

Visit
FREETESTPAPER.com
for more papers



Website: freetestpaper.com



[Facebook.com/freetestpaper](https://www.facebook.com/freetestpaper)



REGENT SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2018
SECONDARY FOUR (NORMAL ACADEMIC)

NAME: _____

INDEX NUMBER: _____

CLASS: _____

SETTER: MS KAREN LEE

MATHEMATICS SYLLABUS A

Paper 1

4045/01
3 August 2018
2 hours

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 a pencil for any diagrams or graphs.
 Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

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

If working is needed for any question it must be shown with the answer.
 Omission of essential working will result in loss of marks.
 The total of the marks for this paper is 80.

The use of an approved scientific calculator is expected, where appropriate.
 If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
 For π , use either your calculator value or 3.142.

80	TARGET
PARENT'S SIGNATURE	

This document consists of **22** printed pages.

Mathematical Formulae**Compound interest**

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

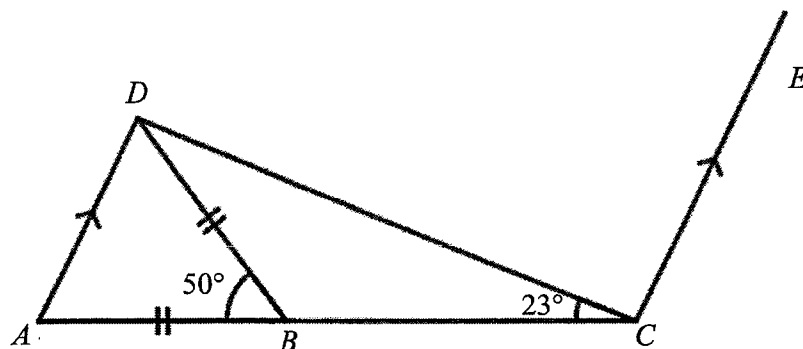
Answer **all** the questions.

1 (a) Simplify $\frac{10x^2}{3} \div \frac{2x^5}{9}$.

Answer (a) [1]

(b) Solve the inequality $-8y \leq 10$.

Answer (b) [1]



In the diagram, ABC is a straight line, $BA = BD$ and AD is parallel to CE .

Find,

(a) angle DAB ,

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

(b) angle ADC ,

Answer (b) Angle $ADC = \dots\dots\dots^\circ$ [1]

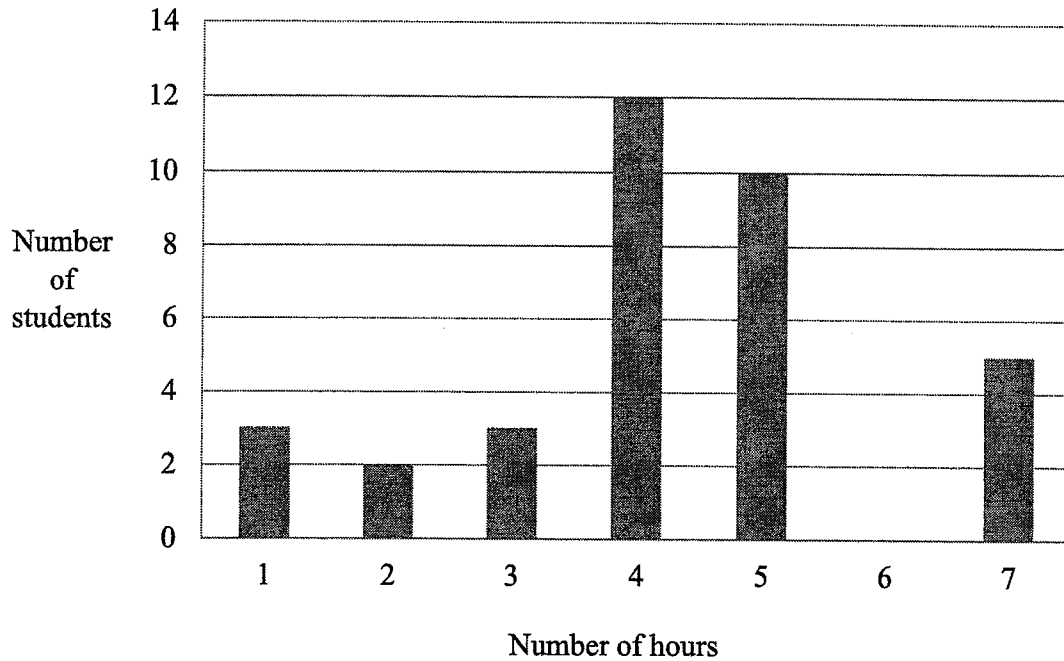
(c) angle DCE .

Give a reason for your answer.

Answer (c) Angle $DCE = \dots\dots\dots^\circ$ because $\dots\dots\dots$ [1]

5

- 3 Each student of a class was asked how many hours they spent on the computer in the last week. The results are shown in the bar chart below.



- (a) Find the total number of students in the class.

Answer (a) [1]

- (b) The same information is to be shown on a pie chart.
Calculate the angle representing the students who have spent 3 hours.

Answer (b)° [2]

4 Given $3^{x-1} \leftarrow 3^3 = 3^{12}$, find x .

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

- 5 Peter has two bags.
The first bag contains two cards numbered 2 and 3.
The second bag contains three cards labeled red, blue and green respectively.
- He picks a card from each bag.
Complete the table of all possible outcomes.

Answer

First bag	Second bag
2	Red

[2]

7

- 6 Michael invests \$5000 for 4 years.
He receives compound interest at 1.75% per year.

How much is the investment worth at the end of the four years?

Answer \$ [2]

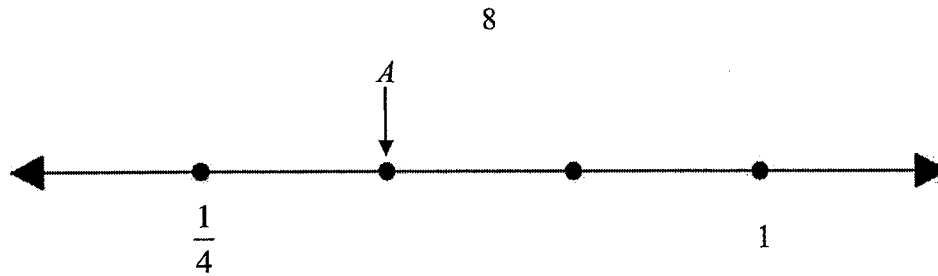
-
- 7 (a) Simplify $5x - 2(x + 1)$.

Answer (a) [1]

- (b) Factorise $3x^2 - x - 2$.

Answer (b) [2]

8



The diagram shows a number line of **equal** intervals.

- (a) Write down the fraction indicated by the arrow A .

Answer (a) [1]

- (b) Draw an arrow on the number line to represent $\sqrt{0.5625}$ and label it B . [1]

- 9 The lines $y - 2x = 5$ and $y = kx + h$ have the same gradient.

- (a) Find the value of k .

Answer (a) $k =$ [1]

- (b) Given that $(1, 3)$ is a point on $y = kx + h$, find the value of h .

Answer (b) $h =$ [2]

- 10 This is part of a timetable of a regular bus service between Choa Chu Kang and Woodlands. All the buses take the same duration to complete the journey.

Choa Chu Kang (Depart)	Woodlands (Arrive)
0630	0720
0646	0736
0702	.
.	.
.	.
.	1416
.	.

- (a) (i) How long does it takes to travel from Choa Chu Kang to Woodlands?

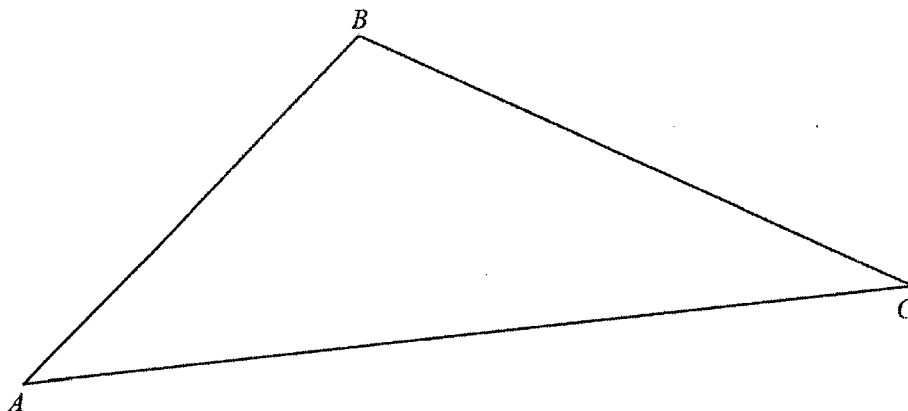
Answer (a)(i) min [1]

- (ii) A bus arrives at Woodlands at 1416.
At what time did it leave Choa Chu Kang?

Answer (a)(ii) [1]

- (b) The bus leaves Choa Chu Kang at a regular interval of 16 minutes.
Another bus service leaves Choa Chu Kang at a regular interval of 12 minutes.
Given that both buses first leave at the same time at 0734, what is the next time that both buses will leave at the same time?

Answer (b) [2]

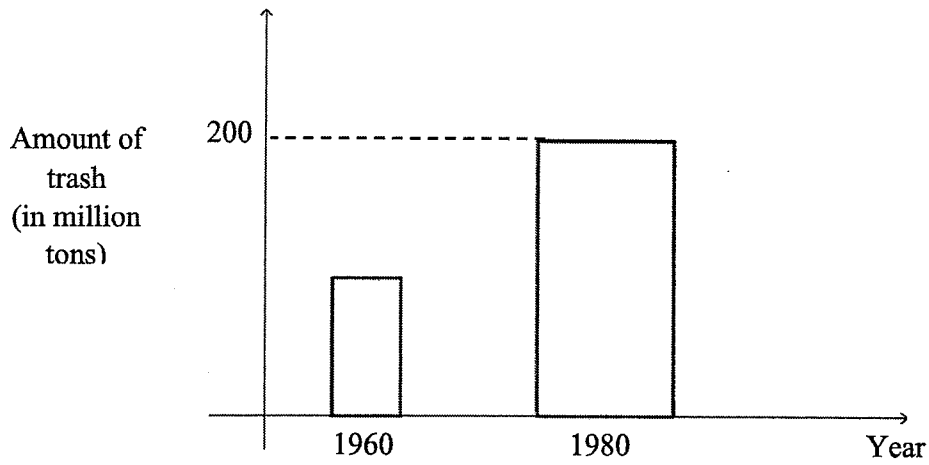


- (a) (i) Construct the perpendicular bisector of AC . [1]
 (ii) Construct the angle bisector of angle BAC . [1]
- (b) The perpendicular bisector of AC and the angle bisector of angle BAC meet at point P . Mark point P on the diagram. [1]
- (c) Measure the length BP .

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

- 12 The graph shows the amount of trash produced in 1960 and 1980 in a particular country.
-

11

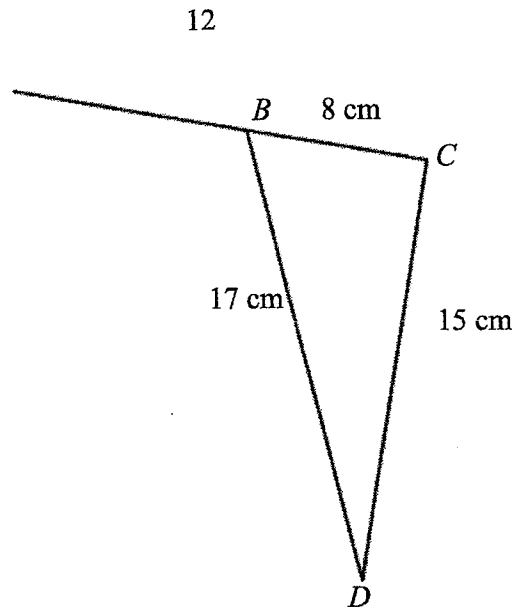


State one feature of the graph that may be misleading and explain why.

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

13

A



In the diagram, $BC = 8$ cm, $CD = 15$ cm, $BD = 17$ cm and ABC is a straight line.

- (a) Show that angle BCD is a right-angle.

Answer (a)

[2]

- (b) Write as a fraction

- (i) $\tan \angle BDC$,

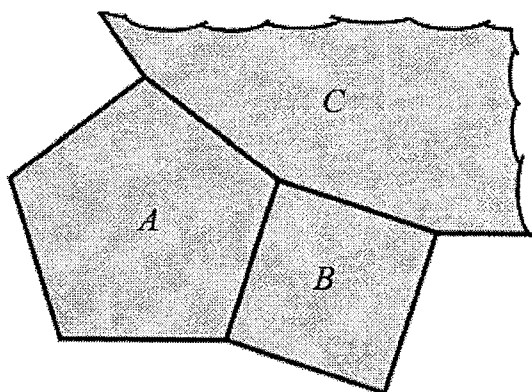
Answer (b)(i) [1]

- (ii) $\cos \angle ABD$.

Answer (b)(ii) [1]

13

14



The diagram shows how three regular polygons, A , B and C are joined together. Shape A has 5 sides and shape B has 4 sides.

How many sides has shape C ?
Show your working.

Answer [4]

15 Solve these simultaneous equations.

14

$$2x - 3y = 12$$

$$4x + y = 3$$

Answer $x =$

$y =$ [3]

16 $-3, -10, -17, -24, \dots$

- (a) Write down the next two terms in this sequence.

Answer (a) , [1]

- (b) Find an expression for the n th term of this sequence.

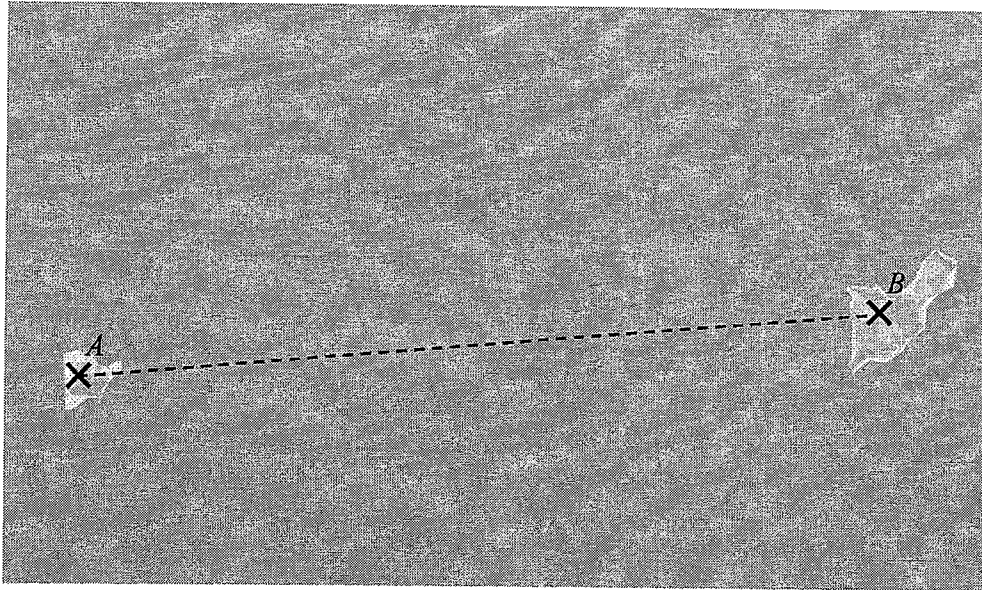
Answer (b) [1]

- (c) Is -102 a term in this sequence?
Give a reason for your answer.

Answer (c)

..... [1]

17



The map shows the position of two islands, A and B .

The scale of the map is $1 : 200\,000$.

- (a) Find the actual distance between A and B .
Give your answers in kilometres.

Answer (a) km [2]

- (b) A third island has an area of 300 km^2 .

Calculate the area of the island on the map.

Give your answers in cm^2 .

Answer (b) cm^2 [2]

- 18 The table below shows the prices of class tee purchased by a group of students.

Price (\$ x)	Frequency
$10 \leq x < 15$	35
$15 \leq x < 20$	28
$20 \leq x < 25$	19
$25 \leq x < 30$	12
$30 \leq x < 35$	10

- (a) State the modal class.

Answer (a) [1]

- (b) Calculate an **estimate** of the mean price of a class tee.

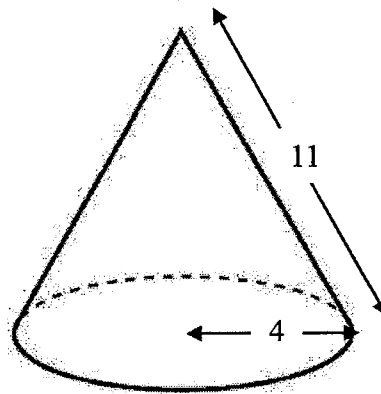
Answer (b) \$ [3]

- (c) Explain why this is only an estimate of the mean price these students spent on a class tee.

Answer (c):
 [1]

17

19



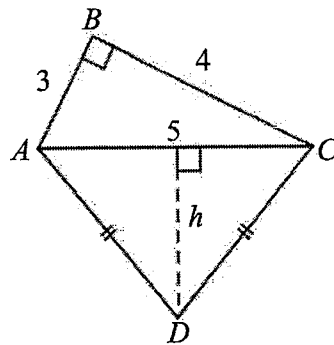
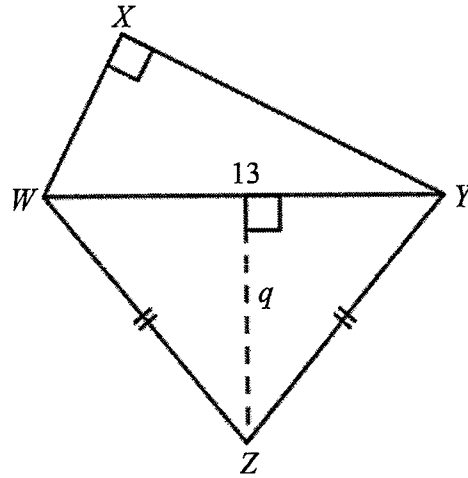
A solid cone has a circular base of radius 4 cm and a slant height of 11 cm.

Calculate its **total** surface area.

Answer cm^2 [3]

20

18

Shape *P*Shape *Q*

Shape *P* is made from an isosceles triangle and a right-angled triangle.

$AB = 3$ cm, $BC = 4$ cm, $AC = 5$ cm and the area of the isosceles triangle is 17.5 cm².

(a) Find the area of shape *P*.

Answer (a) cm² [2]

(b) Calculate the perpendicular height, h , in centimetres, of the isosceles triangle.

Answer (b) $h =$ cm [2]

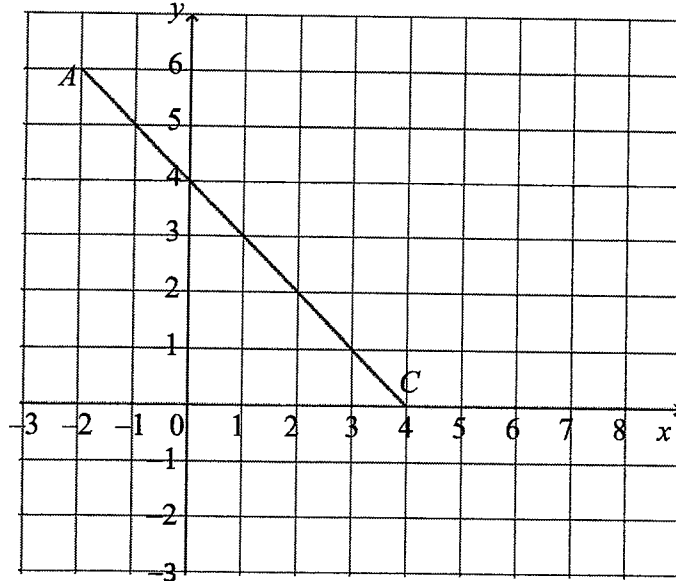
(c) Shape *Q* is **similar** to shape *P*.

In shape *Q*, $WY = 13$ cm and the perpendicular height is q cm.

Find q .

Answer (c) $q =$ cm [1]

- 21 The points $A(-2, 6)$ and $C(4, 0)$ form a straight line.



- (a) Find the length of AC .

Answer (a) units [2]

- (b) Write down the coordinates of the point where the line AC crosses the y -axis.

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

- (c) The point B has the same x -coordinate as A and a y -coordinate 3 less than that of A .
Find the coordinates of B .

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

- (d) AC is the line of symmetry of the quadrilateral $ABCD$.
Write down the coordinates of D .

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

22

$$x^2 - 6x + 3 = (x + a)^2 + b$$

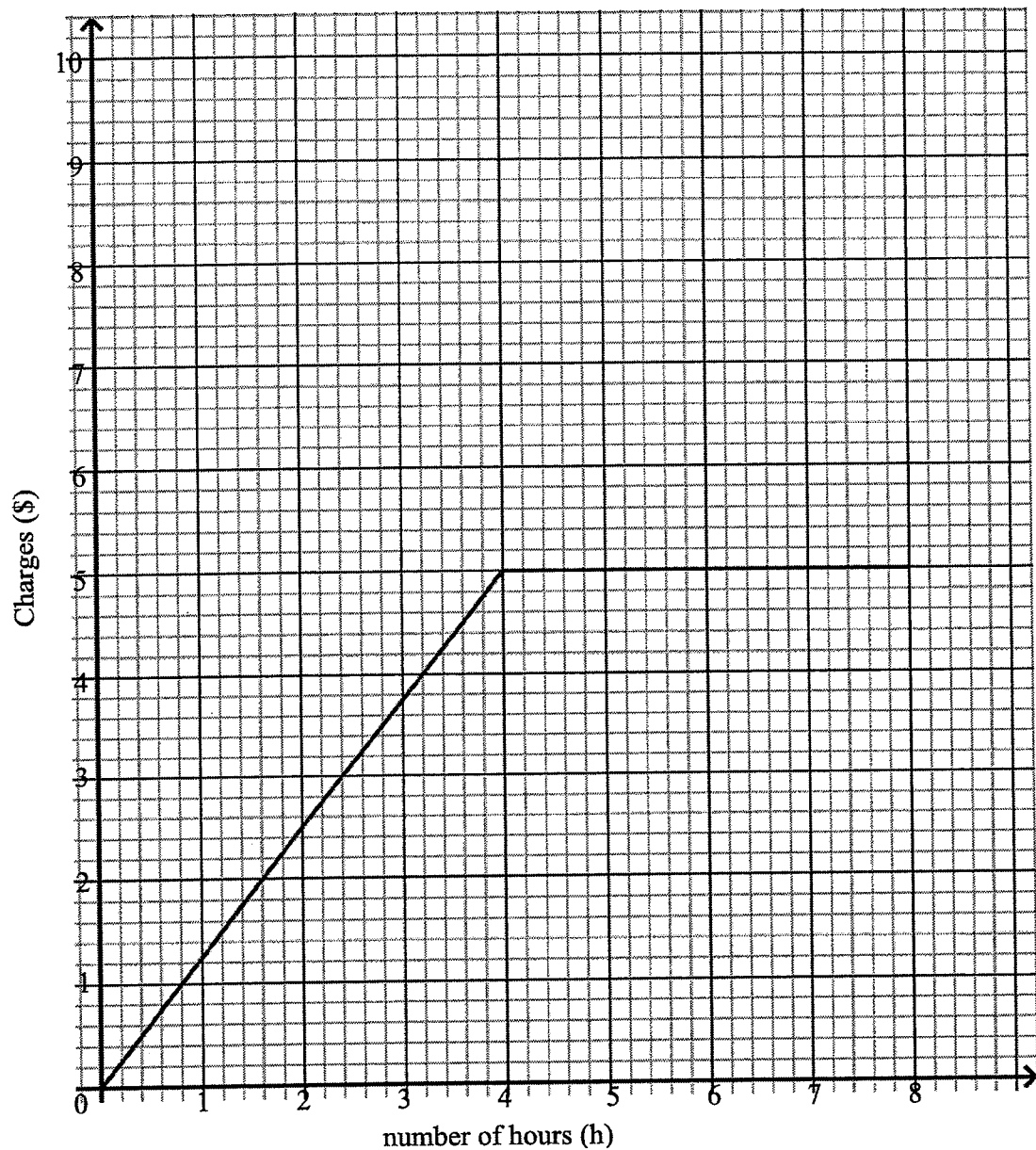
(a) Find a and b .

Answer (a) $a = \dots\dots\dots b = \dots\dots\dots$ [2]

(b) Hence solve $x^2 - 6x + 3 = 0$.

Answer (b) $x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

- 23 The graph shows the parking rate of carpark *A*.



- (a) How much does it cost to park at carpark *A* for 2 hours?

Answer (a) \$ [1]

- (b) What is the hourly parking rate at carpark *A* for the first 4 hours?

Answer (b) \$ /h [1]

- 23 (c) Carpark *B* charges a fixed parking rate of \$2 per hour.
Draw a suitable line on the graph to represent the parking charges of carpark *B*. [1]
- (d) John wants to park his car for 4 hours.
Which carpark is the cheaper option and by how much?

Answer (d) Carpark is cheaper by \$ [1]

- 24 The table shows the population of three countries in 2016.

Country	Population
Malaysia	3.119×10^7
China	1.379×10^9
Singapore	5607000

- (a) Express the population of Singapore in 2016 in standard form.

Answer (a) [1]

- (b) Which country has the largest population?

Answer (b) [1]

- (c) In 2017, China's population increased to 1.4095×10^9 .
Calculate the percentage increase.

Answer (c) % [2]

End of Paper



**REGENT SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2018
SECONDARY FOUR (NORMAL ACADEMIC)**

NAME: _____

INDEX NUMBER: _____

CLASS: _____

SETTER: MS KAREN LEE

MATHEMATICS SYLLABUS A

4045/02

Paper 2

13 AUG 2018

2 hours

Additional Materials: Answer 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.

You may use a pencil for any diagrams or graphs.

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

Section A

Answer **all** questions.

Section B

Answer **one** question.

Give your answers on the separate Answer Paper provided.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

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

You are reminded of the need for clear presentation in your answers.

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

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

The total of the marks for this paper is 60.

60	TARGET
PARENT'S SIGNATURE	

This document consists of 9 printed pages.

Mathematical Formulae*Compound interest*

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

Section A (52 marks)

Answer **all** the questions in this section.

- 1 (a) Calculate $\sqrt{(-2)^2 - (3)(-5)}$. [1]

- (b) By rounding the numbers to 1 significant figure, **estimate** the value of

$$\frac{62.89 \div 8.93}{3.12 - 0.075}$$

You must show your working.

[3]

- (c) (i) Write 240 as the product of its prime factors. [1]

- (ii) Find the smallest positive integer value of k such that $240k$ is a perfect square. [1]

- 2 (a) Expand and simplify $(2x+3)^2$. [2]

- (b) Factorise completely

(i) $9 - a^2$, [1]

(ii) $2ax + 10x - 3ay - 15y$. [2]

- (c) Make b the subject of the formula $m = \sqrt{ab}$. [2]

- 3 (a) The price of a book was reduced by 20% in a sale.
Annie paid \$20 when she bought the book in the sale.
How much did Annie saved? [2]

- (b) The price of a television is \$1499.
Mrs Tan decides to pay by hire-purchase.
She pays a 15% deposit and then 24 equal monthly payments of \$55.
How much does she pay in total? [2]

4

- 4 (a) Janice cycles 24 km in 1 hour 30 minutes.

Calculate her speed in km/h.

[2]

- (b) d is inversely proportional to p .

Given that $p = 5$ when $d = 12$, find

- (i) an expression for d in terms of p ,

[2]

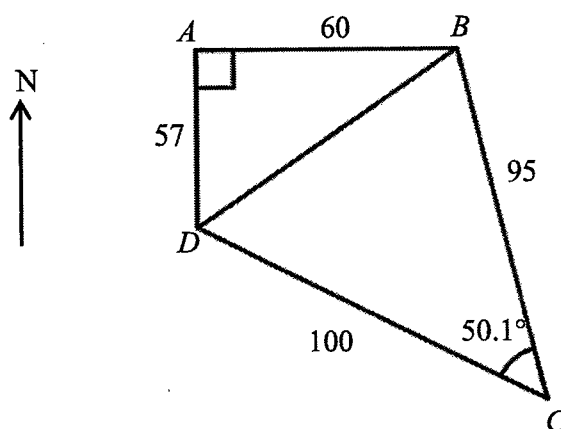
- (ii) the value of d when $p = 3$.

[1]

- 5 The diagram shows a field $ABCD$, where A is due north of D .

$AB = 60$ m, $BC = 95$ m, $AD = 57$ m and $CD = 100$ m.

Angle $BCD = 50.1^\circ$ and angle $DAB = 90^\circ$



Find

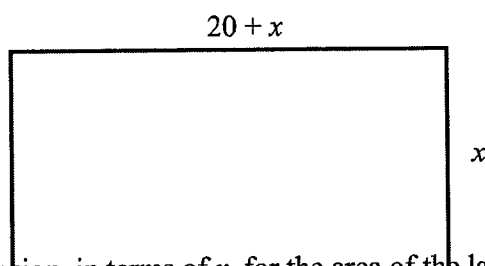
- (a) angle ADB ,

[2]

- (b) area of $ABCD$.

[2]

- 6 A farmer has a rectangular plot of land with length $(20 + x)$ metres and width x metres.



- (a) Write down an expression, in terms of x , for the area of the land. [1]

The area of the land is twice the perimeter of the land.

- (b) Write down an expression in x to represent this information, and show that it reduces to

$$x^2 + 12x - 80 = 0. \quad [3]$$

- (c) Solve the equation $x^2 + 12x - 80 = 0$, giving your answers to 2 decimal places. [2]

- (d) Calculate the area of the land. [1]

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

The table below is for $y = 2 - \frac{6}{x}$.

x	1	1.5	2	3	4	5	6
y	-4	-2	-1	0	0.5	p	1

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

- (b) Using a scale of 2 cm to 1 unit, draw a horizontal x -axis for $0 \leq x \leq 6$.

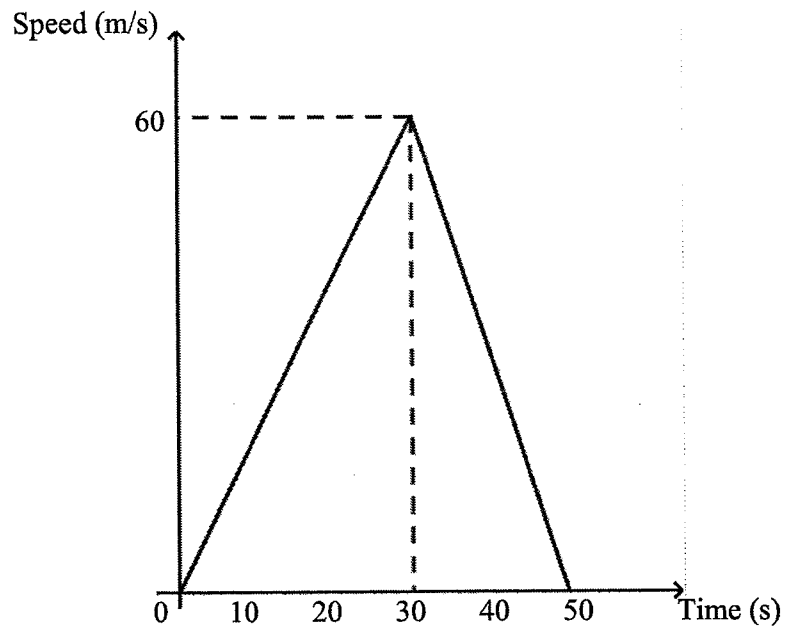
Using a scale of 4 cm to 1 unit, draw a vertical y -axis for $-4 \leq y \leq 1$.

Plot the graph of $y = 2 - \frac{6}{x}$ for $1 \leq x \leq 6$. [2]

- (c) Use your graph to find the value of x when $y = -3$. [1]

- (d) By drawing a tangent, find the gradient of the curve $y = 2 - \frac{6}{x}$ when $x = 4$. [2]

- 8 The graph shows the speed-time graph of Mr Ang's car journey.



- (a) Find the acceleration of the car at $t = 20$. [2]
(b) Find the total distance travelled by Mr Ang. [2]
-

- 9 Janet owns a stall that sells fresh orange juice.

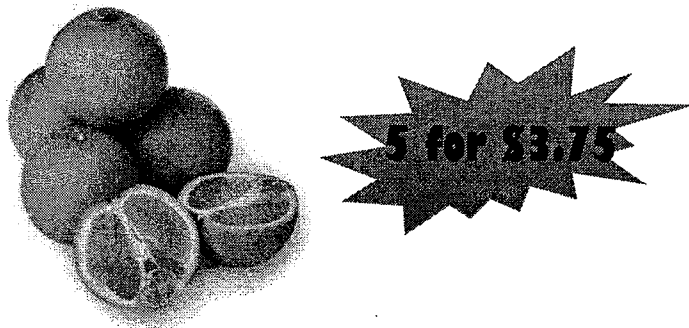
It requires 2 oranges to make a cup of juice.

Janet intends to sell 2500 cups of orange juice in the month of August.

- (a) Find the number of oranges Janet requires.

[1]

The cost of 5 oranges is \$3.75.



- (b) Calculate the total amount Janet will spend in purchasing the oranges she needs.

[1]

Each cup of orange juice is sold in a paper cup with a straw.

The prices of paper cups and straws are shown below.

Supplies		
Item	Description	Unit Cost
Paper cups	Pack of 50s	\$18
	Bulk price (10 or more packs)	\$17.50
	Bulk price (50 or more packs)	\$17
Straws	Pack of 100s	\$1.30
	Pack of 250s	\$1.90

- (c) Calculate the total amount spent by Janet on supplies in August.

[3]

- (d) Janet wants a minimum profit of 20%.

Suggest a sensible amount that Janet should charge for each cup of orange juice.

Justify the decision you make and show your calculations clearly.

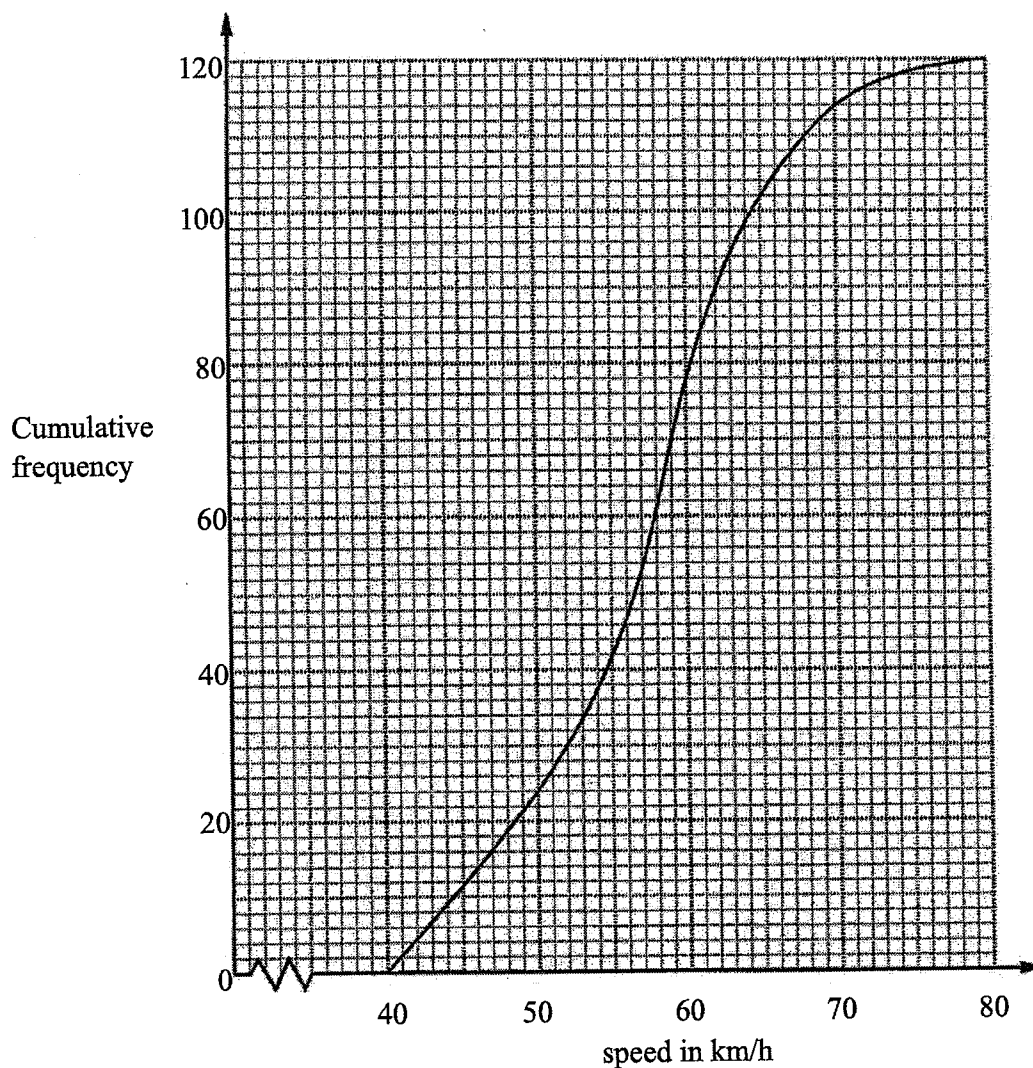
[4]

Section B (8 marks)

Answer **one** question from this section. Each question carries 8 marks.

- 10 (a) Police checked the speeds of 120 cars on road A.

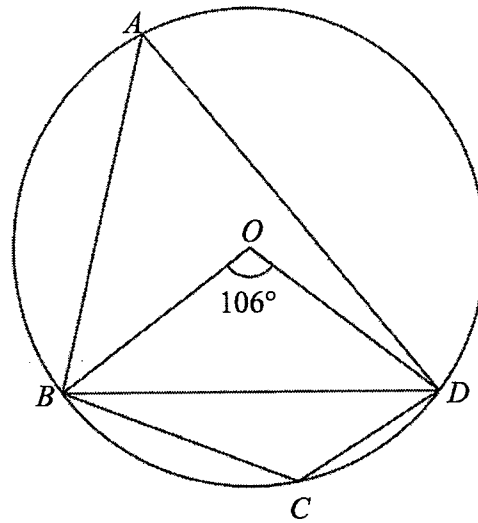
The cumulative frequency curve for the speeds of the cars is shown below.



Use the graph to estimate

- (i) the median, [1]
 - (ii) the interquartile range, [2]
 - (iii) the percentage of cars exceeding the speed limit of 70 km/h. [2]
- (b) Two of the cars were chosen at random. [2]
- Calculate the probability that the speed of both cars is less than 60 km/h.
- (c) The median speed of cars on road B is 52 km/h. [1]
- Comment on the speed of cars on both roads.

11 (a)



A, B, C and D are points on the circle centre O .

Angle $BOD = 106^\circ$

Find, **stating the reasons**,

(i) angle BAD ,

[2]

(ii) angle BCD .

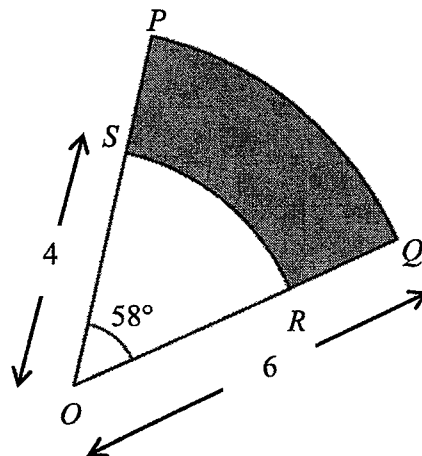
[2]

(b) OPQ is a sector of a circle, centre O , of radius 6 cm.

OSR is a sector of a circle, centre O , of radius 4 cm.

OSP and ORQ are straight lines.

Angle $POQ = 58^\circ$.



(i) Convert 58° to radian.

[1]

(ii) Find the perimeter of $PQRS$.

[3]

End of Paper

Regent Secondary School
Elementary Mathematics
Sec 4 Normal Academic Preliminary Examinations 2018 (Setter: Ms Karen Lee)
Marking Scheme (Paper 1)

Qn		Solutions	Marks	Total	Remarks/Markers' Report														
1	(a)	$\frac{10x^2}{3} \times \frac{9}{2x^5} = \frac{15}{x^3}$	B1	1															
	(b)	$y \square -1.25$	B1	1	Accepts $y \square -1\frac{1}{4}$ or $-\frac{5}{4}$														
2	(a)	$\angle DAB = \frac{180^\circ - 50^\circ}{2}$ (isos. triangle) $= 65^\circ$	B1	1	Reasons not needed for Q2(a) and (b)														
	(b)	$\angle ADC = 180^\circ - 65^\circ - 23^\circ$ ($\angle$ sum of triangle) $= 92^\circ$	B1	1															
	(c)	$\angle DCE = \angle ADC$ (alt. $\angle$) $= 92^\circ$ Angle $DCE = 92^\circ$ because <u>alternate angles</u>	B1	1	$\sqrt{\text{FT}}$ their part (b) B1 for both correct answer and reason.														
3	(a)	35	B1	1															
	(b)	$\frac{3}{35} \leftarrow 860\text{Y}$	M1																
		$= 30.9^\circ$ (1 d.p)	A1	2	Exact: $30\frac{6}{7}\text{Y}$														
4		$3^{x-1+3} = 3^{12}$	M1		Correct use of indices law $a^m \times a^n = a^{m+n}$														
		$x = 10$	A1	2															
5		<table><tr><th>First bag</th><th>Second bag</th></tr><tr><td>2</td><td>Red</td></tr><tr><td>2</td><td>Blue</td></tr><tr><td>2</td><td>Green</td></tr><tr><td>3</td><td>Red</td></tr><tr><td>3</td><td>Blue</td></tr><tr><td>3</td><td>Green</td></tr></table>	First bag	Second bag	2	Red	2	Blue	2	Green	3	Red	3	Blue	3	Green	B1		
First bag	Second bag																		
2	Red																		
2	Blue																		
2	Green																		
3	Red																		
3	Blue																		
3	Green																		
		<table><tr><td>3</td><td>Red</td></tr><tr><td>3</td><td>Blue</td></tr><tr><td>3</td><td>Green</td></tr></table>	3	Red	3	Blue	3	Green	B1	2									
3	Red																		
3	Blue																		
3	Green																		
6		$A = 5000 \left(1 + \frac{1.75}{100}\right)^4$	M1																
		$A = \$5359.30$	A1	2	Reject \$5000														
7	(a)	$3x - 2$	B1	1															
	(b)	$(3x + 2)(x - 1)$	B2	2															
8	(a)	$1 - \frac{1}{4} = \frac{3}{4}$ $\frac{3}{4} \div 3 = \frac{1}{4}$ $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$	B1	1	Accept $\frac{2}{4}$														
	(b)	B $\downarrow$	B1	1	$\sqrt{0.5625} = \frac{3}{4}$														

9	(a)	2	B1	1	
	(b)	$3 = 2(1) + h$	M1		√FT their part (i)
		$h = 1$	A1	2	
10	(a)	(i) $0720 - 0630 = 50 \text{ min}$	B1	1	
		(ii) $1416 - 0050 = 1326$	B1	1	
	(b)	LCM of 16 and 12 = 48	M1		
		$0734 + 0048 = 0822$	A1	2	
11	(a)	Refer to Appendix 1			Must show use of compasses in both drawings to be awarded B1.
	(i)	• Correct drawing of perpendicular bisector	B1	1	
	(ii)	• Correct drawing of angle bisector	B1	1	
	(b)	Refer to Appendix 1 • Correct labelling of point P	B1	1	
	(c)	2.3 ± 0.1	B1	1	
12		Not clear whether the height or the size of rectangle should be used to determine the amount of trash	B1		
		Based on the height, it seems like the amount of trash increased by two times but if base on the size, it seems like the amount of trash increased by more than two times.	B1	2	
		<u>OR</u> <i>Scale of vertical axis not defined,</i>	B1		
		<i>therefore not possible to read the amount of trash produced in 1960.</i>	B1		
13	(a)	$BC^2 + CD^2 = 8^2 + 15^2$ $= 289$ $BD^2 = 17^2$ $= 289$	M1		
		As $BC^2 + CD^2 = BD^2$, by converse of Pythagoras' theorem, triangle BCD is a right-angled triangle. $\therefore \angle BCD = 90^\circ$	A1	2	
	(b)	(i) $\frac{8}{15}$	B1	1	
		(ii) $\cos \angle ABD = -\cos \angle CBD$ $= -\frac{8}{17}$	B1	1	

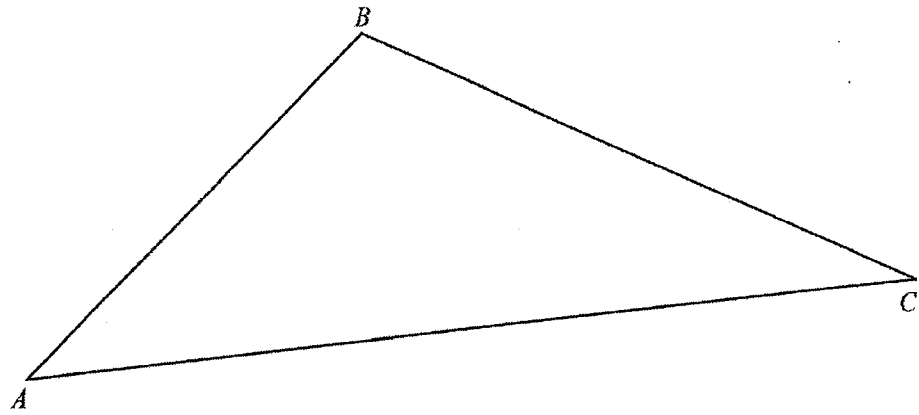
14		each int $\square$ of Shape $A = \frac{180(5-2)}{5}$ $= 108^\circ$	M1		
		each int $\angle$ of Shape $C = 360^\circ - 108^\circ - 90^\circ$ $= 162^\circ$	M1		
		each ext $\angle$ of Shape $C = 180^\circ - 162^\circ$ $= 18^\circ$ $n = \frac{360^\circ}{18^\circ}$ $n = 20$	M1 A1		$\frac{180(n-2)}{n} = 162$ Or $180n - 360 = 162n$ $18n = 360$
			A1	4	
15		$2x - 3y = 12$ --- (1) $4x + y = 3$ --- (2) (1) $\leftarrow 2$ $4x - 6y = 24$ --- (3) (3) - (2) $-6y - y = 24 - 3$	M1		
		$y = -3$ $x = 1.5$	A2	3	
16	(a)	-31, -38	B1	1	
	(b)	$4 - 7n$	B1	1	
	(c)	$4 - 7n = -102$ $106 = 7n$ $n = 15\frac{1}{7}$ As n is not a whole number, -102 is not a term in this sequence.	B1	1	
17	(a)	$1 : 200\ 000$ $= 1\text{ cm} : 2\text{ km}$ $= 11.2\text{ cm} : 22.4\text{ km}$	M1 A1		Accept 11.15 cm : 22.3 km Accept 11.1 cm : 22.2 km
	(b)	$1\text{ cm} : 2\text{ km}$ $= 1\text{ cm}^2 : 4\text{ km}^2$	M1		
		$\frac{300}{4} = 75\text{ cm}^2$	A1	2	
18	(a)	$10 \leq x < 15$	B1	1	
	(b)	$\frac{12.5(35) + 17.5(28) + 22.5(19) + 27.5(12) + 32.5(10)}{35 + 28 + 19 + 12 + 10}$	M1 M1		
		Estimated mean = 19.3 (3 s.f)	A1	3	Or $19\frac{17}{52}$
	(c)	In the calculation, the exact price of every class tee is unknown and the mid-value of each class interval is taken as the price, which may not necessarily be true in reality.	B1	1	Accept any logical explanation that displays idea that not all the class tee price is the mid-value of class interval

19		Area of circle = $\pi(4)^2$ = 50.265 cm ²	M1		
		Curved surface area = $\pi(4)(11)$ = 138.23 cm ²	M1		
		Total SA = 138.23 + 50.265 = 188 cm ² (3 sf)	A1	3	
20	(a)	Area of right-angled triangle = $\frac{1}{2} \times 3 \times 4$ = 6 cm ²	M1		
		Area of shape P = 17.5 + 6 = 23.5 cm ²	A1	2	
	(b)	$\frac{1}{2} \times 3 \times 28 = 17.5$	M1		
		$h = 7$ cm	A1	2	
	(c)	$\frac{5}{13} = \frac{7}{q}$ $q = 18.2$ cm	B1	1	√FT their part (b)
21	(a)	$\sqrt{(-2-4)^2 + (6-0)^2}$	M1		
		= 8.49 units (3 s.f)	A1	2	
	(b)	(0, 4)	B1	1	
	(c)	(-2, 3)	B1	1	
	(d)	(1, 6)	B1	1	
22	(a)	$a = -3$ $b = -6$	B1 B1	2	
	(b)	$(x-3)^2 - 6 = 0$ $(x-3)^2 = 6$ $x-3 = \pm\sqrt{6}$	M1		Only accepts solving by completing square
		$x = 0.551$ or 5.45	A1	2	

23	(a)	\$2.50	B1	1	
	(b)	\$1.25	B1	1	
	(c)		C1	1	
	(d)	Carpark A is cheaper by \$3	B1	1	√FT their part (c)
24	(a)	5.607×10^6	B1	1	
	(b)	China	B1	1	
	(c)	$\frac{1.4095 \times 10^9 - 1.379 \times 10^9}{1.379 \times 10^9} \times 100\%$	M1		
		= 2.21% (3 s.f)	A1	2	

Appendix 1

11



Regent Secondary School
Elementary Mathematics
Sec 4 Normal Academic Preliminary Examinations 2018 (Setter: Ms Karen Lee)
Marking Scheme (Paper 2)

Qn		Solutions	Marks	Total	Remarks/Markers' Report
1	(a)	4.36	B1	1	
	(b)	$\frac{60 \leftarrow 9}{3 - 0.08}$	M1 M1		M1 for rounding off 2 numbers correctly
		= 185	A1	3	
	(c)	(i) $2^4 \leftarrow 8 \leftarrow 5$	B1	1	
		(ii) $3 \leftarrow 5 = 15$	B1	1	
2	(a)	$(2x+3)(2x+3)$ $= 4x^2 + 6x + 6x + 9$ $= 4x^2 + 12x + 9$	M1 A1/B2	 2	
	(b)	(i) $(3-a)(3+a)$	B1	1	
		(ii) $2x(a+5) - 3y(a+5)$ $= (2x-3y)(a+5)$	M1 A1	 2	
	(c)	$m^2 = ab$ $b = \frac{m^2}{a}$	M1 A1	 2	
3	(a)	80% $\rightarrow$ \$20 1% $\rightarrow$ \$0.25 20% $\rightarrow$ \$5	M1 A1	 2	
	(b)	$\$1499 \leftrightarrow \frac{15}{100} = \224.85 $\$55 \leftarrow 24 = \1320 $\$1320 + \$224.85 = \$1544.85$	M1 A1	 2	
4	(a)	Speed = $\frac{24}{1.5}$ $= 16 \text{ km/h}$	M1 A1	 2	
	(b)	(i) $d = \frac{k}{p}$ where k is a constant $12 = \frac{k}{5}$	M1		
	(ii)	$k = 60$ $d = \frac{60}{p}$	A1	2	
	(b)	20	B1	1	

5	(a)	$\tan \angle ADB = \frac{60}{57}$	M1		
		$\angle ADB = 46.469$ $= 46.5^\circ$ (1 dp)	A1	2	
	(b)	Area of $ABCD = \frac{1}{2}(60)(57) + \frac{1}{2}(95)(100)\sin 50.1^\circ$	M1		
		$= 1710 + 3644.03$	A1	2	
		$= 5350 \text{ m}^2$			
6	(a)	$x(20+x)\text{m}^2$	B1	1	
	(b)	$x(20+x) = 2[2(20+x+x)]$	M1		$\sqrt{\text{FT1}}$ their part a
		$20x + x^2 = 80 + 8x$	M1		M1 for correct expansion
		$x^2 + 12x - 80 = 0$ (shown)	A1	3	
	(c)	$x = \frac{-12 \pm \sqrt{12^2 - 4(1)(-80)}}{2(1)}$	M1		
		$x = -16.7703$ or $x = 4.7703$ $= -16.77$ (2 dp) $x = 4.77$ (2 dp)	A1	2	No A1 if student reject -16.77
	(d)	$4.7703(20 + 4.7703)$ $= 118 \text{ m}^2$ (3 sf)	B1	1	
7	(a)	0.8	B1	1	
	(b)	Refer to Appendix 1 • All points plotted correctly • Smooth curve	P1 C1	2	-1m for wrong scale/axes
	(c)	1.2 ± 0.1	B1	1	
	(d)	Refer to Appendix 1 • Correct tangent line Gradient $= \frac{1 - (-0.8)}{5.3 - 0.6}$ $= 0.383$ (3 sf) [accept 0.36 to 0.40]	M1 A1	2	Accurate ans: 0.375
8	(a)	$\frac{60}{30}$	M1		
		$= 2 \text{ m/s}^2$	A1	2	
	(b)	$\frac{1}{2} \leftarrow 50 \leftarrow 50$	M1		
		$= 1500 \text{ m}$	A1	2	

9	(a)	5000	B1	1	
	(b)	$\frac{5000}{5} \times \$3.75 = \3750	B1	1	
	(c)	Cost of paper cups = $\$17 \times \left(\frac{2500}{50}\right)$ = \$850	M1		M1 for both costs correct
		Cost of straws = $\$1.90 \times \left(\frac{2500}{250}\right)$ = \$19	M1		
		Total cost of supplies = \$850 + \$19 = \$869	A1	3	
	(d)	Total Costs = \$869 + \$3750 = \$4619	M1		√FT1 their part a-c
		Expected earnings = \$4619 × 1.2 = \$5542.80	M1		
		Price per cup = $\frac{5542.80}{2500}$ = \$2.22	M1		
		She should charge <u>\$2.50</u> per cup of orange juice as it is easier to collect the money/allows her to have more profit.	A1	4	Accept any reasonable amount of at least \$2.22 with logical explanation.

Section B

10	(a)	(i) 58 km/h	B1	1	
		(ii) $62 - 52$	M1		
		$= 10 \text{ km/h}$	A1	2	
		(iii) $120 - 114 = 6$	M1		
		$\frac{6}{120} \leftarrow 100\% = 5\%$	A1	2	
	(b)	$\frac{78}{120} \leftrightarrow \frac{77}{119}$	M1		
		$= \frac{143}{340}$	A1	2	
	(c)	The average speed of cars on road B is slower than on road A as the median speed is smaller.	B1	1	
11	(a)	(i) $\frac{106}{2} = 53$ ($\square$ at centre = $2\square$ at circumference)	B1B1	2	1m for correct answer, 1m for correct reason
		(ii) $180^\circ - 53^\circ = 127^\circ$ ($\angle$ in opp segments)	B1B1	2	1m for correct answer, 1m for correct reason
	(b)	(i) $\frac{\pi}{180} \times 58 = 1.01229$ $= 1.01 \text{ rad (3 s.f.)}$	B1	1	
		(ii) $\text{arc } SR = \frac{58Y}{360Y} \leftarrow 2\pi(4)$ $= 4.0492 \text{ cm}$ OR $\text{arc } SR = 4(1.01229)$ $= 4.04916 \text{ cm}$	M1		$\sqrt{\text{FT1}}$ if arc SR is calculated using $r\theta$ with incorrect b(i)
		$\text{arc } PQ = \frac{58Y}{360Y} \leftarrow 2\pi(6)$ $= 6.0737 \text{ cm}$ OR $\text{arc } PQ = 6(1.01229)$ $= 6.07374 \text{ cm}$	M1		$\sqrt{\text{FT1}}$ if arc PQ is calculated using $r\theta$ with incorrect b(i)
		Perimeter $= 4.0492 + 6.0737 + 2 + 2$ $= 14.1 \text{ cm (3 sf)}$	A1	3	