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ANGLICAN HIGH SCHOOL
PRELIMINARY EXAMINATION 2020
SECONDARY FOUR



MATHEMATICS
Paper 1

4048/01
Monday 14 September 2020
2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name 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.

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

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π , use either your calculator value or 3.142, unless the question requires the answer in terms of π .

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

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

The total of the marks for this paper is **80**.

For Examiner's Use

Question	1	2	3	4	5	6	7	8	9	10	11	12
Marks												
Question	13	14	15	16	17	18	19	20	21	22	23	
Marks												

Table of Penalties		Question Number(s)	
Presentation	-1		80
Units	-1		
Significant Figures	-1		
			Parent's/ Guardian's Name/ Signature/ Date

This question paper consists of 21 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 Calculate $\frac{1458}{23.4 - 3.699^2}$. Write your answer correct to

(a) 4 decimal places,

Answer [1]

(b) 4 significant figures.

Answer [1]

2 A water tank contains 2.47×10^7 drops of water and 7×10^9 micro-organisms.
Let L be the average number of micro-organisms per drop of water.
Find the value of L . Give your answer in standard form.

Answer [2]

- 3 (a) Of the 195 countries in the world, Ryan has visited 20. What percentage of the countries in the world has Ryan visited?

Answer % [1]

- (b) At a sale, all prices are reduced by 22.5%. The price of a set of waterproof headphones during the sale is \$139.50. Find its original price.

Answer \$ [1]

- 4 Show that $3^{3x+2} - 9^{\frac{3}{2}x} + (27)^{x+1}$ is divisible by 5 for all positive integer values.

Answer

[2]

- 5 (a) The highest common factor and lowest common multiple of three numbers are 12 and 2376 respectively. If two of the numbers are 108 and 72, find the smallest possible integer value of the third number.

Answer [2]

- (b) (i) Express 6468 as a product of its prime factors.

Answer [1]

- (ii) Find the smallest positive integer k , such that $\sqrt{6468k}$ is an integer.

Answer $k =$ [1]

- 6 (a) 6 men take 4 hours to dig a trench 6 m deep. How long will it take 10 men to dig a trench 5 m deep?

Answer hours [2]

- (b) It is given that y varies directly as the square root of x . Given that $y = 24$ for a particular value of x . Find the value of y when x is increased by 300%.

Answer $y =$ [2]

-
- 7 A map has a scale of 1: 30 000. The length of a rectangular park is 8 cm on the map.

- (a) Find the actual length of the park in km.

Answer km [1]

- (b) Given that the park covers an area of 4.5 km^2 . Find the breadth of the park on the map.

Answer cm [2]

- 8 (a) Convert 9 km/h into m/s.

Answer m/s [1]

- (b) A car uses 17.25 litres of fuel to travel a distance of 250 km. Calculate the distance the car can travel with 60 litres of fuel.

Answer km [1]

- 9 Express as a single fraction in its simplest form $\frac{1}{18x^2 - 2} + \frac{2}{3x - 1}$.

Answer [3]

- 10 (a) Factorise $4a^2b + 4a^2 - b - 1$ completely.

Answer [2]

- (b) Given that $f = 3g - 2x^3$, express x in terms of f and g .

Answer [2]

11 (a) Factorise the expression $6x^2 - 7x - 20$.

Answer [1]

(b) Hence, solve the equation $6(y-1)^2 - 7y + 7 = 20$.

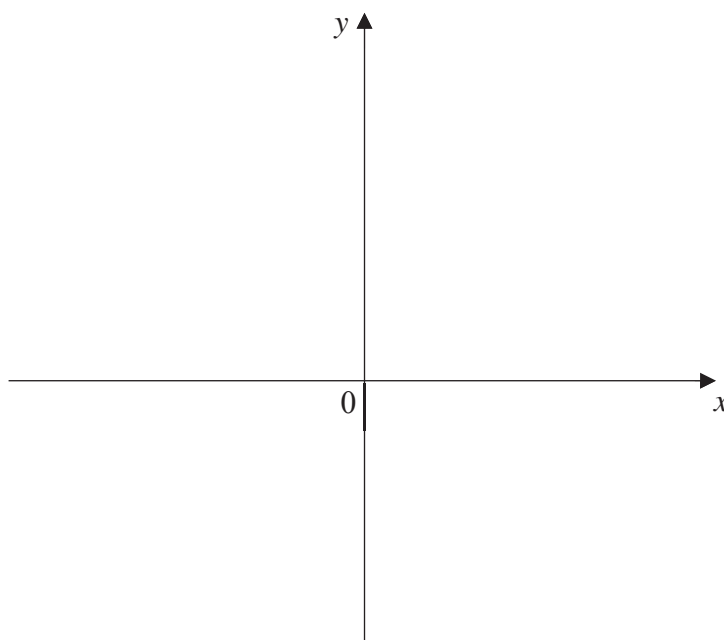
Answer $y = \dots\dots\dots$ or $\dots\dots\dots$ [3]

- 12 (a) (i) Express $y = x^2 + 8x + 16$ in the form $y = (x - h)^2 + k$.

Answer [1]

- (ii) Hence, sketch the graph of $y = x^2 + 8x + 16$ on the axes below. Indicate clearly the coordinates of the points where the graph crosses the axes and the turning point on the curve.

Answer



[2]

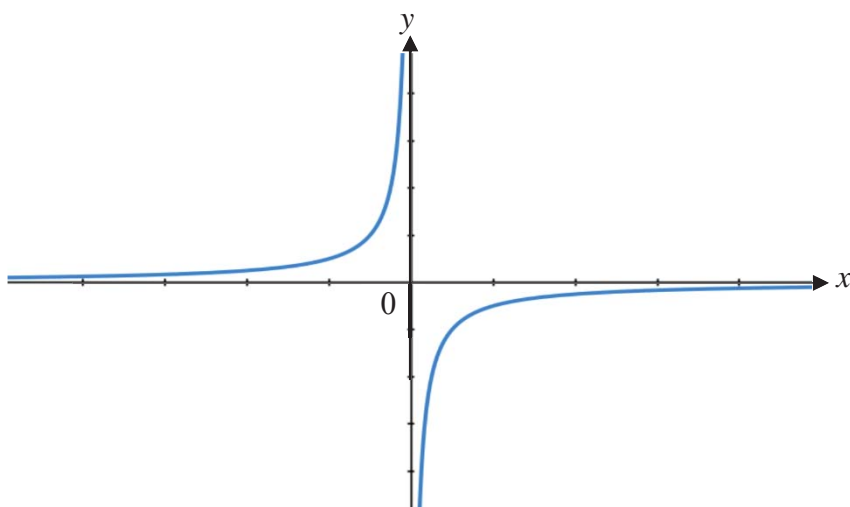
- (b) State the equation of the line of symmetry for $y = x^2 + 4$.

Answer [1]

- (c) State the coordinates of the turning point for $y = (x + 2)^2$.

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

13 (a) The sketch represents the graph of $y = kx^n$.



(i) Write down a possible integer value of n .

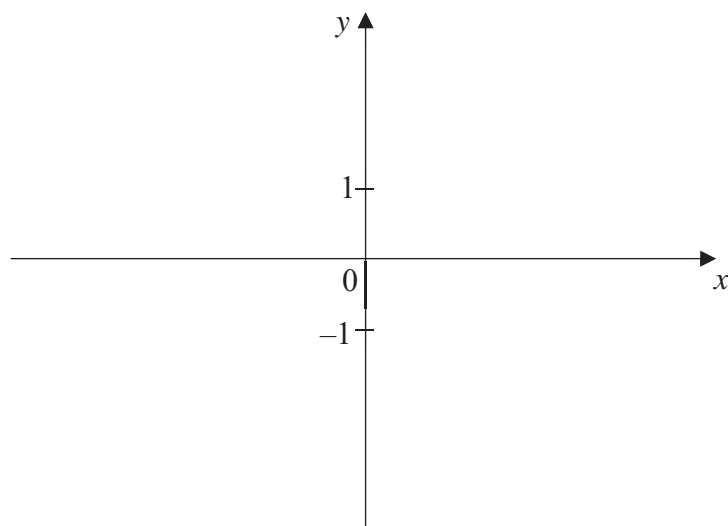
Answer $n = \dots\dots\dots$ [1]

(ii) State the range of values of k .

Answer $\dots\dots\dots$ [1]

(b) Sketch the graph of $y = -2^x$.

Answer



[1]

14 Given the simultaneous equations

$$2x - y = 11,$$

$$5y - 2px + 7 = 0.$$

(a) Show that $x = \frac{24}{5-p}$.

Answer

[2]


(b) State the value of p if there is no solution for the pair of simultaneous equations.

Answer $p = \dots\dots\dots$ [1]

(c) Find the value of y if $p = 1$.

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

- 15 (a) Solve the inequality $\frac{1}{3}(4x-5) \leq 1 - \frac{1}{5}x$, and illustrate your solution on the number line given in the answer space.

Answer  [3]

- (b) Hence, list all possible whole numbers of the solution.

Answer [1]

- 16 An interior angle of a regular n -sided polygon is larger than its exterior angle by 50%. Find n .

Answer $n =$ [2]

17 $\xi = \{x : x \text{ is a positive integer less than } 14\}$

$A = \{x : x \text{ is a composite number}\}$

$B = \left\{x : \frac{x}{3} \text{ is an integer}\right\}$

$C = \{x : x \text{ is a multiple of } 6\}$

(a) List the elements in

(i) A' ,

Answer [1]

(ii) $A' \cap C$.

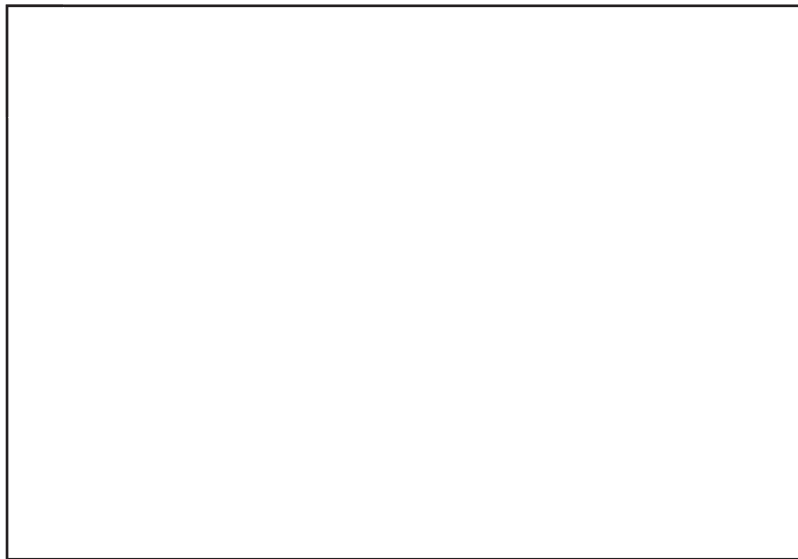
Answer [1]

(b) Draw a Venn diagram to represent the sets A and B .

Label all the elements in $A \cap B$.

Answer

ξ

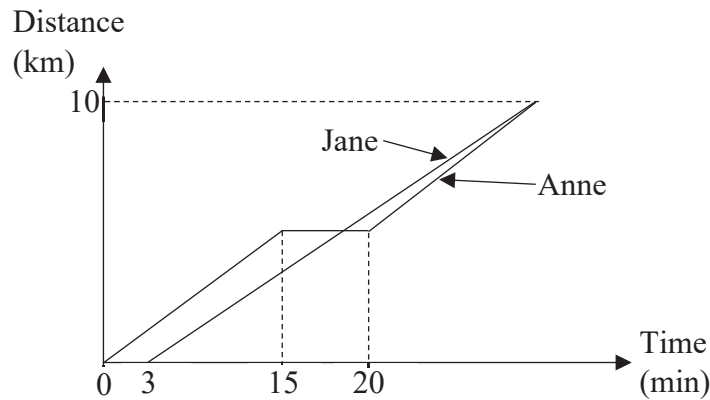


[2]

(c) List all the proper subsets of set C .

Answer [1]

18 The figure below shows the distance-time graph of Anne’s 10 km roller skating journey along East Coast Park.



Anne skates at an average speed of 0.3 km/min for the first 15 min. She takes a 5-min break and continues with an average speed of 0.5 km/min to the end point.

(a) Find the distance travelled by Anne in the first 15 min.

Answer km [1]

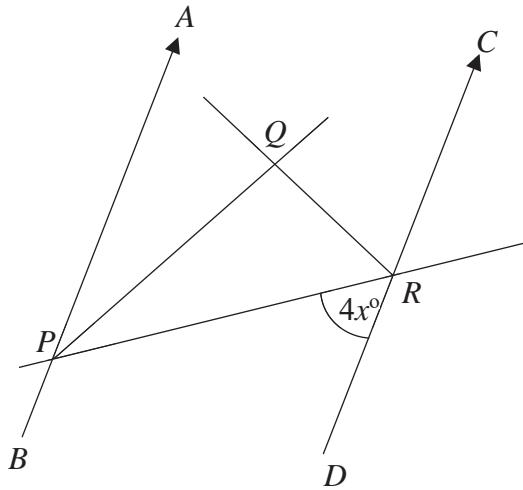
(b) Find the total time taken for Anne to complete the 10 km journey.

Answer minutes [1]

(c) Three minutes later, Jane started to skate behind Anne. Find the average skating speed of Jane for them to complete the journey at the same time. Leave your answer correct to 2 decimal places.

Answer km/min [2]

19 In the figure, AB is parallel to CD . PQ and QR bisect $\angle APR$ and $\angle CRP$ respectively.



Given that $\angle DRP = 4x^\circ$,

(a) express angle QRP in terms of x ,

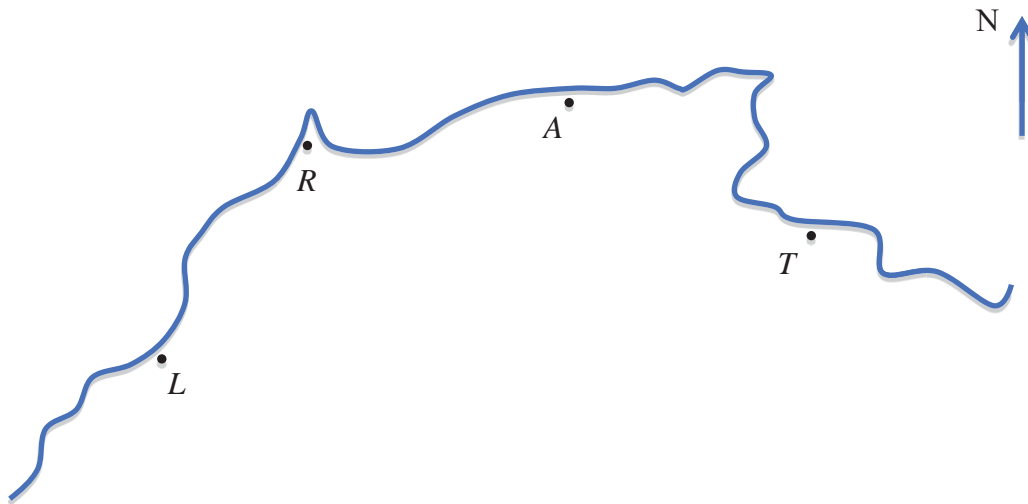
Answer [1]

(b) show that PQ is perpendicular to QR .

Answer

[3]

20 The map shows four cities on the north coast of Africa. The scale of the map is such that 1 cm on the plan represents 200 km on actual ground.

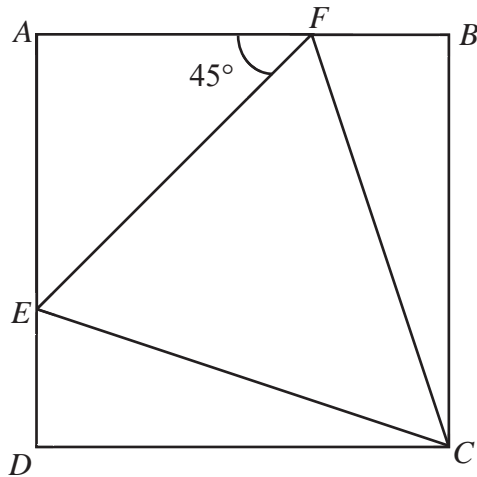


- (a) Using a compass and a ruler only, construct
 - (i) the perpendicular bisector of LT . [1]
 - (ii) the angle bisector of angle RAT . [1]

- (b) An ancient ruin is located at the intersection of the two bisectors in (a).
 - (i) Mark and label the position of the ancient ruin with the letter **X**. [1]
 - (ii) Measure and write down the actual distance, in kilometres, of the ancient ruin from A .

Answer km [1]

21 In the figure, $ABCD$ is a square, $\angle AFE = 45^\circ$ and the ratio of $AF : FB$ is $2 : 1$.



(a) Name a pair of congruent triangles and state the reasons for the congruency.

Answer [2]

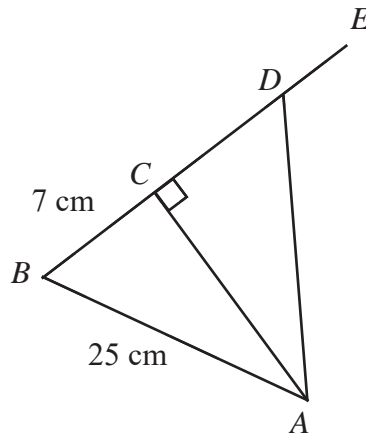
(b) Find the ratio of the area of $\triangle CEF$ to the area of square $ABCD$.

Answer [2]

(c) Given that the area of $\triangle CEF$ is 16 cm^2 . Find the length of the side of the square $ABCD$.

Answer cm [2]

22 In the diagram, $BCDE$ is a straight line, $AB = 25$ cm, $BC = 7$ cm and $\angle ACD = 90^\circ$.



Given that $\tan \angle CAD = \frac{3}{4}$, find

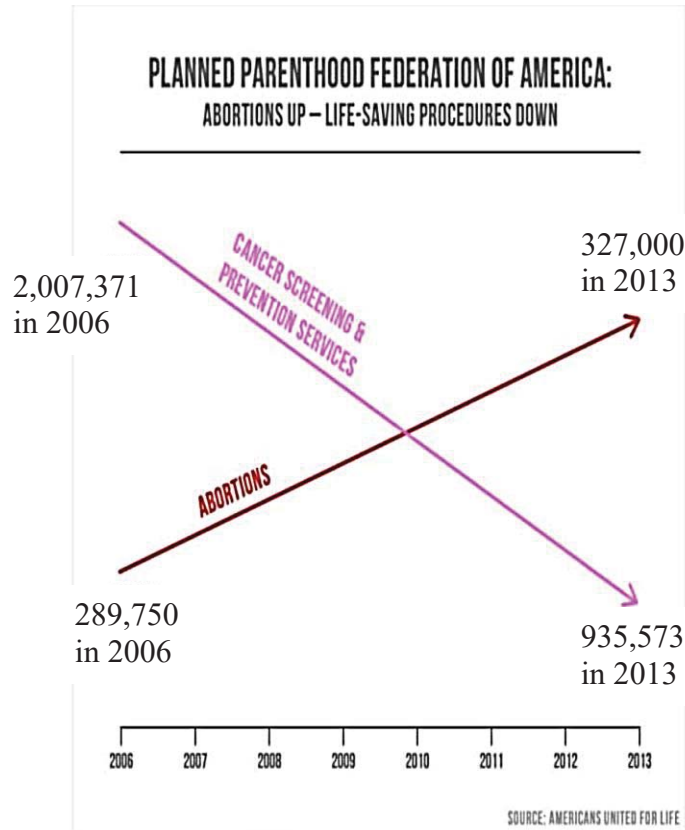
(a) the length of CD ,

Answer $CD = \dots\dots\dots$ cm [2]

(b) $\cos \angle ADE$.

Answer $\cos \angle ADE = \dots\dots\dots$ [2]

23 The chart below shows the annual number of Americans who went for cancer screening and abortion.



(a) Use the graph to calculate the annual rate of decrease of cancer screening from 2006 and 2013.

Answer [1]

(b) Explain why this graph is misleading.

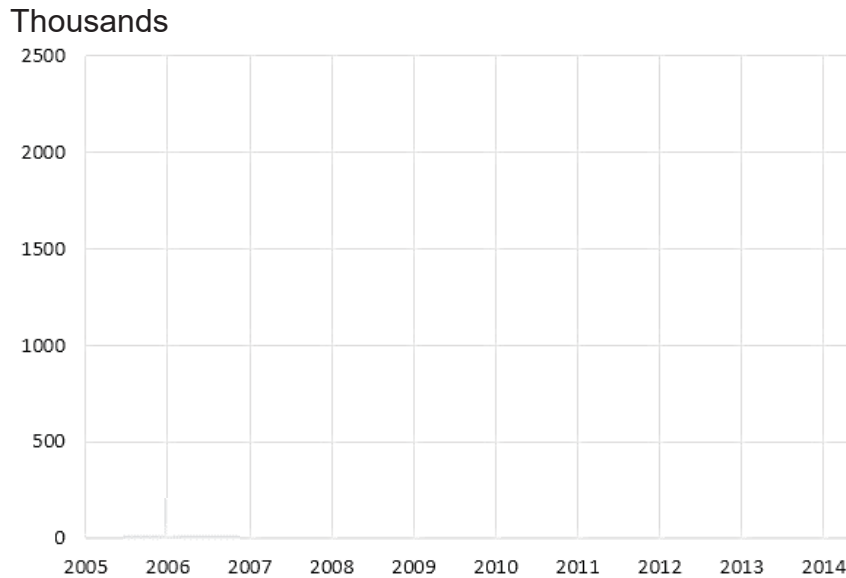
Answer

 [1]

- (c) Draw a new graph using the information from the current graph and the axes below.

Answer

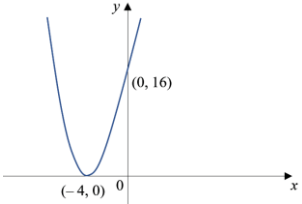
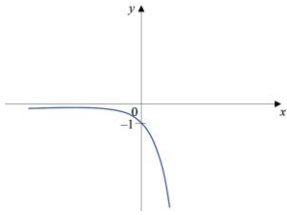
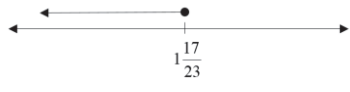
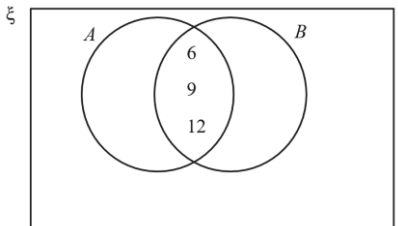
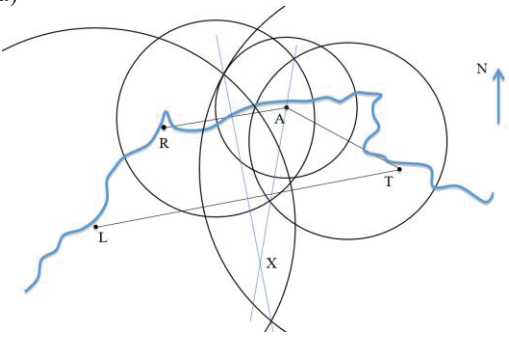
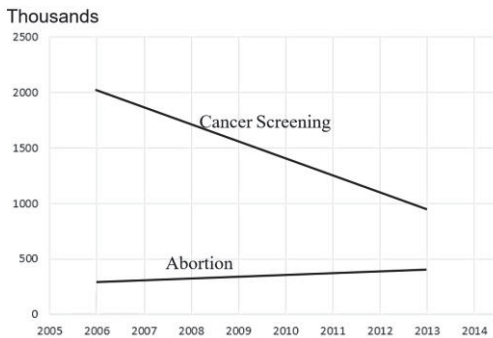
Cancer Screening and Abortion Chart



[1]

END OF PAPER

1	(a) 150.0401 (correct to 4 d.p.) (b) 150.0 (correct to 4 s.f.)	2	2.83×10^2 (3 s.f.)
3	(a) 10.3% (to 3s.f) (b) \$180	4	$3^{3x+2} - 9^{\frac{3}{2}x} + (27)^{x+1} = 3^{3x}(35)$ Since 35 is a multiple of 5, hence $3^{3x+2} - 9^{\frac{3}{2}x} + \left(\frac{1}{27}\right)^{-x-1}$ is divisible by 5 for all positive integer values.
5	(a) Smallest possible of the third number is 132 (i.e. $2^2 \times 3 \times 11$) (b) (i) $6468 = 2^2 \times 3 \times 7^2 \times 11$ (ii) $3 \times 11 = 33$		
6	(a) 2 hours (b) 48		
7	(a) 2.4 km (b) 6.25cm		
8	(a) 2.5 m/s (b) 870 km (3 s.f.) or $869 \frac{13}{23}$	9	$\frac{12x+5}{2(3x-1)(3x+1)}$
10	(a) $(b+1)(2a-1)(2a+1)$ (b) $x = \sqrt[3]{\frac{3g-f}{2}}$	11	(a) $(3x+4)(2x-5)$ (b) $y = -\frac{1}{3}$ or $y = \frac{7}{2}$

<p>12</p>	<p>(a) (i) $y = (x + 4)^2$ (ii)</p>  <p>(b) $x = 0$ (c) $(-2, 0)$</p>	<p>13</p> <p>(a)(i) $n = -1$ or $n = -3$ or Any negative odd number (ii) $k < 0$ (b)</p> 																											
<p>14</p>	<p>(b) $p = 5$ (c) 1</p>	<p>15</p> <p>(a) $x \leq 1\frac{17}{23}$</p>  <p>(b) 0, 1</p>																											
<p>16</p>	<p>$n = 5$</p>	<p>18</p> <p>(a) 4.5 km (b) 31 min (c) 0.36 km/min (2 d.p.)</p>																											
<p>17</p>	<p>$\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13\}$ $A = \{4, 6, 8, 9, 10, 12\}$ $B = \{3, 6, 9, 12\}$ $C = \{6, 12\}$ (a)(i) $A' = \{1, 2, 3, 5, 7, 11, 13\}$ or 1, 2, 3, 5, 7, 11, 13 (ii) $A' \cap C = \{ \}$ or \emptyset or null/empty set or no element (b)</p>  <p>(c) $\{ \}, \{6\}, \{12\}$</p>	<p>19</p> <p>(a) $\angle QRP = 90^\circ - 2x^\circ$ (supplementary angles) (b)</p> <p>20</p> <p>(a)</p>  <p>(b) $AX = 4.5 \times 200 = 900$ km *please note that you may not get the answer as 900km because the size of paper is being shrunk from A4 size to A5 size.</p>																											
<p>21</p>	<p>(a) $\triangle CDE \equiv \triangle CBF$ (SSS) (b) 4 : 9 (c) 6cm</p>																												
<p>22</p>	<p>(a) 18 cm (b) $-\frac{3}{5}$</p>																												
<p>23</p>	<p>(a) 133974.75 persons per year (b) The scale on the vertical axis is not defined.</p>	<p style="text-align: center;">Cancer Screening and Abortion Chart</p>  <table border="1"> <caption>Cancer Screening and Abortion Data (Thousands)</caption> <thead> <tr> <th>Year</th> <th>Cancer Screening</th> <th>Abortion</th> </tr> </thead> <tbody> <tr> <td>2006</td> <td>2000</td> <td>300</td> </tr> <tr> <td>2007</td> <td>1800</td> <td>320</td> </tr> <tr> <td>2008</td> <td>1600</td> <td>340</td> </tr> <tr> <td>2009</td> <td>1400</td> <td>360</td> </tr> <tr> <td>2010</td> <td>1200</td> <td>380</td> </tr> <tr> <td>2011</td> <td>1000</td> <td>400</td> </tr> <tr> <td>2012</td> <td>900</td> <td>400</td> </tr> <tr> <td>2013</td> <td>1000</td> <td>400</td> </tr> </tbody> </table>	Year	Cancer Screening	Abortion	2006	2000	300	2007	1800	320	2008	1600	340	2009	1400	360	2010	1200	380	2011	1000	400	2012	900	400	2013	1000	400
Year	Cancer Screening	Abortion																											
2006	2000	300																											
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2012	900	400																											
2013	1000	400																											

Anglican High School
2020 Secondary 4 Preliminary Examination Mathematics Paper 2

Answer **All** the questions

- 1 (a) (i)** Factorise $2px - 2p + 3qx - 3q$ completely.

Answer [2]

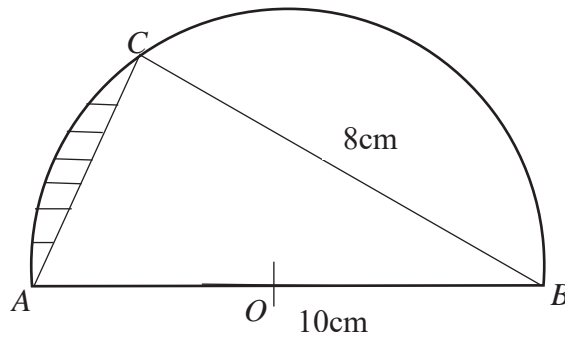
- (ii)** Given that p and q are positive constants, find the value of x for which $2px - 2p + 3qx - 3q = 0$.

Answer $x =$ [1]

- (b)** Simplify $(-3p^2q^{-1})^2(p^{-2}q^2)^3$, expressing your final answer in positive indices.

Answer [2]

2 In the diagram, $BC = 8$ cm and $AB = 10$ cm is the diameter of the semi-circle.



Find

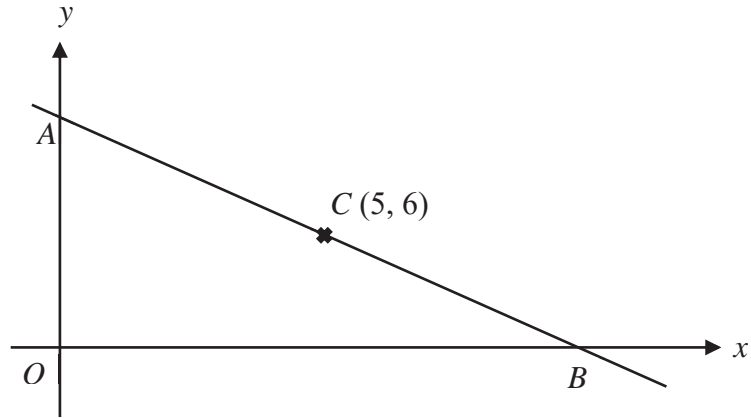
(a) angle COA in radians,

Answerradians [2]

(b) area of the shaded region.

Answer cm^2 [3]

- 3** In the diagram, not drawn to scale, point A lies on the y -axis and point B lies on the x -axis. The coordinates of C is $(5, 6)$.



- (a)** Given that C lies on the line AB and that $5OA = 3OB$, show that the y -intercept of the line AB is 9.

Answer

- (b)** Given that point D lies on the y -axis, state the coordinates of D such that triangle ACD is an isosceles triangle. [3]

Answer (..... ,)

- (c)** Given further that $OCEA$ is a parallelogram, state the coordinates of the point E . [1]

Answer (..... ,)

- (d)** Find the area of the parallelogram, $OCEA$.

Answerunits² [2]

- 4 Mrs Tan bought x kg of rice for \$65 in December 2019. In February 2020, the price of rice increased and she received 6 kg less for the same amount of money spent.

(a) Write down an expression for the price of rice per kilogram, in terms of x ,

(i) in December 2019,

Answer \$..... [1]

(ii) in February 2020.

Answer \$..... [1]

(b) If the increase in price is \$2 per kilogram of rice, form an equation in x and show that it reduces to $x^2 - 6x - 195 = 0$.

Answer

[3]

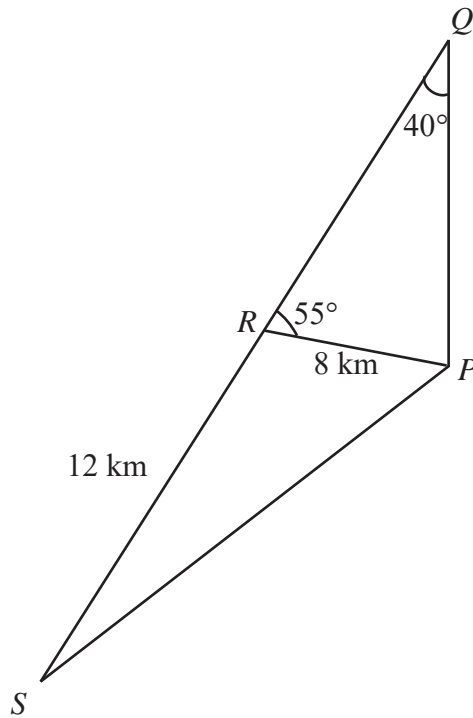
(c) Solve the equation, giving your answers correct to 2 decimal places.

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

(d) Hence, find the price of rice per kilogram in February 2020, leaving your answer to the nearest cent.

Answer [1]

- 5 In the diagram, $PQRS$ are four points on level ground, and Q is due north of P .



Given that angle $PQR = 40^\circ$, angle $PRQ = 55^\circ$, $PR = 8$ km, $RS = 12$ km and that QRS is a straight line,

- (a) show that the distance PS is 17.836 km.

Answer

[3]

- (b) Using the result in (a), find,
 (i) the bearing of P from S ,

◦

Answer [3]

(ii) the shortest distance from R to PS .

- Answer*km [2]
- (c) A vertical tower stands at point R . Evan, walking along PS and stops at a point where the greatest angle of elevation of the top of the tower, T , is 3° . Find the height of the tower.

Answerkm [2]

- 6 (a) The table below shows the amount of flour, sugar and number of eggs needed for each type of pastry sold in a cafe.

	Flour (g)	Sugar (g)	Number of eggs
Cookie	90	50	1.5
Cake	220	200	8
Pancake	60	80	2

The above information is represented by a matrix $\mathbf{D} = \begin{pmatrix} 90 & 50 & 1.5 \\ 220 & 200 & 8 \\ 60 & 80 & 2 \end{pmatrix}$.

Each kg of flour and sugar costs \$1.50 and \$1.80 respectively. A dozen eggs costs \$2.70. Complete the cost in \$ for every gram of flour and sugar as well as the cost in \$ for each egg in the table below :

Flour(\$/g)	Sugar(\$/g)	1 Egg(\$)

[2]

- (b) Write down a 3×1 matrix \mathbf{E} such that its elements represent the unit cost of each ingredient needed for the various pastries.

Answer [1]

- (c) Calculate **DE** and state what the elements of **DE** represent.

Answer

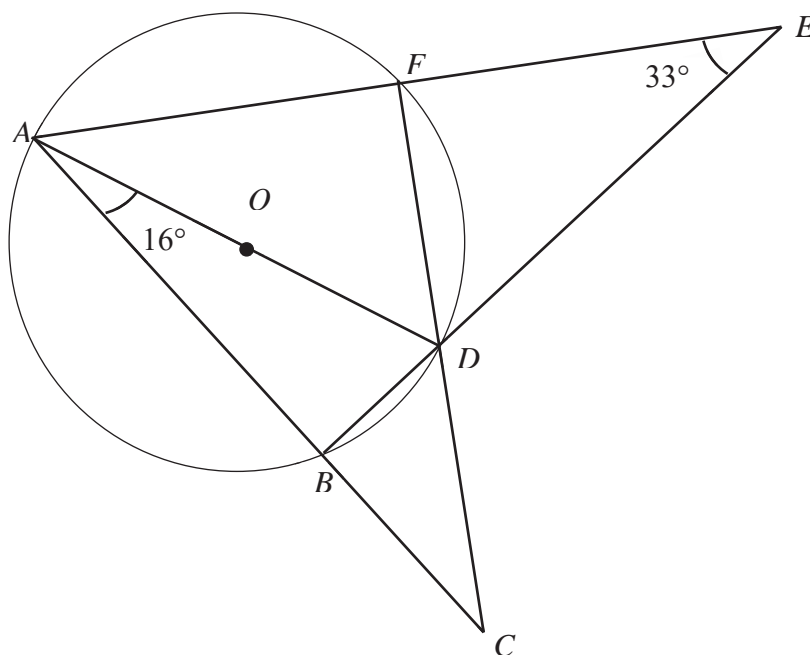
.....

..... [2]

- (d) The cafe prepared 70 cookies, 30 cakes and 120 pancakes on a particular day. Using matrix multiplication, calculate the total cost of the basic ingredients for all the pastries prepared on this day.

Answer \$..... [2]

- 7 (a) In the diagram, AD is the diameter of the circle $ABDF$ with centre O . Given BD and AF produced meet at E , AB and FD produced meet at C , $\angle FED = 33^\circ$ and $\angle DAB = 16^\circ$.



Calculate, stating your reasons clearly,

- (i) $\angle ADB$,

Answer [2]

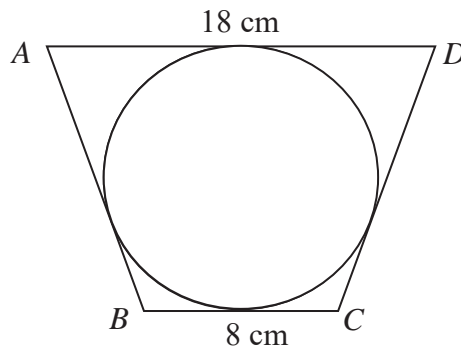
- (ii) $\angle AFB$,

Answer [1]

- (iii) $\angle DAF$.

Answer [2]

- (b) Given $ABCD$ is a trapezium with $AD = 18$ cm, $BC = 8$ cm and $AB = DC$. A circle is inscribed in the trapezium as shown.



- (i) Show that the length of AB is 13 cm, stating your reason(s) clearly.

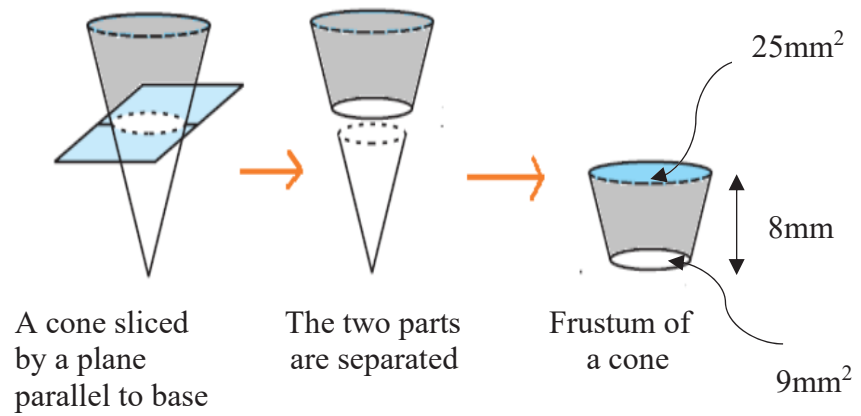
Answer

[2]

- (ii) Calculate the radius of the circle.

Answercm [2]

- 8 (a) A solid cone is cut into a smaller cone and a frustum as shown in the diagram.



The height of the frustum is 8mm. The area of the two circular bases are 9 mm^2 and 25 mm^2 respectively.

- (i) Show that the height of the smaller cone is 12 mm.

Answer

- (ii) Find the volume of the frustum.

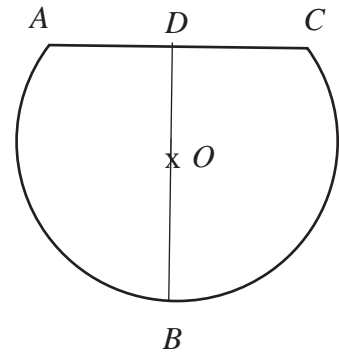
[2]

Answer mm^3 [3]

- (iii) Find the curved surface area of the smaller cone.

Answermm² [3]

- (b) In the figure, $ADCB$ is a major segment of a circle, centre O and radius 7 cm. $BD = 12$ cm. AC is perpendicular to the line BOD . Find the perimeter of the major segment.



Answercm [4]

- 9 Mr Tan is looking to purchase a new car to drive to and from work on weekdays and for leisure on weekends. He estimates the total distance travelled is about 1500 km per month. The average cost of petrol is \$2.20 per litre. To buy a new car, he must pay a down payment of 30% of the selling price of the car before he can take a car loan for the remaining amount from a bank. He has to pay back the loan by monthly instalment. A 5-year car loan simple interest rate offered by most banks is 2.28% per annum. Mr Tan shortlisted 3 cars with all the relevant cost as shown in the table.

	Car A	Car B	Car C
Selling Price	\$87 999	\$108 999	\$107 888
Fuel Consumption(km per litre)	17.2	14.9	17.8
Car Insurance per year	\$ 1 200	\$ 1500	\$ 1 500
Engine Capacity(in cubic cm)	1 598	1 499	1 197
Monthly Car Maintenance	\$200	\$200	\$200
Monthly Car Park charges	\$150	\$150	\$150

He also finds out that the annual road tax of the car is determined by the engine capacity of the car is as follows:

$$\text{Annual Road Tax} = [\$500 + 0.75(\text{Engine Capacity minus } 1000)] \times 0.782$$

- (a) After reviewing the information, Mr Tan decides to buy Car A.
 (i) calculate the down payment.

Answer \$..... [1]

- (ii) calculate the total **monthly** expenditure including monthly instalment payment and all the other monthly costs.

Answer \$..... [7]

- (b) An alternative to buying a car is to rent an electric car that is easily accessible from his house and workplace. Subscription per month is \$15 and it costs 33 cents per minute of use. Mr Tan estimates that the average daily travel time to and from work is about 1 hour and 20 minutes. On weekends, he needs to use the car for about 5 hours for leisure activities. Calculate his monthly expenditure to rent a car.

Answer \$..... [2]

- (c) Do you think Mr Tan should buy or rent a car? Justify your answer.

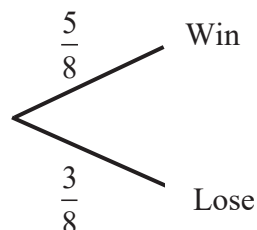
Answer.....
[1]

- 10 (a) Team Alpha and Delta are competing in the badminton finals. Each game will only result in a win or a loss. The competition ends when a team wins 2 games out of 3.

The probability of Alpha team winning in a game is $\frac{5}{8}$.

- (i) Draw a tree diagram to show all the possible outcomes for Alpha team.

Answer



[2]

- (ii) Calculate the probability, expressing your answers in fraction, that Alpha team wins the competition.

Answer [2]

- 10 (b) The frequency table shows the weight in kg of 80 persons who join an exercise club.

Weight	$30 < x \leq 40$	$40 < x \leq 50$	$50 < x \leq 60$	$60 < x \leq 70$	$70 < x \leq 80$
Frequency	8	17	34	18	3

- (i) Find the mean weight.

Answerkg [1]

- (ii) Find the standard deviation.

Answerkg [1]

- (iii) After 6 months of exercising, the mean and standard deviation of these 80 persons are 50kg and 12.2 kg respectively. Give 2 comments on the effect of exercise.

1

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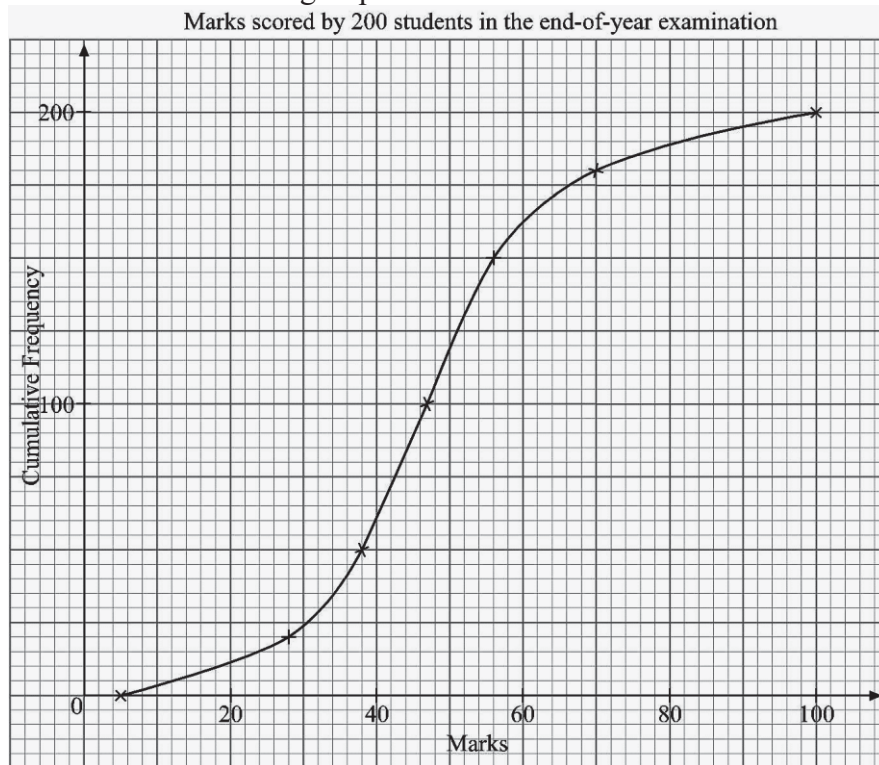
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2

.....

..... [2]

- 10 (c) The cumulative frequency graph below shows the end-of-year Mathematics examination marks of a group of 200 students.



From the graph, find the

- (i) number of students who scored 28 marks or less,

Answer [1]

- (ii) number of students who scored more than 76 marks,

Answer [1]

- (iii) the upper quartile,

Answer [1]

- (iv) minimum mark obtained by the top 2.5% of the cohort,

Answer [1]

- (v) probability that one student scored 28 marks or less and the other student scored more than 76 marks when two students are chosen at random.

Answer[2]

11 The variables x and y are connected by the equation

$$y = \frac{5x}{4} + \frac{1}{x^2}.$$

The table below shows some values of x and the corresponding values of y , correct to 1 decimal place.

x	0.5	1	1.5	2	3	4	5
y	4.6	2.3	2.3	2.8	3.9	5.1	p

- (a) Calculate the value of p .

Answer $p =$ [1]

- (b) Using a scale of 2 cm to represent 1 unit on each axis, draw a horizontal x -axis for $0 \leq x \leq 5$ and a vertical y -axis for $0 \leq y \leq 8$. On your axes, plot the points given in the table and join them with a smooth curve. [3]

- (c) From the graph, find the values of x for which $\frac{5x}{4} + \frac{1}{x^2} - 3 = 0$.

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

- (d) By drawing a tangent, find the gradient of the curve at the point (1, 2.3).

Answer [2]

- (e) (i) On the same axes, draw the graph of $y = \frac{1}{2}x + 2$. [2]

- (ii) Write down the x -coordinates of the points where the two graphs intersect.

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

- (iii) Find the equation in the form $3x^3 + ax^2 + bx + c = 0$, which is satisfied by the values of x found in part (e)(ii).

Answer [1]

END OF PAPER

