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Answer all questions.

- 1 Jack spends $\frac{4}{15}$ of his earnings on food and saves 20% of his earnings.
Write the ratio savings : food in its simplest form.

Answer [2]

- 2 Estimate the percentage of the figure below that is shaded.



Answer % [1]

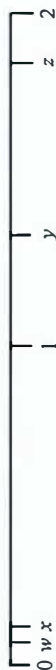
- 3 Evaluate $\frac{-52.5^2 - \sqrt[3]{0.09}}{60^3 + 4 \times \frac{9}{8}}$, giving your answers to

- (a) 2 significant figures,
(b) 4 decimal places.

Answer (a) [1]
(b) [1]

- 4 The four numbers below are represented on a number line as shown.

$$1.8, 18\%, \frac{1}{18}, 1.8\bar{2}$$



Find the values of w , x , y and z .

Answer $w =$
 $x =$
 $y =$
 $z =$ [2]

- 5 Given $315 = 3^2 \times 5 \times 7$ and $882 = 2 \times 3^2 \times 7^2$, find

- (a) q ,
(b) the highest common factor of 315 and 882, giving your answer in index notation,
(c) the smallest integer k such that $882k$ is a perfect cube.

Answer (a) $q =$ [1]
(b) [1]
(c) $k =$ [1]

- 6 A huge piece of cheddar cheese weighs 18.35 kg. Small pieces of cheese, weighing 200 g each, are cut from it.
- (a) How many small pieces of cheese of 200 g each can be obtained?
- (b) Find the weight, in grams, of the remaining amount of cheese.

Answer (a) [2]

(b) g [1]

- 7 An area of 6 cm^2 on a map represents an actual area of 216 km^2 . Find
- (a) the scale of the map in the form of $1 : n$,
- (b) the actual distance, in kilometres, represented by 3.8 cm on the map.

Answer (a) [2]

(b) km [1]

- 8 Factorise the following expressions completely

- (a) $9f^2 - 1$,
- (b) $np^2 - 1 - p^2 + n$.

Answer (a) [1]

(b) [2]

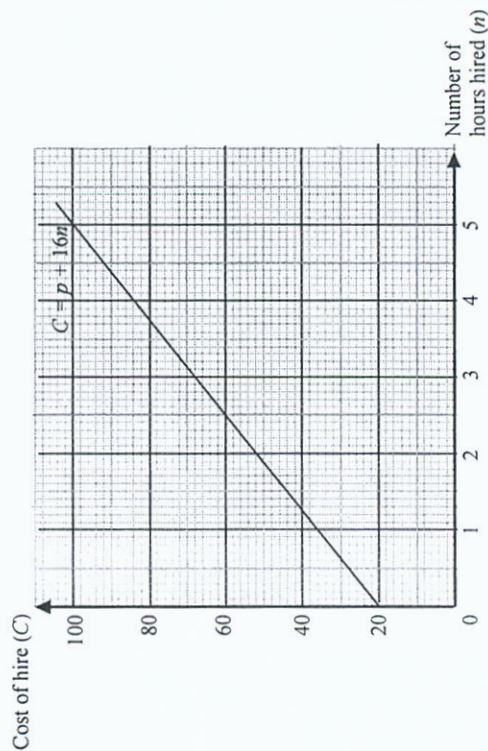
- 9 (a) Solve $\frac{1}{5-h} = -2$.
- (b) Solve $2m^2 - 5m = 3$ by factorisation.

Answer (a) $h =$ [2]

(b) $m =$ or [3]

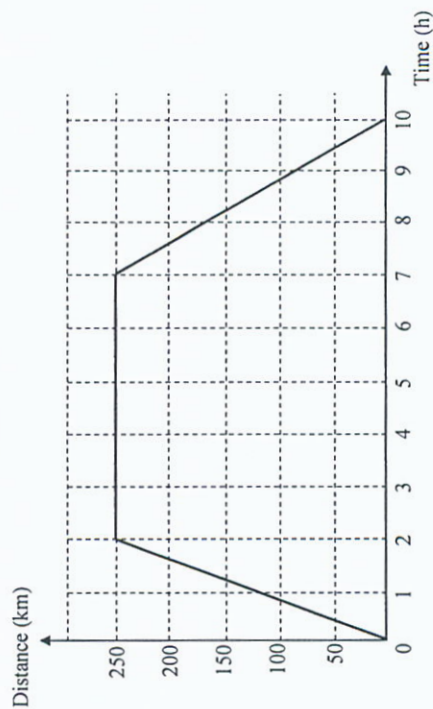
- 13 The graph below shows the charges by a company for hiring an auto mechanic.

- (a) Mr. Heng paid \$60 for hiring an auto mechanic from this company.
How many hours did he hire him for?
- (b) The relationship between the cost of hire (C) and the number of hours hired (n) is represented by the equation $C = p + 16n$.
With help from the graph below,
(i) find the value of p ,
(ii) state what does the value '16' in the equation $C = p + 16n$ represents.



- Answer (a) h [1]
- (b)(i) $p =$ [1]
- (b)(ii) [1]
-

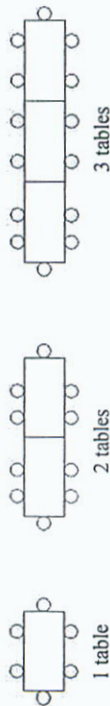
- 14 Rina drove from Singapore to Malacca for a business conference and then back to Singapore. The distance-time graph of her journey is as shown below.



- (a) Find the distance that Rina drove from Singapore to Malacca.
- (b) Find the speed, in km/h, during her return journey.
- (c) Rina left Singapore at 0830. What time did she return back to Singapore?
Leave your answer in the 24 hour format.

- Answer (a) km [1]
- (b) km/h [2]
- (c) [1]

- 15 A canteen table can seat 6 students. When placed together in a single row, the canteen tables can seat pupils as shown below.



The number of pupils that can be seated and the number of tables placed together form a pattern. It is tabulated in the table below.

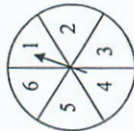
No. of table(s)	1	2	3	...	8
No. of pupils	6	10	14	...	?

- (a) How many pupils can be seated when 8 canteen tables are joined together?
 (b) Write down an expression, in terms of n , for the number of pupils that can be seated at n tables.
 (c) State, explaining your reason clearly, if it is possible to seat 721 pupils completely with no empty seat at the tables.

Answer (a) [1]
 (b) [1]
 (c) [2]

- 16 The diagram shows a spinner numbered 1 to 6. The pointer is spun twice. The result is recorded only if both values are odd numbers. Otherwise, the pointer is re-spun.

The process is repeated until all odd pairs are obtained. The sum of both numbers is then computed.



- (a) Complete the list of all the possible outcomes in the space below.

First value	Second value	Sum
1	1	2
1	3	4

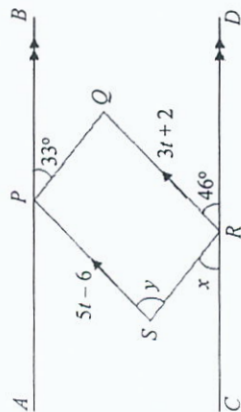
- (b) Find the probability that the sum of both values is
 (i) a multiple of 4,
 (ii) a prime number.

Answer (a) In the space above [2]
 (b)(i) [1]
 (b)(ii) [1]

13

- 17 In the diagram below, $PQRS$ is a parallelogram and APB is parallel to CRD .
 $SP = (5t - 6)$ cm, $RQ = (3t + 2)$ cm, $\angle BPQ = 33^\circ$ and $\angle QRD = 46^\circ$, find

- (a) the value of t ,
 (b) angle y ,
 (c) angle x .



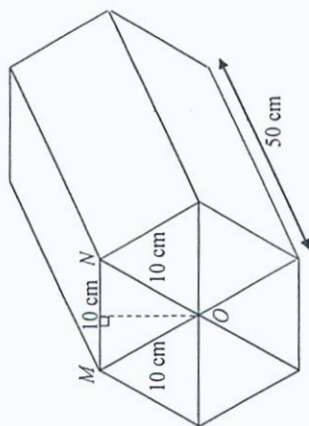
Answer (a) $t = \dots\dots\dots$ cm [2]
 (b) $y = \dots\dots\dots^\circ$ [2]
 (c) $x = \dots\dots\dots^\circ$ [2]

4NA Math 2015 Prelim

[Turn Over]

14

- 18 The figure below shows a solid hexagonal prism. The cross section of the prism is a regular hexagon made up of six equilateral triangles, with sides of length 10 cm. The length of the prism is 50 cm.



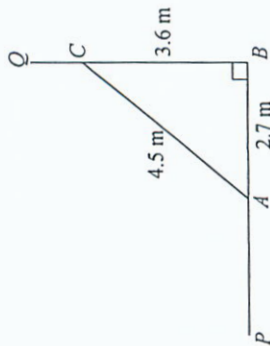
Calculate

- (a) the area of triangle MNO ,
 (b) the volume of the solid hexagonal prism, giving your answer to the nearest thousand cubic centimetre.

Answer (a) $\dots\dots\dots$ cm² [2]
 (b) $\dots\dots\dots$ cm³ [2]

4NA Math 2015 Prelim

- 20 A ladder AC , of length 4.5 m, is placed against a wall QB and on a flat ground PB . The foot of the ladder at point A is 2.7 m away from the base, B , of the wall. The top of the ladder at point C is 3.6 m vertically above B .



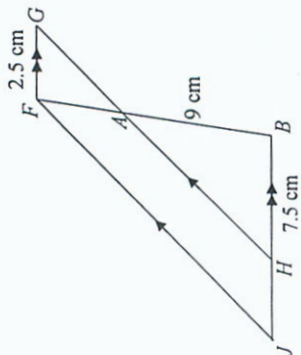
(a) Express, as a fraction in its simplest form,

- (i) $\sin \angle BAC$,
(ii) $\cos \angle CAP$.

- (b) If the ladder AC slides vertically down by 1.2 m, how far is the foot of the ladder from point B now?
Give your answer correct to the nearest metre.

Answer (a)(i) [1]
(a)(ii) [1]
(b) m [2]

- 19 In the diagram below, $FG \parallel JB$ and $JF \parallel HG$. $FG = 2.5$ cm, $HB = 7.5$ cm and $AB = 9$ cm. Lines FB and HG intersect at A .



- (a) Show that triangles AFG and ABH are similar. State your reasons clearly.
(b) Find the length of AF .
(c) Name another pair of similar triangles in the diagram.

Answer (a) [2]
.....
.....
.....
(b) cm [2]
(c) [1]

- 21 y friends share \$ x among themselves.
Each of them receives \$7 and there is \$4 left.
If there were \$5 more, each would get \$8.
- (a) Write down a pair of simultaneous linear equations connecting x and y .
(b) Hence, find the amount of money shared among them.

- 22 Faris and Firdaus took part in a 21 km half marathon race. Faris ran at an average speed of x km/h. Firdaus' average speed was 5 km/h slower than Faris and he completed the race 30 minutes later.
- (a) Write down, in terms of x , the time taken in hours for Faris to complete the race.
(b) Write down, in terms of x , the time taken in hours for Firdaus to complete the race.
(c) Form an equation in x and show that it reduces to $x^2 - 5x - 210 = 0$.
(d) Hence, solve the equation $x^2 - 5x - 210 = 0$ to find the average speed of Faris.

Answer (a) h [1]
(b) h [1]
(c) In the space above [2]
(d) km/h [2]

End of Paper 1

JYSS Prelim 2015 Paper 1 (4N Mathematics)

No.	Answer	Workings	Marks	*Remarks
1	3 : 4	$\frac{20}{100} : \frac{4}{15}$ $\frac{1}{5} : \frac{4}{15}$ $\Rightarrow 3 : 4$	M1	*M1 awarded if student converts 20% into fraction ($\frac{20}{100}$)
2	37.5%	Estimation: $\frac{3}{8} \times 100\%$ $= 37.5\%$	A1	
3 (a)	-0.013	-0.012762 $= -0.013$ (2 s.f.)	B1	*Accept answers between 30% - 37.5%
(b)	-0.0128	-0.012762 $= -0.0128$ (4 d.p.)	B1	
4	$w = \frac{1}{18}$ $x = 18\%$ $y = 1.8^2$ $z = 1.8$		A2	*1m awarded if at least 2 is correct.
5 (a)	$q = 2$	$882 = 2 \times 3^2 \times 7^2$ so, $q = 2$	B1	
(b)	$3^2 \times 7$	$HCF = 3^2 \times 7$	B1	*0m if student did not leave in index notation.
(c)	84	$k = 2^2 \times 3 \times 7$ $= 84$	B1	
6 (a)	91 pieces	$\frac{18350}{200}$ $= 91.75$ $= 91$ pieces	M1 A1	*M1 awarded if student converts 18.35kg to grams.
(b)	150 g	$18350g - 91 \times 200g$ $= 150g$	B1	
7 (a)	1 : 600 000	$6 \text{ cm}^2 : 216 \text{ km}^2$ $1 \text{ cm}^2 : 36 \text{ km}^2$ $1 \text{ cm} : 6 \text{ km}$ $1 : 600\,000$	M1 A1	
(b)	22.8 km	$1 \text{ cm} : 6 \text{ km}$ $3.8 \text{ cm} : 22.8 \text{ km}$	B1	
8 (a)	$(3f - 1)(3f + 1)$	$9f^2 - 1$ $= (3f - 1)(3f + 1)$	B1	

	(b)	$(p^2 + 1)(n - 1)$	$np^2 - 1 - p^2 + n$ $= np^2 - p^2 + n - 1$ $= p^2(n - 1) + (n - 1)$ $= (p^2 + 1)(n - 1)$	M1 A1	
9	(a)	$h = 5.5$	$\frac{1}{5-h} = -2$ $-10 + 2h = 1$ $2h = 11$ $h = 5.5$	M1 A1	*M1 awarded if student does cross multiplication
	(b)	$m = -0.5$ or $m = 3$	$2m^2 - 5m = 3$ $2m^2 - 5m - 3 = 0$ $(2m + 1)(m - 3) = 0$ $2m + 1 = 0$ or $m - 3 = 0$ $2m = -1$ or $m = 3$ $m = -0.5$ or $m = 3$	M1 A2	*M1 awarded if student manages to factorize correctly
10	(a)	$m = 9$	$\frac{2q^3}{r(r-1)} = 8 - m$ $m = 8 - \frac{2q^3}{r(r-1)}$ $= 8 - \frac{2(-1)^3}{2(2-1)}$ $= 9$	M1 A1	*M1 awarded when student shows correct substitution of $r = 2$ and $q = -1$ into the equation.
	(b)	$q = \sqrt[3]{\frac{r(r-1)(8-m)}{2}}$	$\frac{2q^3}{r(r-1)} = 8 - m$ $2q^3 = r(r-1)(8-m)$ $q^3 = \frac{r(r-1)(8-m)}{2}$ $q = \sqrt[3]{\frac{r(r-1)(8-m)}{2}}$	M1 A1	*M1 awarded when student manages to cross multiply correctly.
11		\$736.84	\$1 = 0.90 Euros \$3000 = 2700 Euros Remaining Euros $= 2700 - 2000$ $= 700$ Euros 700 Euros $= \frac{700}{0.95}$ $= \$736.84$ (2d.p.)	M1 A1	
12	(a)	\$5754.45	$A = P(1 + \frac{i}{100})^n$ $= 60000(1 + \frac{2.2/12}{100})^{30}$ $= \$65754.447$	M1 M1	

		Interest = 65754.447 – 60000 = \$5754.45 (2d.p.)	A1	
	(b)	$R = 4\%$ Interest = 56000 – 50000 $I = \frac{PRT}{100}$ $6000 = \frac{(50000)(R)(3)}{100}$ $R = 4\%$ From graph, When $C = 60$, $n = 2.5$ hours $C = p + 16n$ p : y-intercept of graph $p = 20$	M1 A1	
13	(a)	2.5 hours	B1	
	(b)	$p = 20$	B1	
	(i)	It costs \$16 an hour to hire the auto mechanic from this company.	B1	
14	(a)	250 km	B1	
	(b)	83.3 km/h Speed = rise / run $= \frac{250}{3}$ $= 83.3$ km/h	M1 A1	
	(c)	18 30 (10 hr later)	B1	
15	(a)	34 $14 + 4 + 4 + 4 + 4 + 4$ $= 34$	B1	
	(b)	$4n + 2$ $6 + 4(n - 1)$ $= 6 + 4n - 4$ $= 4n + 2$	B1	
	(c)	If $4n + 2 = 721$, $n = 179.75$ Since n is not an integer (n = number of tables), it is not possible to fit 721 students completely.	M1 A1	
16	(a)	First value Second value Sum 1 1 2 1 3 4 1 5 6 3 1 4 3 3 6 3 5 8 5 1 6 5 3 8 5 5 10	A2	*1m awarded if student gets at least 3 correct pairs. (or any indication that students understood the pattern)

	(b)	$\frac{4}{9}$	$\frac{4}{9}$	B1	*0m awarded if student did not reduce fractions.
	(i)	$\frac{1}{9}$	$\frac{1}{9}$	B1	
17	(a)	$t = 4$ $5t - 6 = 3t + 2$ $2t = 8$ $t = 4$	$\angle y = 33^\circ + 46^\circ$ $= 79^\circ$ $\angle x = 180^\circ - 46^\circ - 101^\circ$ $= 33^\circ$	M1 A1	
	(b)	$\angle y = 79^\circ$	Perpendicular height $= \sqrt{10^2 - 5^2}$ $= \sqrt{75}$ Area of triangle MNO $= \frac{1}{2} \times 10 \times \sqrt{75}$ $= 43.3 \text{ cm}^2$	M1 A1	Or $\frac{1}{2} \times 10 \times 10 \times \sin 60$ $= 43.3$
18	(a)	43.3 cm^2	Volume of prism $= 43.301 \times 6 \times 50$ $= 12\,990.38$ $= 13\,000 \text{ cm}^3$ (nearest thousand)	M1 A1	
19	(a)	$\angle HAB = \angle FAG$ (vertically opposite angles) $\angle AHB = \angle FGA$ (alternate angles, $FG \parallel JB$) $\angle AFG = \angle ABH$ (alternate angles, $FG \parallel JB$) By AA Property, AFG and ABH are similar. (shown)	$AF = 3 \text{ cm}$ $\frac{AF}{AB} = \frac{FG}{BH}$ $\frac{AF}{2.5} = \frac{7.5}{AF}$ $AF = 3 \text{ cm}$	M1 A1	*Any 2 angles will do. (AA Test)
	(b)	Triangles BAH and BFJ or FAG and BFJ	$\sin \angle BAC$ $= \frac{3.6}{4.5}$ $= \frac{4}{5}$	B1	
20	(a)	$\frac{4}{5}$		B1	

	(a) (ii)	$-\frac{3}{5}$	$\cos \angle CAP$ $= -\frac{2.7}{4.5}$ $= -\frac{3}{5}$	B1	
	(b)	4 m	$\sqrt{4.5^2 - 2.4^2}$ ≈ 3.81 $\approx 4 \text{ m (nearest metre)}$	M1	
21	(a)	$7y + 4 = x$ $x + 5 = 8y$	$7y + 4 = x$ $x + 5 = 8y$	A1 B1 B1	
	(b)	\$67	$x = 8y - 5$ $\therefore 7y + 4 = 8y - 5$ $y = 9$ $x = 72 - 5$ $= 67$	M1 A1	
22	(a)	$\frac{21}{x} \text{ h}$	$x \text{ km} - 1 \text{ hour}$ $21 \text{ km} - \frac{21}{x} \text{ h}$	B1	
	(b)	$\frac{21}{x-5} \text{ h}$	$(x-5) \text{ km} - 1 \text{ hour}$ $21 \text{ km} - \frac{21}{x-5} \text{ h}$	B1	
	(c)	(shown)	$\frac{21}{x-5} - \frac{21}{x} = \frac{30}{60}$ $21x - 21x + 105 = \frac{1}{2}$ $\frac{x(x-5)}{2}$ $x^2 - 5x - 210 = 0 \text{ (shown)}$	M1 A1	
	(d)	17.2 km/h	$x = \frac{5 \pm \sqrt{25 - 4(-210)}}{2}$ $= 17.2 \text{ or } -12.2 \text{ (rejected)}$ Speed of Farris = 17.2 km/h	M1 A1	

Section A (44 marks)

Answer all the questions in this section.

- 1 A city of 7.6 billion people consumes 100 million cans of carbonated drinks.
 - (a) Express 7.6 billion in standard form. [1]
 - (b) Calculate the average number of cans consumed per person, giving your answer in standard form. [2]
- 2 (a) By rounding each number to 1 significant figure, estimate the value of $\frac{47.92 \times 8.28}{9.72}$. [1]

Show your working clearly. [2]

- (b) The exact answer to a question is 8.3719. Steven rounds this answer to 2 significant figures. Calculate the difference between Steven's answer and the exact answer as a percentage of the exact answer. [2]

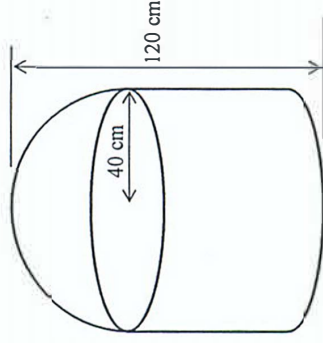
- 3 Mei Ting carried out a survey with a group of 12 students on the number of books they read in the past month.

Number of books	0	1	2	3	4
Number of students	4	1	1	3	3

- (a) Write down the modal number of book(s). [1]
- (b) Find the median number of book(s). [1]
- (c) If these results were represented by a pie chart, calculate the angle for the sector representing 4 books. [2]
- 4 (a) Factorise $2x^2 - 7x + 5$. [2]
- (b) Hence, express $\frac{3}{2x^2 - 7x + 5} + \frac{1}{x - 1}$ as a single fraction in its simplest form. [3]

- 5 (a) It is given that y is inversely proportional to x^2 and x is always positive. If $y = 27$ when $x = 6$, calculate the value of x when $y = 3$. [3]
- (b) A certain number of workers take 7 days to complete a project. If the number of workers is halved, how many days are needed to complete the same project? [2]

6. The diagram shows a water tank, made up of a cylinder and a hemisphere, of radius 40 cm and a height of 120 cm.



- (a) Calculate the total volume of the tank. [3]
- (b) Water is poured into the tank at a rate of 18 litres per minute. Calculate the time taken, to the nearest minute, for the tank to be completely filled. [3]

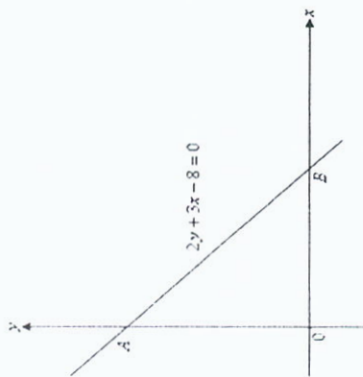
- 7 The table below shows the marks of 100 students who took a test.

Mark (x)	$0 < x \leq 20$	$20 < x \leq 40$	$40 < x \leq 60$	$60 < x \leq 80$	$80 < x \leq 100$
Frequency	31	28	19	14	8

Estimate the

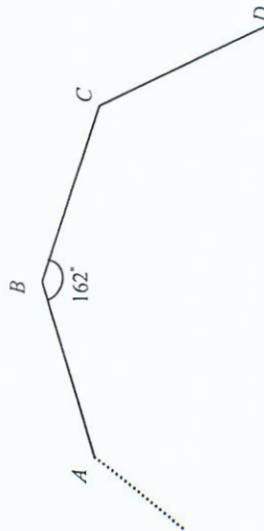
- (a) mean mark, [1]
- (b) standard deviation. [2]

- 8 (a) The diagram shows the line with equation $2y + 3x - 8 = 0$.



- (i) Find the coordinates of A and B . [2]
 (ii) The point $(p, 2)$ lies on this line. Find p . [2]
 (iii) Find the coordinates of the point where the line $x = 1$ intersects with $2y + 3x - 8 = 0$. [2]

- (b) The diagram below shows three sides of a regular polygon. Each interior angle of the polygon is 162° .



- (i) How many sides does the polygon have? [2]
 (ii) Find angle BAC . [2]

- 9 In this question, show all your construction lines. Answer this question on a plain piece of paper.

- (a) Construct an accurate full-size drawing of triangle ABC with sides $AB = 8$ cm, $BC = 6$ cm and $AC = 9$ cm. [2]
 (b) Construct the angle bisector of $\angle ACB$. [1]
 (c) Construct the perpendicular bisector of BC . [1]

Section B (16 marks)

Answer any two questions from this section. Each question carries 8 marks.

- 10 (a) Answer (a) on writing paper.

Sketch the graph of $y = (x+1)(x-5)$.

Do not make an accurate plot but show, on your sketch, the coordinates of the point where the graph cuts the axes and the coordinates of the turning point. [3]

- (b) Answer (b) on a single sheet of graph paper.

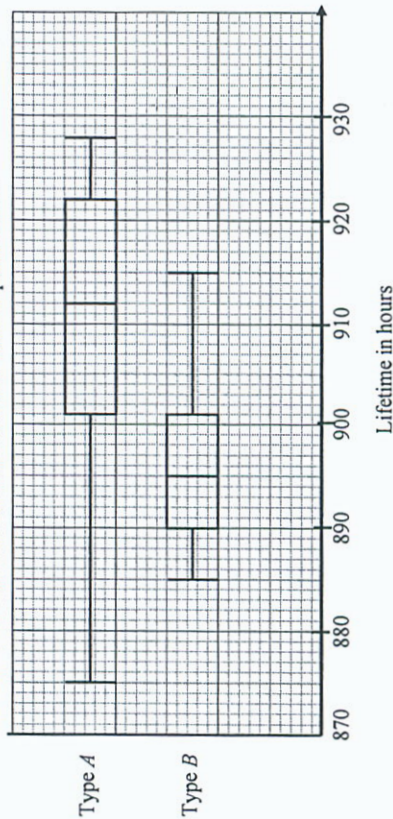
The table below is for $y = x + \frac{1}{x}$.

x	0.25	0.5	1	1.5	2	2.5	3	3.5	4
y	4.25	p	2	2.17	2.5	2.9	3.33	3.79	4.25

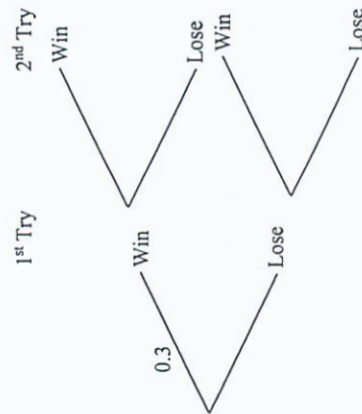
- (i) Calculate the value of p . [1]
- (ii) Draw the graph of $y = x + \frac{1}{x}$ for $0.25 \leq x \leq 4$. [2]
- (iii) By drawing a tangent, find the gradient of the curve $y = x + \frac{1}{x}$ when $x = 2$. [2]

Use a scale of 2 cm to 0.5 unit on both horizontal x -axis and vertical y -axis.

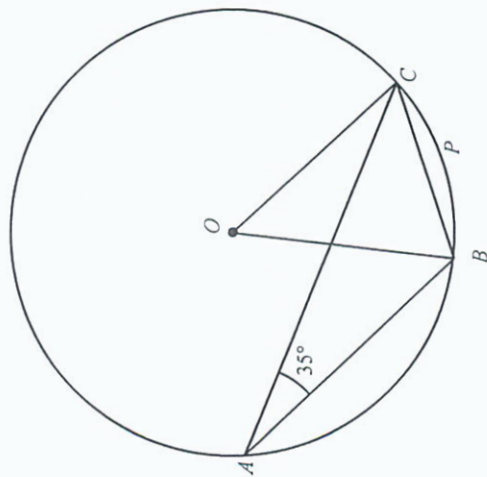
- 11 (a) A survey is carried out on the lifetime in hours of two types of light bulb, A and B. The results are summarised in the box-and-whisker plots below.



- (i) Write down the median lifetime for Type A light bulb. [1]
- (ii) If both light bulbs cost the same, which type of light bulb gives better value for money? Give a reason for your answer. [1]
- (iii) Find the interquartile range for Type A light bulb. [1]
- (iv) Which type of light bulb is more consistent in their lifetime? Give a reason for your answer. [1]
- (b) Mr Tan participated in a lucky draw. The probability that he wins a prize is 0.3. He was awarded two tries.

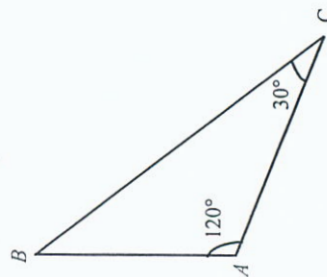


- (i) Copy and complete the tree diagram, showing the probabilities of Mr Tan winning a prize or not in the two tries. [2]
- (ii) Calculate the probability that Mr Tan wins a prize on both tries. [2]



- (a) The radius of the circle, centre O , is 24 cm. Angle $BAC = 35^\circ$.
- Find angle BOC . [1]
 - Show that $35^\circ = 0.6109$ radians, correct to 4 decimal places. [2]
 - Calculate the length of the minor arc BPC . [1]

- (b) A ship sails from Port A at 08 00 towards Port B . Port B is due North of Port A . It sails at an average speed of 10 km/h, reaching Port B at 12 00.



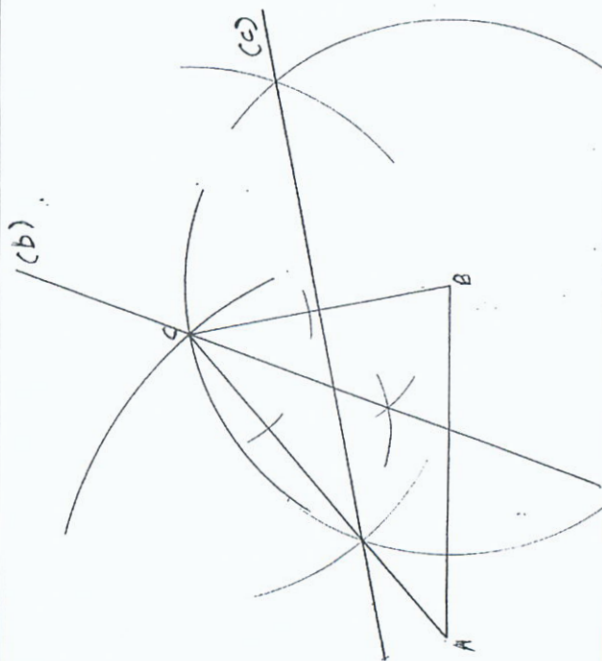
- Show that the distance $AB = 40$ km. [1]
- Calculate the distance BC . [2]
- Calculate the bearing of B from C . [1]

- End of Paper -

1 (a)	7.6 billion = 7.6×10^9	B1
(b)	$(100 \times 10^6) \div (7.6 \times 10^9)$ 1.32×10^{-2}	M1 A1
2 (a)	$\frac{50 \times 8}{10}$ $= 40$	M1 A1
(b)	$\frac{8.4 - 8.3719}{8.3719} \times 100\%$ $= 0.336\%$	M1 A1
3 (a)	Mode = 0 books	B1
(b)	Median = 2.5 books	B1
(c)	$\frac{3}{12} \times 360^\circ = 90^\circ$	M1 A1
4 (a)	$2x^2 - 7x + 5 = (2x - 5)(x - 1)$ $\frac{3}{2x^2 - 7x + 5} + \frac{1}{x - 1} = \frac{3 + (2x - 5)}{(2x - 5)(x - 1)}$ $= \frac{2x - 2}{(2x - 5)(x - 1)}$ $= \frac{2(x - 1)}{(2x - 5)(x - 1)}$ $= \frac{2}{2x - 5}$	M1 M1 A1
5 (a)	$y = \frac{k}{x^2}$ where k is a constant $27 = \frac{k}{6^2}$ $k = 27 \times 6^2$ $= 972$ $\therefore y = \frac{972}{x^2}$ When $y = 3$, $3 = \frac{972}{x^2}$ $x^2 = \frac{972}{3}$ $x^2 = 324$ $x = \sqrt{324}$ $x = 18$	M1 M1 A1 (A1 to be awarded if students reject -18 at the end.)

(b)	Number of workers $7 \div \frac{1}{2}$ $= 7 \times 2$ 14	M1 A1
6 (a)	$\pi(40^2)(120 - 40) + \frac{2}{3}\pi(40^3)$ Volume of tank = 536165.147 $= 536000\text{cm}^3$	M1 M1 A1
(b)	$\frac{536165.147}{18000}$ Time taken = 29.79 $= 30 \text{ min}$	M1 M1 for conversion of litres to cm^3 A1
7 (a)	Mean marks $= \frac{[(10 \times 31) + (30 \times 28) + (50 \times 19) + (70 \times 14) + (90 \times 8)]}{3800 + 100}$ $= 38 \text{ marks}$	B1
(b)	$\sqrt{\frac{\sum fx^2 - \left(\frac{\sum fx}{\sum f}\right)^2}{\sum f}}$ $= \sqrt{\frac{209200}{100} - 38^2}$ $= \sqrt{648}$ $= 25.5 \text{ marks}$	M1 B1
8 (a)(i)	At A, $x = 0$ $2y + 3x - 8 = 0$ $2y = 8$ $y = 4$ A is (0, 4) At B, $y = 0$ $3x = 8$ $x = 2\frac{2}{3}$ B is $(2\frac{2}{3}, 0)$	B1 B1

(a) (ii)	when $y = 2$, $x = p$ $4 + 3p - 8 = 0$ $3p = 4$ $p = 1\frac{1}{3}$	M1 A1	
(a) (iii)	when $x = 1$, $2y + 3 - 8 = 0$ $2y = 5$ $y = 2\frac{1}{2}$ The point is $(1, 2\frac{1}{2})$	M1 A1	
(b) (i)	Exterior angle $= 180^\circ - 162^\circ = 18^\circ$ Number of Sides $= 360^\circ \div 18^\circ = 20$	M1 A1	
(b) (ii)	$\angle BAC = (180^\circ - 162^\circ) \div 2$ $= 9^\circ$ (isos. Δ)	M1 A1	



9 (a)	Construction lines with arcs Accuracy	B1	
(b)	(no marks for no construction lines)	B1	
(c)	(no marks for no construction lines)	B1	
10 (a)	Correct shape Correct x- and y-intercepts Correct min point	B1 B1 B1	
(b) (i)	$p = 2.5$	B1	
(ii)	Correct points smooth curve	B1 B1	
(iii)	Tangent gradient $= 0.75 \pm 0.05$	M1 A1	
11 (a) (i)	912 hours	B1	
(ii)	Type A because median lifetime is greater.	B1	
(iii)	IQR $= 922 - 901$ $= 21$ hours	B1	
(iv)	Type B. Smaller IQR.	B1	

(b)(i)	1st Try 2nd Try	B1 for 1 mistake B2 for all correct answers 0 for 2 or more mistakes
(ii)	$P(\text{win on both tries}) = 0.3 \times 0.3 = 0.09$	M1 A1
12 (a)(i)	$\angle BOC = 70^\circ$ ($\angle$ at centre = $2\angle$ at O^{ac})	B1
(ii)	$180^\circ = \pi$ radians $35^\circ = \frac{35}{180} \pi$ $= 0.61086$ ≈ 0.6109 radians	M1 A1
(iii)	$\text{Arc} = 24(2 \times 0.6109)$ $= 29.3$ cm	B1
(b)(i)	$AB = 10 \times 4$ $= 40$ km	B1
(ii)	$\frac{BC}{\sin 120^\circ} = \frac{40}{\sin 30^\circ}$ $BC = \frac{40}{\sin 30^\circ} \times \sin 120^\circ$ $= 69.3$ km	M1 A1
(iii)	$\text{Bearing} = 120^\circ + 30^\circ$ $= 150^\circ$	B1