questions.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

Calculators should be used where appropriate.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 50.

	<b>For Examiner's Use</b>
<b>Total</b>	<div></div> <div><b>50</b></div>



Answer **all** the questions.

1 Evaluate

$$-\frac{14.72 + 1.2}{\frac{15}{4} \div \left(-\frac{8}{5}\right)}$$

leaving your answer to

(a) 1 decimal place, [1]

(b) 4 significant figures. [1]

---

2 (a) Express 42 875 as a product of its prime factors. [1]

(b) Hence, evaluate  $\sqrt[3]{42\,875}$ . [1]

---

3 Ms. Chu bought 80 correction tapes, 480 highlighters and 120 blue pens. She wants to pack all the stationery into identical gift packs to make as many gift packs for this year's Youth Day Celebration.

(a) Calculate the greatest number of gift packs. [2]

(b) The other Secondary 1 form teachers would like to make the same gift pack for their classes. Using your answer in (a), calculate the number of blue pens required for this year's Youth Day Celebration. You may assume that each class has exactly 40 students and there are 7 classes in the Secondary 1 cohort. [2]

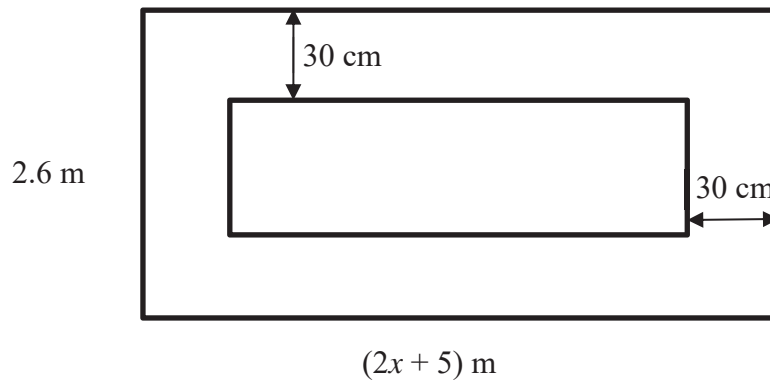
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- 4 The End-Of-Year Examination for a language paper consists of 3 papers.

Paper	Weighting (%)
1	$2x - y + 10$
2	$3y - 2x - 6$
3	?
Total	100

- (a) Find an expression in terms of  $x$  and  $y$  for the weighting of Paper 3. [2]
- (b) If the weighting for Paper 3 is 30%, find the value of  $y$ . [2]

- 5 An artist uses a rectangular canvas which measures  $(2x + 5)$  m by 2.6 m. She leaves a border of 30 cm along the edges of the canvas as shown in the diagram below.

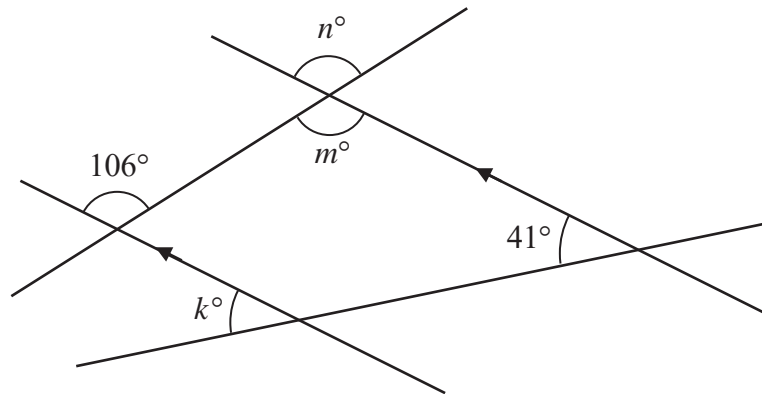


- (a) Show that the area of the canvas can be expressed as  $(5.2x + 13) \text{ m}^2$ . [1]
- (b) Given that the area is  $44.2 \text{ m}^2$ , find the length of the canvas. [3]
- (c) Find the area of the border. [2]

- 6 Find the values of the unknown angles in the diagram below.

State your reasons clearly.

[3]



- 7 5 interior angles in a heptagon are  $130^\circ$  each. The remaining 2 angles are in the ratio of 1:4. Find the largest exterior angle of this heptagon.

[3]

- 8 Janel was cycling at an average speed of 12 km/h for 36 minutes before cycling over a pothole and falling down. She spent 10 minutes resting before cycling 5 km back home in 25 minutes. Calculate

(a) the distance travelled, in km, before she fell down,

[2]

(b) the average speed, in km/h, for the whole journey.

Leave your answer to 3 significant figures.

[3]

- 9 Table 1 shows the weekly basic earnings by a driver from *GrubCar* using a *Grub* rental car, a personal car and a vehicle from other car rental companies. *Grubcar* provides private hire cars and ride hailing services.

Source of car	Weekly Earnings (if at least 10 trips have been completed in 1 week)
<i>Grub</i> Rentals	\$500
Your personal car	\$150
Other car rental companies	\$100

Table 1

Table 2 shows the \*incentives that a *GrubCar* driver will earn for the month of September 2017.

Target (total trips in September 2017)	From <i>Grub</i> Rentals or if you use your personal car
170 trips and above	\$450
140 – 169 trips	\$340
100 to 139	\$225
70 – 99 trips	\$175
40 – 69 trips	\$100

Table 2

- (a) Mr. Lee just joined *GrubCar* as a driver. Upon signing the agreement, he realised that 20% of his total earnings (weekly basic earnings with incentives) will be taken by *GrubCar*. Calculate the deduction in Mr. Lee's salary if his salary was \$1 840 in September.

[2]

\*Incentives: A reward that makes one work harder for.

- (b) Mr. Tan, another *GrubCar* driver said the following statement to Mr. Lee.

*“A GrubCar driver may earn \$4 000 as his total earnings for the month of September.”*

Use the information given in Table 1 and Table 2 to justify if Mr. Tan’s statement is accurate.

Note: You may assume that the month of September has 4 weeks.

[4]

- 
- 10 *HiLo*, a beverage drink company conducted a survey to find out how many times a person consumes its Cheese Tea drink in one month.

<b>No. of times</b>	0	1	2	3	4	$\geq 5$
<b>Frequency</b>	15	19	27	$x$	5	4

- (a) Describe the meaning of the first column in the table. [1]

<b>No. of times</b>	0
<b>Frequency</b>	15

- (b) Write down the value of  $x$  if 100 people had participated in this survey. [2]

- (c) Express the number of people who consumes at least 5 times or more as a percentage of the total number of people who consumed at most 2 Cheese Tea drinks in one month. [2]  
Leave your answer to 3 significant figures.
-

11 **Answer this entire question on a piece of graph paper.**

The table below shows some values of  $x$  and the corresponding values of  $y$  for the linear function  $y = -3x + 4$ .

$x$	$-2$	$0$	$4$
$y$	$a$	$4$	$b$

- (a) Find the values of  $a$  and of  $b$ . [2]
- (b) Using a scale of 2 cm to 1 unit for on the  $x$ -axis and 1 cm to 1 unit for the  $y$ -axis, draw the graph for the linear function  $y = -3x + 4$  for  $-2 \leq x \leq 4$ . [3]
- (c) Using your graph, find the value of  $x$  when  $y = 1$  for  $y = -3x + 4$ . [1]
- (d) (i) On the same axes, draw a straight line that passes through the points  $(1, 2)$  and  $(-1, -4)$ . [1]
- (ii) Hence, find the intersection point of the 2 lines. [1]
- (e) Find the gradient of the straight line drawn in (d)(i). [2]

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**END OF PAPER**



1	(a)	$4, \pi/\pi$	17	<div style="text-align: center;">C</div> <div style="text-align: center;">A</div> <div style="text-align: center;">B</div> <p>(a) Triangle ABC drawn, labelled and with correct dimensions (angles <math>\pm 1^\circ</math>, length <math>\pm 0.1\text{cm}</math>), with construction lines shown</p> <p>(bi) Perpendicular bisector of <math>AB</math> properly constructed with construction lines shown</p> <p>(bii) Angle bisector of angle <math>ABC</math> properly constructed with construction lines shown</p>
	(b)	$\sqrt{49}$		
	(b)	$\sqrt{3}$		
2		$-2\frac{1}{2}$		
3	(a)	$LCM = 2^2 \times 3^2 \times 5^3 \times 7^2$		
	(b)	$k = 3$		
4		$0.04 \text{ or } \frac{1}{25}$		
5	(a)	$\frac{13a + 2b}{15}$		
	(b)	0		
6	(a)	$\$(p + 2)$		
	(b)	$\$2(p + 2)$ <b>OR</b> $\$(2p + 4)$		
7	(a)	$-2a(b2)$ <b>OR</b> $2a(-b + 2)$		
8		$y = 1$		
9	(a)	$c:d = 2:5$		
	(b)	8: 25		
10		2		
11	(a)	$T_1 = 2$ $T_2 = 6$ $T_3 = 12$ $T_4 = 20$		
	(bi)	$T_n = \frac{n(n+1)}{2}$		
	(bii)	55		
12	(a)	$\$7.50/GB$		
	(b)	Ans: <u>She should switch to Songtel as it is cheaper for 4GB of data</u> (\$29) compared to M2 (\$30)		
13	(a)	\$2100		
	(b)	25%		
14	(a)	$x$ -intercept: Number of instalments <b>OR</b> Number of months to finish payment $y$ -intercept: price of the uPhone		
	(b)	-225		
	(c)	Monthly instalment of \$225		
	(d)	\$450		
15	(a)	$x = 30$		
	(b)	$41\frac{2}{3}\%$		
16		$\text{Reflex } \angle QTU = 233^\circ$		



**FINAL ANSWERS**

1(a)	6.8	1(b)	6.793
2(a)	$5^3 \times 7^3$	2(b)	35
3(a)	40	3(b)	840
4(a)	$96 - 2y$	4(b)	33
5(a)	Area $= 2.6(2x + 5)$ $= (5.2x + 13) m^2$ (shown)	5(b)	17
6	$k^\circ = 41$ (corr. angles) $m^\circ = 106$ (alt. angles) $n^\circ = 106$ (vert. opp. angles)	7	$130^\circ$
8(a)	7.2 km	8(b)	10.3 km/h
9(a)	\$368	9(b)	NIL
10(a)	It means that 15 people who were surveyed have not tried HiLo's Cheese Tea	10(c)	6.55%
11(a)	$a = 10$ $b = -8$	11(b)	Last page of answers.
11(c)	$x = 1$	11d(i)	NIL
11(d)(ii)	(0.8, 1.5)	11(e)	3





# Geylang Methodist School (Secondary)

## Mid-Year Examination 2017

Candidate  
Name

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Class

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Index Number

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### MATHEMATICS

Paper 1

**1 Express**

Candidates answer on the Question Paper.

**1 hour**

**Setter :** Ms Tan Kai Wei

**4 May 2017**

### 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, 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 for this paper.**

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
<div style="text-align: right; font-size: 2em; font-weight: bold;">50</div>

- 1** Consider the following numbers

$$4\frac{1}{2}, 0, \frac{\pi}{2}, 17, \sqrt{5}, -3$$

Write down all

- (a) prime number(s),  
 (b) irrational number(s).

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

(b) ..... [1]

- 2** Given that  $792 = 2^3 \times 3^3 \times 11$  and  $360 = 2^3 \times 3^2 \times 5$ , find

- (a) the highest common factor of 792 and 360,  
 (b) the smallest integer  $k$ , such that  $360k$  is a perfect square.

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

(b) ..... [2]

- 3 Evaluate  $\sqrt[3]{1728}$  by prime factorisation.

*Answer* ..... [3]

---

- 4 Given that  $x = -2$  and  $y = 3$ , evaluate  $\frac{3x^2}{2x - xy}$ .

*Answer* ..... [2]

---

**5** Evaluate the following expressions, leaving your answer in its simplest form.

**(a)**  $\sqrt[3]{-8} + 8$

**(b)**  $5 - (-5)^2 + (-3) \times (-2)^3$

**(c)**  $-3\frac{2}{9} + 1\frac{1}{2}$

**(d)**  $-\frac{6}{7} + \frac{3}{4} \times \frac{8}{15}$

<i>Answer</i>	(a)	.....	[1]
	(b)	.....	[2]
	(c)	.....	[2]
	(d)	.....	[3]

- 6 (a) Express  $6\frac{3}{4}\%$  as a fraction in its simplest form.
- (b) Express 25 cents as percentage of \$5.

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

---

- 7 By rounding each number off to 1 significant figure, estimate the value of  
 $19.76 - \sqrt{8.99} \times 3.65$ .

Show your working clearly.

*Answer* ..... [2]

---

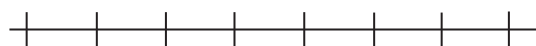
8 It is given that  $2(x-3) > 8$ .

(a) Solve the inequality.

(a) ..... [2]

(b) Represent the solution on the given number line.

*Answer (b)*



[1]

(c) Hence write down the smallest possible value of  $x$  if

(i)  $x$  is a prime number,

(ii)  $x$  is a perfect square,

(iii)  $x$  is a perfect cube.

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

(c)(ii) ..... [1]

(c)(iii) ..... [1]



9 Solve the following equations.

(a)  $\frac{22}{y} = 4$

(b)  $2(3y + 1) = -3(y - 2)$

(c)  $\frac{2x - 3}{7} = \frac{x}{5}$

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

- 10** Given that  $m \times n = 29$  and both  $m$  and  $n$  are prime numbers, find the two possible values of  $2m + n$ .

*Answer* ..... and ..... [2]

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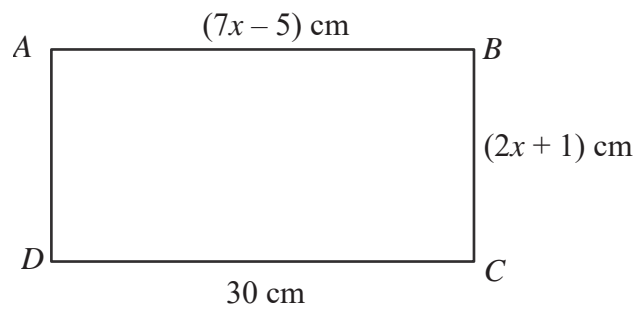
- 11** Jill is  $m$  years old now. Terry is 5 years older than Jill. Daniel is twice as old as Terry. Express, in terms of  $m$ ,
- (a) Terry's present age,
  - (b) Daniel's present age, and
  - (c) the sum of their ages in 3 years' time.

*Answer*

- (a) ..... [1]
- (b) ..... [1]
- (c) ..... [2]

---

- 12 The diagram below shows a rectangle  $ABCD$ .



- (a) Find the value of  $x$ .
- (b) Find the perimeter of the rectangle  $ABCD$ .

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

(b) ..... [2]

---

- 13 (a) Expand and simplify  $5(-a + b) - 2(a - 2b)$ .
- (b) Express  $\frac{x}{5} - \frac{2(x+3)}{3}$  as a fraction in its simplest form.

*Answer* (a) ..... [2]  
(b) ..... [3]

---

**END OF PAPER 1**



# Geylang Methodist School (Secondary) Mid - Year Examination 2017

## MATHEMATICS

Paper 2

1 Express

Additional materials : Writing Paper

1 hour 30 minutes

Setter : Ms Tan Kai Wei

5 May 2017

### 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 in both sides of the paper.

You may use a pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

If working is needed for any question, it must be shown with the answer.

Omission of essential working will result in the 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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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.

Total Score: [50 marks]

---

- 1 (a) Evaluate  $\frac{15.65 - \sqrt{103.56} + 2.492^2}{1.56 - \sqrt[3]{-9.05}}$  leaving your answer correct to
- (i) 3 significant figures, and [1]
- (ii) 3 decimal places. [1]
- (b) The number of people who attended the Super Carnival held at Geylang Methodist School (Primary) was stated as 15 800, correct to 3 significant figures. State the smallest and largest possible number of people who attended the carnival. [2]
- 
- 2 Alvin runs 12 km in 45 minutes. He then walks a further 2.4 km at an average speed of 4 km/h. Calculate
- (a) his running speed, giving your answer in km/h, [1]
- (b) his time taken for walking in minutes, [2]
- (c) his average speed for the whole journey in km/h. [2]
- 
- 3 (a) Convert 96 km/h to m/s. [2]
- (b) Express 65 cm to 3.5 m as a ratio in its lowest terms. [2]
- (c) If  $A$  exceeds  $B$  by 50% and  $B$  exceeds  $C$  by 50%, find the ratio of  $A : C$  in its simplest form. [3]
- 
- 4 A school decides to donate goodie bags to the residents staying at an old folks' home. There are a total of 210 kg of rice, 315 canned food, and 525 packets of biscuits. The school decided to pack them equally into the goodie bags, with no remaining food items.
- (a) Find the greatest number of goodie bags needed, [2]
- (b) Find the number of packets of biscuits in each goodie bag. [1]
- (c) One of the students asked if there could be 8kg of rice, 18 canned food, and 28 packets of biscuits in each goodie bag. Is this possible? Explain your answer. [2]

5 (a) Francis played a game by following the instructions below:

- ❖ Write the positive integer,  $x$ .
- ❖ Multiply it by 2.
- ❖ Add 3.
- ❖ Square the result.
- ❖ Divide the result by 5.
- ❖ Subtract the result by 4.

(i) Write down an algebraic expression for the final result, leaving your answer in  $x$ . [2]

(ii) Given that Francis' original number is 32, calculate the final answer. [2]

(b) Simplify the expressions

(i)  $2a + 5ac - 2c - 4c - 6a - 8ca$ , [2]

(ii)  $\frac{1}{3}a + \frac{2}{7}b + \frac{4}{5}a - \frac{2}{3}b$ . [2]

(c) Factorise the expressions

(i)  $3x(a + 3) - 2(a + 3)$ , [2]

(ii)  $10xy - 6x + 12xz$ . [2]

6 If  $\frac{a-2b}{5} = \frac{b}{3}$ , find the ratio of  $a : b$ . [3]

7 A cookie costs  $x$  **dollars**, a canned drink cost 2 more dollars than a cookie, and a biscuit costs  $y$  **cents**.

(a) Write down an algebraic expression, in dollars, in terms of  $x$ , for the cost of a canned drink. [1]

(b) Write down an algebraic expression, in dollars, in terms of  $y$ , for the cost of a biscuit. [1]

Helen bought 3 cookies, 5 canned drinks and 2 biscuits for \$22.50.

(c) Write an algebraic equation and show that it reduces to  $400x + y - 625 = 0$ . [3]

(d) If a biscuit costs 25 cents, find the cost of one canned drink. [2]

- 8 Angus and four of his friends went for a meal at a seafood restaurant. The bill was shown as below:

Item No.	Dish	Cost (before GST)
1	Chilli crab	\$88.95
2	Sambal chilli kangkong	\$16.50
3	Cereal prawns	\$25.63
4	Claypot tofu	\$14.87
5	Prawn paste chicken	\$23.55
6	Fried noodles	\$12.28

The seafood restaurant charges 7% GST (Goods and Services Tax) on the total bill.

- (a) Calculate the total bill inclusive of GST. [1]

During the 20<sup>th</sup> anniversary of opening the restaurant, the manager decides to give a discount of 20% for the whole day.

- (b) Does it make a difference whether the discount is applied before or after the GST is added to the bill? Explain your reasoning. [3]

- 9 The following electronic scooter was seen for sale at a shop.



The first scooter was sold at the selling price as shown and the shopkeeper made a profit of 25%. The second scooter was sold at a 10% discount.

Given that the two scooters has the same cost price, calculate the total profit made by the shopkeeper. [3]

**END OF PAPER 2**





**Sec 1E Paper 1 – Solutions**

1a	17	M1
1b	$\frac{\pi}{2}, \sqrt{5}$ (Mark awarded only for two correct answers)	B1
2a	$\text{HCF} = 2^3 \times 3^2$ $= 8 \times 9$ $= 72$	M1  A1
2b	$k = 2 \times 5$ $= 10$	M1  A1
3	Prime factorisation workings $\sqrt[3]{1728}$ $= \sqrt[3]{2^6 \times 3^3}$ $= 2^2 \times 3$ $= 12$	M1  M1  A1
4	$\frac{3(-2)^2}{2(-2) - (-2)(3)}$ $= \frac{3(4)}{-4 - (-6)}$ $= 6$	M1   A1
5a	$\sqrt[3]{-8} + 8$ $= -2 + 8$ $= 6$	   B1
5b	$5 - (-5)^2 + (-3) \times (-2)^3$ $= 5 - 25 + (-3) \times (-8)$ $= 5 - 25 + 24$ $= -20 + 24$ $= 4$	M1    A1
5b	$-3\frac{2}{9} + 1\frac{1}{2}$ $= -\frac{29}{9} + \frac{3}{2}$ $= -\frac{58}{18} + \frac{27}{18}$	   M1

	$= -\frac{31}{18}$ $= -1\frac{13}{18}$	A1
5c	$-\frac{6}{7} + \frac{3}{4} \times \frac{8}{15}$ $= -\frac{6}{7} + \frac{2}{5}$ $= -\frac{30}{35} + \frac{14}{35}$ $= -\frac{16}{35}$	M1 M1 A1
6a	$6\frac{3}{4}\%$ $= \frac{27}{400}$	B1
6b	$\frac{250}{5000} \times 100\%$ $= 5\%$	B1
7	$19.76 - \sqrt{8.99} \times 3.65$ $= 20 - \sqrt{9} \times 4$ $= 20 - 3 \times 4$ $= 8$	M1 A1
8a	$2(x-3) > 8$ $2x-6 > 8$ $x > 7$	M1 A1
8b		
8c	<p>(i) <math>x = 11</math></p> <p>(ii) <math>x = 9</math></p> <p>(iii) <math>x = 8</math></p>	B1 B1 B1
9a	$\frac{18}{y} = 4$	

	$\frac{18}{4} = x$ $x = 4\frac{1}{2}$		M1
			A1
9b	$2(3y+1) = -3(y-2)$ $6y+2 = -3y+6$ $9y = 4$ $y = \frac{4}{9}$		M1
			A1
9c	$\frac{2x-3}{7} = \frac{x}{5}$ $5(2x-3) = 7x$ $10x-15 = 7x$ $3x = 15$ $x = 5$		M1
			A1
10	$2m+n$ $= 2(29)+1$ $= 59$	$2m+n$ $= 2(1)+29$ $= 31$	B1 each
11a	$(5+m)$ years old		B1
11b	$2(5+m)$ years old or $(10+2m)$ years old		B1
11c	$m+3+m+8+13+2m$ $= 4m+24$		M1
			A1
12a	$7x-5=30$ $x=5$		M1
			A1
12b	$BC = 2(5)+1 = 11 \text{ cm}$ <p>Perimeter of rectangle <math>ABCD</math></p> $= 30 \times 2 + 11 \times 2$ $= 82 \text{ cm}$		M1
			A1
13a	$5(-a+b) - 2(a-2b)$ $= -5a+5b-2a+4b$ $= -7a+9b$		M1
			A1

13b	$\frac{x}{5} - \frac{2(x+3)}{3}$ $= \frac{x}{5} - \frac{2x+6}{3}$ $= \frac{3x}{15} - \frac{5(2x+6)}{15}$ $= \frac{3x-5(2x+6)}{15}$ $= \frac{3x-10x-30}{15}$ $= \frac{-7x-30}{15}$	M1      M1  A1

## Sec 1E Paper 2 – Solutions

1ai	3.21 (3 sf)	M1
1aii	3.206 (3 dp)	M1
1b	Smallest number – 15750 Largest number – 15849	B1 B1
2a	Running speed $= \frac{12km}{45min}$ $= 12 \div \frac{45}{60}$ $= 16km/h$	B1
2b	Time taken $= \frac{2.4}{4}$ $= 0.6hr$ $= 36min$	M1 A1
2c	Average speed $= \frac{12 + 2.4}{\frac{3}{4} + 0.6}$ $= 10.7km/h$	M1 A1
3a	$96km/h$ $= \frac{96km}{1hr}$ $= \frac{96000m}{3600s}$ $= 26.7m/s$	M1 A1
3b	65cm : 3.5m $= 65 : 350$ $= 13 : 70$	M1 A1
3c	A : B $= 1.5 : 1$ B : C $= 1.5 : 1$ A : B : C	M1

	$= (1.5 \times 1.5) : 1.5 : 1$ $= 2.25 : 1.5 : 1$ $A : C$ $= 2.25 : 1$	M1 A1
4a	HCF of 210, 315 and 525 $= 5 \times 3 \times 7$ $= 105$	M1 A1
4b	Number of packets of biscuits $= 525 \div 105$ $= 5$	B1
4c	No. The items need to be distributed equally.	M1 A1
5ai	$\frac{(2x+3)^2}{5} - 4$	B2
5aii	$\frac{[2(32)+3]^2}{5} - 4$ $= 893.8$ Accept answer if student calculated based on the instructions given, or their own algebraic formula.	M1 A1
5bi	$2a + 5ac - 2c - 4c - 6a - 8ca$ $= 2a - 6a + 5ac - 8ca - 2c - 4c$ $= -4a - 3ac - 6c$	M1 A1
5bii	$\frac{1}{3}a + \frac{2}{7}b + \frac{4}{5}a - \frac{2}{3}b$ $= \frac{1}{3}a + \frac{4}{5}a + \frac{2}{7}b - \frac{2}{3}b$ $= \frac{5}{15}a + \frac{12}{15}a + \frac{6}{21}b - \frac{14}{21}b$ $= \frac{17}{15}a - \frac{8}{21}b$ $= 1\frac{2}{15}a - \frac{8}{21}b$	M1 A1
5ci	$3x(a+3) - 2(a+3)$ $= (a+3)(3x-2)$	M2

5cii	$10xy - 6x + 12xz$ $= 2x(5y - 3 + 6z)$	M2
6	$\frac{a-2b}{5} = \frac{b}{3}$ $3(a-2b) = 5b$ $3a - 6b = 5b$ $3a = 11b$ $a : b = 11 : 3$	M1    M1 A1
7a	$\$ (x + 2)$	B1
7b	$\$ \frac{y}{100}$	B1
7c	$3x + 5(x + 2) + \frac{2y}{100} = 22.50$ $3x + 5x + 10 + \frac{2y}{100} = 22.50$ $8x + 10 + \frac{2y}{100} = 22.50$ $8x + \frac{2y}{100} = 12.50$ $800x + 2y = 1250$ $400x + y = 625$ $400x + y - 625 = 0$	M1    M1   A1
7d	$400x + 25 - 625 = 0$ $x = 1.5$ Cost of one canned drink = $1.5 + 2 = \$3.50$	M1 A1
8a	Total bill inclusive of GST $= (88.95 + 16.50 + 25.63 + 14.87 + 23.55 + 12.28) \times \frac{107}{100}$ $= \$194.50$	B1



8b	<p>No it does not make a difference.</p> <p><u>GST → Discount</u></p> <p>Total cost</p> $= 194.50 \times \frac{80}{100}$ $= 155.60$ <p><u>Discount → GST</u></p> <p>Cost after discount</p> $= 181.78 \times \frac{80}{100}$ $= 145.42$ <p>Cost after GST</p> $= 145.42 \times \frac{107}{100}$ $= 155.60$	<p>A1</p> <p>M1 each for each explanation.</p>
9	<p>Original cost of electronic scooter</p> $= 320 \div \frac{125}{100}$ $= 256$ <p>Selling price of second scooter</p> $= 320 \times \frac{90}{100}$ $= 288$ <p>Total profit made</p> $= (320 + 288) - (256 \times 2)$ $= \$96$	<p>M1</p> <p>M1</p> <p>A1</p>





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CLASS

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INDEX  
NUMBER

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## MATHEMATICS

Paper 1

**4048/01**

**10 October 2017**  
**1 hour 30 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, 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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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

60

Parent's Signature

***Mathematical Formulae****Compound Interest*

$$\text{Total amount} = P \left( 1 + \frac{r}{100} \right)^n$$

*Mensuration*

$$\text{Curved surface area of cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

*Trigonometry*

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

*Statistics*

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left( \frac{\sum fx}{\sum f} \right)^2}$$

Answer **all** the questions.

- 1 75% of a number  $x$  is  $\frac{5}{4}$ .  
Find  $x$ .

Answer  $x = \dots\dots\dots$  [2]

---

- 2 Two numbers  $P$  and  $Q$  are such that  

$$P = 2^3 \times 3 \times 5^b,$$

$$Q = 2 \times 3^a \times 5^2.$$

- (a) State one possible value of  $a$  if the LCM of  $P$  and  $Q$  is  $2^3 \times 3 \times 5^2$ .

Answer  $a = \dots\dots\dots$  [1]

- (b) State one possible value of  $b$  if the HCF of  $P$  and  $Q$  is  $2 \times 3 \times 5^2$ .

Answer  $b = \dots\dots\dots$  [1]

---

- 3 In a music examination,  $\frac{1}{3}$  of the candidates achieve a Distinction.

$\frac{2}{5}$  of the remaining candidates achieve a Merit.

Find the fraction of candidates who achieve neither a Distinction nor a Merit.

Answer  $\dots\dots\dots$  [2]

---

- 4 Find the value of  $\frac{2p-q+1}{5q}$  when  $p=2$  and  $q=-1$ .

Answer ..... [2]

---

- 5 Solve  $3x - 4(2 - x) = 6$ .

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

---

- 6 (a) Estimate the value of  $\frac{\sqrt{24.9} - 1.96^2}{\sqrt[3]{64.45}}$ , giving your answer correct to one significant figure.

Answer ..... [2]

- (b) State the number of significant figures in 10.0010.

Answer ..... [1]

---

- 7      (a)      Construct triangle  $ABC$  where  $BC = 7$  cm and  $AC = 5$  cm. The line  $AB$  has been drawn for you. [1]
- (b)      Draw the perpendicular bisector of  $AB$ . [1]
- (c)      Draw the angle bisector of angle  $BAC$ . [1]
- (d)       $X$  is the point of intersection between the perpendicular bisector of  $AB$  and the angle bisector of angle  $BAC$ .  
                    Mark on your diagram below the point  $X$ . [1]



**8** It is given that  $m : n = 3 : 7$ .

(i) Write  $m$  in terms of  $n$ .

*Answer* .....[1]

(ii) Find the value of  $n$  when  $m = \frac{14}{3}$ .

Answer n = .....[2]

9 Ali and Benny cut grass for a living.

Ali charges \$27 for cutting grass on a circular patch of radius 3.5 m. Benny charges \$23 for cutting 32.5 m<sup>2</sup> of grass.

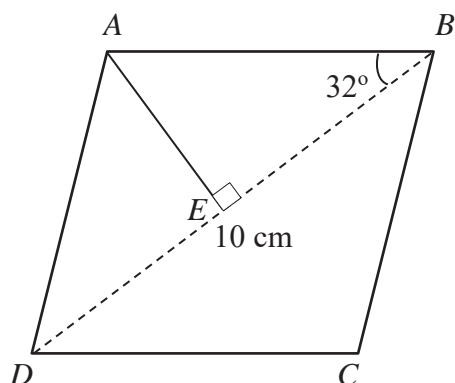
Show your working clearly to determine which grass cutter offers a better deal.

*Answer*

[3]



- 10**  $ABCD$  is a rhombus where  $BD = 10$  cm, angle  $ABD = 32^\circ$  and area of the rhombus is  $31.2 \text{ cm}^2$ .



- (a) Find angle  $ADB$ .

Answer angle  $ADB = \dots\dots\dots^\circ$  [1]

- (b) Find  $AE$ , the perpendicular distance from point  $A$  to  $BD$ .

Answer  $AE = \dots\dots\dots \text{ cm}$  [3]

- 11** Factorise the following completely.

- (a)  $3f - 6f^2$

Answer  $\dots\dots\dots$  [1]

- (b)  $2m(7 + n) - 14m(n + 2)$

Answer  $\dots\dots\dots$  [2]

**12** Express the following in its simplest form.

**(a)**  $3(2a + 5b) - (2a - b + 1)$ .

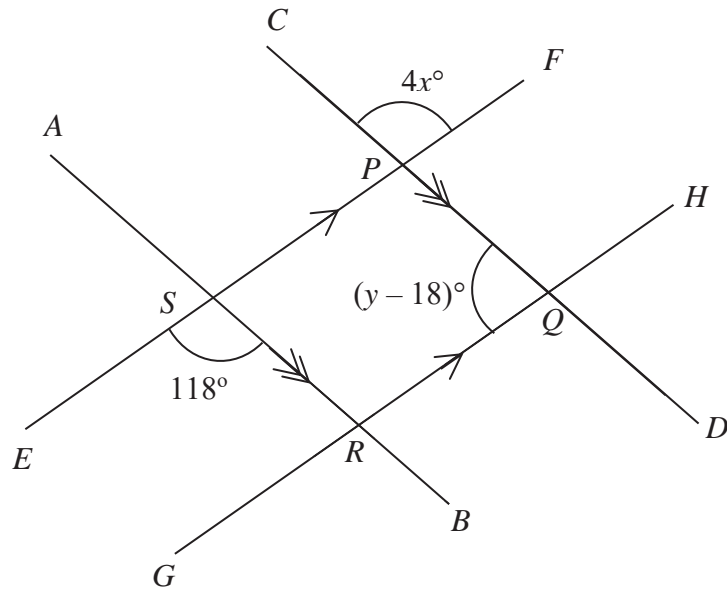
*Answer* ..... [2]

**(b)**  $m - \frac{3m + n}{4}$ .

*Answer* ..... [2]

---

- 13 In the diagram below,  $AB$  is parallel to  $CD$  and  $EF$  is parallel to  $GH$ .  
By stating the reasons clearly in your working, find the value of  $x$  and of  $y$ .



Answer .....

.....

.....

.....

.....

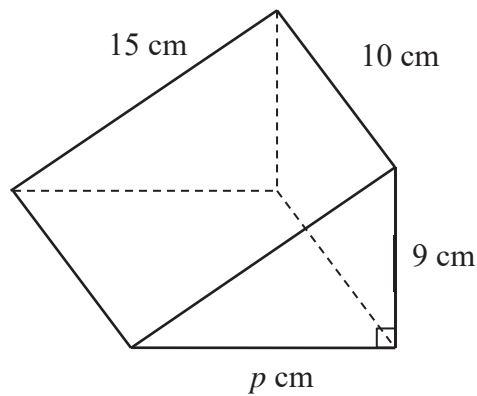
.....

.....

.....

..... [4]

- 14 The figure below shows a right-angled triangular prism.



- (a) Given that the volume of the prism is  $540 \text{ cm}^3$ , show that  $p = 12$ .

Answer .....

.....

.....

.....

..... [2]

- (b) Find the total surface area of the prism.

Answer .....  $\text{cm}^2$  [2]

---

- 15 (a) Solve  $-\frac{2}{3}x \leq -4$ .

Answer ..... [1]

- (b) Show your solution on the number line below.

Answer



[1]

- (c) State the smallest prime value of  $x$  which satisfies  $-\frac{2}{3}x \leq -4$ .

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

- 16 During the recent Great Singapore Sale, Jane bought a computer at a discounted price of \$1155.20.

- (a) If the computer was sold at a discount of 40%, find the original price of the computer.

Answer \$ ..... [2]

- (b) Jane has to pay an additional 7% on Goods and Services Tax (GST).  
What is the total amount she has to pay for the purchase of the computer?

Answer \$ ..... [2]

17 The first four numbers of a sequence are 3, 8, 13, and 18.

(a) Find the sixth term in the sequence.

*Answer* ..... [1]

(b) Write down, in terms of  $n$ , an expression for the  $n$ th term.

*Answer* ..... [1]

(c) Hence, find the 37th term in the sequence.

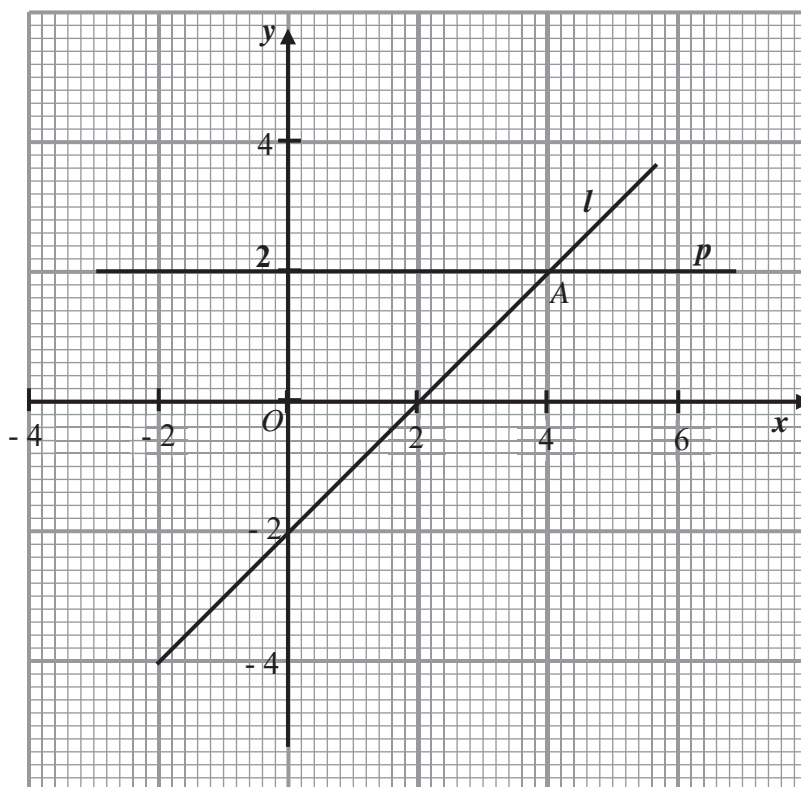
*Answer* ..... [1]

(d) Explain clearly if 244 is a term in this sequence.

*Answer* .....  
.....  
.....  
.....  
..... [2]

---

- 18 The diagram below shows the graph of two straight lines  $l$  and  $p$ .



- (a) State the coordinates of the point  $A$  where the line  $p$  intersects the line  $l$ .

Answer .....[1]

- (b) Find the gradient of the line  $l$ .

Answer .....[1]

- (c) Mark the point  $B(0, -4)$  on the grid above. [1]

- (d) Hence, calculate the area of the triangle whose vertices are points  $A$ ,  $B$  and  $O$ .

Answer .....unit<sup>2</sup>[2]

- (e) The point  $C(4, h)$  is such that  $A$ ,  $B$ ,  $C$  and  $O$  form a parallelogram.  
Write down a possible value of  $h$ .

Answer  $h =$  .....[1]



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CLASS

	/	
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INDEX  
NUMBER

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**Mathematics**

Paper 2

**4048/02**

**12 October 2017**

**1 hour 30 minutes**

Additional Materials:      Answer Paper (4 sheets)  
                                        Graph Paper (1 sheet)  
                                        Cover Page (1 sheet)

**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 on both sides of the paper.  
You may use an HB 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.

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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**

**60**

**Parent's Signature**



*Mathematical Formulae**Compound interest*

$$\text{Total amount} = P \left( 1 + \frac{r}{100} \right)^n$$

*Mensuration*

$$\text{Curved surface area of a cone} = \pi r l$$

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$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

*Trigonometry*

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

*Statistics*

$$\text{Mean} = \frac{\sum f x}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum f x^2}{\sum f} - \left( \frac{\sum f x}{\sum f} \right)^2}$$

Answer **all** the questions.

- 1 (a) Given that  $a : b = \frac{1}{2} : \frac{1}{3}$  and  $b : c = 1.2 : 2$ , find  $a : c$  in its simplest form where  $a$  and  $c$  are integers. [3]
- (b) The earnings from a business is co-shared by business owners Zen, Ben and Gwen.  
The earnings is distributed among the three owners such that Zen gets 20% more money than Gwen, and Gwens' share is a third of Ben's share.  
If Gwen receives \$210 from the earnings,
- (i) How much will Ben receive? [1]
- (ii) How much will Zen receive? [2]
- (iii) How much is the total earnings from the business? [1]

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

The variables  $x$  and  $y$  are connected by the equation

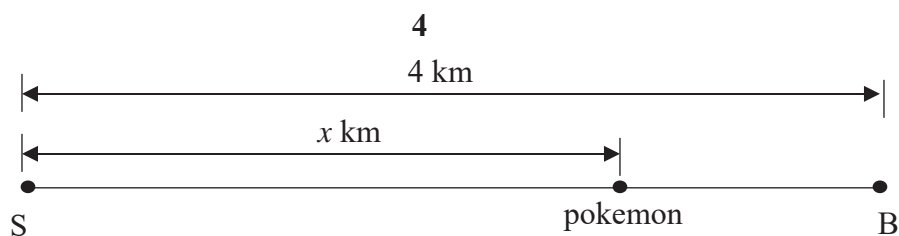
$$y = 4x - 4.$$

Some corresponding values of  $x$  and  $y$  are given in the table below.

$x$	-1	0	1	2	3	4
$y$	$p$	-4	0	4	8	12

- (a) Find the value of  $p$ . [1]
- (b) Using a scale of 2 cm to represent 1 unit, draw a horizontal  $x$ -axis for  $-1 \leq x \leq 4$ .  
Using a scale of 1 cm to represent 1 unit, draw a vertical  $y$ -axis for  $-8 \leq y \leq 12$ .  
On your axes, plot the points given in the table and join them with a straight line. [2]
- (c) From the graph in (b), find the values of
- (i)  $x$  when  $y = 9$ , [1]
- (ii)  $y$  when  $x = 1.5$ . [1]
- (d) The point  $(-0.5, a)$  lies on the graph  $y = 4x - 4$ . Use the graph to find the value of  $a$ . [1]

3



Sruti and Bing Xuan stay 4 km away from each other, at S and B respectively.

They set off at the same time from their homes to hunt for pokemon.

The pokemon is  $x$  km from S.

- (a) Bing Xuan runs at a constant speed of 18 km/h from his house.

Write down an expression, in terms of  $x$ , for the number of hours he took. [1]

- (b) Sruti runs at a constant speed which is 6 km/h less than Bing Xuan's speed.

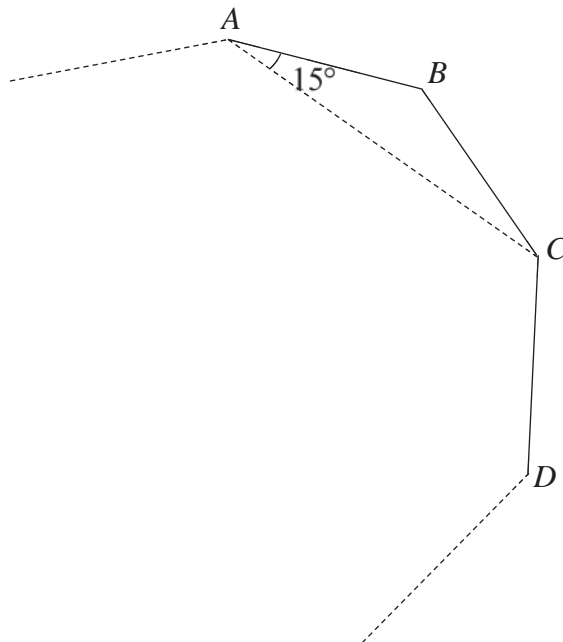
Write down an expression, in terms of  $x$ , for the number of hours she took. [1]

- (c) The difference between their times was 10 **minutes**.

Write down an equation in  $x$  to represent this information, and hence find the distance Bing Xuan ran. [4]

4

The figure below illustrates a regular  $n$ -sided polygon.



- (i) State the special name given to triangle  $ABC$ . [1]

Find

- (ii)  $\angle ABC$ , [1]

- (iii) value of  $n$ , [3]














- (iv) reflex  $\angle ACD$ . [2]

5 Study the table below.

Row	Sequence 1	Sequence 2
1	5	$1 \times 1 - 1 = 0$
2	8	$2 \times 2 - 1 = 3$
3	11	$3 \times 3 - 1 = 8$
4	$p$	$4 \times 4 - 1 = 15$
5	17	$5 \times 5 - 1 = 24$
$q$	20	$q^2 - 1 = r$
.	.	.
.	.	.
.	.	.
$n$	$s$	$t$

- (a) Find the value of  $p$ , of  $q$  and of  $r$ . [3]
- (b) Write down, in terms of  $n$ ,
- (i) an expression for  $s$ , [1]
- (ii) an expression for  $t$ . [1]
- (c) Explain why the value of  $s$  cannot be 102. [2]
-

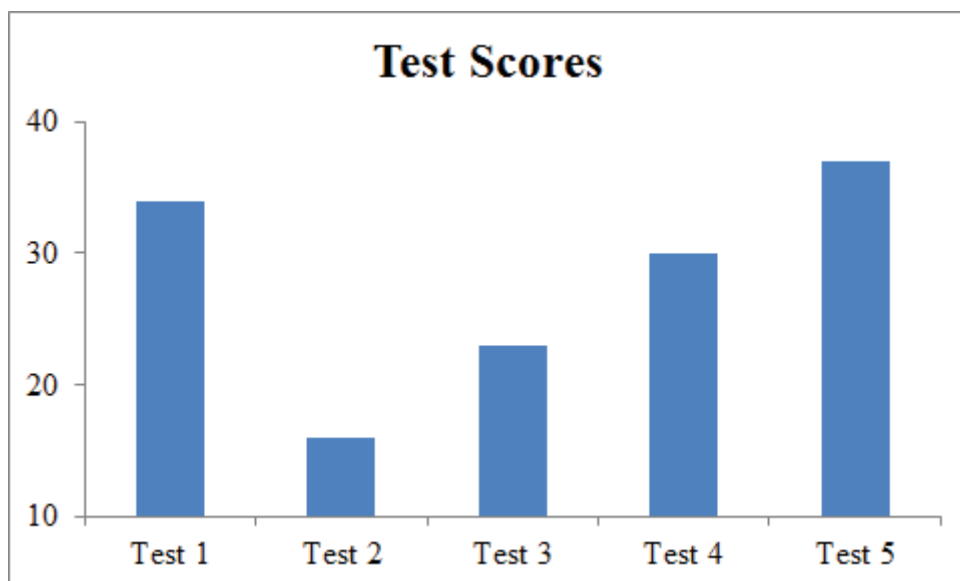
- 6 (a) During a survey, some students were asked to state their favourite food. The diagram is an incomplete pictogram of the survey results.

	Students' favourite food
Burger	   
Hot dog	  
Pizza	   
Chicken chop	 
Salad	



represents 8 students

- (i) 5 students chose salad. Calculate the number of students who participated in the survey altogether. [2]
- (ii) Express the number of students who chose chicken chop as a percentage of those who chose pizza. [2]
- (iii) A problem was encountered when completing the pictogram for the 'Salad' category. Explain where the problem lies. [1]
- (b) The test scores of Meelan are shown below.



Meelan commented that his score for Test 3 is twice as much as his score for Test 2. Do you agree with his comment? Why? [2]

- 7 Bala wants to buy a sofa set that is priced at \$1 800.
- He is considering between two modes of payment, *A* and *B*.
- The details of the two modes of payment are as follows:

Payment mode <i>A</i>	Payment mode <i>B</i>
Charge the sofa set to credit card	Downpayment of 25%
Additional 8% credit card processing fee (On top of the retail price)	Monthly instalments of \$99 each month for 15 months

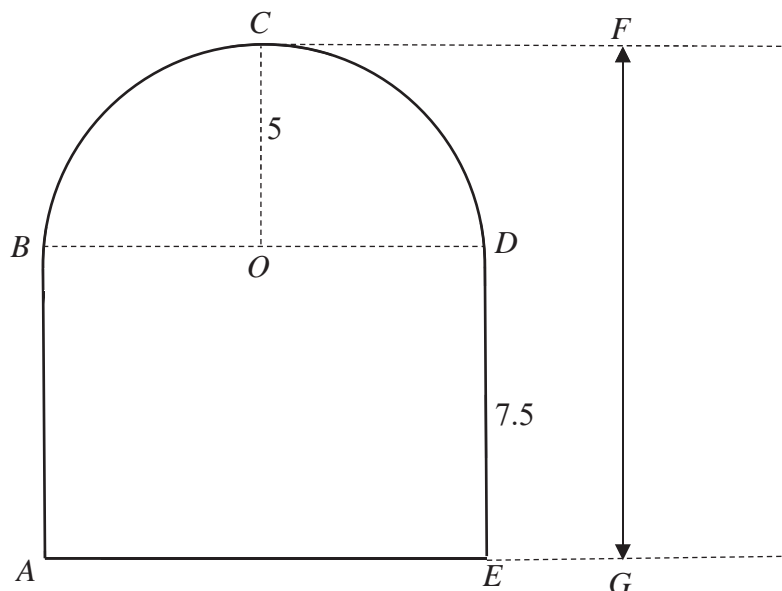
- (a) Which mode of payment is a better deal for Bala? Show your working. [5]
- (b) Calculate the amount of interest Bala has to pay if he chooses to pay by payment mode *B*. [2]
- (c) Calculate the interest rate per annum for payment mode *B*. [3]
-

- 8 A uniform cross section of a fun ride tunnel  $ABCDE$  is shown below.

$ABCDE$  is made up of a semi-circle  $BCD$  with centre  $O$  and a rectangle  $ABDE$ .

It is given that  $DE = 7.5$  m and  $OC = 5$  m.

The fun ride train can only be safe if its vertical height is not more than 70% of the vertical height  $FG$  of the tunnel.



- (a) Can a fun ride train with a vertical height of 8 m be safe enough to enter the tunnel?  
Justify your answer with necessary working. [3]

It is given that the tunnel is 0.45 km long.

- (b) A 64 - metre long train travels at 25 m/s through the tunnel.  
Calculate the time taken for the train to pass completely through the tunnel.  
Express your answer to the nearest second. [3]
- (c) How much soil, in cubic metres, will be excavated for the construction of the tunnel? [2]
- (d) The budget in the construction of the tunnel is \$400 000.  
It costs \$10.50 to excavate  $1 \text{ m}^3$  of soil to construct the tunnel.  
Determine whether the construction of this tunnel is above or below the budget. [2]





1	$0.75x = \frac{5}{4}$	M1
	$x = \frac{5}{3}$ or $1\frac{2}{3}$	A1
2(a)	$a = 1$ (or $a = 0$ )	B1
2(b)	$b = 2$ (or any other integer larger than 2)	B1
3	Fraction for Merit = $\frac{2}{5} \times \frac{2}{3} = \frac{4}{15}$	M1
	Fraction for neither = $1 - \frac{1}{3} - \frac{4}{15} = \frac{2}{5}$	A1
4	$\frac{2p - q + 1}{5q} = \frac{2(2) - (-1) + 1}{5(-1)}$	M1
	$= -\frac{6}{5}$ or $-1\frac{1}{5}$	A1
5	$3x - 8 + 4x = 6$	M1
	$7x = 14$	
	$x = 2$	A1
6(a)	$\frac{\sqrt{25} - 2^2}{\sqrt[3]{64}}$	M1
	$= \frac{5 - 4}{4} = 0.25 \approx 0.3$	A1
6(b)	6 significant figures	B1
7	X	B1 for C with arcs B1 for $\perp$ bisector with arcs B1 for angle bisector with arcs B1 for X

8(i)	$\frac{m}{n} = \frac{3}{7} \Rightarrow m = \frac{3}{7}n$	B1	
8(ii)	$n = \frac{7}{3} \times \frac{14}{3}$	M1	
	$n = \frac{98}{9} = 10\frac{8}{9}$	A1	
9	$\pi(3.5)^2 = 38.4845$	M1	
	Ali: $\frac{27}{38.4845} = \$0.70$ per $m^2$		
	Benny: $\frac{23}{32.5} = \$0.71$ per $m^2$	M1 attempt to find rate per $m^2$ for either Ali or Benny	
	Ali offers a better deal.	A1	
10(a)	angle $ADB = 32^\circ$	B1	
10(b)	$\Delta ABD = 31.2 \div 2 = 15.6 \text{ cm}^2$	M1 relate to half area of rhombus	
	$AE = \frac{15.6 \times 2}{10}$	M1	
	$AE = 3.12 \text{ cm}$	A1	
11(a)	$3f(1 - 2f)$	B1	
11(b)	$2m(7 + n) - 14m(n + 2) = 2m[7 + n - 7(n + 2)]$	M1	
	$= 2m(-6n - 7)$	A1	
12(a)	$6a + 15b - 2a + b - 1$	M1	
	$= 4a + 16b - 1$	A1	
12(b)	$= \frac{4m - (3m + n)}{4}$	M1	
	$= \frac{4m - 3m - n}{4}$		
	$= \frac{m - n}{4}$	A1	
13	$\angle EPD = 4x$ (vertically opposite angles) $\angle ESB = 4x$ (corresponding angles)	M1	(deduct max of 1 mark if any missing or incorrect reason)
	$4x = 118$		
	$x = 29.5$	A1	
	$\angle SRQ = 118$ (alternate angles)		
	$y - 18 + 118 = 180$ (interior angles)	M1	
	$y = 80$	A1	
14(a)	$\frac{1}{2}p(9)(10) = 540$	M1	
	$p = \frac{540 \times 2}{90}$		
	$p = 12$	A1 a.g.	

<b>14(b)</b>	Total surface area $= (15 + 9 + 12) \times 10 + \frac{1}{2} \times 12 \times 9 \times 2$ $= 468 \text{ cm}^2$	<b>M1</b> <b>A1</b>
<b>15(a)</b>	$x \geq 6$	<b>B1</b>
<b>15(b)</b>	Draw $x \geq 6$ on number line	<b>B1</b>
<b>15(c)</b>	$x = 7$	<b>B1</b>
<b>16(a)</b>	$\frac{1155.20 \times 100}{60}$ \$1925.33	<b>M1</b> <b>A1</b>
<b>16(b)</b>	$1.07 \times 1155.20$ $= 1236.06$	<b>M1</b> <b>A1</b>
<b>17(a)</b>	28	<b>B1</b>
<b>17(b)</b>	$5n - 2$	<b>B1</b>
<b>17(c)</b>	183	<b>B1</b>
<b>17(d)</b>	$5n - 2 = 244$ $\Rightarrow n = 49.2$ No, n is not a positive integer	<b>M1</b> <b>A1</b>
<b>18(a)</b>	(4, 2)	<b>B1</b>
<b>18(b)</b>	Grad = 1	<b>B1</b>
<b>18(c)</b>	Mark $B(0, -4)$ on Question Paper	<b>B1</b>
<b>18(d)</b>	$\frac{1}{2} \times 4 \times 4 = 8 \text{ units}^2$	<b>M1 A1</b>
<b>18(e)</b>	$h = -2$ or 6	<b>B1 any one</b>

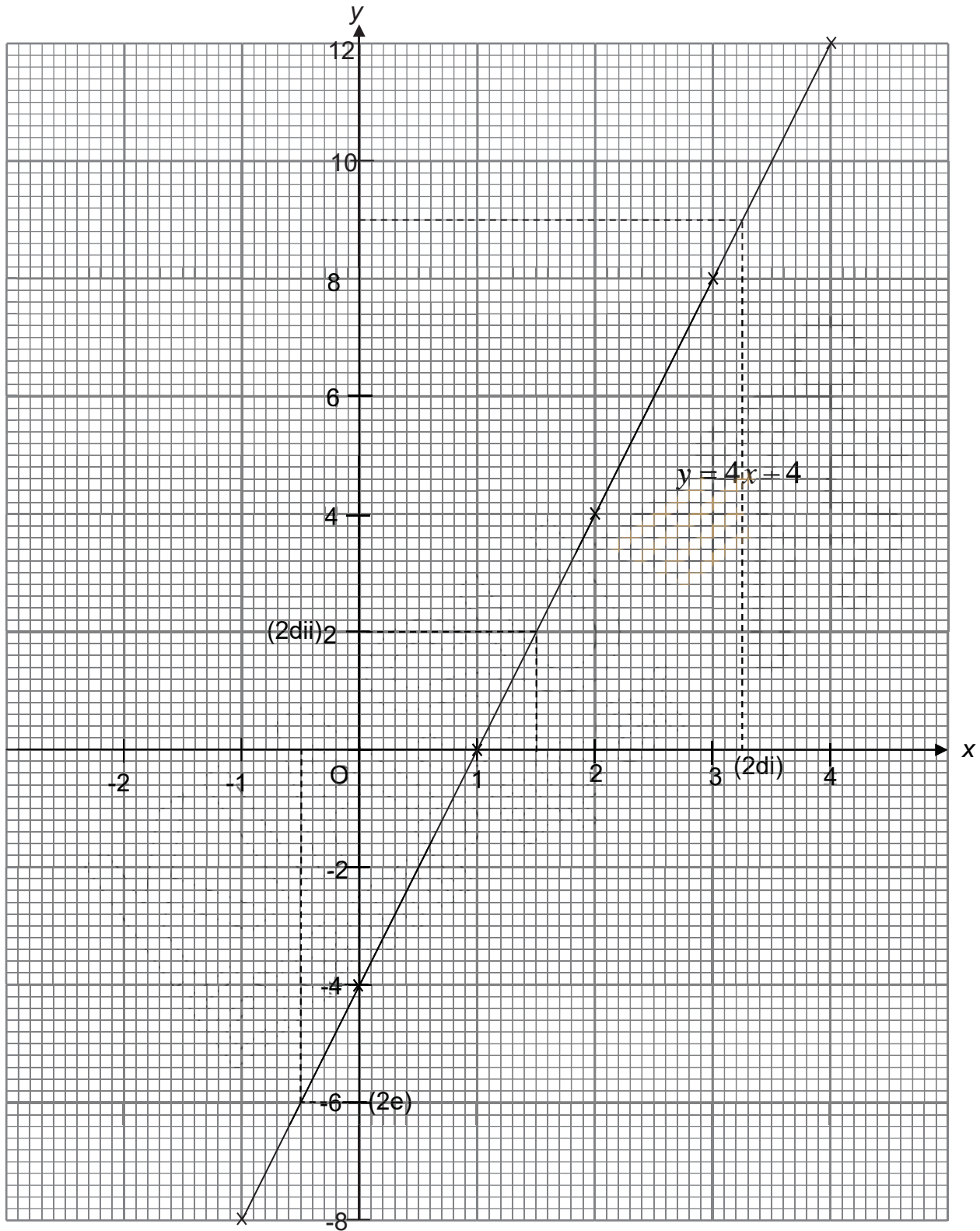
Qn No	Solutions	Remarks
1a	$a : b = \frac{1}{2} : \frac{1}{3}$ $= \frac{1}{2} \times 6 : \frac{1}{3} \times 6$ $= 3 : 2$  $b : c = 1.2 : 2$ $= 1.2 \times 10 : 2 \times 10$ $= 12 : 20$ $= \frac{12}{4} : \frac{20}{4}$ $= 3 : 5$ $a : b = 3 \times 3 : 2 \times 3$ $= 9 : 6$ $b : c = 3 : 5$ $= 3 \times 2 : 5 \times 2$ $= 6 : 10$ $a : c = 9 : 10$	[M1]-obtaining integers for a : b and b : c [M1]-obtaining common integer for b [A1]
1bi	Amt Ben receive = $210 \times 3 = \$630$	[B1]
1bii	Amt Zen receive = $\frac{210}{100} \times 120$ $= \$252$	[M1] [A1]
1biii	Total earnings from the business = $630 + 252 + 210 = \$1092$	[B1]
2a	When x = - 1, $p = 4(-1) - 4$ $p = -8$	[B1]
2b	Smooth line intersecting all the plotted points. 6 correctly plotted points	[G1] [G1]
2ci	x = 3.25	[B1]
2cii	y = 2	[B1]
2d	a = - 6	[B1]
3a	Time taken by Bing Xuan = $\frac{4-x}{18} h$	[B1]
3b	Time taken by Sruti = $\frac{x}{12} h$	[B1]
3c	$\frac{x}{12} - \frac{4-x}{18} = \frac{10}{60}$ $\frac{18x}{(12)(18)} - \frac{12(4-x)}{(12)(18)} = \frac{1}{6}$ $\frac{18x-12(4-x)}{216} = \frac{1}{6}$ $18x-48+12x = \frac{1}{6} \times 216$ $30x-48=36$ $30x=84$	[M1] [M1]-Common denominator

	$x = \frac{84}{30}$ $x = 2.8$ <p>Distance Bing Xuan ran = <math>4 - 2.8 = 1.2</math> km</p>	[A1] [B1]
4i	Isosceles triangle	[B1]
4ii	$\angle ABC = 180^\circ - 15^\circ - 15^\circ$ ( $\angle$ sum of $\Delta$ ) $= 150^\circ$	[B1]
4iii	<p>Size of 1 exterior angle = <math>180^\circ - 150^\circ</math>  <math>= 30^\circ</math></p> <p>Size of 1 exterior angle = <math>\frac{360^\circ}{n}</math></p> $\frac{360^\circ}{n} = 30^\circ$ $360^\circ = 30^\circ n$ $n = \frac{360^\circ}{30^\circ} = 12$ <p><b>OR</b></p> $\frac{180^\circ(n-2)}{n} = 150^\circ$ $180^\circ n - 360^\circ = 150^\circ n$ $180^\circ n - 150^\circ n = 360^\circ$ $30^\circ n = 360^\circ$ $n = 12$	[M1]       [M1]       [A1]       [M1] [M1]    [A1]
4iv	$\angle ACD = 150^\circ - 15^\circ = 135^\circ$ Reflex $\angle ACD = 360^\circ - 135^\circ$ ( $\angle$ at a pt. ) $= 225^\circ$	[M1] [A1]
5a	$p = 14$ $q = 6$ $r = 6^2 - 1 = 35$	[B1] [B1] [B1]
5bi	$s = 3n + 2$	[B1]
5bii	$t = n \times n - 1 = n^2 - 1$	[B1]
5c	$s = 3n + 2 = 102$ $3n = 100$ $n = \frac{100}{3}$ $n = 33\frac{1}{3}$ <p>Since n is not a positive integer, hence s cannot be 102.</p>	[M1] [A1]
6ai	<p>Total number of students = <math>11.5 \times 8 + 5</math>  <math>= 97</math> students</p>	[M1] [A1]

6aii	$\% \text{ of students} = \frac{1.75}{3.25} \times 100$ $= 53 \frac{11}{13} \%$	[M1] [A1]
6aiii	<p>The problem is due to one picture/image represents 8 students, hence only number of students in multiples of 2 can be represented on the pictogram accurately and the number of students whose favourite food is salad is 5 which is not a multiple of 2.</p> <p>OR</p> <p>5 when represented on the pictogram is tough to be identified by the naked eye for its value.</p>	[B1] [B1]
6b	<p>I do not agree with his comment because though according to the height of the bars of the bar chart, the height of bar of test 3 is double that of test 2, however this is not true as the <b>vertical marks axis</b> does not begin with zero mark, but instead it begins with 10 marks.</p>	[B1] [B1]
7a	<p>Payment mode A:</p> $\text{Total amount he needs to pay} = \frac{1800}{100} \times 108$ $= \$1\,944$ <p>Payment mode B:</p> $\text{Downpayment} = \frac{1800}{100} \times 25$ $= \$450$ $\text{Total amount he needs to pay} = 99 \times 15 + 450$ $= \$1\,935$ <p>Hence mode of payment B is a better deal.</p>	[M1] [A1]    [M1] [A1]  [A1]
7b	$\text{Amount of interest} = 1\,935 - 1800$ $= \$135$	[M1] [A1]
7c	$\text{Balance} = \frac{1800}{100} \times 75 = \$1350$ $\frac{PRT}{100} = 135 = I$ $1350 \times \frac{R}{100} \times \frac{15}{12} = 135$ $13.5 \times R \times \frac{15}{12} = 135$ $R = 135 \div 13.5 \div \frac{15}{12} = 8\%$	[M1] I = PRT formula [M1] recognizing R/100 and 15/12.  [A1]
8a	$\text{Vertical height of tunnel} = 7.5 + 5 = 12.5 \text{ m}$	[M1]

	<p>Minimum safety height = <math>\frac{12.5}{100} \times 70 = 8.75 \text{ m}</math></p> <p>Yes the train is safe enough to enter the tunnel since the vertical height of the train is 8m which is less than the minimum safety vertical height of 8.75 m.</p>	<p>[M1]</p> <p>[A1]</p>
8b	<p>Time taken = <math>\frac{(450 + 64)m}{25m/s}</math></p> <p><math>\approx 21 \text{ sec (nearest seconds)}</math></p>	<p>[M1, M1]</p> <p>getting total distance, then substituting into the speed distance time formula</p> <p>[A1]</p>
8c	<p>Volume of tunnel = uniform cross sectional area <math>\times</math> height</p> <p><math>= \left( \frac{1}{2} \times \pi \times 5^2 + 10 \times 7.5 \right) \times 450</math></p> <p><math>\approx 51421</math></p> <p><math>\approx 51400 \text{ m}^3 \text{ (3sf)}</math></p>	<p>[M1]</p> <p>[A1]</p>
8d	<p><math>\times 51421</math> <math>\swarrow</math> <math>1 \text{ m}^3</math> ----- <math>\\$10.50</math> <math>\searrow</math> <math>\times 51421</math></p> <p><math>51421 \text{ m}^3</math> ----- <math>\\$539\,920</math></p> <p>The construction of this tunnel is above the budget as the actual costs incurred in constructing the tunnel is \$539 920 which is \$139 920 more than the amount of \$400 000.</p>	<p>[M1]</p> <p>[A1]</p>

Q2)









**SWISS COTTAGE SECONDARY SCHOOL**  
**SECONDARY ONE EXPRESS**  
**SECOND SEMESTRAL EXAMINATION**

**E**

Name: \_\_\_\_\_ (      ) Class: \_\_\_\_\_

**MATHEMATICS**

**4048/01**

Paper 1

**Tuesday 3 October 2017**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

**READ THESE INSTRUCTIONS FIRST**

Write your class, index number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** the 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.

Electronic Calculators are **NOT ALLOWED** in this paper.

If the degree of accuracy is not specified in the question and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

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 document consists of **8** printed pages.

**Setter:** Mr Wilson Wee

**Vetter:** Ms Tan Hui Lan

**[Turn over**

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Answer **all** the questions.

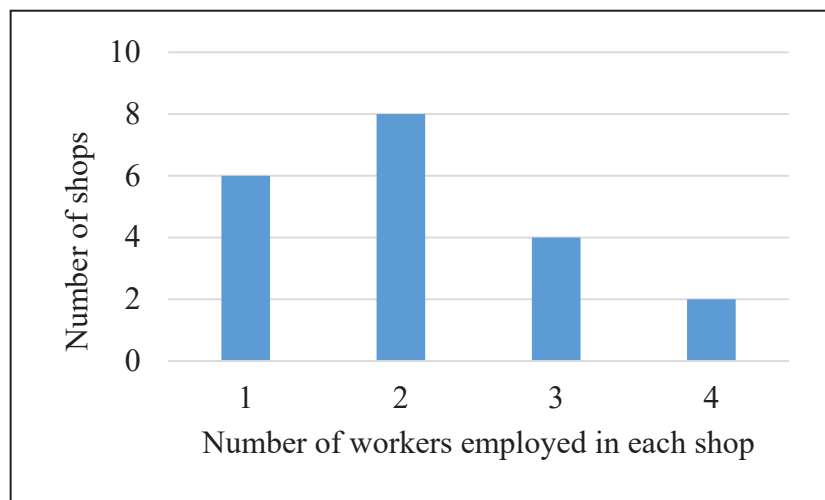
- 1 State all the irrational number(s) from the following list.

$$\frac{2}{3}, \pi, \sqrt[3]{5}, \frac{22}{7}, 0.0053$$

Answer ..... [1]

---

- 2 A survey was conducted on 20 shops to find the number of workers they employ. The results of the survey are shown in the bar chart below.



Calculate

- (a) the percentage of shops with more than 2 workers,

Answer ..... % [2]

- (b) the total number of workers employed in all 20 shops.

Answer ..... workers [2]

---

- 3 Written as the product of its prime factors,  $375 = 3 \times 5^3$ .

(a) Express 90 as the product of its prime factors.

*Answer* ..... [1]

(b) Hence write down

(i) the LCM of 375 and 90, giving your answer as the product of its prime factors,

*Answer* ..... [1]

(ii) the greatest integer that will divide both 375 and 90 exactly.

*Answer* ..... [1]

- 4 The stem and leaf diagram below shows the waiting times, in minutes, of some patients in a clinic.

Stem	Leaves
1	5 6
2	0 1 3 7 8
3	0 2 2 2 6
4	1 2 5

Key: 1 | 5 represents 15 minutes

(a) Find the total number of patients at the clinic.

*Answer* ..... patients [1]

(b) For these times, find

(i) the mode,

*Answer* ..... minutes [1]

(ii) the median.

*Answer* ..... minutes [1]

- 5 By rounding off each number to 1 significant figure, estimate  $\frac{6.29 \times 20.6}{4.12}$ .

*Answer* ..... [2]

---

- 6 Each year, the value of a painting increases by 10%. If the value of the painting was \$12100 in 2016, find its value in 2014.

*Answer* \$ ..... [3]

---

- 7 Given that  $a = 2$  and  $b = -3$ , evaluate  $\frac{b^3 - 3a}{4ab}$ .

*Answer* ..... [2]

---

- 8 Daisy bought 20 cartons of eggs. There were  $x$  eggs in each carton.

(a) Write down an expression, in terms of  $x$ , for the number of eggs she bought.

Answer ..... [1]

(b) When the cartons were opened, she found that  $y$  eggs were broken. She placed the unbroken eggs equally into 30 baskets. Write an expression, in terms of  $x$  and  $y$ , for the number of eggs in each basket.

Answer ..... [1]

---

- 9 Subtract  $3x^2 - 6x + 2$  from  $5x^2 - 4x - 3$ .

Answer ..... [2]

---

- 10 Simplify  $\frac{2x-5y}{3} + \frac{2x-3y}{4}$ .

Answer ..... [3]

---

**11** Factorise the following completely.

**(a)**  $35ax - 5ay$

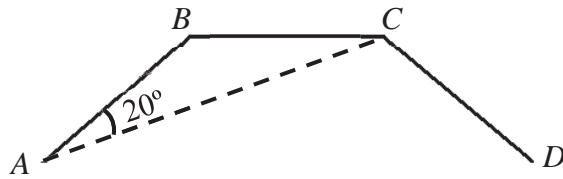
*Answer* ..... [1]

**(b)**  $2ax + 6bx - ay - 3by$

*Answer* ..... [2]

---

**12**  $AB$ ,  $BC$  and  $CD$  are adjacent sides of a regular polygon and  $\angle BAC = 20^\circ$ .



**(a)** Calculate the exterior angle of the polygon.

*Answer* ..... [2]

**(b)** Calculate  $\angle ACD$ .

*Answer* ..... [2]

---

- 13** Worker *A* can paint a room in 2 hours. Worker *B* can paint the same room in 4 hours. Find the time it will take for the room to be painted if both workers paint at the same time.

*Answer* ..... hours [3]

---

- 14** Betty earns 3 times as much as Nick and Nick earns \$200 more than Alfred. If Nick earns \$ $x$ ,

**(a)** write down an expression, in terms of  $x$ , for

**(i)** Alfred's earnings,

*Answer* \$ ..... [1]

**(ii)** Betty's earnings,

*Answer* \$ ..... [1]

**(iii)** the sum of Betty, Nick and Alfred's earnings.

*Answer* \$ ..... [2]

**(b)** If the sum of all their earnings is \$8800, find Nick's earnings.

*Answer* \$ ..... [2]

---



- 15** A group of people was asked how many siblings they have in their family. The results of this survey are summarised in the table below.

Number of siblings	0	1	2	3	4
Frequency	5	10	$x$	4	1

- (a) If the mode is 1, write down the largest possible value of  $x$ .

*Answer* ..... [1]

- (b) If the median is 2, write down the smallest possible value of  $x$ .

*Answer* ..... [1]

- (c) If the mean is 1.5, calculate the value of  $x$ .

*Answer* ..... [2]

- 16** Answer this whole question on a sheet of graph paper.

The variables  $x$  and  $y$  are connected by the equation  $y = 3 - 3x$ .

Some corresponding values of  $x$  and  $y$  are given in the table below.

$x$	-3	-2	-1	0	1	2	3
$y$	12	$a$	6	3	0	-3	-6

- (a) Find the value of  $a$ . [1]

- (b) Using a scale of 2 cm to represent 1 unit, draw a horizontal  $x$ -axis for  $-3 \leq x \leq 3$ . [3]  
Using a scale of 1 cm to represent 1 unit, draw a vertical  $y$ -axis for  $-6 \leq y \leq 12$ .  
On your axis, plot the points given in the table and join them with a straight line.

- (c) Use your graph to find the value of  $x$  when  $y = 8$ . [1]

**END OF PAPER**



**SWISS COTTAGE SECONDARY SCHOOL**  
**SECONDARY ONE EXPRESS**  
**SECOND SEMESTRAL EXAMINATION**

**E**

Name: \_\_\_\_\_ (      ) Class: \_\_\_\_\_

**MATHEMATICS**

**4048/02**

Paper 2

**Monday 09 October 2017**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

**READ THESE INSTRUCTIONS FIRST**

Write your class, index number and name on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** the 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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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 document consists of **10** printed pages.

**Setter:** Ms Leung Yan Ru

**Vetter:** Ms Tan Hui Lan

**[Turn over**

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Answer **all** the questions.

- 1 A regular polygon has interior angles of  $156^\circ$ .

Find the number of sides of the polygon.

Answer ..... [2]

---

- 2 Evaluate the following, giving your answers to 3 significant figures.

(a) 
$$\frac{\left(-\frac{2}{3}\right)^3}{7.2386 - 2.3412},$$

Answer ..... [1]

(b)  $\sqrt{2} + 3\sqrt{5} - 1.273.$

Answer ..... [1]

---

- 3 Consider the number sequence 7, 4, 1, -2, -5, ....., .....,

Write down

- (a) the next two terms,

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

- (b) an expression for the  $n$ th term,

Answer  $T_n =$  ..... [1]

- (c) the 53th term.

Answer ..... [1]

---

- 4 Jack packs 726 boxes of chocolates, 660 bottles of wine and 693 tins of cookies into gift hampers.  
Each gift hamper contains an equal number of chocolates, wine and cookies.

Find the greatest possible number of gift hampers he could pack.

*Answer* ..... [2]

---

- 5 Two telecommunications service providers, Star Mobile and Sing Mobile offer the following mobile price plans for a 32 GB jphone 7.

<b>Star Mobile Combo 3</b>	<b>Sing Mobile 4G3</b>
3GB data/200 minutes outgoing talktime	3GB data/200 minutes outgoing talktime
jphone price \$378	jphone price \$561
Subscription rate \$62.90/month	Subscription rate \$42.90/month

\*mobile price plans are valid for 2 years

Which service provider offers a mobile price plan which is more value for money?  
Support your answer with valid mathematical working.

*Answer* ..... [3]

---

6 (a) Solve  $\frac{5x}{3} > 1.2 + \frac{2x}{11}$ .

Answer ..... [2]

(b) Hence, write down the smallest prime number  $x$  which satisfies  $\frac{5x}{3} > 1.2 + \frac{2x}{11}$ .

Answer Smallest Prime = ..... [1]

---

7 In 2015, a supermarket employs 168 workers consisting of shelf stockers, cashiers, managers in the ratio of 7: 4: 3.

(a) Find the number of cashiers employed in 2015.

Answer ..... [2]

(b) The number of managers employed in 2015 is 20% more than in 2014.

Find the number of managers employed in 2014.

Answer ..... [2]

---

**8** Solve

**(a)**  $2(5x+13) = 3(x+1) + 2,$

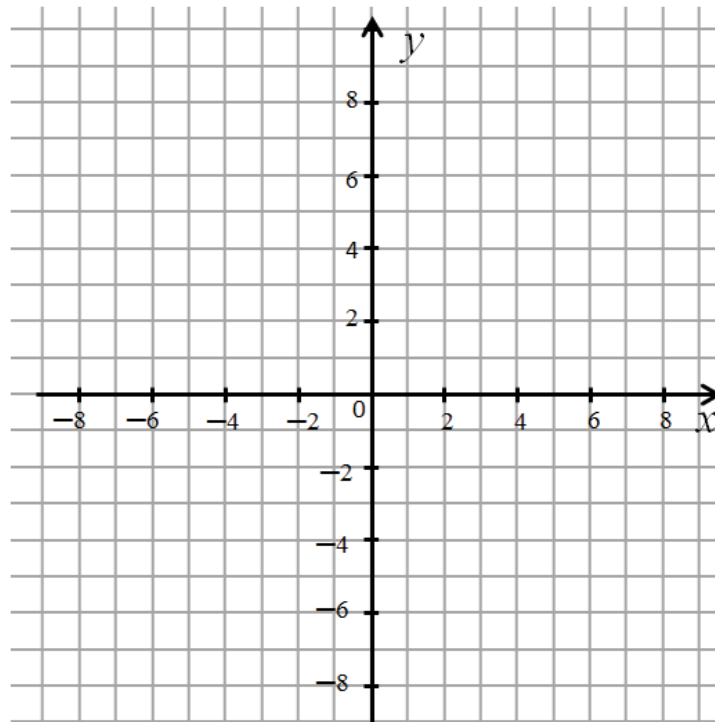
*Answer*  $x = \dots\dots\dots$  [2]

**(b)**  $\frac{4y}{5} - \frac{2y+1}{3} = \frac{1}{7}.$

*Answer*  $y = \dots\dots\dots$  [3]

---

- 9 (a) Plot the points of the trapezium  $ABCD$ , where the ordered pairs are  $A(-3, 6)$ ,  $B(5, 6)$ ,  $C(7, -3)$ ,  $D(-7, -3)$  on the grid below. [2]



- (b) Find the gradient of  $AD$ .

Answer ..... [2]

- (c) Calculate the area of trapezium  $ABCD$ .

Answer ..... units<sup>2</sup> [2]

- 10** An athlete taking part in a dualathlon runs a distance of 800 m at an average speed of 6 km/h. He stops to rest for 10 minutes before he cycles a further distance of 2 km in 12 minutes.

Calculate

- (a)** the time, in minutes, he takes to run the distance of 800 m,

*Answer* ..... minutes [2]

- (b)** his cycling speed in km/h,

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

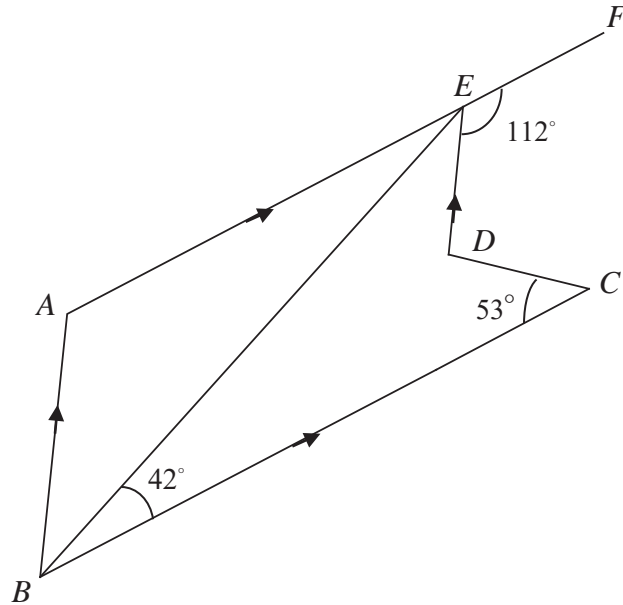
- (c)** his average speed for the whole race.

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

---



11



In the diagram,  $AF$  is parallel to  $BC$  and  $AB$  is parallel to  $DE$ .  
 $AEF$  is a straight line.  
 Angle  $CBE = 42^\circ$ , angle  $BCD = 53^\circ$  and angle  $DEF = 112^\circ$ .

Stating your reasons clearly, find

(a) angle  $EAB$ ,

Answer Angle  $EAB = \dots\dots\dots$  [1]

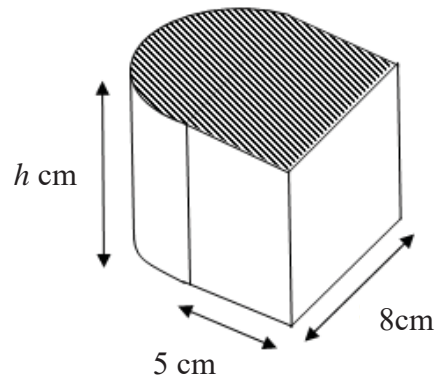
(b) angle  $BED$ ,

Answer Angle  $BED = \dots\dots\dots$  [2]

(c) reflex angle  $EDC$ .

Answer Reflex Angle  $EAB = \dots\dots$  [3]

12

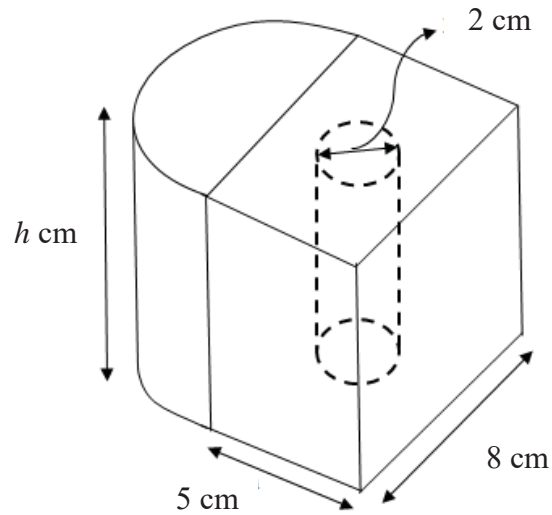


The diagram shows a prism with a cross section that consists of a semicircle and a rectangle with dimensions 8 cm by 5 cm.  
The prism has a height of  $h$  cm.

- (a) Calculate the cross sectional area of the solid.

Answer .....  $\text{cm}^2$  [2]

(b)



A round cylindrical hole with a diameter of 2 cm is removed from the cuboid to form the artifact as shown above.

- (i) Given that the volume of the artifact is  $560 \text{ cm}^3$ , show that  $h = 9.034 \text{ cm}$  correct to four significant figures.

[3]

*Answer*

- (ii) Hence, find the total surface area of the artifact.

*Answer* .....  $\text{cm}^3$  [3]



### Marking Scheme for Math 1E SA2 P1 2017

Qn	Marking Point	Marks Awarded	Remarks
1a	$\pi, \sqrt[3]{5}$	B1	
2a	Percentage = $\frac{6}{20} \times 100\%$ = 30%	M1 A1	
2b	Total number = $1 \times 6 + 2 \times 8 + 3 \times 4 + 4 \times 2$ = 42	M1 A1	
3a	$\begin{array}{r} 2 \overline{) 90} \\ 3 \overline{) 45} \\ 3 \overline{) 15} \\ 5 \overline{) 5} \\ 1 \end{array}$ $90 = 2 \times 3 \times 3 \times 5 = 2 \times 3^2 \times 5$	B1	
3bi	$375 = 3 \times 5 \times 5 \times 5$ $90 = 2 \times 3 \times 3 \times 5$  LCM = $2 \times 3 \times 3 \times 5 \times 5 \times 5$ = $2 \times 3^2 \times 5^3$	B1	
3bii	HCF = $3 \times 5$ = 15	B1	
4a	15 patients	B1	
4bi	32 minutes	B1	
4bii	30 minutes	B1	
5	$\begin{array}{r} 6.29 - 20.6 \\ 4.12 \\ \approx \frac{6 \times 20}{4} \\ = 30 \end{array}$	M1 A1	
6	Value of painting in 2015 = $\frac{100}{110} \times 12100$ = \$11000  Value of painting in 2014 = $\frac{100}{110} \times 11000$ = \$10000	M1 A1	

<b>7</b>	$\frac{b^3 - 3a}{4ab}$ $= \frac{(-3)^3 - 3(2)}{4(2)(-3)}$ $= \frac{-27 - 6}{-24}$ $= \frac{-33}{-24}$ $= 1\frac{3}{8}$	<b>M1</b>          <b>A1</b>	Evaluation of $b^3$
<b>8a</b>	No. of eggs in each carton = $x$  No. of eggs bought = $20 \times x$ $= 20x$	<b>B1</b>	
<b>8b</b>	No. of eggs broken = $y$  No. of eggs unbroken = $20x - y$  No. of eggs in each basket = $\frac{20x - y}{30}$	<b>B1</b>	
<b>9</b>	$5x^2 - 4x - 3 - (3x^2 - 6x + 2)$ $= 5x^2 - 4x - 3 - 3x^2 + 6x - 2$ $= 2x^2 + 2x - 5$	<b>M1</b>      <b>A1</b>	Form expression
<b>10</b>	$\frac{2x-5y}{3} + \frac{2x-3y}{4}$ $= \frac{4(2x-5y)}{12} + \frac{3(2x-3y)}{12}$ $= \frac{4(2x-5y) + 3(2x-3y)}{12}$ $= \frac{8x - 20y + 6x - 9y}{12}$ $= \frac{14x - 29y}{12}$	<b>M1</b>          <b>M1</b>      <b>A1</b>	Converting both fractions to same denominator          Expansion of expressions

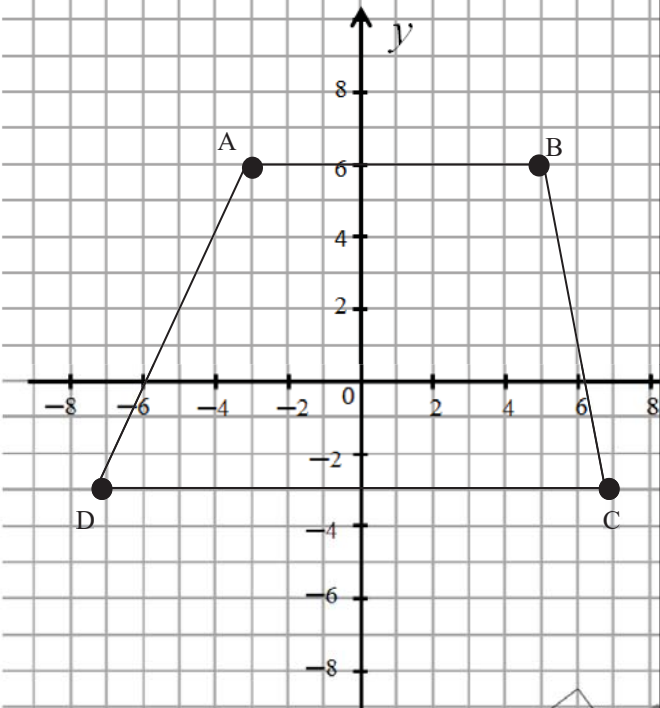
<b>11a</b>	$5a(7x - y)$	<b>B1</b>	
<b>11b</b>	$2ax + 6bx - ay - 3by$ $= 2x(a + 3b) - y(a + 3b)$ $= (2x - y)(a + 3b)$	<b>M1</b> <b>A1</b>	
<b>12a</b>	$\angle BCA = 20^\circ$ (base $\angle$ s of isos. triangle)  Exterior angle $= 20^\circ + 20^\circ$ (ext $\angle$ = sum of int. opp. $\angle$ s) $= 40^\circ$	<b>M1</b> <b>A1</b>	
<b>12b</b>	Interior angle $= 180^\circ - 40^\circ$ ( $\angle$ s sum of triangle) $= 140^\circ$  $\angle ACD = 140^\circ - 20^\circ$ $= 120^\circ$	<b>M1</b>     <b>A1</b>	
<b>13</b>	In 1 hour, fraction of the room painted $= \frac{1}{2} + \frac{1}{4}$ $= \frac{2}{4} + \frac{1}{4}$ $= \frac{3}{4}$  $\frac{3}{4}$ room painted in 1 hr $\frac{4}{3}$ room painted in $\frac{1}{3} \times 4$ hrs $= 1\frac{1}{3}$ hrs	<b>M1</b>       <b>M1</b> <b>A1</b>	
<b>14ai</b>	Alfred's earnings = $\$(x - 200)$	<b>B1</b>	
<b>14aii</b>	Betty's earnings = $\$3x$	<b>B1</b>	
<b>14aiii</b>	Sum of Betty, Nick and Alfred's earnings $= 3x + x + (x - 200)$ $= \$(5x - 200)$	<b>M1</b> <b>A1</b>	
<b>14b</b>	Since the sum of all their earnings is \$8800, $5x - 200 = 8800$ $5x = 9000$ $x = 1800$  Hence, Nick's earnings is \$1800.	<b>M1</b>      <b>A1</b>	

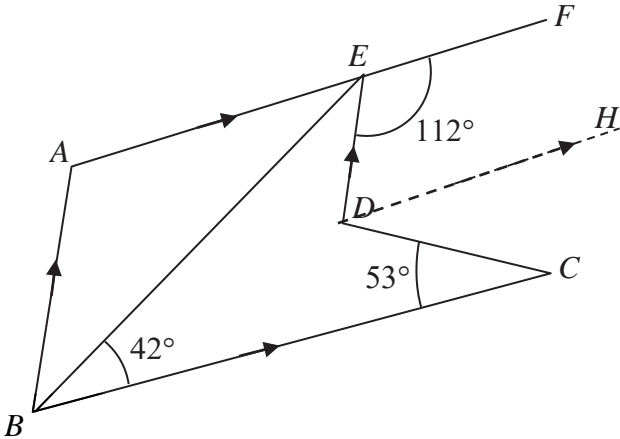
<b>15a</b>	9	<b>B1</b>	
<b>15b</b>	$5 + 10 = (x - 1) + 4 + 1$ $15 = x + 4$ $x = 11$	<b>B1</b>	
<b>15c</b>	$\frac{0 \times 5 + 1 \times 10 + 2 \times x + 3 \times 4 + 4 \times 1}{5 + 10 + x + 4 + 1} = 1.5$ $\frac{2x + 26}{x + 20} = 1.5$ $2x + 26 = 1.5(x + 20)$ $2x + 26 = 1.5x + 30$ $0.5x = 4$ $x = 8$	<b>M1</b>       <b>A1</b>	
<b>16a</b>	9	<b>B1</b>	
<b>16b</b>	As shown in attached graph.	<b>B1</b>  <b>B1</b> <b>B1</b>	Correct scale used on both axes. Correct plotting of points. Straight line passing through all points.
<b>16c</b>	-1.7	<b>B1</b>	Accept answers from -1.6 to -1.8



Qn	Marking Point	Marks Awarded	Remarks			
1	$\frac{(n-2) \times 180^\circ}{n} = 156^\circ$ $180n - 360 = 156n$ $180n - 156n = 360$ $24n = 360$ $n = \frac{360}{24}$ $n = 15$	M1       A1				
2(a)	$\frac{\left(-\frac{2}{3}\right)^3}{7.2386-2.3412} = -0.060500 \approx -0.0605$	B1				
2(b)	$\sqrt{2} + 3\sqrt{5} - 1.273 = 6.8494 \approx 6.85$	B1				
3(a)	-8, -11	B1				
3(b)	$T_n = 10 - 3n$	B1				
3(c)	$T_{53} = 10 - 3(53) = -149$	B1				
4	<table><tr><td><math display="block">\begin{array}{r} 2 \overline{)660} \\ 2 \overline{)330} \\ 3 \overline{)165} \\ 5 \overline{)55} \\ 11 \overline{)11} \\ \underline{1} \end{array}</math><math display="block">660 = 2^2 \times 3 \times 5 \times 11</math></td><td><math display="block">\begin{array}{r} 2 \overline{)726} \\ 3 \overline{)363} \\ 11 \overline{)121} \\ 11 \overline{)11} \\ \underline{1} \end{array}</math><math display="block">726 = 11^2 \times 3 \times 2</math></td><td><math display="block">\begin{array}{r} 3 \overline{)693} \\ 3 \overline{)231} \\ 7 \overline{)77} \\ 11 \overline{)11} \\ \underline{1} \end{array}</math><math display="block">693 = 3^2 \times 7 \times 11</math></td></tr></table>	$\begin{array}{r} 2 \overline{)660} \\ 2 \overline{)330} \\ 3 \overline{)165} \\ 5 \overline{)55} \\ 11 \overline{)11} \\ \underline{1} \end{array}$ $660 = 2^2 \times 3 \times 5 \times 11$	$\begin{array}{r} 2 \overline{)726} \\ 3 \overline{)363} \\ 11 \overline{)121} \\ 11 \overline{)11} \\ \underline{1} \end{array}$ $726 = 11^2 \times 3 \times 2$	$\begin{array}{r} 3 \overline{)693} \\ 3 \overline{)231} \\ 7 \overline{)77} \\ 11 \overline{)11} \\ \underline{1} \end{array}$ $693 = 3^2 \times 7 \times 11$	M1	
$\begin{array}{r} 2 \overline{)660} \\ 2 \overline{)330} \\ 3 \overline{)165} \\ 5 \overline{)55} \\ 11 \overline{)11} \\ \underline{1} \end{array}$ $660 = 2^2 \times 3 \times 5 \times 11$	$\begin{array}{r} 2 \overline{)726} \\ 3 \overline{)363} \\ 11 \overline{)121} \\ 11 \overline{)11} \\ \underline{1} \end{array}$ $726 = 11^2 \times 3 \times 2$	$\begin{array}{r} 3 \overline{)693} \\ 3 \overline{)231} \\ 7 \overline{)77} \\ 11 \overline{)11} \\ \underline{1} \end{array}$ $693 = 3^2 \times 7 \times 11$				
	Greatest possible number of hampers = 3×11 = 33	A1				
5	Total price of iphone from Singtel = 378 + 62.90× 24 = \$1887.60  Total price of iphone from Starhub = 561 + 42.90× 24 = \$1590.60  Starhub is more value for money.	M1   M1  A1				

<b>6(a)</b>	$\frac{5x}{3} > 1.2 + \frac{2x}{11}$ $\frac{5x}{3} - \frac{2x}{11} > 1.2$ $\frac{55x - 6x}{33} > 1.2$ $49x > 39.6$ $x > \frac{39.6}{49}$ $x > 0.80816$	<b>M1 or</b>  <b>M1</b>   <b>A1</b>	
<b>6(b)</b>	smallest prime number of $x = 2$	<b>B1</b>	Must follow hence.
<b>7(a)</b>	Cashiers $= \frac{168}{3+4+7} \times 4$ $= 48$	<b>M1</b> <b>A1</b>	
<b>7(b)</b>	Managers in 2015 $= \frac{168}{3+4+7} \times 3$ $= 36$ Managrs in 2014 = $\frac{36}{120} \times 100 = 30$	<b>M1</b> <b>A1</b>	
<b>8(a)</b>	$2(5x+13) = 3(x+1) + 2$ $10x + 26 = 3x + 3 + 2$ $7x = -21$ $x = -3$	<b>M1</b>   <b>A1</b>	
<b>8(b)</b>	$\frac{4y}{5} - \frac{2y+1}{3} = \frac{1}{7}$ $\frac{3(4y) - 5(2y+1)}{15} = \frac{1}{7}$ $\frac{12y - 10y - 5}{15} = \frac{1}{7}$ $\frac{2y - 5}{15} = \frac{1}{7}$ $7(2y - 5) = 15$ $14y - 35 = 15$ $14y = 50$ $y = \frac{50}{14}$	<b>M1 (awarded for correct denominator and numerator)</b>   <b>M1 (awarded for correct cross factorization)</b> <b>A1</b>	

9(a)		B2	B1 for 2 correct ordered pairs.
9(b)	Gradient $= \frac{9}{4}$ $= 2.25$	M1 A1	
9(c)	Area $= \frac{1}{2} \times 9 \times (8 + 14)$ $= 99 \text{ units}^2$	M1 A1	
10(a)	$800 \text{ m} = 0.8 \text{ km}$ Time taken $= \frac{0.8}{6} \times 60$ $= 8 \text{ minutes}$	M1  A1	
10(b)	Cycling Speed $= \frac{2}{12 \div 60}$ $= 10 \text{ km/h}$	M1  A1	
10(c)	Average speed $= \frac{0.8+2}{\frac{8}{60} + \frac{10}{60} + \frac{12}{60}}$ $= 5.6 \text{ km/h}$	M1  A1	
11(a)	$\angle EAB = 112^\circ$ (corresponding angle, AE parallel to BC)	B1	
11(b)	$\angle ABE = 180^\circ - 112^\circ - 42^\circ = 26^\circ$ (corresponding angle, AB parallel to ED) $\angle BED = 26^\circ$ (alternate angle, AB parallel to ED)	M1  A1	
11(c)			

	 <p>Construct DH parallel to EF  <math>\angle EDH = 180^\circ - 112^\circ = 68^\circ</math> (interior angle, EF parallel to DH)  <math>\angle HDC = 53^\circ</math> (alternate angle, EF parallel to DH)  Obtuse <math>\angle EDC = 53^\circ + 68^\circ = 121^\circ</math>  Reflex <math>\angle EDC = 360^\circ - 121^\circ = 239^\circ</math>  (angels at a point)</p>	<p><b>M1</b></p> <p><b>M1</b> <b>A1</b></p>	
<b>12(a)</b>	<p>Cross Sectional Area</p> $= 8 \times 5 + \frac{1}{2} \times \pi \times 4^2$ $= 65.132$ $\approx 65.1 \text{ cm}^2$	<p><b>M1</b></p> <p><b>A1</b></p>	
<b>12(bi)</b>	<p>Volume of original figure</p> $= 65.132h \text{ cm}^3$ <p>Volume of cylinder</p> $= \pi \times 1^2 \times h$ $= h\pi \text{ cm}^3$ $560 = 65.132h - h\pi$ $560 = h(65.132 - \pi)$ $h = \frac{560}{65.132 - \pi}$ $h = 9.03365 \approx 9.034 \text{ cm}$	<p><b>M1</b></p> <p><b>M1</b></p> <p><b>A1</b></p>	
<b>12(bii)</b>	<p>Circumference of semicircle</p> $= \frac{1}{2} \times 2 \times \pi \times 4$ $= 12.566 \text{ cm}$ <p>Perimeter of base</p> $= 12.566 + 5 + 8 + 5$ $= 30.566 \text{ cm}$ <p>Original surface area</p> $= 30.566 \times 9.034 + 2 \times 65.132$ $= 406.397 \text{ cm}^2$	<p><b>M1</b></p>	

	Total surface area of artefact $= 406.397 - 2 \times \pi \times 1^2 + 2 \times \pi \times 1 \times 9.034$ $= 456.87$ $\approx 457 \text{ cm}^3$	<b>M1</b>  <b>A1</b>	



- 1 Arrange  $-2\frac{1}{2}$ ,  $-2.52$ ,  $1.\dot{2}$ ,  $1.0\dot{2}$ ,  $1\frac{1}{5}$  in ascending order.

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

- 2 Solve  $-\frac{x}{3} \leq 4$  and illustrate the solution on a number line.

Answer ..... [1]

Number line :

[1]

- 3 It is given that  $A = 2^2 \times 3^4 \times 5$  and  $B = 2^2 \times 3^2 \times 5^2 \times 7$ . Giving your answer in index notation, write down

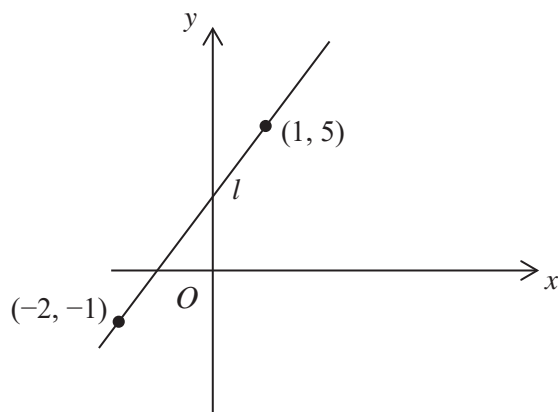
(a) the HCF of  $A$  and  $B$ ,

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

(b) the LCM of  $A$  and  $B$ .

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

- 4 Find the gradient of the line  $l$  shown below.



Answer ..... [2]

**5** Evaluate the following.

(a)  $12 - \frac{15}{7} \times \left(1\frac{1}{3} \div 5\frac{1}{2}\right) + \left(-2\frac{2}{5}\right)$

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

(b)  $\frac{\sqrt[3]{15^2 + 19^3}}{\sqrt{20 - \pi}}$ , giving your answer correct to 2 decimal places.

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

**6** Raju cycles  $y$  km in 4 hours. If he maintains the same average speed, how many km can he cycle in  $x$  minutes?

Answer ..... km [2]

**7** Given that  $C = 2^5 \times 3^2 \times 5^3$ , find the smallest integer  $k$  that will make  $kC$

(a) a square number,

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

(b) a perfect cube.

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

[Turn over



**8** Evaluate the following.

- (a)  $(5.12 - 1.23)^2 + [-4.21 + (-1.45)] \div (-2 + 5)^3$ , giving your answer to the nearest integer.

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

- (b)  $\left(\frac{3}{2}\right)^2 \times \left(\frac{1}{15} - 2\frac{1}{13}\right) - \left(-\frac{28}{15} + 1\frac{2}{3}\right) \div \sqrt[3]{47.5}$ , giving your answer correct to 3 significant figures.

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

**9** Three bells toll at regular intervals of 20 minutes, 30 minutes and 15 minutes.

- (a) Given that they toll together at 3.15 p.m., find the time they will next toll together.

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

- (b) If there was a fourth bell that tolled together with the first three bells at 3.15 p.m., what must be the minimum interval at which the fourth bell tolls such that the four bells will next toll together at 5.15 p.m.?

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

**10** Oranges cost 14 cents each. Amy has a \$10 note and wishes to buy as many oranges as possible. Calculate

- (a) the number of oranges that she can buy,

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

- (b) the change that she will receive.

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

**11 (a)** Express, correct to 1 significant figure,

**(i)** 4.879,

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

**(ii)** 39.61.

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

**(b)** Use your answer in part (a) to estimate  $4.879 \div 39.61$ .

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

**12** If  $a = \frac{c}{b} - \frac{e-d}{f+g}$ , find  $g$  when  $a = 3$ ,  $b = -2$ ,  $c = 8$ ,  $d = -3$ ,  $e = -5$  and  $f = 4$ .

*Answer  $g =$*  .....[3]

**13** Factorise the following completely.

**(a)**  $45am + 15a^2m^2 + 5a^2m$

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

**(b)**  $2x(y+2) - 4w(2+y)$

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

- 14** A man bought a total of 30 books.  
 $x$  books cost \$18 each and the rest cost \$3 each. If he spent \$165 in all, form an equation in  $x$  and find the number of \$3 books he bought.

*Answer* ..... [4]

- 15**     **(a)**     Expand and simplify  $4(3a - 2b) - 5(3a - 4b + 2)$ .

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

- (b)**     Express  $\frac{x+3}{4} - \frac{2(x+5)}{6} + \frac{3(x+1)}{2}$ , as a single fraction in its simplest form.

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

- 16**     Solve the following equations.

**[Turn over]**

**(a)**  $7x + 5 = 2x - 15$

*Answer (a)*  $x = \dots\dots\dots[2]$

**(b)**  $-\frac{10x+3}{2} + 2x = \frac{1}{3}$

*Answer (b)*  $x = \dots\dots\dots[3]$

- 17 (a) Expand and simplify  $\frac{1}{3}\left[6a - 2\left(\frac{3}{2}a - 4b\right)\right]$ .

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

- (b) Ali bought 4 shirts at \$ $x$  each,  $m$  shirts at \$15 each,  $(3m + 2)$  shirts at \$10 each and half a dozen shirts at \$ $2x$  each. Find, in its simplest form, in terms of  $x$  and  $m$ , the total cost of the shirts he bought.

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

- (c) Evaluate, without using the calculator,  $\frac{-3x^2}{4y}$ , where  $x = -5$  and  $y = \frac{3}{2}$ .

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

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

- (a) It is given that  $y = 2x + 3$ . Copy and complete the table below. [2]

$x$	-2	0	3
$y$		3	

- (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, draw the graph of  $y = 2x + 3$ . [3]
- (c) Using your graph, find
- (i) the value of  $x$  when  $y = 0.7$ , [1]
  - (ii) the value of  $y$  when  $x = 2.6$ . [1]
- (d) The total cost of renting a badminton court can be represented by the equation  $y = 2x + 3$ , where \$ $y$  is the total cost of rental and  $x$  is the number of hours rented.
- (i) Explain why the graph is irrelevant for  $x < 0$ . [1]
  - (ii) What does the coefficient of  $x$  represent? [1]

**End of Paper**





**Answers :**

$$1. \quad -2.52, -2\frac{1}{2}, 1.0\dot{2}, 1\frac{1}{5}, 1.\dot{2}$$

$$2. \quad x \geq -12$$

$$3a. \quad 2^2 \times 3^2 \times 5$$

$$3b. \quad 2^2 \times 3^4 \times 5^2 \times 7$$

$$4. \quad 2$$

$$5a. \quad 9\frac{31}{385}$$

$$5b. \quad 4.68$$

$$6. \quad \frac{xy}{240}$$

$$7a. \quad 10$$

$$7b. \quad 6$$

$$8a. \quad 15$$

$$8b. \quad -4.47$$

$$9a. \quad 16 \text{ } 15/4.15 \text{ p. m.}$$

$$9b. \quad 8$$

$$10a. \quad 71$$

$$10b. \quad 6 \text{ cents}$$

$$11ai. \quad 5$$

$$11aii. \quad 40$$

$$11b. \quad \frac{1}{8}$$

$$12. \quad -3\frac{5}{7}$$

$$13a. \quad 5am(9+3am+a)$$

$$13b. \quad 2(y+2)(x-2w)$$

$$14. \quad 25$$

$$15a. \quad -3a+12b-10$$

$$15b. \quad \frac{17x+7}{12}$$

$$16a. \quad -4$$

16b.  $-\frac{11}{18}$

17a.  $a + \frac{8}{3}b$

17b.  $16x + 45m + 20$

17c.  $-12.5$

18a.  $-1, 9$

18ci.  $-1.1$

18cii.  $8.2$

18di. Irrelevant because cannot rent for negative number of hours

18dii. The cost of renting for 1h/gradient of line





COMMONWEALTH SECONDARY SCHOOL  
END OF YEAR EXAMINATION 2017

MATHEMATICS  
PAPER 1

Name: \_\_\_\_\_ (       )       Class: \_\_\_\_\_

SECONDARY ONE EXPRESS  
4048/1

Wednesday 4 Oct 2017  
08 00 – 09 30  
1h 30min

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.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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.

**Name of setter:** Mr Rizman Hassan

For Examiner's Use	
Presentation	
Accuracy	
Total	60

Parent's Signature: \_\_\_\_\_

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

[Turn over

- 1 Consider the following numbers:

$$\sqrt{2}, \quad \frac{14}{3}, \quad \sqrt{49}, \quad -\frac{12}{4}, \quad 0.78, \quad \pi$$

Write down the

(a) integers,

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

(b) irrational numbers.

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

- 2 Sarawak's population was 2 477 000 in 2010. This value has been rounded to the nearest 1000. What are the largest and smallest possible values of Sarawak's population in 2010?

Answer Smallest : ..... [1]

Largest : ..... [1]

- 3 (a) Express 1728 as a product of its prime factors. Leave your answer in index notation.  
 (b) Hence, evaluate  $\sqrt[3]{1728}$ , showing your working clearly.

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

(b) ..... [2]

- 4 Leonard is cutting some squares from a styrofoam board with a length of 192 cm and a breadth of 144 cm. He wants the squares to be as large as possible and does not want any leftover styrofoam board. Find
- (a) the length of the side of each square,
  - (b) the number of squares he can cut from the board altogether.

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

(b) ..... [1]

- 5 Alan, Brenda, Calvin, David and Ethan share a pack of collector's cards. Alan takes  $\frac{1}{3}$  of the cards. After Alan has taken his share, Brenda takes  $\frac{1}{5}$  of the remaining cards. After Brenda has taken her share, Calvin takes  $\frac{1}{6}$  of the remaining cards. After Calvin has taken his share, David takes  $\frac{1}{4}$  of the remaining cards. After David has taken his share, Ethan takes all of the remaining cards. Find the fraction of the pack of collector's cards which belongs to Ethan.

Answer ..... [3]

- 6 Store  $X$  sells bubble tea for \$3.10 with a 10% discount while Store  $Y$  sells bubble tea for \$4.90 with a 40% discount. Use estimation to determine which store will give the better price.



U.P. :\$3.10  
Now:10% Off!



40% Discount!  
Bubble  
Tea  
U.P. :\$4.90

Answer ..... [3]

- 7 Express  $\frac{2x+5}{3} + \frac{7x}{2} + 2$  as a single fraction in its simplest form.

Answer ..... [2]

- 8 (a)** Solve the following equation.

$$3x - [6 - (5x - 4)] = 14$$

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

- (b)** If  $\frac{p-3r}{q} = 2r - p$ , find the value of  $p$  when  $r = 5$  and  $q = -3$ .

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



- 9 The perimeter of a rectangular field is 1200 m and its length is 200 m longer than its breadth. Find the area of the field, giving your answer in  $\text{km}^2$ .

*Answer* .....  $\text{km}^2$  [3]

---

- 10 The shape of a particular fish tank can be modelled after a cuboid, with a base measuring 40 cm by 30 cm, and a height of 25 cm. The tank contains water to  $\frac{4}{5}$  of its full height.
- (a) Calculate the volume of water in the tank. Give your answer in litres.
- (b) Find the surface area of the tank that is in contact with the water.

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

(b) .....  $\text{cm}^2$  [2]

- 11**  $y$  is an integer that satisfies the inequalities  $-5y \leq -15$  and  $4y < 28$ . Solve the inequalities and hence write down all the possible values of  $y$ .

*Answer* ..... [3]

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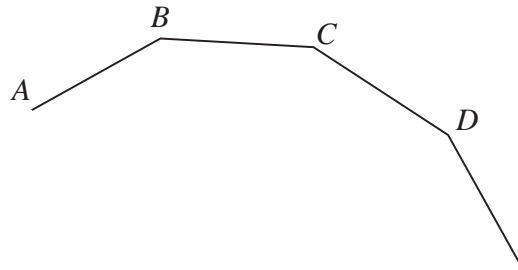
- 12** An examination consists of 2 papers. Keith scores  $(2a - 5b - 3)$  marks for the first paper and  $(4a + 2b - 6)$  marks in the second paper. Express, in terms of  $a$  and  $b$ ,
- (a) Keith's total score in the examination.
- (b) Charles' total score if it is  $\frac{2}{3}$  of Keith's total score.

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

(b) ..... [2]

- 13** The points  $A$ ,  $B$ ,  $C$  and  $D$  are consecutive vertices of a regular polygon with 15 sides.  
Find

- (a)  $\angle ABC$  ,  
(b)  $\angle ABD$  .

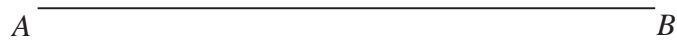


Answer (a) .....  $^{\circ}$  [2]

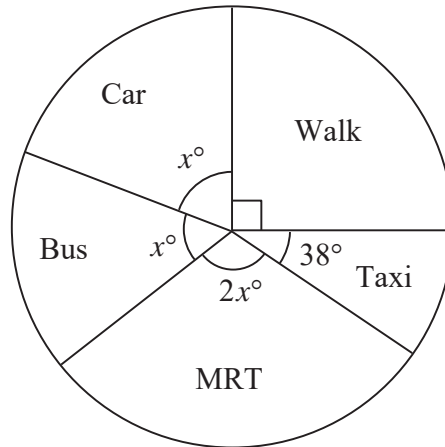
(b) .....  $^{\circ}$  [2]

- 14 (a) Construct triangle  $ABC$  where  $AC = 9.8$  cm and  $\angle ABC = 70^\circ$ .  
 $AB$  has already been drawn for you. [1]
- (b) Measure and label the smallest angle in triangle  $ABC$ . [1]
- (c) Construct the bisector of angle  $BAC$ . [1]
- (d) Mark clearly a point along  $BC$ , equidistant from  $AC$  and  $AB$ . Label this point  $D$ . [1]

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



- 15** The pie chart represents the distribution of how students from a particular school travel to school every day.



- (a) Find the value of  $x$ .  
 (b) The number of students who walk to school exceeds the number of students who take the bus by 128. Find the total number of students in the school.

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

(b) ..... [3]

- 16 (a)** Nevin's monthly salary is \$2050. In a particular month, he spent 25.5% of his salary on his car instalment, \$780 on food and \$840 on his bills. Express the amount that he overspent as a percentage of his monthly salary, giving your answer correct to 3 decimal places.

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

- (b)** Is  $x\%$  of 330 or 330% of  $x$  greater in value? Show your calculations clearly and explain your answer.

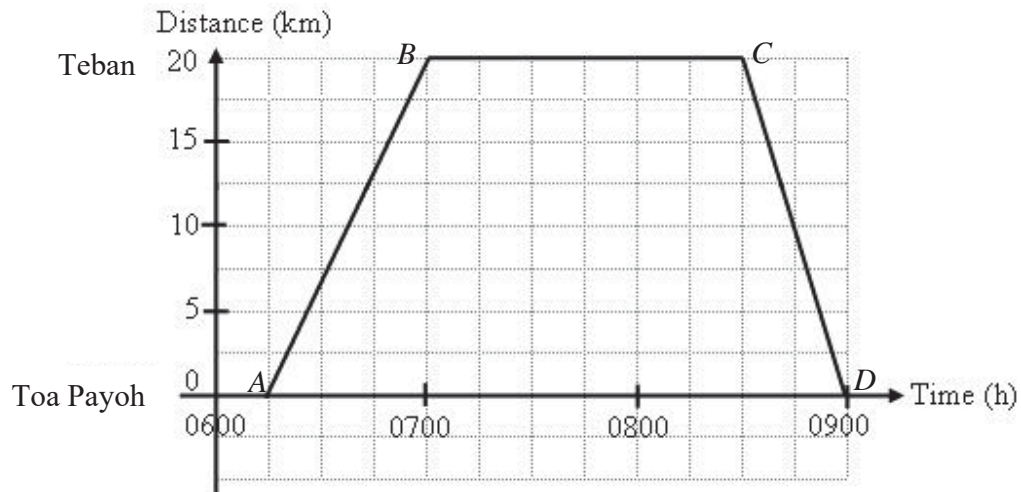
*Answer (b)* .....

..... [2]

- 17 A sum of money is divided among Nathan, Ian and Bryan in the ratio 5 : 6 : 9. After Nathan gives \$70 to his mother, the ratio of money each of them has becomes 3 : 4 : 6. Find the amount of money Nathan has after giving \$70 to his mother.

*Answer* \$ ..... [4]

- 18 The distance-time graph below shows Maya's journey from her home in Toa Payoh to her grandmother's house in Teban on a Sunday morning. She returned home after helping her grandmother with some household chores.



- How long did Maya stay at her grandmother's house?
- State the total distance travelled by Maya on a Sunday morning.
- Calculate the gradient of the line segment  $AB$  and state what the gradient represents.

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

(b) ..... km [1]

- (c) The gradient of the line segment  $AB$  is ..... and it represents .....  
 ..... [2]

**End of Paper**





# COMMONWEALTH SECONDARY SCHOOL END OF YEAR EXAMINATION 2017

## MATHEMATICS PAPER 2

Name: \_\_\_\_\_ (       )       Class: \_\_\_\_\_

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**SECONDARY ONE EXPRESS**

**Friday 6 October 2017**

**4048/2**

**08 00 – 09 30**

**1 h 30min**

---

### 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, 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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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.

**Name of setter:** Mrs Ang YM

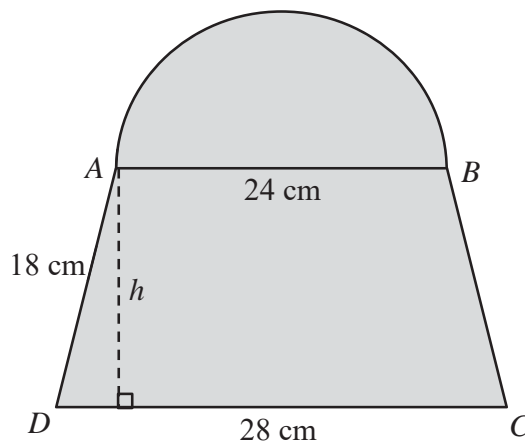
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This paper consists of **6** printed pages including the cover page.

[Turn over

- 1 (a) The usual selling price of a washing machine is \$899. During the Great Singapore Sale, it was sold at a 15% discount.
- (i) What is the selling price of the washing machine during the Great Singapore Sale? [2]
- (ii) If the profit made before the Sales is 40%, find the percentage profit made during the Sale. [3]
- (b) A cyclist travels at an average speed of 30 km/h from home to office. If the cyclist travels at an average speed of 35 km/h instead, he would reach office 10 minutes earlier. By letting the distance between his home and office be  $x$  km, form an equation in  $x$  and hence find the value of  $x$ . [3]
- 

- 2 Tricia has 2 pieces of cardboard. She cut one of them into a semi-circle and the other into a trapezium. She put them together and formed the composite figure as shown below.  $AB = 24$  cm,  $CD = 28$  cm and  $AD = BC = 18$  cm.



- (a) Calculate the perimeter of the composite figure. [2]
- (b) Given that the area of the trapezium is  $390 \text{ cm}^2$ , find the perpendicular height,  $h$ . [2]
- (c) Find the total area of the composite figure, giving your answer in square metres. [2]
-

3 The first four lines of a sequence are given below:

$$T_1 = 5 = 1^2 \times 5$$

$$T_2 = 24 = 2^2 \times 6$$

$$T_3 = 63 = 3^2 \times 7$$

$$T_4 = 128 = 4^2 \times 8$$

$$\vdots$$

- (a) Write down the next line of the sequence. [1]  
 (b) Write down the  $n^{\text{th}}$  line of the sequence in terms of  $n$ . [1]  
 (c) Hence, write down the 50<sup>th</sup> line of the sequence. [2]  
 (d) Another sequence is given below:

$$S_1 = T_1 + 3$$

$$S_2 = T_2 + 4$$

$$S_3 = T_3 + 5$$

$$\vdots$$

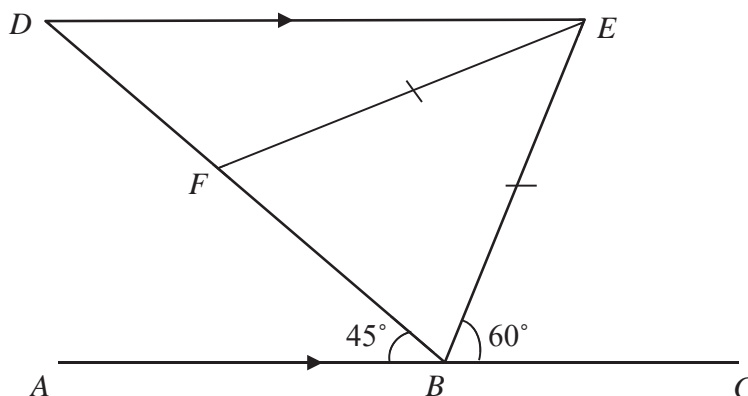
- (i) Calculate the value of  $S_4$ . [1]  
 (ii) Write down an expression for  $S_n$  in terms of  $n$ . [2]

- 4 (a) Given that  $4a + b = 7b - 3a$ , find the exact value of  $\frac{a}{2b}$ . [3]  
 (b) Solve the equation  $\frac{2x+3}{3} - x = \frac{x-5}{4}$ . [3]  
 (c) Find two consecutive odd numbers such that the sum of the greater number and thrice of the smaller number is 86. [3]

- 5 (a) In the diagram below,  $ABC$  is a straight line.  $EF = EB$  and  $DE$  is parallel to  $AC$ .  $\angle ABD = 45^\circ$  and  $\angle CBE = 60^\circ$ . Stating your reason(s) clearly, calculate

(i) reflex  $\angle BDE$ , [2]

(ii)  $\angle BEF$ . [2]



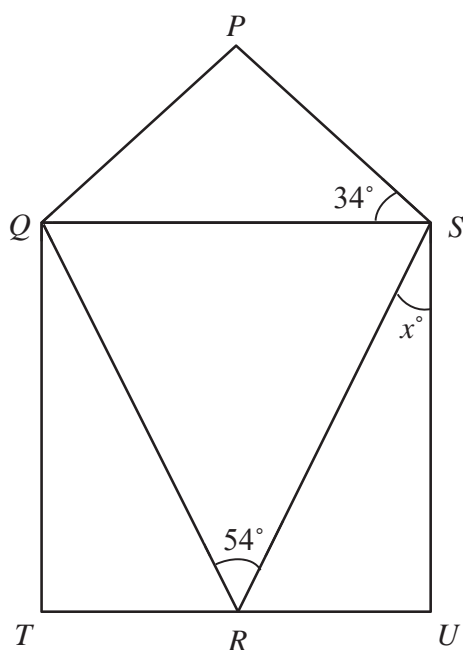
- (b) In the diagram below,  $PQRS$  is a kite and  $QTUS$  is a square.  $\angle QRS = 54^\circ$  and  $\angle PSQ = 34^\circ$ .

(i) Find the value of  $x$ . [2]

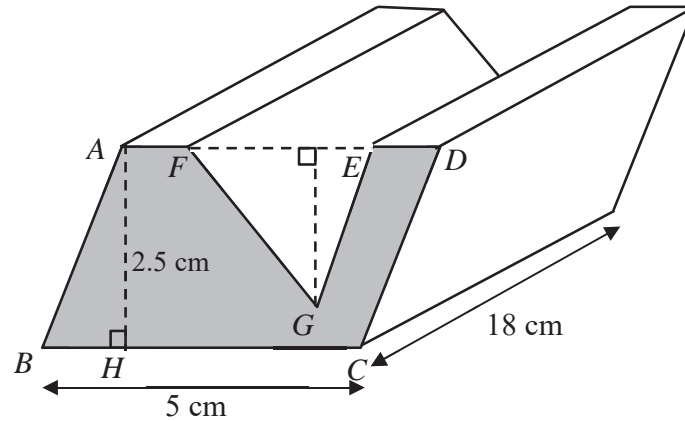
(ii) Calculate

(a)  $\angle TSR$ , [2]

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

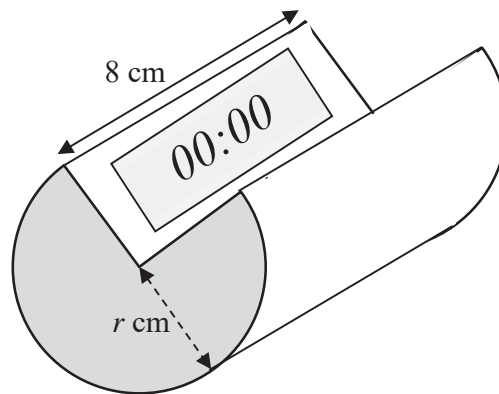


- 6 The figure shows a wooden mobile phone holder.



The uniform cross section is a triangle  $EFG$  removed from a parallelogram  $ABCD$ . Given that  $BC = 5$  cm,  $AH = 2.5$  cm,  $FE : BC = 3 : 5$  and the perpendicular height of triangle  $EFG$  is  $\frac{3}{4}$  of  $AH$ .

- Find the area of the uniform cross section of the mobile phone holder. [2]
- Calculate the volume of wood required to make this holder. [2]
- If  $AB = 3.6$  cm,  $AF = ED$ ,  $FG = 2.4$  cm and  $EG = 1.8$  cm, calculate the total surface area of the holder. [2]
- The same volume of wood can also be made into a table clock of length 8 cm and  $\frac{3}{4}$  of a circle as the uniform cross section.



Calculate the radius,  $r$  cm, of the cross section of the table clock.

[3]

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

- (a)** Copy and complete the following table for  $y = 3x - 7$ . [2]

$x$	-2	0	2	4
$y$		-7	-1	

- (b)** Use a scale of 2 cm to represent 1 unit on the horizontal  $x$ -axis and 2 cm to represent 2 units on the vertical  $y$ -axis. On your axes, plot the points, draw and label the graph of  $y = 3x - 7$ . [3]
- (c)** State the gradient and  $y$ -intercept of the graph. [2]
- (d)** From the graph, find
- (i)** the value of  $x$  when  $y = -4$ , [1]
- (ii)** the value of  $y$  when  $x = 3$ . [1]
- (e)** On the same axes, draw and label the graph of  $x = -1$ . [1]
- (f)** Hence, state the coordinates of the point of intersection of the two graphs. [1]
- 

**END OF PAPER**



## COMMONWEALTH SEC SCH 1E EOY P1 2017 MARKING SCHEME

Qn.	Mark Scheme	Mark Awarded	Remarks
1(a)	$-\frac{12}{4}, \sqrt{49}$	B1	
1(b)	$\sqrt{2}, \pi$	B1	
2	Smallest = 2 476 500 Largest = 2 477 499	B1 B1	
3(a)	$1728 = 2^6 \times 3^3$	B1	
3(b)	$\sqrt[3]{1728} = \sqrt[3]{2^6 \times 3^3}$ $= \sqrt[3]{2^3 \times 2^3 \times 3^3}$ $= 2 \times 2 \times 3$ $= 12$	M1  A1	
4(a)	$\begin{array}{r} 2 \overline{)144,192} \\ 2 \overline{)72,96} \\ 2 \overline{)36,48} \\ 2 \overline{)18,24} \\ 3 \overline{)9,12} \\ 1 \overline{)3,4} \end{array}$  Length of each square = $2^4 \times 3 = 48$ cm	M1     A1	
4(b)	Number of squares = $3 \times 4 = 12$ squares	B1	
5	Remainder after Alan and Brenda = $\frac{4}{5} \times \frac{2}{3} = \frac{8}{15}$  Fraction of card Ethan has = $\frac{8}{15} \times \frac{5}{6} \times \frac{3}{4}$  $= \frac{1}{3}$	M1  M1  A1	
6	Store X : Estimated price $\approx 3 - 0.3 = \$2.70$ Store Y : Estimated price $\approx 5 - 2 = \$3$ Store X will give a better price.	M1  M1  A1	



## COMMONWEALTH SEC SCH 1E EOY P1 2017 MARKING SCHEME

7	$\frac{2x+5}{3} + \frac{7x}{2} + 2$ $= \frac{2(2x+5) + 7x(3)}{6} + 2$ $= \frac{4x+10+21x}{6} + \frac{12}{6}$ $= \frac{25x+22}{6}$	M1       A1	
8(a)	$3x - [6 - (5x - 4)] = 14$ $3x - (6 - 5x + 4) = 14$ $3x - 6 + 5x - 4 = 14$ $8x = 24$ $x = 3$	M1       A1	
8(b)	$\frac{p-3r}{q} = 2r - p$ <p>When <math>q = -3</math> and <math>r = 5</math>,</p> $\frac{p-3(5)}{-3} = 2(5) - p$ $p - 15 = (10 - p)(-3)$ $p - 15 = +30 + 3p$ $30 - 15 = 3p - p$ $2p = 15$ $p = 7\frac{1}{2}$	M1       M1       A1	
9	<p>Let the breadth be <math>x</math> m.</p> <p>Length = <math>(x + 200)</math> m.</p> <p>Perimeter = <math>200 + x + 200 + x + x + x</math></p> $1200 = 400 + 4x$ $4x = 800$ $x = 200$ <p>Length = 400 m</p> <p>Breadth = 200 m</p> <p>Area = <math>0.2 \times 0.4 = 0.08 \text{ km}^2</math> or <math>\frac{2}{25} \text{ km}^2</math></p>	M1 M1       A1	

## COMMONWEALTH SEC SCH 1E EOY P1 2017 MARKING SCHEME

<b>10(a)</b>	$20 \times 30 \times 40 = 24000\text{cm}^3$ $= 24l$	<b>B1</b>	
<b>10(b)</b>	Surface area in contact with water $= 30 \times 40 + 2(30 \times 20) + 2(40 \times 20)$ $= 1200 + 1200 + 1600$ $= 4000\text{cm}^2$	<b>M1</b>  <b>A1</b>	
<b>11</b>	$-5y \leq -15$ $y \geq \frac{-15}{-5}$ $y \geq 3$  $4y < 28$ $y < \frac{28}{4}$ $y < 7$  Possible values of $y = 3, 4, 5, 6$ .	<b>M1</b>    <b>M1</b>  <b>A1</b>	
<b>12(a)</b>	Total score $= (2a - 5b - 3) + (4a + 2b - 6)$ $= 6a - 3b - 9$	<b>B1</b>	
<b>12(b)</b>	Charlie's score $= \frac{2}{3} \times (6a - 3b - 9)$ $= 4a - 2b - 6$	<b>M1</b>  <b>A1</b>	
<b>13(a)</b>	Sum of interior angles $= (15 - 2) \times 180^\circ = 2340^\circ$ $\angle ABC = \frac{2340}{15}$ $= 156^\circ$	<b>M1</b>  <b>A1</b>	
<b>13(b)</b>	$\angle DBC = \frac{180^\circ - 156^\circ}{2} = 12^\circ$ (Isosceles triangle) $\angle ABD = 156^\circ - 12^\circ = 144^\circ$	<b>M1</b>  <b>A1</b>	

## COMMONWEALTH SEC SCH 1E EOY P1 2017 MARKING SCHEME

<b>14</b>		<b>B1 – correct triangle <math>ABC</math> drawn</b> <b>B1 – correct measurement of angle <math>ACB</math> : <math>54^\circ \pm 1^\circ</math></b> <b>B1 – correct angle bisector drawn</b> <b>B1 – correct labelling of point D</b>	
<b>15(a)</b>	$x + x + 2x = 360^\circ - 90^\circ - 38^\circ$ $4x = 232^\circ$ $x = 58^\circ$	<b>M1</b>  <b>A1</b>	
<b>15(b)</b>	$\frac{128}{32} \times 360^\circ$ $= 1440^\circ$	<b>M1</b>  <b>A1</b>	
<b>16(a)</b>	Amount spent = $2050 \times 25.5\% + 780 + 840 = \$2142.75$ Percentage overspent = $\frac{2142.75 - 2050}{2050} \times 100\% = 4.524\%$	<b>M1</b>  <b>A1</b>	

## COMMONWEALTH SEC SCH 1E EOY P1 2017 MARKING SCHEME

<b>16(b)</b>	$  \begin{array}{l}  x\% \text{ of } 330: \\  \frac{x}{100} \times 330 \\  = \frac{330x}{100} \\  = \frac{33x}{10}  \end{array}  $ $  \begin{array}{l}  330\% \text{ of } x: \\  \frac{330}{100} \times x \\  = \frac{33}{10} \times x \\  = \frac{33x}{10}  \end{array}  $ <p>They are the same in value as both will give <math>\frac{33x}{10}</math> as the result.</p>	<b>M1</b>	
<b>17</b>	<p>Old</p> <p>Nathan : Ian : Bryan</p> <p>= 5 : 6 : 9</p> <p>= 10 : 12 : 18</p> <p>New</p> <p>Nathan : Ian : Bryan</p> <p>= 3 : 4 : 6</p> <p>= 9 : 12 : 18</p> <p>1 unit ---- \$70</p> <p>9 units --- <math>9 \times \\$70</math></p> <p>= \$630</p>	<p><b>M1</b></p> <p><b>M1</b></p> <p><b>M1</b></p> <p><b>A1</b></p>	

- 1 (a) The usual selling price of a washing machine is \$899. During the Great Singapore Sale, it was sold at a 15% discount.
- (i) What is the selling price of the washing machine during the Great Singapore Sale? [2]
- (ii) If the profit made before the Sales is 40%, find the percentage profit made during the Sale. [3]
- (b) A cyclist travels at an average speed of 30 km/h from home to office. If the cyclist travels at an average speed of 35 km/h instead, he would reach office 10 minutes earlier. By letting the distance between his home and office be  $x$  km, form an equation in  $x$  and hence find the value of  $x$ . [3]

Answer:

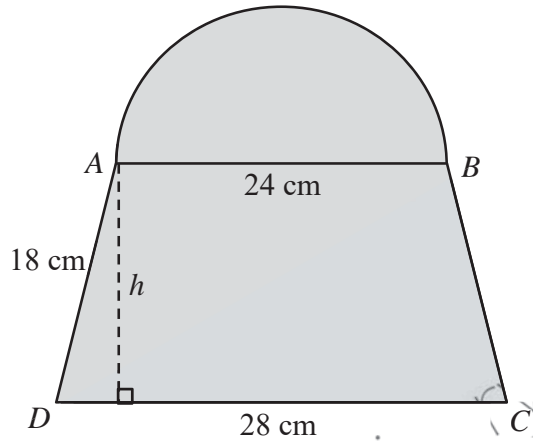
(a) (i) selling price during the Sale  $= \frac{85}{100} \times 899$  [M1]  
 $= \$764.15$  [A1]

(ii) original price before the Sale  $= \frac{100}{140} \times 899$   
 $= \$642.14$  [M1]  
 Percentage profit during Sale  $= \frac{764.15 - 642.14}{642.14} \times 100\%$  [M1]  
 $= 19.0\% \text{ (3s.f.)}$  [A1]

(b)  $\frac{x}{30} - \frac{x}{35} = \frac{10}{60}$  [M1]  
 $\frac{7x - 6x}{210} = \frac{1}{6}$   
 $\frac{x}{210} = \frac{1}{6}$  [M1]  
 $6x = 210$   
 $x = 35$  [A1]

---

- 2 Tricia has 2 pieces of cardboard. She cut one of them into a semi-circle and the other into a trapezium. She put them together and formed the composite figure as shown below.  $AB = 24$  cm,  $CD = 28$  cm and  $AD = BC = 18$  cm.



- (a) Calculate the perimeter of the composite figure. [2]  
 (b) Given that the area of the trapezium is  $390 \text{ cm}^2$ , find the perpendicular height,  $h$ . [2]  
 (c) Find the total area of the composite figure, giving your answer in square metres. [2]

Answer:

- (a) Perimeter  $= 2(18) + 28 + \frac{\pi(24)}{2}$  [M1]  
 $= 102 \text{ cm (3 s.f.)}$  [A1]
- (b)  $390 = \frac{1}{2} \times h \times (24 + 28)$  [M1]  
 $h = 15 \text{ cm}$  [A1]
- (c) total area of the composite figure  $= 390 + \frac{\pi(12^2)}{2}$  [M1]  
 $= 616 \text{ cm}^2$   
 $= 0.0616 \text{ m}^2$  [A1]
-

3 The first four lines of a sequence are given below:

$$T_1 = 5 = 1^2 \times 5$$

$$T_2 = 24 = 2^2 \times 6$$

$$T_3 = 63 = 3^2 \times 7$$

$$T_4 = 128 = 4^2 \times 8$$

$$\vdots$$

- (a) Write down the next line of the sequence. [1]  
 (b) Write down the  $n^{\text{th}}$  line of the sequence in terms of  $n$ . [1]  
 (c) Hence, write down the 50<sup>th</sup> line of the sequence. [2]  
 (d) Another sequence is given below:

$$S_1 = T_1 + 3$$

$$S_2 = T_2 + 4$$

$$S_3 = T_3 + 5$$

$$\vdots$$

- (i) Calculate the value of  $S_4$ . [1]  
 (ii) Write down an expression for  $S_n$  in terms of  $n$ . [2]

Answer:

(a)  $T_5 = 225 = 5^2 \times 9$  [B1]

(b)  $T_n = n^3 + 4n^2 = n^2 \times (n + 4)$  [B1]

(c)  $T_{50} = 135000 = 50^2 \times 54$   
           [B1]           [B1]

(d) (i)  $S_4 = T_4 + 6$   
            $= 134$  [B1]

(ii)  $S_n = T_n + (n + 2)$  [M1]  
        $= n^3 + 4n^2 + n + 2$  [A1]

---

- 4 (a) Given that  $4a + b = 7b - 3a$ , find the exact value of  $\frac{a}{2b}$ . [3]
- (b) Solve the equation  $\frac{2x+3}{3} - x = \frac{x-5}{4}$ . [3]
- (c) Find two consecutive odd numbers such that the sum of the greater number and thrice of the smaller number is 86. [3]

Answer:

(a)  $4a + b = 7b - 3a$   
 $7a = 6b$  [M1]  
 $\frac{a}{b} = \frac{6}{7}$  [M1]  
 $\frac{a}{2b} = \frac{6}{14} = \frac{3}{7}$  [A1]

(b)  $\frac{2x+3}{3} - x = \frac{x-5}{4}$   
 $\frac{2x+3-3x}{3} = \frac{x-5}{4}$   
 $\frac{3-x}{3} = \frac{x-5}{4}$  [M1]  
 $4(3-x) = 3(x-5)$   
 $12-4x = 3x-15$  [M1]  
 $7x = 27$   
 $x = 3\frac{6}{7}$  [A1]

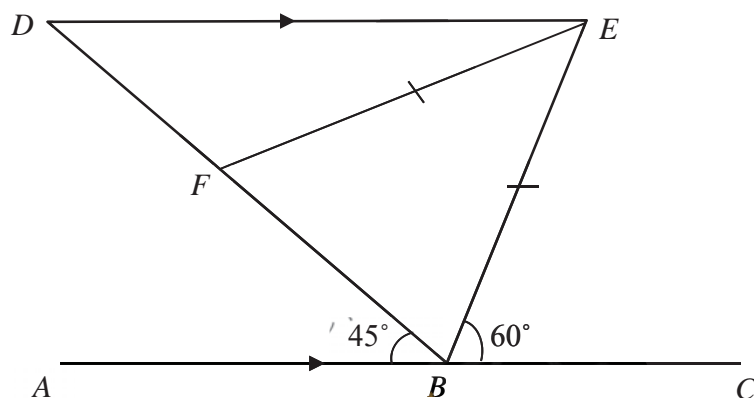
(c) Let the smaller odd number be  $x$   
 And the consecutive odd number be  $x + 2$ . [M1]  
 $x + 2 + 3x = 86$  [M1]  
 $4x = 84$   
 $x = 21$   
 The two consecutive odd numbers are 21 and 23. [A1]  
**[Deduct 1 mark for non-algebraic methods.]**

---



- 5 (a) In the diagram below,  $ABC$  is a straight line.  $EF = EB$  and  $DE$  is parallel to  $AC$ .  $\angle ABD = 45^\circ$  and  $\angle CBE = 60^\circ$ . Stating your reason(s) clearly, calculate

- (i) reflex  $\angle BDE$ , [2]  
 (ii)  $\angle BEF$ . [2]



Answer:

- (a) (i)  $\angle BDE = 45^\circ$  (alt.  $\angle$ s)  
 Reflex  $\angle BDE = 360^\circ - 45^\circ$  ( $\angle$ s at a point) [M1]  
 $= 315^\circ$  [A1]
- (ii)  $\angle FBE = 180^\circ - 45^\circ - 60^\circ$  (adj.  $\angle$ s on a straight line)  
 $= 75^\circ$  [M1]  
 $\angle BEF = 180^\circ - 2(75^\circ)$  (iso. triangle)  
 $= 30^\circ$  [A1]

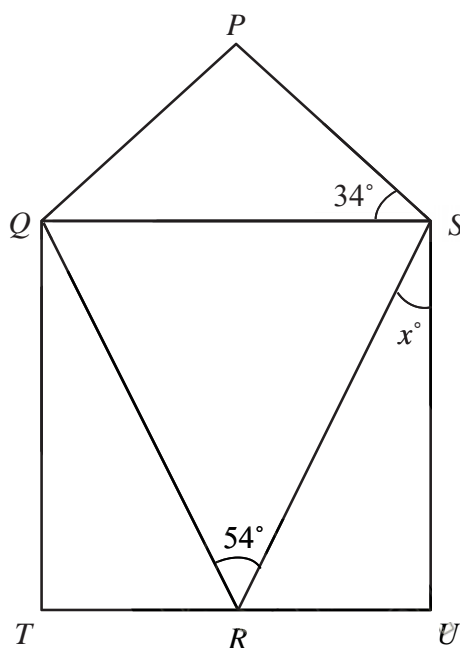
- (b) In the diagram below,  $PQRS$  is a kite and  $QTUS$  is a square.  $\angle QRS = 54^\circ$  and  $\angle PSQ = 34^\circ$ .

(i) Find the value of  $x$ . [2]

(ii) Calculate

(a)  $\angle TSR$ , [2]

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



Answer:

(b)(i) Since  $PQRS$  is a kite,  $QR=RS$

$$\angle QSR = \frac{180^\circ - 54^\circ}{2} \text{ (iso. triangle) [M1]}$$

$$= 63^\circ$$

$$x = 90 - 63 = 27 \quad \text{[A1]}$$

(ii)(a) Since  $QTUS$  is a square,

$$\angle TSU = 45^\circ$$

$$\begin{aligned} \angle TSR &= 45^\circ - x^\circ \\ &= 45^\circ - 27^\circ \text{ [M1]} \\ &= 18^\circ \quad \text{[A1]} \end{aligned}$$

(b) Since  $PQRS$  is a kite,  $PQ=PS$

$$\angle PQS = 34^\circ$$

$$\begin{aligned} \angle UQP &= 45^\circ + 34^\circ \text{ [M1]} \\ &= 79^\circ \quad \text{[A1]} \end{aligned}$$

---

[Deduct ½ mark from the question itself for no/wrong reasons given]

Answer:

- (a) area of the uniform cross section  $= (5 \times 2.5) - \left( \frac{1}{2} \times 3 \times 1.875 \right)$  [M1]  
 $= 9.6875 \text{ cm}^2$  [A1]
- (b) Volume of wood  $= 9.6875 \times 18$  [M1]  
 $= 174.375 \text{ cm}^3$  [A1]
- (c) Total Surface area  $= 2(9.6875) + (5 \times 18) + 2(3.6 \times 18) + (2.4 \times 18) + (1.8 \times 18) + 2(1 \times 18)$  [M1]  
 $= 350.575 \text{ cm}^2$  [A1]
- (d)  $174.375 = \left( \frac{3}{4} \pi r^2 \right) \times 8$  [M1]  
 $174.375 = 6\pi r^2$   
 $r^2 = \frac{174.375}{6\pi}$  [M1]  
 $r = \sqrt{\frac{174.375}{6\pi}} = 3.04 \text{ cm (3 s.f.)}$  [A1]

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

- (a) Copy and complete the following table for  $y = 3x - 7$ . [2]

$x$	-2	0	2	4
$y$		-7	-1	

- (b) Use a scale of 2 cm to represent 1 unit on the horizontal  $x$ -axis and 2 cm to represent 2 units on the vertical  $y$ -axis. On your axes, plot the points, draw and label the graph of  $y = 3x - 7$ . [3]
- (c) State the gradient and  $y$ -intercept of the graph. [2]
- (d) From the graph, find
- (i) the value of  $x$  when  $y = -4$ , [1]
- (ii) the value of  $y$  when  $x = 3$ . [1]
- (e) On the same axes, draw and label the graph of  $x = -1$ . [1]
- (f) Hence, state the coordinates of the point of intersection of the two graphs. [1]

**[Answers done on writing papers for Q7 instead of graph paper will not be marked]**

**END OF PAPER**



Name : \_\_\_\_\_

Class

Index Number

--	--

# METHODIST GIRLS' SCHOOL

Founded in 1887



## MID-YEAR EXAMINATION 2017 Secondary 1

Thursday

11 MAY 2017

### MATHEMATICS

1 h 30 min

#### INSTRUCTIONS TO CANDIDATES

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 paper clips, highlighters 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.

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

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.

Marks
60

**1** State which of the following are **irrational** numbers.

$$6.345, \quad \pi - 2.4, \quad \frac{(\sqrt{2})^2}{16}, \quad \sqrt[3]{9}.$$

*Answer* ..... [1]

**2** Arrange the following numbers in **ascending** order:

$$|-2.2|, \quad 2\frac{2}{5}, \quad 2.3, \quad 2.3\dot{2}$$

*Answer* ..... [1]

**3** Draw a number line (using an interval of 1 unit) to represent **composite** numbers between 1 and 13.

*Answer*

[2]

**4 (a)** Express 0.0749561234 correct to 3 significant figures.

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

**(b)** The number 904 999 corrected to ***n*** significant figures is 905 000.

Write down the largest possible value of ***n***.

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

**5** (a) Evaluate  $[(69 - 33) \times 20 \div 5] - 21 \div 3$ ,

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

(b)  $\frac{1}{3} \div \left(-\frac{2}{3}\right) + \left(-1\frac{1}{2}\right)^2 \times \sqrt[3]{-27}$ .

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



- 6 Given that  $p = 2$ ,  $q = -1$  and  $r = -3$ , evaluate  $\frac{3pq^2}{r}$ .

Answer ..... [1]

- 7 Mrs Kheng drives a distance of  $x$  km per day.

- (a) Find an expression for the total distance travelled, in km, in  $p$  weeks.  
 (b) Mrs Kheng paid \$ $y$  for the petrol used in  $p$  weeks. Find her cost of petrol consumption, in \$, per day.

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

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

- 8 (a) Express 2704 as a product of prime factors in index notation.

- (b) Hence, find the

- (i) value of  $\sqrt{\frac{2704}{9}}$ ,

- (ii) smallest positive integer value of  $k$ , such that  $2704k$  is a perfect cube.

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

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

(ii) ..... [2]

**9** Written as the product of its prime factors,

$$2\,940 = 2^2 \times 3 \times 5 \times 7^2$$

$$8\,232 = 2^3 \times 3 \times 7^3$$

$$8\,085 = 3 \times 5 \times 7^2 \times 11$$

Giving your answer as a product of its prime factors, find

- (a) the highest common factor,  
(b) and lowest common multiple  
of the three numbers above.

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

(b)..... [1]

**10** The theatre is 36 km away from Melissa's home. Melissa left her home at 09 25 and drove for 20 minutes before stopping by a petrol station. She spent 10 minutes at the petrol station and drove another 15 minutes to reach the theatre.

- (a) At what time did Melissa reach the theatre?  
(b) Find the average speed, in km/h, for the whole journey.  
(c) She left the theatre at 14 35 on the same day. Calculate, in hours and minutes, the time for which she spent at the theatre.

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

(b) .....km/h [2]

(c).....h.....min [1]

- 11** Mrs. Wong distributed 30 cylindrical blocks, 45 cubes and 105 triangular blocks to the students in her class. Each student received the same number of cylindrical blocks, cubes and triangular blocks.

- (a) Find the largest possible number of students in the class.  
(b) How many triangular blocks did each student receive?

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

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

- 12** Margaret sold an art piece for \$ 4800. When she sold it, she made a loss of 4% of her cost price.

- (a) Find the cost price.  
(b) The same art piece is now valued for \$5 250. Find the gain in value as a percentage of its cost price.

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

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

- 13** If  $5\frac{1}{3} : 24 = 22 : x$ , find the value of  $x$ .

*Answer*  $x = \dots\dots\dots$  [2]

- 14** A metallic block has a volume of  $11 \text{ cm}^3$ , correct to the nearest cubic centimetre.

**(a)** Find the

- (i)** greatest possible volume and
- (ii)** the least possible volume of the metallic block.

- (b)** The mass of the metallic block is 31 g, correct to the nearest gram.  
Find the greatest possible mass of  $1 \text{ cm}^3$  of the metallic block.

*Answer (a) (i)*.....  $\text{cm}^3$  [1]

*(ii)*.....  $\text{cm}^3$  [1]

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

- 15** The stem-and-leaf diagram shows the number of key chains sold by each pupil for a fund-raising project.

Stem	Leaf
0	7 9
1	1 4 8
2	0 1 5 8 8 8 8 9 9 9
3	0 2 4 5 7 8 9
4	0 2

Key: 2|5 represents 25 key chains sold

- (a) Find the total number of pupils selling the key chains.
- (b) Find the
- (i) modal number of key chains sold,
- (ii) median number of key chains sold.

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

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

(ii)..... [1]

- (c) The information in the stem-and-leaf diagram are represented in the table below. Complete the table below.

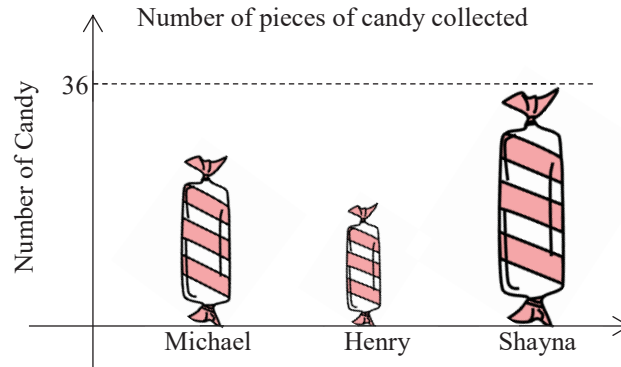
No. of key chains sold, $n$	$0 \leq n < 10$	$10 \leq n < 20$	$20 \leq n < 30$	$30 \leq n < 40$	$40 \leq n < 50$
No. of pupils	2			7	2

[1]

- (d) Using the table in part (c) above, calculate an estimate for the mean number of key chains sold.

Answer (d)..... [2]

- 16** The diagram is drawn to show the number of pieces of candy collected by Michael, Henry and Shayna.



State one aspect of the graph that may be misleading and explain how this may lead to a misinterpretation of the graph.

.....

.....

.....

.....

[2]

- 17** The scale of a map is 6 cm to 1.5 km.

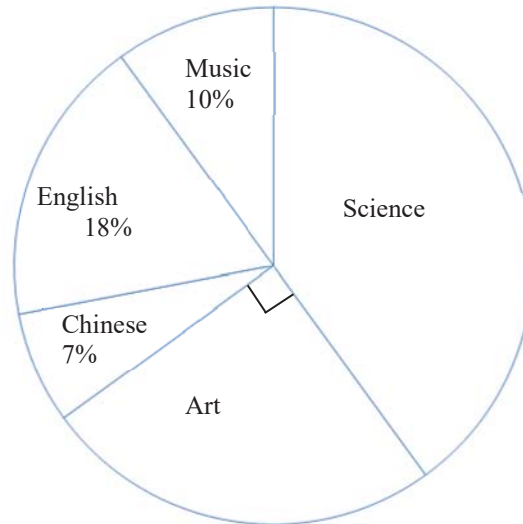
- (a) Write the scale in the form 1 :  $n$ .
- (b) The actual length of a bridge is 8 km. Calculate the length of the bridge, in cm, represented on the map.
- (c) Calculate the actual area of a field, in  $\text{km}^2$ , which is  $72 \text{ cm}^2$  on the map.

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

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

(c)..... $\text{km}^2$  [2]

- 18** The pie chart represents the favourite subject of a group of students. 28 students choose Chinese as their favourite subject.



- (a) How many students are there in the group?
- (b) Calculate the number of students who like Science.
- (c) 20% of the students whose favourite subject is Art decided to change their option to Science. Calculate the new percentage of students who like Science.

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

(b) ..... [3]

(c)..... % [3]

**End of Paper**





- 1 State which of the following are **irrational** numbers.

$$6.345, \quad \pi - 2.4, \quad \frac{(\sqrt{2})^2}{16}, \quad \sqrt[3]{9}.$$

Answer .....  $\pi - 2.4, \sqrt[3]{9}$ ..... [1]

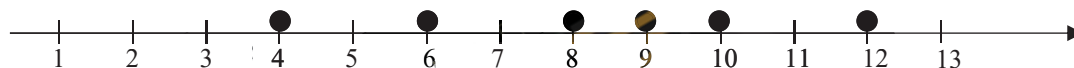
- 2 Arrange the following numbers in ascending order:

$$|-2.2|, \quad 2\frac{2}{5}, \quad 2.3, \quad 2.3\dot{2}$$

Answer ..  $|-2.2|, 2.3, 2.3\dot{2}, 2\frac{2}{5}$ ..... [1]

- 3 Draw a number line (using an interval of 1 unit) to represent **composite** numbers between 1 and 13.

Answer



[1m] for Line + Arrow + Equal Intervals

[1m] for correct placement of dots

[2]

- 4 (a) Express 0.0749561234 correct to 3 significant figures.

Answer (a) ....0.0750..... [1]

- (b) The number 904 999 corrected to  $n$  significant figures is 905 000.

Write down the largest possible value of  $n$ .

Answer (b) .....5..... [1]

5 (a)  $[(69 - 33) \times 20 \div 5] - 21 \div 3,$

$$[(69 - 33) \times 20 \div 5] - 21 \div 3$$

$$= [36 \times 20 \div 5] - 7 \text{ -----M1}$$

$$= \left[ \frac{36 \times 20}{5} \right] - 7$$

$$= 144 - 7 \text{ -----M1}$$

$$= 137 \text{ ----- A1}$$

Answer (b) .....137..... [3]

(b)  $\frac{1}{3} \div \left(-\frac{2}{3}\right) + \left(-1\frac{1}{2}\right)^2 \times \sqrt[3]{-27}.$

$$\frac{1}{3} \div \left(-\frac{2}{3}\right) + \left(-1\frac{1}{2}\right)^2 \times \sqrt[3]{-27}$$

$$= \frac{1}{3} \div \left(-\frac{2}{3}\right) + \left(\frac{-3}{2}\right)^2 \times (-3)$$

$$= \frac{1}{3} \times \left(\frac{-3}{2}\right) + \frac{9}{4} \times (-3) \text{ ..... M1 [for } \frac{9}{4}]$$

$$= \frac{-1}{2} + \left(-\frac{27}{4}\right)$$

$$= \frac{-2-27}{4} \text{ .....M1}$$

$$= \frac{-29}{4}$$

$$= -7\frac{1}{4} \text{ -----A1}$$

Answer (b) ..... $-7\frac{1}{4}$ ..... [3]

- 6 Given that  $p = 2$ ,  $q = -1$  and  $r = -3$ , evaluate  $\left(\frac{3pq^2}{r}\right)$ .

$$\left(\frac{3pq^2}{r}\right)$$

$$= \frac{3(2)(-1)^2}{-3}$$

$$= \frac{6}{-3}$$

$$= -2 \text{ -----A1}$$

Answer ..... -2..... [1]

- 7 Mrs Kheng drives a distance of  $x$  km per day.

- (a) Find an expression for the total distance travelled, in km, in  $p$  weeks.  
 (b) Mrs Kheng paid \$ $y$  for the petrol used in  $p$  weeks. Find her cost of petrol consumption, in \$, per day.

(a) Total dist. travelled =  $7xp$  km ----- A1

(b) Cost of petrol consumption = \$  $\frac{y}{7p}$  ----- A1

Answer (a).....  $7xp$  .....km [1]

(b) \$.....\$  $\frac{y}{7p}$ .....[1]

- 8 (a) Express 2704 as a product of prime factors in index notation.

- (b) Hence, find the

(i) value of  $\sqrt{\frac{2704}{9}}$ ,

- (ii) smallest positive integer value of  $k$ , such that  $2704k$  is a perfect cube.

(a)  $2704 = 2^4 \times 13^2$  -----A1

(b)  $\sqrt{\frac{2704}{9}} = \sqrt{\frac{2^4 \times 13^2}{3^2}}$

$$= \frac{2^2 \times 13}{3} \text{ -----M1}$$

$$= 17\frac{1}{3} \text{ ----- A1}$$

(c)  $k = 2^2 \times 13$  ----- M1

$$= 52 \text{ -----A1}$$

M1-----

2	2704
2	1352
2	676
2	338
13	169
13	13
	1

Answer (a).....  $2^4 \times 13^2$ ..... [2]

(b) (i) .....  $17\frac{1}{3}$ ..... [2]

(ii) .....52..... [2]

**9** Written as the product of its prime factors,

$$2\,940 = 2^2 \times 3 \times 5 \times 7^2$$

$$8\,232 = 2^3 \times 3 \times 7^3$$

$$8\,085 = 3 \times 5 \times 7^2 \times 11$$

Giving your answer as a product of its prime factors, find

- (a) the highest common factor,  
(b) and lowest common multiple  
of the three numbers above.

$$\text{HCF} = 3 \times 7^2 \text{ ---- A1}$$

$$\text{LCM} = 2^3 \times 3 \times 5 \times 7^3 \times 11 \text{ ----A1}$$

$$\text{Answer (a)} \dots\dots\dots 3 \times 7^2 \dots\dots\dots [1]$$

$$(b) \dots\dots 2^3 \times 3 \times 5 \times 7^3 \times 11 \dots\dots [1]$$

**10** The theatre is 36 km away from Melissa's home. Melissa left her home at 09 25 and drove for 20 minutes before stopping by a petrol station. She spent 10 minutes at a petrol station and drove another 15 minutes to reach the theatre.

- (a) At what time did Melissa reach the theatre?  
(b) Find the average speed, in km/h, for the **whole** journey.  
(c) She left the theatre at 14 35 on the same day. Calculate, in hours and minutes, the time for which she spent at the theatre.

$$(a) 1010 \text{ ---- B1}$$

(b) Average speed

$$= 36 \div \frac{3}{4} \text{ ----M1}$$

$$= 36 \times \frac{4}{3}$$

$$= 48 \text{ km/h ----A1}$$

$$(c) \text{ Time taken} = 4 \text{ h } 25 \text{ min ----B1}$$

$$\text{Answer (a)} \dots\dots\dots 1010 \dots\dots\dots [1]$$

$$(b) \dots\dots\dots 48 \dots\dots \text{km/h} [2]$$

$$(c) \dots\dots\dots 4 \text{ h } 25 \text{ min} \dots\dots\dots [1]$$

- 11** Mrs. Wong distributed 30 cylindrical blocks, 45 cubes and 105 triangular blocks to the students in her class. Each student received the same number of cylindrical blocks, cubes and triangular blocks.

- (a) Find the largest possible number of students in the class.  
(b) How many triangular blocks did each student receive?

(a) Largest possible no. of students = HCF of 30, 45 and 105

$$= 3 \times 5$$

$$= 15 \text{ ----- A1}$$

M1-----

5	30, 45, 105
3	6, 9, 21
2	3, 7

(b) No. of triangular blocks each received = 7 ---- A1

Answer (a).....15..... [2]

(b) .....7.....[1]

- 12** Margaret sold an art piece for \$ 4800. When she sold it, she made a loss of 4% of her cost price.

- (a) Find the cost price.  
(b) The same art piece is now valued for \$5 250. Find the gain in value as a percentage of its cost price.

(a) cost price of art piece = \$  $\frac{4800 \times 100}{96}$  ----M1  
= \$5000 ---- A1

(b) % gain =  $\frac{5250-5000}{5000} \times 100 \%$  ---- M1

$$= \frac{250}{5000} \times 100\%$$

$$= 5\% \text{ ----- A1}$$

Answer (a) \$.....5000..... [2]

(b) .....5.....% [2]

- 13** If  $5\frac{1}{3} : 24 = 22 : x$ , find the value of  $x$ .

$$\begin{aligned} 5\frac{1}{3} : 24 &= \frac{16}{3} : 24 \\ &= 16 : 72 \text{ ----- M1} \\ &= 2 : 9 \\ &= 22 : 99 \text{ ----- A1} \end{aligned}$$

*Answer*  $x = \dots\dots\dots 99 \dots\dots\dots$  [2]

- 14** A metallic block has a volume of  $11 \text{ cm}^3$ , correct to the nearest cubic centimetre.

**(a)** Find the

- (i)** greatest possible volume and  
**(ii)** the least possible volume of the metallic block.

- (i)** greatest possible Volume =  $11.5 \text{ cm}^3$  ----- A1  
**(ii)** least possible volume =  $10.5 \text{ cm}^3$  -----A1

- (b)** The mass of the metallic block container is 31 g, correct to the nearest gram.  
Find the greatest possible mass of  $1 \text{ cm}^3$  of the metallic block.

Greatest possible mass of  $1 \text{ cm}^3$  of the metallic block

$$\begin{aligned} &= \frac{31.5}{10.5} \text{ -----M1} \\ &= 3 \text{ g -----A1} \end{aligned}$$

*Answer (a) (i)*..... $11.5 \dots\dots\dots \text{cm}^3$  [1]

*(ii)*..... $10.5 \dots\dots\dots \text{cm}^3$  [1]

*(b)*..... $3 \dots\dots\dots \text{g}$  [2]

- 15** The stem-and-leaf diagram shows the number of souvenir key chains sold by each pupil for a fund-raising project.

Stem	Leaf
0	7 9
1	1 4 8
2	0 1 5 8 8 8 8 9 9 9
3	0 2 4 5 7 8 9
4	0 2

Key: 2|5 represents 25 key chains sold

- (a) Find the total number of pupils selling the key chains.  
 (b) Find the  
 (i) modal number of key chains sold,  
 (ii) median number of key chains sold.

$$\begin{aligned} \text{(bii) median} &= \frac{28+29}{2} \\ &= 28.5 \text{ key chains} \text{ ----A1} \end{aligned}$$

Answer (a).....24..... [1]

(b) (i).....28..... [1]

(ii).....28.5..... [1]

- (c) Use the stem-and-leaf diagram above to complete the following table.

$n$ , no. of key chains sold	$0 \leq n < 10$	$10 \leq n < 20$	$20 \leq n < 30$	$30 \leq n < 40$	$40 \leq n < 50$
No. of pupils	2	3	10	7	2

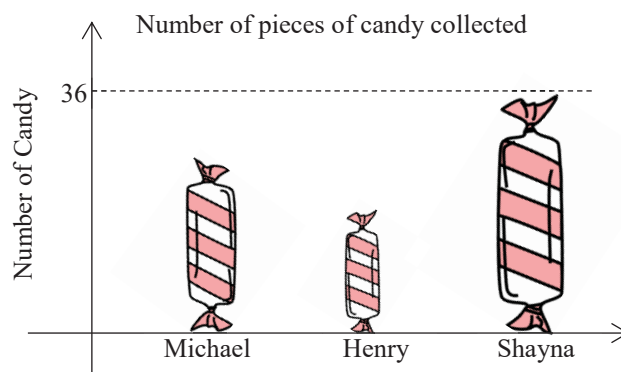
[1]

- (d) Using the table in part (c) above, calculate an estimate for the mean number of key chains sold.

$$\begin{aligned} \text{Mean} &= \frac{2(5)+3(15)+10(25)+7(35)+2(45)}{24} \text{ ----M1} \\ &= \frac{10+45+250+245+90}{24} \\ &= \frac{640}{24} \\ &= \frac{80}{3} \\ &= 26\frac{2}{3} \text{ key chains} \text{ ----A1} \end{aligned}$$

Answer (d).....  $26\frac{2}{3}$ ..... [2]

- 16 The diagram is drawn to show the number of pieces of candy collected by Michael, Henry and Shayna at a party.



State one aspect of the graph that may be misleading and explain how this may lead to a misinterpretation of the graph. [2]

The size of the icons/bars used are different hence it is not clear whether the height or the area of the candy gives the readings. OR ----A2

The graph does not indicate if it starts from zero and does not have intervals.

Hence data cannot be accurately read from the graph. ---A2

**[Other reasonable answers may be accepted – A1: Aspect/A1: Reason]**

- 17 The scale of a map is 6 cm to 1.5 km.

- (a) Write the scale in the form 1 :  $n$ .  
 (b) The actual length of a bridge is 8 km. Calculate the length of the bridge, in cm, represented on the map.  
 (c) Calculate the actual area of a field, in  $\text{km}^2$ , which is  $72 \text{ cm}^2$  on the map.

$$\begin{aligned} \text{(a)} \quad & 6 \text{ cm} : 1.5 \text{ km} \\ & 6 \text{ cm} : 150\,000 \text{ cm} \\ & 1 : 25\,000 \quad \text{----A1} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & 6^2 \text{ cm}^2 : (1.5)^2 \text{ km}^2 \quad \text{---M1} \\ & 36 \text{ cm}^2 : 2.25 \text{ km}^2 \\ & 72 \text{ cm}^2 : 2.25 \times 2 \text{ km}^2 \end{aligned}$$

$$\begin{aligned} \text{actual area} &= 2.25 \times 2 \\ &= 4.5 \text{ km}^2 \quad \text{----A1} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & 6 \text{ cm} : 1.5 \text{ km} \\ & 6 \div \frac{3}{2} \times 8 \text{ cm} : 8 \text{ km} \quad \text{---- M1} \end{aligned}$$

$$\begin{aligned} \text{Length of bridge} &= 6 \times \frac{2}{3} \times 8 \\ &= 32 \text{ cm} \quad \text{---- A1} \end{aligned}$$

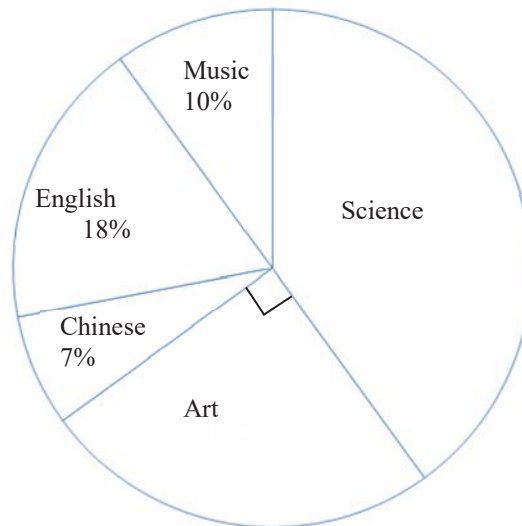
Answer (a).....1 : 25 000 ..... [1]

(b) .....32.....cm [1]

(c).....4.5..... $\text{km}^2$  [2]



- 18** The pie chart represents the favourite subject of a group of students. 28 students choose Chinese as their favourite subject.



- (a) How many students are there in the group?
- (b) Calculate the number of students who like Science.
- (c) 20% of the students whose favourite subject is Art decided to change their option to Science. Calculate the new percentage of students who like Science.

$$\begin{aligned} \text{(a) Total no. of students} &= \frac{28}{7} \times 100 \quad \text{---M1} \\ &= 400, \quad \text{--- A1} \end{aligned}$$

$$\text{(b) \% of pupils who like Art} = 25 \% \quad \text{---M1}$$

$$\begin{aligned} &\% \text{ of pupils who like Science} \\ &= (100 - 10 - 18 - 7 - 25)\% \\ &= 40 \% \quad \text{--- M1} \end{aligned}$$

$$\text{Hence no. of pupils who like Science} = \frac{40}{100} \times 400 = 160 \quad \text{--- A1}$$

$$\begin{aligned} \text{(c) No. of students who changed their option} &= \frac{20}{100} \times \left( \frac{25}{100} \times 400 \right) \quad \text{---M1} \\ &= 20 \end{aligned}$$

$$\begin{aligned} \text{New \% of pupils who like Science} &= \frac{180}{400} \times 100\% \quad \text{---M1} \\ &= 45\% \quad \text{---A1} \end{aligned}$$

Answer (a).....400..... [2]

(b) ..... 160.....[3]

(c).....45.....%[3]

**End of Paper**





**ST JOSEPH'S INSTITUTION**

**END OF YEAR EXAMINATIONS (2017)  
(SECONDARY 1)**

CANDIDATE  
NAME

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CLASS

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INDEX  
NUMBER

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**MATHEMATICS**

**Paper 1**

**5 October 2017**

**1 hour 15 minutes  
(08:15 – 09:30h)**

Candidates answer on the Question Paper

**READ THESE INSTRUCTIONS FIRST**

Write your Class, index number and name on the space provided above.

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 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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 50.

**For Examiner's Use**

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This document consists of **11** printed pages including this cover page.

Answer ALL questions.

1.  $27, \frac{1}{\sqrt{2}}, -4, 0.70\dot{7}, 19, \sqrt[3]{64}$

(a) Write down the

- (i) prime number,
- (ii) perfect cube,
- (iii) irrational number.

(b) Arrange the numbers in ascending order.

Ans (a)(i) \_\_\_\_\_ [1]

(ii) \_\_\_\_\_ [1]

(iii) \_\_\_\_\_ [1]

(b) \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ [1]

---

2. Evaluate  $[(-5) \times 64 - (-2)^3 \times 7] \div (-11)$

Ans \_\_\_\_\_ [2]

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3. (a) Simplify  $\frac{2a^2b^3}{c^3} \div \frac{6a^4}{c^2}$  .

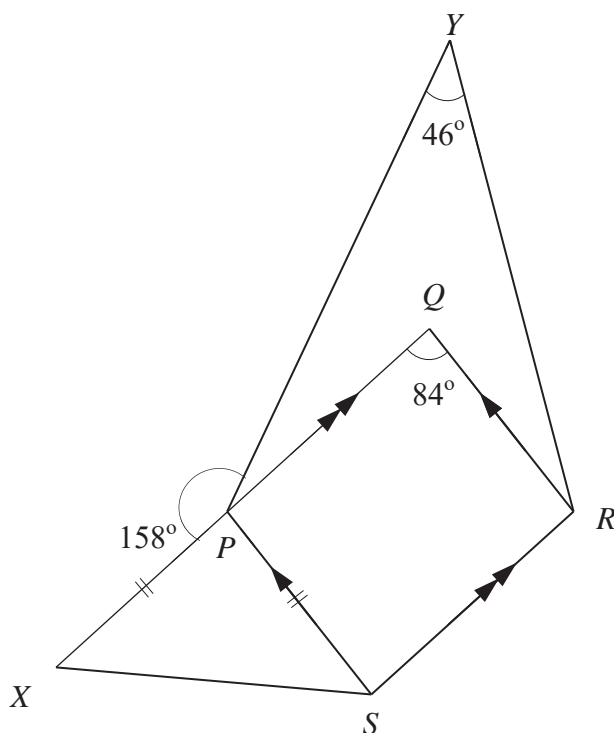
(b) By factorising the numerator and denominator, simplify  $\frac{8p^4q-24p^3q^2}{2p^2q^2-6pq^3}$  .

Ans (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [3]

4. In the figure,  $PQRS$  is a parallelogram. It is given that  $\angle PQR = 84^\circ$ ,  $\angle XPY = 158^\circ$  and  $\angle PYR = 46^\circ$ .  $PXS$  is an isosceles triangle where  $PX = PS$  and  $QPX$  is a straight line. Find, stating your reasons clearly,

- (a)  $\angle PXS$ ,  
 (b)  $\angle YPS$ .



Ans (a) \_\_\_\_\_ [3]

(b) \_\_\_\_\_ [3]

5. A group of secondary 1 students took a Mathematics test and their scores were represented in the stem and leaf diagram below.

Stem	Leaf							
4	6	7	9					
5	1	3	4	8				
6	0	1	3	5	7	7	7	8

Key : 4|6 means 46 marks

- (a) Find the
- mean score,
  - median score.
- (b) If another student's score of 100 is added, which average, mean or median, is the more appropriate measure to be used? Explain your answer.

Ans (a)(i) \_\_\_\_\_ [2]

(ii) \_\_\_\_\_ [1]

(b) \_\_\_\_\_ [2]

6. 8 men can paint a room in 20 days.
- (a) How many more days are needed for 5 men to paint a room?
- (b) The room was painted in  $d$  days. Write down an expression, in terms of  $d$ , for the number of men needed to paint the room.

Ans (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [1]

- 
7. Three light houses flash at the same time at 2.50 am. The first light house flashes every 12 seconds, the second light house every 14 seconds and the third light house every 20 seconds. At what time will the three light houses next flash together?

Ans \_\_\_\_\_ [3]

---



8. Solve the following equations.

(a)  $3m - 2 = 40 - [4m + 3(m - 6)]$

(b)  $\frac{3q+2}{5} - \frac{q-1}{2} = \frac{3(q+1)}{4}$

Ans (a) \_\_\_\_\_ [3]

(b) \_\_\_\_\_ [3]

9. (a) Given that the sum of the interior angles of a polygon is four times the sum of its exterior angles, calculate the number of sides of the polygon.
- (b) What is the special name given to the polygon in (a)?

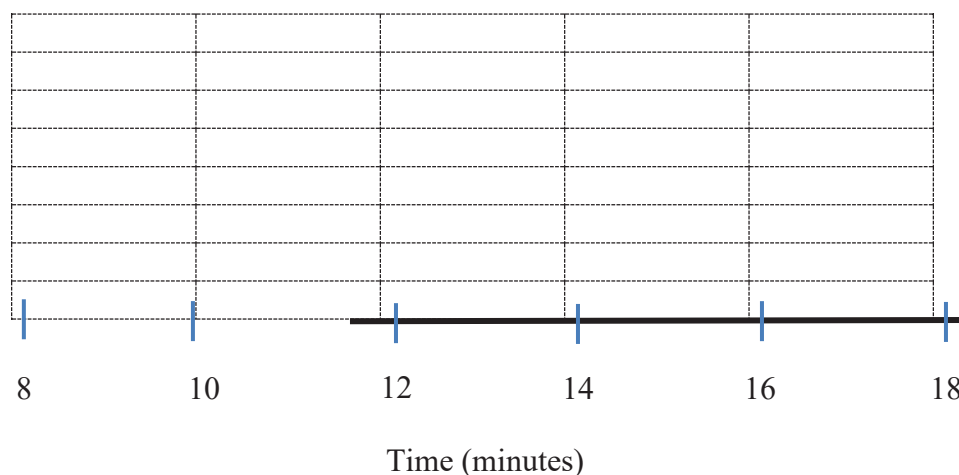
Ans (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [1]

10. A survey was conducted to find out the time taken, in minutes, for a group of students to walk to school. The following set of data was obtained.

8	10	14	16	10
14	12	18	12	8
10	8	12	10	14
14	16	10	8	10

- (a) Represent the above data in the dot diagram below. [1]



- (b) Find the modal time taken by the students.
- (c) If the above data is represented by a pie chart, what is the angle represented by students who took 10 minutes to walk to school?

Ans (b) \_\_\_\_\_ [1]

(c) \_\_\_\_\_ [2]

11. (a) Using prime factorization, express 576 as a product of its prime factors, giving your answer in index notation.
- (b) Hence, find  $\sqrt{576}$  without the use of a calculator.

Ans (a) \_\_\_\_\_ [2]

(b) \_\_\_\_\_ [2]

12. The frequency,  $F$  Hertz, of a note produced by a guitar string is proportional to the square root of the tension,  $T$  Newtons, of the string. When the tension is 49 Newtons, the string produced a note with a frequency of 224 Hertz.
- (a) Find an equation connecting  $F$  and  $T$ .
  - (b) Find the tension of the guitar string to produce a frequency of 512 Hertz.

Ans (a) \_\_\_\_\_ [3]

(b) \_\_\_\_\_ [2]

---

**End of Paper**



ST JOSEPH'S INSTITUTION

END-OF-YEAR EXAMINATIONS (2017)  
(SECONDARY 1)

CANDIDATE  
NAME

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CLASS

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INDEX  
NUMBER

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## MATHEMATICS

### PAPER 2

10 OCTOBER 2017

1 hour 15 minutes  
(0800-0915)

Candidates are to answer on the Question Paper

#### READ THESE INSTRUCTIONS FIRST

Write your Class, index number and name on the space provided above.

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 paper clips, highlighters, glue or correction fluid.

Answer **ALL** questions in this paper in the spaces provided.

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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

**At the end of the examination, hand in Question 7 (Graph) and the Question Paper separately.**

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is **50**.

For Examiner's Use

This document consists of **9** printed pages including this cover page.

[Turn over]

PAPER 2 [50 marks]

Answer **ALL** the questions. All working must be clearly shown in the space provided.

1. During a sale, a television set is selling at \$4000 after a 15% discount. Customers are allowed to purchase this television set on a hire purchase scheme where they need to pay a deposit of \$200 and the remaining amount to be paid by instalments. The two schemes are :

Scheme 1 : Monthly instalment of \$180 for 2 years with 0% interest rate.

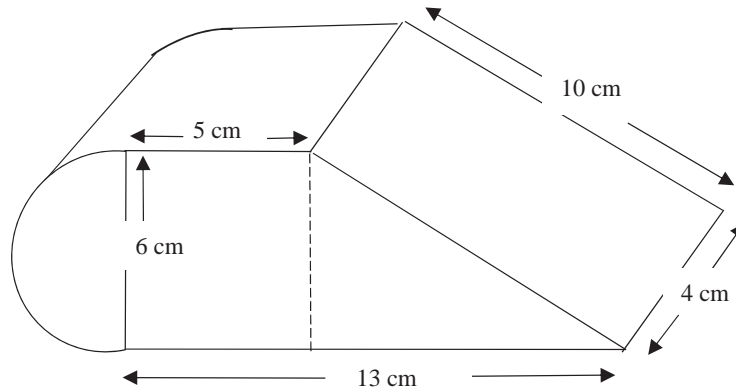
Scheme 2 : Monthly instalment for 2 years at 2% simple interest rate per annum

- (a) Calculate the simple interest incurred at the end of 2 years if Scheme 2 was chosen. [ 2 ]

- (b) Mr Lim said that Scheme 1 is better as there is 0% interest incurred. Explain with detailed workings whether he is right. [ 4 ]

.....  
.....  
.....

2. The door stopper below shows a composite prism. Its cross-sectional area is made up of a semicircle of radius 3 cm, a rectangle and a triangle. Calculate the



- (a) cross-sectional area of the prism,

[ 3 ]

- (b) perimeter of the cross-sectional area of the prism,

[ 3 ]



(c) volume of the prism,

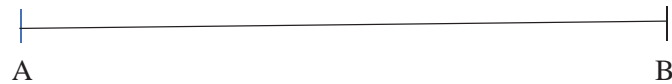
[ 2 ]

(d) total surface area of the prism.

[ 3 ]

3. Answer the whole of this question in the space provided below.

- (a) Using a ruler and a pair of compasses, construct triangle ABC where  $BC = 9\text{ cm}$  and  $AC = 10\text{ cm}$ . AB has already been drawn. [ 2 ]
- (b) Construct the angle bisector of angle CAB. [ 2 ]
- (c) If the angle bisector of angle CAB meets BC at point P,  
(i) mark the point P with a '×' and label it. [ 1 ]  
(ii) measure and write down the length of BP. [ 1 ]



4. It is given that  $s = \frac{v^2 - u^2}{2a}$ .

(a) Express  $a$  in terms of  $s$ ,  $u$  and  $v$ .

[ 2 ]

(b) Find  $a$  when  $s = 4$ ,  $u = 3.6$  and  $v = 5.8$

[ 2 ]

5.  $x$  kg of cherries costs \$36 and the cost of 1 kg of raspberries is \$4 more than the cost of 1 kg of cherries.

(a) Write down an expression in terms of  $x$ , for the cost of 1 kg of cherries. [ 1 ]

(b) Write down an expression in terms of  $x$ , for the cost of 1 kg of raspberries. [ 1 ]

Jeremy bought 1 kg of cherries and 3 kg of raspberries.

(c) If he paid \$36 in total, form an equation in  $x$  and solve for  $x$ . [ 4 ]

(d) Hence, find the cost of 2 kg of cherries. [ 2 ]

6. (a) Fill in the space provided in the table below for the 5<sup>th</sup> row

Row	Pattern	Sum of numbers
1	$1 + 3$	4
2	$1 + 3 + 5$	9
3	$1 + 3 + 5 + 7$	16
4	$1 + 3 + 5 + 7 + 9$	25
5		
.	.	.
.	.	.
$n$	$1 + 3 + 5 + \dots + k$	$S$

[ 2 ]

- (b) Express  $k$  in terms of  $n$ . [ 2 ]

- (c) Find the formula relating  $S$  and  $n$ . [ 1 ]

- (d) Is it possible to have a sum of 300? Explain your answer. [ 2 ]

.....  
 .....  
 .....  
 .....

**Hand in Question 7 (Graph) separately.**

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

The variables  $x$  and  $y$  are related by the equation  $y = -2x - 1$ . Some corresponding values of  $x$  and  $y$  are given in the table below.

$x$	$-3$	$-2$	$q$	$3$
$y$	$p$	$3$	$-3$	$-7$

- (a) Calculate the value of  $p$  and of  $q$ . [ 2 ]
- (b) Using a scale of 2 cm to represent 1 unit on the  $x$ -axis and 2 cm to represent 2 units on the  $y$ -axis, draw the graph of  $y = -2x - 1$  for  $-3 \leq x \leq 3$ . [ 3 ]
- (c) Using your graph, find the value of  $x$  when  $y = 1.5$  [ 1 ]
- (d) By drawing the line  $y = -5$  on the same graph, write down the coordinates of the point of intersection of the two lines. [ 2 ]

**~ End of Paper ~**



2017 Sec 1 EOY Paper 2 (Answer Key)

1(a) \$152

1(b) Scheme 1 : \$4520; Scheme 2 : \$4152; Difference = \$368

From the above, Mr Lim is incorrect as the total amount paid for Scheme 2 is \$368  
cheaper than the total amount paid for Scheme 1.

2(a) 68.1 cm<sup>2</sup>

2(b) 37.4 cm

2(c) 273 cm<sup>3</sup>

2(d) 286 cm<sup>2</sup>

3(cii) BP = 4.3 cm

4(a)  $a = \frac{v^2 - u^2}{2s}$

4(b)  $a = 2.585$

5(a) Cost of 1 kg of cherries = \$  $\frac{36}{x}$

5(b) Cost of 1 kg of strawberries = \$  $(\frac{36}{x} + 4)$

5(c)  $\frac{36}{x} + 3(\frac{36}{x} + 4) = 36$ ;  $x = 6$

5(d) Cost of 2 kg of cherries = \$12

6(a)

5	1 + 3 + 5 + 7 + 9 + 11	A1	36	A1
---	------------------------	----	----	----

6(b)  $k = 2n + 1$

6(c)  $S = (n + 1)^2$

6(d) It is **not possible** to have a sum of 300 as the sum must be a **perfect square**.

7(a)  $p = 5, q = 1$

7(c)  $x = -1.25$

7(d) Coordinates are (2, -5)





**TANJONG KATONG SECONDARY SCHOOL**  
**Mid-Year Examination 2017**  
**Secondary 1**

CANDIDATE  
NAME

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CLASS

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INDEX NUMBER

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**MATHEMATICS**

**4048/01**

Paper 1

**Monday 15 May 2017**

**1 hour**

Candidates answer on the Question Paper.

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**READ THESE INSTRUCTIONS FIRST**

Write your name, class and register number on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, 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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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 40.

<b>For Examiner's Use</b>

For  
Examiner's  
UseAnswer **all** the questionsFor  
Examiner's  
Use

- 1 Express  $\frac{2}{11}$  as a recurring decimal.

Answer ..... [1]

- 2 Using all the numbers below, complete the following table.

$$3.\dot{3}, \pi, \sqrt{5}, \sqrt[3]{8}, -2.1^2$$

Answer

Rational Number(s)	
Irrational Number(s)	

[2]

- 3 Given that  $x$  is an integer, when  $x$  is rounded off to 1 significant figure, the answer is 40.  
Write the least possible value of  $x$  and the largest possible value of  $x$ .

Answer

Least possible value.....

Largest possible value..... [2]

For  
Examiner's  
Use

- 4  $m$  and  $n$  are two prime numbers, both larger than 5.  
 “The sum of  $m$  and  $n$  will always be a prime number.”  
 Do you agree with this statement? Justify your answer.

For  
Examiner's  
Use

*Answer*

.....

.....

.....

.....

[2]

- 
- 5 Mary's household paid \$55.75 for water services in March 2017. The water charges are going to increase by 15% by July 2017. Calculate the amount, correct to the nearest cent, Mary would have to pay in July 2017 if their usage of water remains the same.

*Answer* \$..... [2]

---

For  
Examiner's  
Use

- 6 (a) Given that the value of  $m + n = -2$ , find the value of  $4m + 4n - 3$ .

For  
Examiner's  
Use

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

- (b) Given that  $a = 2$ ,  $b = -1$  and  $c = 10$ , calculate the value of  $\frac{\sqrt{c - 3ab}}{b}$ .

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

---

For  
Examiner's  
Use

7

- (a) A rectangle has an area of  $69.8 \text{ cm}^2$  and its length is  $5.2 \text{ cm}$ .  
Estimate the breadth of the rectangle.

For  
Examiner's  
Use

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

- (b) Estimate the value of  $\sqrt{82} \times \sqrt[3]{7}$ , without using a calculator. Show your working clearly.

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

---

For  
Examiner's  
Use

8

Mr Sim bought 60 eggs at  $q$  cents per dozen.

- (a) Express the total amount of money he paid for the eggs, in terms of  $q$ .

For  
Examiner's  
Use

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

- (b) He sold them for  $r$  cents each. Show that the profit he made is  $5(12r - q)$  cents.

Answer :

[1]

- (c) Hence, explain what will happen if  $12r - q < 0$ .

Answer

.....  
.....

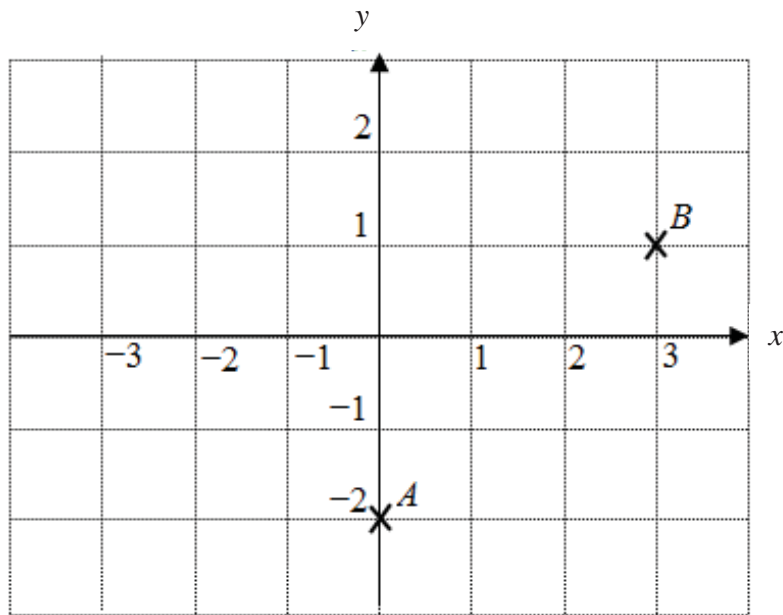
[1]

For  
Examiner's  
Use

9

$A$  and  $B$  are points on the coordinate plane as shown.

For  
Examiner's  
Use



- (a) Write down the coordinates of point  $A$ .

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

- (b) Find the gradient of line  $AB$ , given that  $B(3, 1)$ .

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

- (c) Given that  $C(k, 1)$  is a point on the coordinate plane such that the area of triangle  $ABC$  is 9 units<sup>2</sup>, find the possible values of  $k$ .

Answer (c)  $k = \dots\dots\dots$  or  $\dots\dots\dots$  [2]



For  
Examiner's  
Use

- 10 (a)** When written as the product of their prime factors,  
 $360 = 2^3 \times 3^2 \times 5$ ,  
 $3024 = 2^4 \times 3^3 \times 7$ .

For  
Examiner's  
Use

- (i)** Find the highest common factor of 360 and 3024.

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

- (ii)** Find the smallest positive integer  $p$  such that  $360p$  is a perfect square.

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

- (iii)** Find the smallest positive integer  $q$  for which  $360q$  is a multiple of 3024.

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

- (b)** When the students in a school are arranged into rows of 9, 12 or 20, there will be a student who does not fit into any row. Given that the number of students in the school does not exceed 500, find the greatest possible number of students.

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

For  
Examiner's  
Use

- 11** During each week, a site engineer checks the water level above the ground as required by the environment authority of a country. The table below shows the daily water level recorded for a particular week.

For  
Examiner's  
Use

Day	Monday	Tuesday	Wednesday	Thursday	Friday
<b>Water level (in mm)</b>	+ 7.3	− 12.0	− 19.3	+ 11.7	− 4.6

- (a)** On which day was the lowest level of water recorded?

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

- (b)** What is the largest difference in water level between any two days of the week?

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

- (c)** Calculate the average water level.

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

For  
Examiner's  
Use

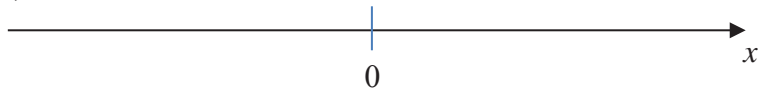
12

- (a) Solve the inequality  $\frac{4x-11}{2} \leq 3x-3 < 4$ .

Represent your answer on the number line given below.

For  
Examiner's  
Use

Answer (a)



[4]

- (b) Hence, write down

- (i) the greatest integer value of  $x$  which satisfies  $\frac{4x-11}{2} \leq 3x-3 < 4$ .

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

- (ii) the smallest integer value of  $x$  which satisfies  $\frac{4x-11}{2} \leq 3x-3 < 4$ .

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

---

**End of Paper**

**TANJONG KATONG SECONDARY SCHOOL**  
**Mid-Year Examination 2017**  
**Secondary 1**

CANDIDATE  
NAME

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CLASS

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INDEX NUMBER

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**MATHEMATICS**

**4048/02**

Paper 2

**5 May 2017**

Additional Materials:    Writing Paper  
                                    Graph Paper

**1 hour 15 minutes**

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**READ THESE INSTRUCTIONS FIRST**

Write your name, class and register number on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, 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  $\pi$ , use either your calculator value or 3.142, unless the question requires the answer in terms of  $\pi$ .

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

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 50.

- 1 (a) Write down the following numbers in order of size, starting with the smallest.

$$0.564, \quad 0.565, \quad 0.5\dot{6}, \quad 0.5\dot{6}\dot{3} \quad [1]$$

- (b) Expand and simplify  $a(a+1) - 2(2-a)$ . [2]

- (c) (i) Evaluate  $\frac{\sqrt[3]{249} + 41}{0.55}$ .

Write down the first five digits on your calculator display. [1]

- (ii) Write down your answer to **part (i)** correct to 3 significant figures. [1]

- 2 There are three numbers. The second number is thrice the first number.  
The third number is three less than four times the first number.

- (a) Given that the first number is  $2n$ , write down an algebraic expression, in terms of  $n$ , for

(i) the second number,

(ii) the third number. [2]

- (b) If the sum of the three numbers is 77, form an equation in  $n$ . [1]

- (c) Solve the equation in part (b) and find the third number. [3]

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

The table below shows some values of  $x$  and the corresponding values of  $y$ .

$x$	$-3$	$0$	$3$
$y$	$5$	$1$	$-3$

- (a) Using a scale of 2 cm to represent 1 unit on each axis, draw a horizontal  $x$ -axis for  $-3 \leq x \leq 3$  and a vertical  $y$ -axis for  $-3 \leq y \leq 5$ . [3]

On your axes, plot the points given in the table and join them with a straight line.

- (b) Use your graph to find the value of  $x$  when  $y = 3$ . [1]

- 4 (a) Solve the inequality  $15 - 3x < -x - 16$ .  
Hence, find the smallest prime number,  $x$ , such that  $15 - 3x < -x - 16$ . [3]
- (b) It is given that  $-3 \leq x \leq 1$  and  $-5 \leq y \leq 2$ , calculate  
(i) the smallest possible value of  $x - y$ , [1]  
(ii) the greatest possible value of  $x^2 + y^2$ . [1]
- (c) Given that  $x = 6$  is the solution to the equation  $2kx - 7 = x + 11$ , find the value of  $k$ . [2]
- 5 (a) (i) Factorise completely  $4x^2 - 4xy - py + px$ . [3]
- (ii) Factorise  $b^2 + b$ . Explain why if  $b$  is a positive integer, then  $b^2 + b$  is always even. [2]
- (b) A stamp collector will suffer a loss of 35% if he sells a particular stamp for \$273.  
(i) Find the price he paid for it. [2]
- (ii) What would the selling price be if he wants to make a profit of 15%? [2]
- 6 (a) Solve the following equations.  
(i)  $2(x - 3) - 5x = -3$  [3]  
(ii)  $\frac{2}{y + 5} = \frac{3}{4y - 1}$  [3]
- (b) (i) Simplify  $\frac{\sqrt{64p^2}}{4} \div \frac{10}{p^2}$ . [3]  
(ii) Express  $\frac{y - 2}{3} - \frac{y + 3}{2}$  as a single fraction in its simplest form. [3]

- 7 Jasmine and her family plan to visit the Singapore Zoological Gardens by bus from Yishun. To travel to the zoo by bus, the family needs to take Bus 171 from bus stop  $X$  near their house. Then, they will need to alight at bus stop  $Y$  to take Bus 927 to the zoo.

(a) The distance from bus stop  $X$  to bus stop  $Y$  is 12 km.

- (i) If Bus 171 travelled at an average speed of 40 km/h, calculate the time taken to travel from bus stop  $X$  to bus stop  $Y$ . [1]

The distance from bus stop  $Y$  to the zoo is 6 km.

- (ii) Find the time taken to travel from bus stop  $Y$  to the zoo if Bus 927 travelled at an average speed of 30 km/h. [1]

Hence, find the total time taken to travel from bus stop  $X$  to the zoo, leaving your answer in minutes. [1]

State an assumption that you have made in your calculation. [1]

**Table 1** below shows information on Bus 927 from Choa Chu Kang Bus Interchange:

Period	0630 - 0830	0831 - 1659	1700 - 1900	After 1900
Estimated waiting time	13 – 14 minutes	13 – 18 minutes	13 – 18 minutes	13 – 18 minutes

- (b) The family boards Bus 171 from bus stop  $X$  at 0930.

When they reach bus stop  $Y$ , Bus 927 has just left.

Using your answer in part (a) and **Table 1**, do you think they will definitely be able to reach the zoo by 1015? Show your working clearly. [3]

**End of Paper**






Sec 1 Mathematics Mid Year Examination 2017 Marking Scheme

1	$0.\dot{1}\dot{8}$		B1
2	Rational Numbers	$3.\dot{3}, \sqrt[3]{8}, -2.1^2$	B2 (minus 1 mark for each mistake, up to 2 mistakes)
	Irrational Numbers	$\pi, \sqrt{5}$	
3	Least: 35 Largest: 44		B1 B1
4	No. If $m = 9$ and $n = 7$ , $m + n = 16$ . 16 is not a prime number.		B1 – use of specific eg. B1 – correct conclusion
5	$\frac{115}{100} \times 55.75 = 64.11$		M1 – calculate 15% or 115% A1
6a	−11		B1
6b	$\frac{\sqrt{c-3ab}}{b}$ $= \frac{\sqrt{10-3(2)(-1)}}{-1}$ $= -4$		M1 – substitution  A1
7a	14		B1 C.A.O
7b	$\sqrt{82} \times \sqrt[3]{7}$ $= \sqrt{81} \times \sqrt[3]{8}$ $= 9 \times 2$ $= 18$		M1 estimate $82 \approx 81$ or $7 \approx 8$ .  A1 (do not accept 17)
8a	$5q$		B1
8b	$60r - 5q = 5(12r - q)$		B1 – $60r - 5q$
8c	Mr Sim will make a loss if $12r - q < 0$ (or $12r < q$ )		B1 o.e (accept negative profit, Mr Sim will lose money)
9a	$(0, -2)$		B1
9b	$m = \frac{3}{3}$ $= 1$		M1 rise/run or change in y/ change in x (nfw) A1
9c	−3 or 9		B2
10ai	$2^3 \times 3^2 = 72$		M1 (any method, 2 <b>and</b> 3 seen as common factors) A1
10 aii	10		B1
10a	42		B1

Sec 1 Mathematics Mid Year Examination 2017 Marking Scheme

iii		
10b	LCM = 180 No. of students = 361	M1 – finding LCM A1
11a	Wednesday	B1
11b	$11.7 - (-19.3) = 31$	M1 – largest minus smallest value or smallest minus largest A1
11c	$\frac{7.3 - 12.0 - 19.3 + 11.7 - 4.6}{5} = -3.38$	M1 – calculating average (sum/5) A1
12a	$\frac{4x-11}{2} \leq 3x-3 < 4$ $\frac{4x-11}{2} \leq 3x-3 \quad \text{and} \quad 3x-3 < 4$ $x \geq -2.5 \quad \text{and} \quad x < 2\frac{1}{3}$ $-2.5 \leq x < 2\frac{1}{3}$ 	M1 Split  M1 Solving inequality by moving $x$ to one side (either inequality)  A1 (if improper, A0)  B1
12bi	2	√B1
12b	-2	√B1
ii		

**Secondary One Mathematics**

**Mid-Year Examination 2017**

**Paper 2 Marking Scheme**

**Deduct maximum of 1 mark overall for no statement/ units**

**Statement to be stated for Question 2(c) / 5(b) (i) & (ii) / 7(a) (i) (ii) and (b)**

	<b>Solution</b>	<b>Marks</b>	<b>Remarks</b>
1(a)	$0.\dot{5}6\dot{3}$ , $0.564$ , $0.565$ , $0.5\dot{6}$	B1	
1(b)	$a(a+1) - 2(2-a)$ $= a^2 + a - 4 + 2a$ $= a^2 + 3a - 4$	B1  B1	Either $a^2 + a$ or $-4 + 2a$ seen
1(c)(i)	85.983	B1	
1(c)(ii)	86.0	B1√	
			<b>5 marks</b>
2(a) (i)	$6n$ or $3(2n)$	B1	
2(a)(ii)	$8n - 3$ or $4(2n) - 3$	B1	
2(b)	$2n + 6n + (8n - 3) = 77$	B1√	$2n + (a)(i) + (a)(ii) = 77$ seen
2 (c)	$16n = 80$ $n = 5$  Third number = 37	M1 A1  B1	simplifying variable on one side
			<b>6 marks</b>
3 (a)	Axes correctly drawn and labeled correct scale used Correct plotting of points  Joining of points with a line	B1 B1  B1	B0 for missing pts or any 1 pt plotted wrong
3 (b)	$x = -1.5$ or $1.50$	B1	
			<b>4 marks</b>
4(a)	$15 - 3x < -x - 16$ $2x > 31$ $x > 15.5$ Smallest prime number = 17	M1 A1 B1√	Grouping of variable or constant A0 for $\frac{31}{2}$ Must see $x > \text{constan}t$
4(b)(i)	$-3 - 2 = -5$	B1	
4(b)(ii)	$(-3)^2 + (-5)^2 = 34$	B1	
4(c)	$12k - 7 = 17$ $12k = 24$ $k = 2$	M1  A1	Substituting of value to solve for $k$
			<b>7 marks</b>

5(a)(i)	$4x^2 - 4xy - py + px$ $= 4x(x - y) - p(y - x)$ $= 4x(x - y) + p(x - y)$ $= (4x + p)(x - y)$	M1 B1 A1	Either $4x(x - y)$ or $p(y - x)$ $p(x - y)$ seen (SOI)
5(a)(ii)	$b^2 + b = b(b + 1)$  <b><math>b</math> and <math>b + 1</math> are consecutive integers, thus one of them must be even. The <b>product</b> of an <b>even</b> integer with another integer is always even. / <b>Odd / Even integer multiply by another integer</b> will always be even.</b>	B1  B1	Product and even seen
5 (b) (i)	Price = $\frac{273}{65} \times 100$ = \$420	M1  A1	o.e.
5 (b) (ii)	Selling Price = $\frac{115}{100} \times 420$ = \$483	M1 $\sqrt{\phantom{x}}$  A1	115% x (b)(i)
			<b>9 marks</b>
6 (a) (i)	$2(x - 3) - 5x = -3$ $2x - 6 - 5x = -3$ $-3x = 3$ $x = -1$	B1  M1  A1	Correct Expansion for $2(x - 3)$ Grouping of variable/constant A0 for $\frac{3}{-3}$
6 (a)(ii)	$\frac{2}{y + 5} = \frac{3}{4y - 1}$ $2(4y - 1) = 3(y + 5)$ $8y - 2 = 3y + 15$ $5y = 17$ $y = 3\frac{2}{5}$	M1  M1  A1	Remove denominator  Group constant / variable A0 for $\frac{17}{5}$
6(b)(i)	$\frac{\sqrt{64p^2}}{4} \div \frac{10}{p^2}$ $= \frac{8p}{4} \times \frac{p^2}{10}$ $= \frac{p^3}{5} / \frac{1}{5} p^3$	B1  M1  A1	For $8p$ x $\frac{p^2}{10}$ seen

6(b)(ii)	$\frac{2(y-2)}{3} - \frac{y+3}{2}$ $= \frac{2y-4-3(y+3)}{6}$ $= \frac{2y-4-3y-9}{6}$ $= \frac{-y-13}{6} \text{ or } \frac{-(y+13)}{6}$	<p>M1</p> <p>B1</p> <p>A1</p>	<p>Express as a single fraction with common denominator</p> <p>For correct expansion of <math>-3y-9</math></p> <p>ISW</p>
			<b>12 marks</b>
7(a)(i)	<p>Time taken from Bus Stop X to Bus Stop Y = <math>\frac{12}{40}</math> h</p> <p><math>= \frac{3}{10}</math> h or 18 min</p>	B1	
7 (a) (ii)	<p>Time taken from Bus Stop Y to the zoo = <math>\frac{1}{5}</math> h or 12 min</p> <p>Total time taken from Bus Stop X to the zoo = 18 min + 12 min = 30 min</p> <p>Assumption: No waiting time required during transfer of buses</p>	<p>B1</p> <p>B1</p> <p>B1</p>	B0 if answer given in hour
7(b)	<p>Max waiting time needed for Bus 927 + Total travel time = 30 + 18 = 48 minutes</p> <p>If they need to be at the zoo by 1015, total time needed should not be more than 45 minutes. No, they cannot.</p>	<p>B1</p> <p>B1</p> <p>B1</p>	<p>Indicated the maximum waiting time for Bus 927</p> <p>Calculating total time needed to reach zoo/ Award 1 mark if student use minimum waiting time (i.e. 13 + 30 = 43 minutes)</p> <p>Conclusion with working shown</p>
			<b>7 marks</b>

