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BEDOK VIEW SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2018

CANDIDATE
NAME

REGISTER
NUMBER

CLASS

MATHEMATICS SYLLABUS A

Secondary 4 Normal Academic

Paper 1

4045/01

13 August 2018

2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your 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.

Total	
--------------	--

Setter: Ms Sherine Wong

Parent's / Guardian's Signature:

This document consists of **17** printed pages.

Do not turn over the page until you are told to do so.

*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

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

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

3

Answer **all** the questions.

- 1 (a) Express 64 as a product of its prime factors.

Answer (a) [1]

- (b) Given that $4 \times 64^n = 1$, find the value of n .

Answer (b) $n =$ [2]

- 2 The population of Bedok in 2017 was 285 000 correct to the nearest 1 000.

Write down

- (a) the least possible population of Bedok in 2017,

Answer (a) [1]

- (b) the greatest possible population of Bedok in 2017.

Answer (b) [1]

4

- 3 (a) Express 34 billion in standard form.

Answer (a) [1]

- (b) The thickness of a pack of 500 sheets of paper is 4.8 cm.

Find the thickness of one sheet of paper, giving your answer in millimetres.

Answer (b) mm [2]

- 4 Mr Han leaves home at 6.50 am and travels to his work place at an average speed of 45 km/h. He arrives at work at 7.15 am.

How far is the distance from Mr Han's home to his work place?

Answer km [2]

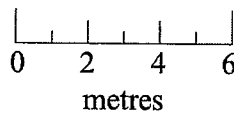
- 5 Find the fraction exactly halfway between $\frac{2}{3}$ and $\frac{5}{7}$.

Give your answer in its simplest form.

Answer [2]

5

- 6 The diagram below shows an accurate scale taken from a scale floorplan of a house.



- (a) Express this scale in the form 1 : n .

Answer (a) 1 : [2]

- (b) The actual area of the living room is 66 m^2 .

Calculate the area of the living room on the floorplan. Give your answer in cm^2 .

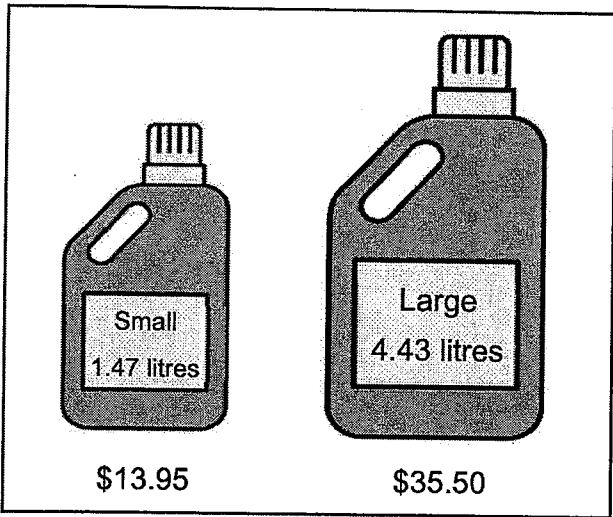
Answer (b) cm^2 [2]

- 7 Under the new Active Mobility Act, the speed limit for personal mobility devices (PMD) on footpaths is 15 km/h. Express 15 km/h in metres per second.

Answer m/s [2]

6

8 Liquid detergent is sold in two sizes, small and large.



Find which of the two sizes gives the better value.
You must show all your working.

Answer [3]

9 During a sale, a camera is sold at a 15% discount. As Kenny has a loyalty card with the store, he gets a further discount of 5% and pays \$969 for the camera.
Find the original price of the camera.

Answer \$ [2]

7

- 10 Mrs Yasmin travelled to Bangkok during the June holidays.

She exchanged S\$600 into Thai baht at the exchange rate of S\$1 = 23.88 baht.

While in Bangkok, she spent 11 580 baht.

On her return, she exchanged the remaining baht into Singapore dollars at the exchange rate of S\$1 = 24 baht. How many Singapore dollars did she receive?

Answer S\$ [3]

- 11 Simplify $\frac{4x+1}{3} - \frac{x}{4}$.

Answer [2]

12 The first five terms of a sequence are

3, 9, 15, 21, 27,,,

(a) Find

(i) an expression for the n th term,

Answer (a)(i) [1]

(ii) the 100th term.

Answer (a)(ii) [1]

(b) Is 283 part of the sequence? Justify your answer.

Answer (b)
 [2]

13 Solve $(x - 6)(2x + 3) = 0$.

Answer $x =$ or [2]

9

14 s is directly proportional to t^2 , where $t > 0$.

Given that $s = 27$ when $t = 9$, find

(a) an expression for s in terms of t ,

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

(b) the value of t when $s = \frac{1}{12}$.

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

15 (a) x is an integer where $4x > 7$ and $x \leq 5$.

Using a number line to represent the solution, write down all the possible values of x .

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

(b) Solve $5a - 13 = 9 + 2a$.

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

10

- 16 (a) Given that $x^2 - 4x + 7 = (x + m)^2 + n$, find m and n .

Answer (a) $m = \dots\dots\dots$

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

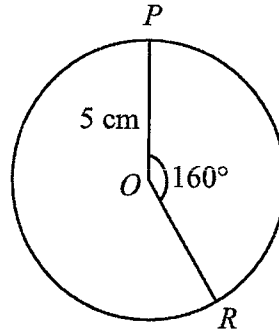
- (b) Hence, or otherwise, solve $x^2 - 4x + 7 = 5$.

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

11

17 A circle has centre O and radius 5 cm.

P and R are points on the circumference and angle $POR = 160^\circ$.



Find, leaving all your answers in their simplest form in terms of π ,

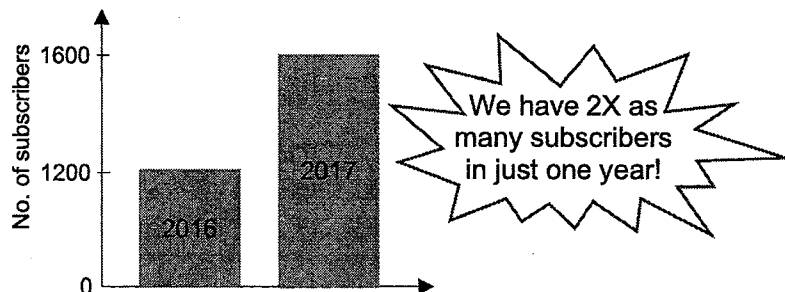
(a) the perimeter of the minor sector POR ,

Answer (a) cm [1]

(b) the area of the major sector POR .

Answer (b) cm^2 [2]

18 Explain why the following claim is misleading. Support your argument with figures.



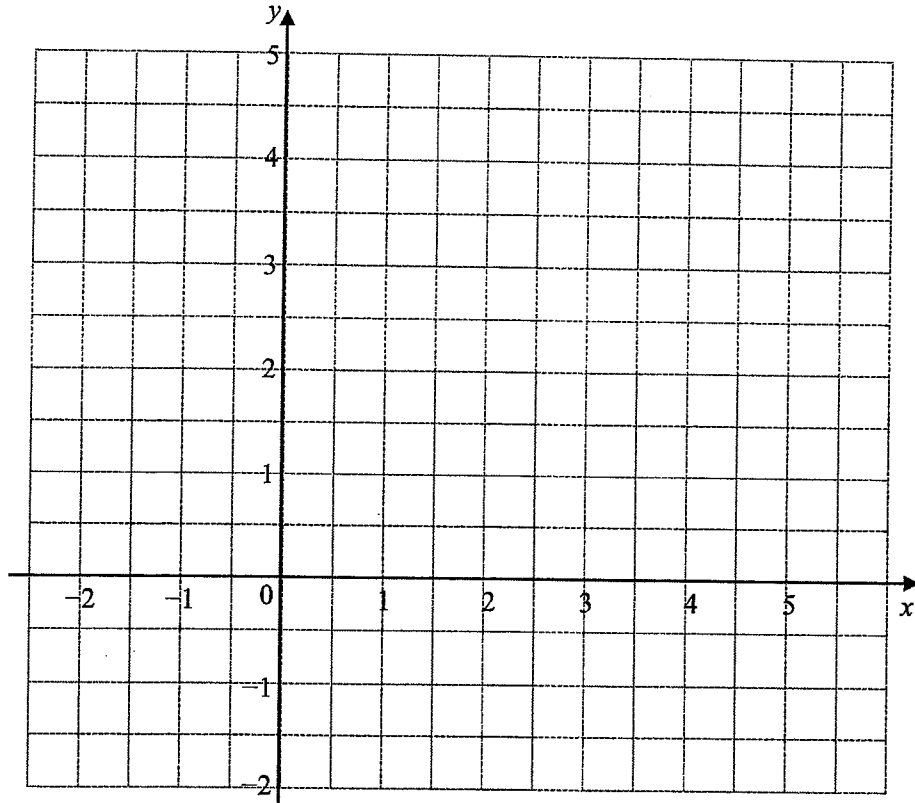
Answer

..... [2]

19 (a) On the axes below,

(i) draw the line $y = 2x$,

(ii) draw the line $y = 4 - 2x$.



[3]

(b) Hence, solve these simultaneous equations.

$$y = 2x$$

$$y = 4 - 2x$$

Answer (b) $x = \dots\dots\dots$

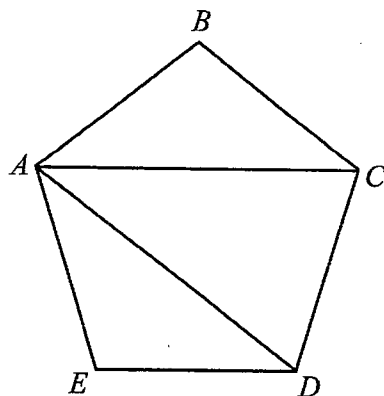
$y = \dots\dots\dots$ [1]

20 Find the interior angle of a regular 12-sided polygon.

Answer $\dots\dots\dots^\circ$ [2]

13

21 The diagram below shows a regular pentagon $ABCDE$.



Calculate

(a) angle ABC ,

Answer (a) ° [2]

(b) angle ACD .

Answer (b) ° [2]

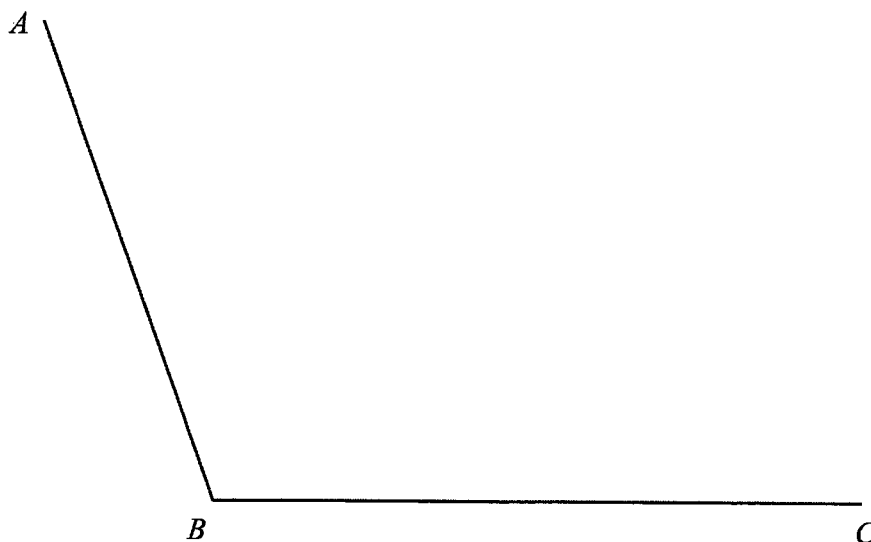
14

22 The quadrilateral $ABCD$ is such that $AB = 7$ cm, $BC = 9$ cm, $CD = 8$ cm and $DA = 11$ cm.

AB and BC are drawn below.

- (a) Complete the quadrilateral. [1]
- (b) Measure angle BAD .
- (c) Construct
 - (i) the angle bisector of angle ABC , [1]
 - (ii) the perpendicular bisector of AB . [1]

Answer (a), (c)(i) and (ii)



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

15

23 The number of days that students were absent in a particular week is shown in the table below.

Number of days absent	0	1	2	3	4	5
Number of students	16	5	7	2	1	1

(a) Write down

(i) the mode,

Answer (a)(i) day(s) [1]

(ii) the median.

Answer (a)(ii) day(s) [1]

(b) Calculate the mean.

Answer (b) day(s) [2]

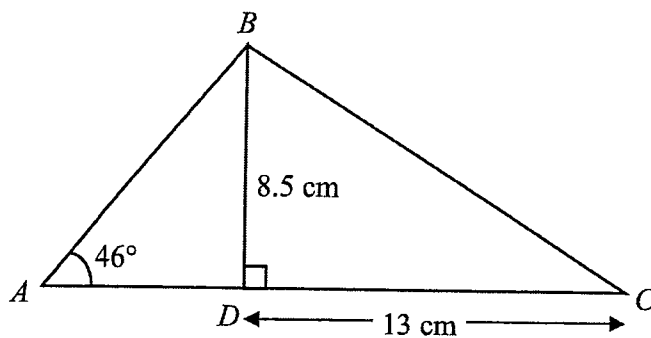
(c) One student is chosen at random.

What is the probability the student was absent for more than 2 days?

Answer (c) [1]

16

- 24 The diagram below shows triangle ABC where BD is perpendicular to AC .
 Angle $BAD = 46^\circ$, $BD = 8.5$ cm and $DC = 13$ cm.



Calculate

- (a) angle BCD ,

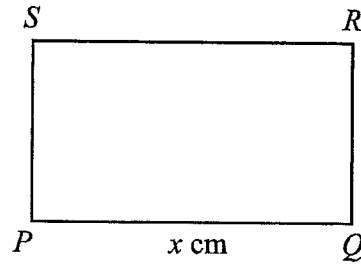
Answer (a) $^\circ$ [2]

- (b) AB .

Answer (b) cm [2]

17

- 25 The diagram below shows a rectangle, $PQRS$, where $PQ = x$ cm.
The area of the rectangle is 44 cm^2 .



- (a) Write, in terms of x , the expression for

(i) the length PS ,

Answer (a)(i) [1]

(ii) the perimeter of the rectangle.

Answer (a)(ii) [1]

- (b) Given that the perimeter of the rectangle is 27 cm, show that $2x^2 - 27x + 88 = 0$.

Answer (b)

[2]

- (c) Solve the equation $2x^2 - 27x + 88 = 0$ to find the two possible values of x .

Answer (c) $x =$ or [2]

END OF PAPER



BEDOK VIEW SECONDARY SCHOOL

PRELIMINARY EXAMINATION 2018

CANDIDATE
NAME

REGISTER
NUMBER

CLASS

MATHEMATICS SYLLABUS A

Secondary 4 Normal Academic

Paper 2

4045/02

14 August 2018

2 hours

Additional Materials: Answer Paper
Graph paper

READ THESE INSTRUCTIONS FIRST

Write your answers and working on the separate Answer Paper provided.
Write your 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.

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.

The use of a 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.

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

Setter: Ms Sherine Wong

Parent's / Guardian's Signature:

This document consists of 11 printed pages.

Do not turn over the page until you are told to do so.

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

	India	U.S.A.	Singapore
Population	1.32 billion	312 million	5.61 million
Land area (km ²)	3.29 million	9.83 million	720

Using information from the table above,

- (a) find how many more people live in India than in the U.S.A., giving your answer in standard form, [2]
- (b) calculate the average number of people per square kilometre living in the U.S.A., giving your answer correct to the nearest whole number, [1]
- (c) express, in the form $m : n$, where m and n are integers, the ratio population in Singapore : population in India. [1]
-

- 2 When written as the product of their prime factors,

$$x = 2^3 \times 3^6,$$

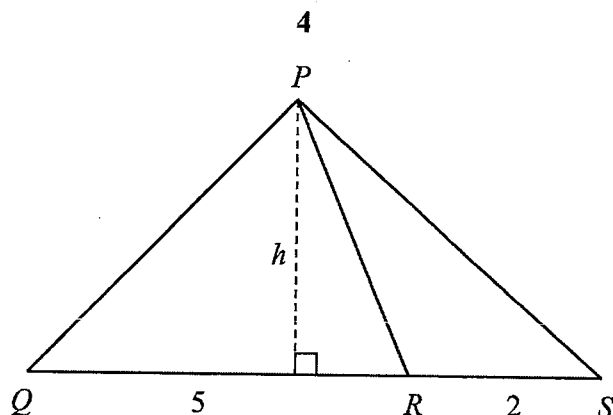
$$y = 2 \times 3^2 \times 5,$$

$$z = 2^2 \times 3 \times 7.$$

Find

- (a) the value of the cube root of x , [1]
- (b) the LCM of x , y and z , giving your answer as the product of its prime factors, [1]
- (c) the greatest number that will divide x , y and z exactly. [1]
-

3



In the diagram above, QRS is a straight line and $QR : RS = 5 : 2$.

(a) Express

(i) the area of triangle PQR in terms of QR and h , [1]

(ii) the area of triangle PQS in terms of QS and h . [1]

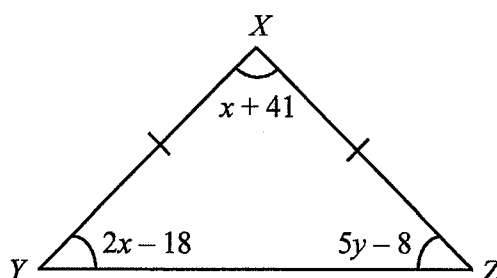
(b) Calculate the area of triangle PQR as a percentage of the area of triangle PQS . [2]

4 (a) Factorise $2x^2 - 7x + 3$. [2]

(b) Hence, simplify $\frac{2x^2 - 7x + 3}{x^2 - 9}$. [2]

5 The diagram below shows an isosceles triangle XYZ where $XY = XZ$.

The angles are as shown on the diagram.

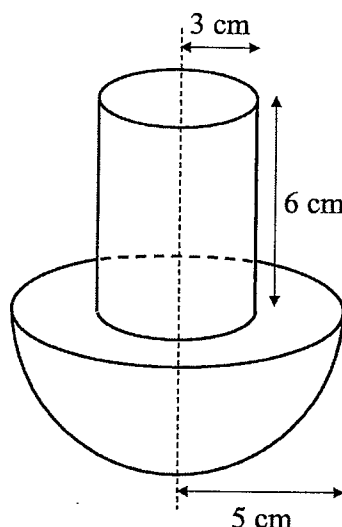


(a) Write down two simultaneous equations, in terms of x and y , to represent the information given. [2]

(b) Solve the simultaneous equations and hence find the size of the angles of the triangle. [3]

5

- 6 The diagram below shows a toy which is made from a cylinder and a hemisphere. The cylinder has a radius of 3 cm and a height of 6 cm. The hemisphere has a radius of 5 cm and shares the same centre as the base of the cylinder.



Find the total surface area of the toy.

[3]

- 7 The stem-and-leaf diagram below shows the marks for Mr Lim's 24 students for their last Chemistry test.

1	3	4	5	8	8	9			
2	0	1	1	2	3	3	6	7	9
3	2	3	3	4	6	7	8		
4	0	0							

Key	
1 3	means 13 marks

- (a) Find
- (i) the range of marks, [1]
 - (ii) the median mark. [2]
- (b) Sheryl missed the test. She sat for the test later and Mr Lim said that her mark would increase the range by 2 but decrease the median.
- What mark did Sheryl get? [1]

6

- 8 The table below shows the distribution of ages of 30 residents in a hospice.

Age, x years	Frequency
$50 \leq x < 60$	2
$60 \leq x < 70$	5
$70 \leq x < 80$	8
$80 \leq x < 90$	10
$90 \leq x < 100$	5

(a) Estimate

(i) the mean,

[1]

(ii) the standard deviation.

[1]

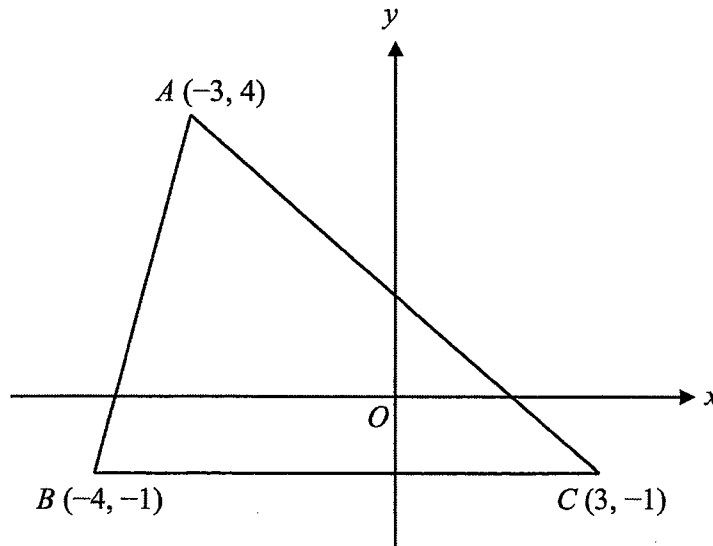
(b) Arun claims that the range for the residents' age is 50 years.

Explain why his claim may not be true.

[2]

- 9 The diagram below shows triangle ABC .

A is the point $(-3, 4)$, B is the point $(-4, -1)$ and C is the point $(3, -1)$.



(a) The points A , B , C , and T are the vertices of a parallelogram.

Given that the x -coordinate of T is positive, find the coordinates for the two possible positions of T .

[2]

(b) (i) Find the gradient of the line AB .

[2]

(ii) Hence, find the equation of the line AB .

[2]

7

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

The table of values below is for the curve $y = x + \frac{6}{x}$.

x	1	2	3	4	5	6	7	8
y	7	5	5	5.5	6.2	7	7.9	p

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

(b) Draw the graph of $y = x + \frac{6}{x}$ for $1 \leq x \leq 8$.

Use a scale of 2 cm to 1 unit on both axes. [3]

(c) Use your graph to find

(i) the values of x when $y = 6$, [2]

(ii) the minimum value of y . [1]

11 Mr Schneider lives and works in Singapore.

He travels regularly to his company's main office in Germany.

When he flies back to Singapore, he takes a taxi from Changi Airport to his home.

The table below shows the taxi fares and surcharges.

Metered Fare	
The first 1 km or less (Flag Down)	\$ 3.70
Every 400 m thereafter or less up to 10 km	\$ 0.22
Every 350 m thereafter or less after 10 km	
Surcharges	
<u>Peak Period</u>	25% of metered fare
Mon – Fri (except Public Holidays): 6 am – 9.29 am	
Mon – Sun & Public Holidays: 6 pm – 11.59 pm	
<u>Late Night</u>	50% of metered fare
Midnight – 5.59 am	
<u>Changi Airport</u>	\$ 5.00
Fri – Sun: 5 pm – 11.59 pm	
All other times	

- (a) Given that the route from Changi Airport to Mr Schneider's home is 13.5 km in distance, calculate the fare he has to pay when he takes the taxi on Friday at 3 pm. [3]

Mr Schneider's family will be visiting him in Singapore.

There will be five adults and three children arriving at 3.45 am on a Friday.

Mr Schneider is considering the following options for his family's choice of transport.

The table below shows the seating capacity of the 4-seater taxis and 7-seater MaxiCabs.

4-Seater Taxi		
		
7-Seater MaxiCab		
		
* Three children passengers are equivalent to two adult passengers.		

The table below shows the fares and surcharges for MaxiCabs.

MaxiCab Meet and Greet by Driver	
Arrival from Changi Airport to destination	\$ 60.00
Every en-route stop	\$ 20.00
<u>Late night surcharge</u> Midnight – 5.59 am	\$ 12.00
<u>Extra passenger</u> For more than 4 adult passengers or equivalent	\$ 3.00 per passenger
* Three children passengers are equivalent to two adult passengers.	

- (b) Calculate the total cost for Mr Schneider's family if they take a MaxiCab from Changi Airport to his home. [2]
- (c) Would it be cheaper for Mr Schneider's family to take two taxis instead? Show your working to support your answer. [3]
-

10

Section B (8 marks)

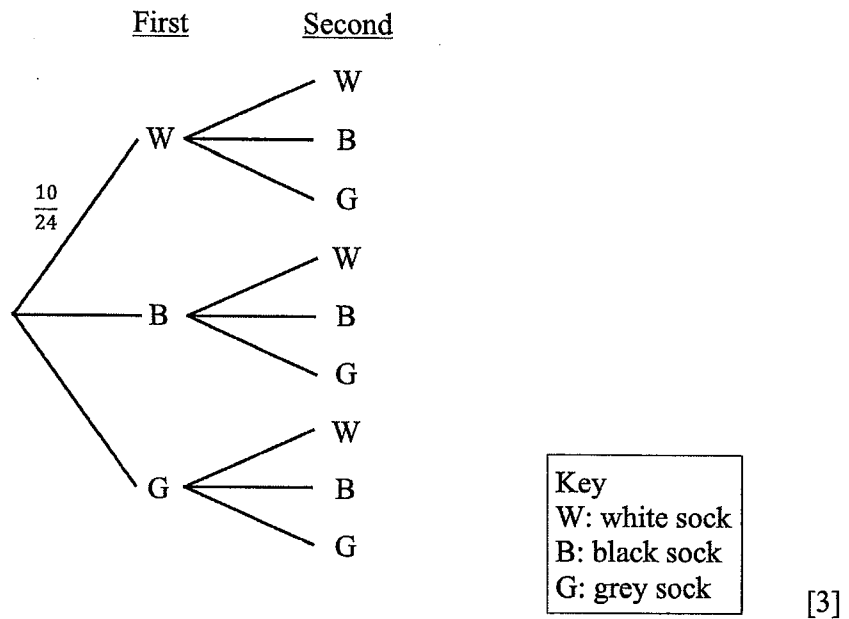
Answer **one** question from this section. Each question carries 8 marks.

- 12** Jared's sock drawer contains 5 pairs of white socks, 4 pairs of black socks and 3 pairs of grey socks.

His socks are not sorted out in matching pairs as Jared is an untidy person.

He takes out two socks at random, without replacement.

- (a)** Copy and complete the tree diagram below to show this information.

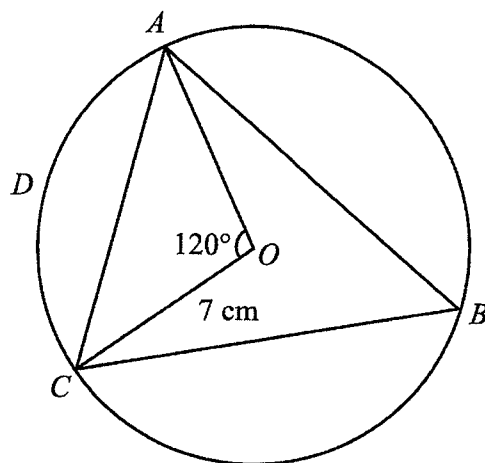


- (b)** Find, in its simplest form, the probability that

- | | |
|---|-----|
| (i) two white socks are taken, | [2] |
| (ii) both socks taken are of the same colour, | [2] |
| (iii) both socks taken are mismatched. | [1] |

11

- 13 In the diagram below, the radius of the circle, centre O , is 7 cm.
Angle $AOC = 120^\circ$.



- (a) Find angle ABC . [1]
(b) Show that $120^\circ = 2.094$ radians, correct to 3 decimal places. [1]
(c) Calculate the length of the chord AC . [2]
(d) Calculate
(i) the area of the **minor** sector AOC , [2]
(ii) the area of the segment ADC . [2]

END OF PAPER

No.	Working		Remarks
1	(a)	$64 = 2^6$ [B1]	
	(b)	$4 \times 64^n = 1$ $2^2 \times 2^{6n} = 2^0$ [M1] $2 + 6n = 0$ $n = -\frac{1}{3}$ [A1] <u>Alternatively</u> $4^1 \times 4^{3n} = 4^0$ [M1] $1 + 3n = 0$ $n = -\frac{1}{3}$ [A1]	

[Total : 3m]

2	(a)	The least possible population = 284 500 [B1]	
	(b)	The greatest possible population = 285 499 [B1]	

[Total : 2m]

3	(a)	34 billion = 3.4×10^{10} [B1]	
	(b)	500 sheets — 4.8 cm 500 sheets — 48 mm [M1] 1 sheet — $48 \div 500$ = 0.096 mm [A1]	

[Total : 3m]

4	6:50 am $\rightarrow$ 7.15 am Total time = 25 mins [M1] Distance = $45 \text{ km/h} \times \frac{25}{60} \text{ h}$ = 18.75 km [A1]		
---	--	--	--

[Total : 2m]

5	$\frac{1}{2} \left(\frac{2}{3} + \frac{5}{7} \right)$ [M1] = $\frac{29}{42}$ [A1]		
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[Total : 2m]

Bedok View Secondary School**2018 Sec 4NA Prelim P1 Marking Scheme**

6	(a)	3 cm : 6 m 1 cm : 2 m [M1] 1 cm : 200 cm 1 : 200 [A1]	
	(b)	1 cm : 2 m 1 cm ² : 4 m ² [M1] 16.5 cm ² : 66 m ² [A1]	

[Total : 4m]

7	15 km/h = $\frac{15000}{3600}$ [M1] = 4.17 m/s (3 s.f.) [A1]	
----------	---	--

[Total : 2m]

8	Unit price for small = \$13.95 ÷ 1.47 ℓ = \$9.489 /ℓ [M1] Unit price for small = \$35.50 ÷ 4.43 ℓ = \$8.013 /ℓ [M1] The large size gives the better value. [A1]	Accept alternative methods.
----------	---	-----------------------------------

[Total : 3m]

9	Price before 5% discount = 969 ÷ 0.95 = \$1020 [M1] Original price (before 15% discount) = 1020 ÷ 0.85 = \$1200 [A1]	
----------	---	--

[Total : 2m]

10	S\$1 — 23.88 baht S\$600 — 14 328 baht [M1] Remaining amount after the trip = 14 328 – 11 580 = 2748 baht [M1] S\$1 — 24 baht S\$ $\frac{1}{24}$ — 1 baht S\$114.50 — 2748 baht [A1]	
-----------	--	--

[Total : 3m]

11	$\frac{4x+1}{3} - \frac{x}{4} = \frac{4(4x+1) - 3x}{12} \quad [\text{M1}]$ $= \frac{16x+4-3x}{12}$ $= \frac{13x+4}{12} \quad [\text{A1}]$	
----	---	--

[Total : 2m]

12	(a)	(i) $6n - 3$ [B1] (ii) $6(100) - 3 = 597$ [B1]	
	(b)	Suppose 283 is part of the sequence, then $6n - 3 = 283$ $6n = 286$ $n = 47.7$ [B1] But n is not a whole number. Hence 283 is not part of the sequence. [B1]	

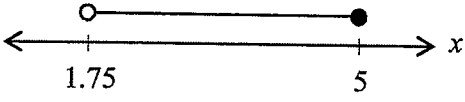
[Total : 4m]

13	$(x-6)(2x+3) = 0$ $(x-6) = 0$ or $(2x+3) = 0$ $x = 6$ [A1] $x = -1.5$ [A1]	
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[Total : 2m]

14	(a)	$s = kt^2$ $27 = 81k$ [M1] $k = \frac{1}{3}$ $s = \frac{1}{3}t^2$ [A1]	
	(b)	When $s = \frac{1}{12}$, $\frac{1}{12} = \frac{1}{3}t^2$ $t^2 = \frac{1}{4}$ [M1] $t = \frac{1}{2}$ [A1]	

[Total : 4m]

15	(a) $4x > 7$ $x > 1.75$  [M1] All possible values of $x = 2, 3, 4, 5$ [A1]	
	(b) $5a - 13 = 9 + 2a$ $5a - 2a = 9 + 13$ [M1] $3a = 22$ $a = 7\frac{1}{3}$ [A1]	

[Total : 4m]

16	(a) $x^2 - 4x + 7$ $= x^2 - 4x + (-\frac{4}{2})^2 - (-\frac{4}{2})^2 + 7$ [M1] $= (x - 2)^2 + 3$ $m = -2, n = 3$ [A1]	
	(b) $x^2 - 4x + 7 = 5$ $(x - 2)^2 + 3 = 5$ $(x - 2)^2 = 2$ [M1] $x - 2 = \pm\sqrt{2}$ $x = \pm\sqrt{2} + 2$ $x = 3.41 \text{ or } 0.586 \text{ (3 s.f.)}$ [A1] <u>Alternatively</u> $x^2 - 4x + 7 = 5$ $x^2 - 4x + 2 = 0$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(2)}}{2(1)}$ [M1] $= \frac{4 \pm \sqrt{8}}{2}$ $= 3.41 \text{ or } 0.586 \text{ (3 s.f.)}$ [A1]	

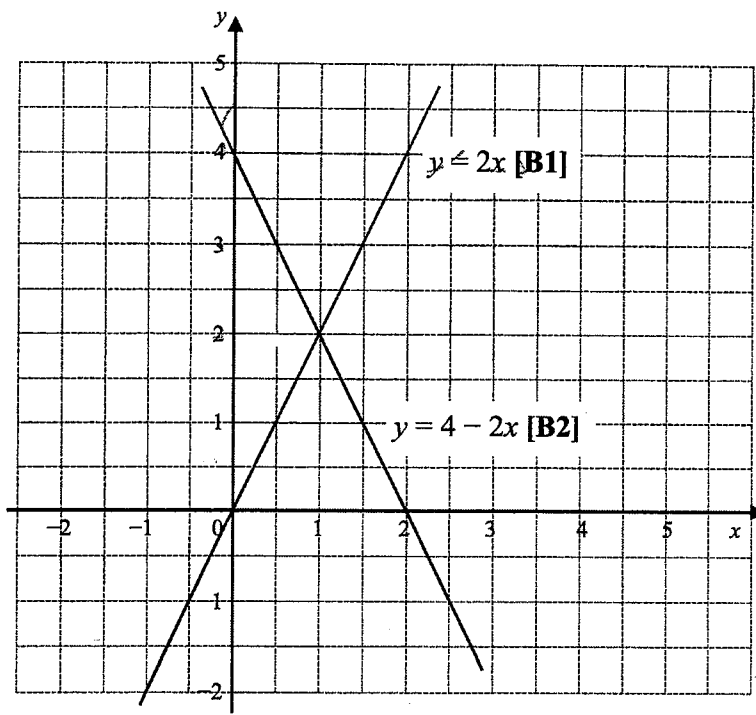
[Total : 4m]

17	(a)	Perimeter of the minor sector POR $= 5 + 5 + \frac{160}{360} \times 2\pi \times 5$ $= (10 + \frac{40}{9}\pi) \text{ cm}$ [B1]	Accept $(10 + 4\frac{4}{9}\pi) \text{ cm}$
	(b)	Area of major sector POR $= \frac{200}{360} \times \pi \times 5^2$ [M1] $= 13\frac{8}{9}\pi \text{ cm}^2$ [A1]	Accept $\frac{125}{9}\pi \text{ cm}^2$

[Total : 3m]

18	The claim is misleading due to the intervals on the vertical axis. [B1] The number of subscribers has only increased by a third (33.3%). [B1]	
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[Total : 2m]

19	(a)	 <table><tr><th colspan="5">$y = 2x$</th></tr><tr><td>x</td><td>0</td><td>1</td><td>2</td><td></td></tr><tr><td>y</td><td>0</td><td>2</td><td>4</td><td></td></tr></table> <table><tr><th colspan="5">$y = 4 - 2x$</th></tr><tr><td>x</td><td>0</td><td>1</td><td>2</td><td></td></tr><tr><td>y</td><td>4</td><td>2</td><td>0</td><td></td></tr></table>	$y = 2x$					x	0	1	2		y	0	2	4		$y = 4 - 2x$					x	0	1	2		y	4	2	0		
$y = 2x$																																	
x	0	1	2																														
y	0	2	4																														
$y = 4 - 2x$																																	
x	0	1	2																														
y	4	2	0																														
	(b)	$x = 1, y = 2$ [B1]																															

[Total : 4m]

20	For a regular 12-sided polygon, Exterior angle = $360 \div 12 = 30^\circ$ [M1] Interior angle = $180 - 30 = 150^\circ$ [A1] <u>Alternatively</u> For a regular 12-sided polygon, Sum of interior angles = $(12 - 2) \times 180 = 1800^\circ$ [M1] Interior angle = $1800 \div 12 = 150^\circ$ [A1]	
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[Total : 2m]

21	(a) Exterior angle of pentagon = $360 \div 5 = 72^\circ$ [M1] Angle $ABC = 180 - 72 = 108^\circ$ [A1] <u>Alternatively</u> Sum of interior angles in pentagon = $(5 - 2) \times 180 = 540^\circ$ [M1] Angle $ABC = 540 \div 5 = 108^\circ$ [A1]	
	(b) Angle $ACB = (180 - 108) \div 2$ $= 36^\circ$ (Base angle of isosceles triangle) [M1] Angle $ACD = \text{Angle } BCD - \text{angle } ACB$ $= 108 - 36$ $= 72^\circ$ [A1] <u>Alternatively</u> Angle $CAD = 108 \div 3 = 36^\circ$ [M1] Angle $ACD = (180 - 36) \div 2$ $= 72^\circ$ (Base angle of isosceles triangle) [A1]	

[Total : 4m]

22	Construction lines must be visible.	
(b)	Angle $BAD = 78^\circ$ [B1]	Accept $77 - 78^\circ$

[Total : 4m]

23	(a)	(i) Mode = 0 day(s) [B1] (ii) Median = 0.5 day(s) [B1]	
	(b)	Mean = $[16(0) + 5(1) + 7(2) + 2(3) + 1(4) + 1(5)] \div 32$ [M1] $= 34 \div 32$ $= 1.0625$ day(s) [A1]	Award [B2] if no working.
	(c)	$P(\text{more than 2 days}) = \frac{4}{32} = \frac{1}{8}$ [B1]	

[Total : 5m]

24	(a)	$\tan \angle BCD = \frac{8.5}{13}$ [M1] $\angle BCD = \tan^{-1} \frac{8.5}{13}$ $= 33.2^\circ$ (1 d.p.) [A1]	
	(b)	$\sin 46^\circ = \frac{8.5}{AB}$ [M1] $AB = \frac{8.5}{\sin 46^\circ}$ $= 11.8$ cm (3 s.f.) [A1]	

[Total : 4m]

25	(a)	(i) $PS = \frac{44}{x}$ [B1] (ii) Perimeter $= 2\left(\frac{44}{x} + x\right)$ $= \frac{88}{x} + 2x$ [B1]	
	(b)	$\frac{88}{x} + 2x = 27$ $\frac{88 + 2x^2}{x} = 27$ [M1] $88 + 2x^2 = 27x$ $2x^2 - 27x + 88 = 0$ (shown) [A1]	Deduct P if no "shown".
	(c)	$2x^2 - 27x + 88 = 0$ $(2x - 11)(x - 8) = 0$ [M1] $x = 8$ or 5.5 [A1]	

[Total : 6m]

Bedok View Secondary School**2018 Sec 4NA Prelim P2 Marking Scheme**

No.	Working		Remarks
1	(a)	$1.32 \text{ billion} - 312 \text{ million}$ $= 1.32 \times 10^9 - 312 \times 10^6$ [M1] $= 1\,008\,000\,000$ $= 1.008 \times 10^9$ [A1]	
	(b)	Average population per km^2 $= (312 \times 10^6) \div (9.83 \times 10^6)$ $= 32 \text{ people per km}^2$ (nearest whole number) [B1]	
	(c)	Population in Singapore : population in India $5.61 \times 10^6 : 1.32 \times 10^9$ $17 : 4000$ [B1]	

[Total : 4m]

2	(a)	$x = 2^3 \times 3^6$ $\sqrt[3]{x} = \sqrt[3]{2^3 \times 3^6}$ $= 2 \times 3^2$ $= 18$ [B1]	
	(b)	$\text{LCM}(x, y, z) = 2^3 \times 3^6 \times 5 \times 7$ [B1]	
	(c)	$\text{HCF}(x, y, z) = 2 \times 3 = 6$ [B1]	

[Total : 3m]

3	(a)	(i) Area of triangle $PQR = \frac{1}{2} \times QR \times h$ [B1] (ii) Area of triangle $PQS = \frac{1}{2} \times QS \times h$ [B1]	
	(b)	$\frac{\text{Area of triangle } PQR}{\text{Area of triangle } PQS} \times 100 = \frac{\frac{1}{2} \times QR \times h}{\frac{1}{2} \times QS \times h} \times 100$ [M1] $= \frac{5}{5+2} \times 100$ $= 71.4\%$ (3 s.f.) [A1]	

[Total : 4m]

4	(a)	$\begin{array}{r l} 2x & -1 \\ x & -3 \\ \hline 2x^2 & +3 \end{array} \begin{array}{l} -x \\ -6x \\ -7x \end{array} \quad [\text{M1}]$ $2x^2 - 7x + 3$ $= (2x - 1)(x - 3) \quad [\text{A1}]$	
	(b)	$\frac{2x^2 - 7x + 3}{x^2 - 9} = \frac{(2x - 1)(x - 3)}{(x + 3)(x - 3)} \quad [\text{M1}]$ $= \frac{2x - 1}{x + 3} \quad [\text{A1}]$	

[Total : 4m]

5	(a)	$2x - 18 = 5y - 8$ (Base angles) $2x - 5y = 10$ [B1] $x + 41 + 2x - 18 + 5y - 8 = 180$ (Sum of angles) $3x + 5y = 165$ [B1]	
	(b)	$2x - 5y = 10$ — (1) $3x + 5y = 165$ — (2) (1) + (2): $5x = 175$ $x = 35$ [M1] Substitute $x = 35$ into (1): $2(35) - 5y = 10$ $70 - 5y = 10$ $5y = 60$ $y = 12$ [M1] Hence angle $XYZ = 2(35) - 18 = 52^\circ$ angle $XZY = 5(12) - 8 = 52^\circ$ angle $YXZ = 35 + 41 = 76^\circ$ [A1]	

[Total : 5m]

6	Total surface area of the toy = Top + curve of cylinder + top ring of hemisphere + curve of hemisphere $= (\pi \times 3^2) + (2\pi \times 3 \times 6) + (\pi \times 5^2 - \pi \times 3^2) + \left(\frac{1}{2} \times 4\pi \times 5^2\right)$ [M2] $= 36\pi + 25\pi + 50\pi$ $= 111\pi$ $= 348.716\dots$ $= 349 \text{ cm}^2$ (3 s.f.) [A1]		
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[Total : 3m]

Bedok View Secondary School**2018 Sec 4NA Prelim P2 Marking Scheme**

7	(a)	(i) Range = $40 - 13 = 27$ marks [B1] (ii) Median = $\frac{23+26}{2}$ [M1] = 24.5 marks [A1]	
	(b)	Sheryl got 11 marks. [B1]	

[Total : 4m]

8	(a)	(i) Mean = 78.7 years (3 s.f.) [B1] (ii) Standard deviation = 11.4 years (3 s.f.) [B1]	
	(b)	The data is grouped. [B1] So the exact age of all the 30 residents are not known. [B1] Hence Arun's claim may not be true. <u>Alternatively</u> Arun's claim will be true only if the oldest and the youngest residents are 100 and 50 years old respectively. [B1] We cannot tell if this is the case because the data is grouped. [B1]	

[Total : 4m]

9	(a)	The coordinates for the two possible positions of T are (4, 4) and [B1] (2, -6). [B1]	
	(b)	(i) Gradient of $AB = \frac{4-(-1)}{-3-(-4)}$ [M1] = 5 [A1] (ii) $y = 5x + c$ At $(-3, 4)$, $4 = 5(-3) + c$ [M1] $c = 19$ Hence the equation of the line AB is $y = 5x + 19$. [A1] <u>Alternatively</u> $y = 5x + c$ At $(-4, -1)$, $-1 = 5(-4) + c$ [M1] $c = 19$ Hence the equation of the line AB is $y = 5x + 19$. [A1]	

[Total : 6m]

10	(a)	$p = 8.75$ [B1]	
	(b)	Plotted points are correct. [B1] Smooth curve cuts through all the points. [B1] Scales on both axes are correct. [B1] (a) $p = 8.75$ (c) (i) When $y = 6$, $x = 1.3$ or 4.7 (ii) Minimum value of $y = 4.9$	Deduct P mark if axes or graph is not labelled.
	(c)	(i) When $y = 6$, $x = 1.3 (\pm 0.5)$ [B1] or $4.7 (\pm 0.5)$ [B1] (ii) Minimum value of $y = 4.9 (\pm 0.5)$ [B1]	Actual x $= 1.267$ or 4.732. Actual y $= 4.899$.

[Total : 6m]

11	(a)	Calculation of taxi fare: \$ 3.70 First 1 km (Flag Down) \$ 4.95 Next 9 km at \$ 0.22 per 400 m [M1] \$ 2.20 Remaining 3.5 km at \$ 0.22 per 350 m [M1] \$ 3.00 Changi Airport surcharge \$ 13.85 Total [A1]	
	(b)	Calculation of MaxiCab fare: \$ 60.00 Changi Airport to destination \$ 12.00 Late night surcharge \$ 9.00 Extra passengers (1 adult & 3 children) [M1] \$ 81.00 Total [A1]	
	(c)	Calculation of taxi fare (for one taxi): \$ 3.70 First 1 km (Flag Down) \$ 4.95 Next 9 km at \$ 0.22 per 400 m \$ 2.20 Remaining 3.5 km at \$ 0.22 per 350 m \$ 10.85 Total metered fare \$ 5.43 Late night surcharge (50% of metered fare) \$ 3.00 Changi Airport surcharge \$ 19.28 Total fare for one taxi [M1] Total fare for two taxis = $2 \times 19.28 = \\$ 38.56$ [M1] Yes, it will be cheaper for Mr Schneider's family to take two taxis instead of the MaxiCab. [A1]	

[Total : 8m]

12	(a)	<u>First</u> <u>Second</u> [B1] for each box	
(b)		(i) $P(WW) = \frac{10}{24} \times \frac{9}{23}$ [M1] $= \frac{15}{92}$ [A1] (ii) $P(WW) + P(BB) + P(GG)$ $= \frac{10}{24} \times \frac{9}{23} + \frac{8}{24} \times \frac{7}{23} + \frac{6}{24} \times \frac{5}{23}$ [M1] $= \frac{22}{69}$ [A1] (iii) $P(\text{mismatched}) = 1 - \frac{22}{69} = \frac{47}{69}$ [B1]	

[Total : 8m]

13	(a)	Angle ABC $= 60^\circ$ (angle at centre is twice the angle at circumference) [B1]	Deduct P if no reason.
	(b)	$180^\circ = \pi$ radians $120^\circ = \frac{120}{180} \pi$ $= 2.094$ radians (3 d.p.) (Shown) [B1]	
	(c)	$AC^2 = 7^2 + 7^2 - 2(7)(7)\cos 120^\circ$ [M1] $AC^2 = 147$ $AC = 12.1243...$ $AC = 12.1$ cm (3 s.f.) [A1]	
	(d)	(i) Area of minor sector AOC $= \frac{120}{360} \times \pi \times 7^2$ or $\frac{1}{2} \times 7^2 \times 2.094$ [M1] $= 51.3126...$ or 51.303 $= 51.3$ cm ² (3 s.f.) [A1] (ii) Area of triangle $AOC = \frac{1}{2} \times 7^2 \times \sin 120^\circ$ $= 21.2176...$ [M1] Area of the segment ADC $= 51.3126 - 21.2176$ or $51.303 - 21.2176$ $= 30.095$ or 30.0854 $= 30.1$ cm ² (3 s.f.) [A1]	

[Total : 8m]