

4.1 Objectives

Paper I - Part A

01. Writes the next two terms of an arithmetic progression when several successive terms are given.
02. Finds the sine ratio of an angle when the lengths of two sides of a right angled triangle are given.
03. Factorises a trinomial expression of the type $x^2 + bx + c$.
04. When several data are given in a table, selects continuous data from them.
05. Given the values of two interior angles of a triangle, finds the value of the exterior angle between two produced sides of the triangle.
06. Simplifies given algebraic fractions with related denominators containing algebraic terms with one unknown.
07. Calculates the gradient of a straight line of the type $y = mx + c$ passing through a given point.
08. Given two sets of which one is a subset of the other, writes their intersection with the elements.
09. Finds the least common multiple of two given algebraic terms.
10. Finds the values of named angles using the data given in a figure comprising two isosceles triangles.
11. Solves an inequality of the type $ax + b \geq c$ and indicates the solution on a number line.
12. Calculates the perimeter of a compound figure with two sectors given the radius and the central angle.
13. Given the value of one angle of a figure of a circle given with a diameter and angles in the same sector, finds the value of another angle.
14. Finds the annual simple interest rate when the monthly interest for a loan is given.
15. Calculates the speed of an object when a distance-time graph depicting the motion of an object within a certain time interval is given.
16. Writes in terms of π and r an expression for the area of a sector given the angle at the centre and the radius as an unknown.

17. Given the frequencies separately for a group of data of four categories, finds the probability of an individual randomly selected belonging to one of them.
18. When the three sides of a triangle and a line drawn parallel to a side through the mid point of another side are given in a diagram, calculates the perimeter of a named triangle in the diagram.
19. Given a diagram of a triangle and a parallelogram situated between the same two parallel lines, finds the ratio between the areas of the triangle and the parallelogram.
20. Finds the radius of a circle when the length of the perpendicular drawn from the centre of the circle to a chord of given length is given.
21. Indicates in terms of man days, the work done by a machine in an hour, when the number of men and the number of days required to complete a task and the number of hours taken by the machine to complete the same task are given.
22. Indicates in a sketch the location of a point situated at a definite distance from two intersecting straight lines using the knowledge on loci.
23. Writes an expression written in logarithmic form in index form.
24. Given a pair of simultaneous equations with different coefficients, derives a value for the difference between the two unknowns without solving them.
25. When a diagram of a circle is given with the centre and data marked on it, finds the relationship between two named angles in it according to the data provided.

Part B

1. Having indicated the first part as a fraction and the second part as a fraction of the rest of a unit comprising of three parts,
 - (i) indicates as a fraction of the unit, the remaining part of the unit excepting its initial part.
 - (ii) writes what fraction of the total unit is another amount of the remaining part.
 - (iii) shows that the second part is three times the third part.
 - (iv) calculates and writes the amount of the complete unit given the amount of the second part as a quantity.
2. (a) Given a diagram of a pattern with four rows made by arranging cubes in rows,
 - (i) writes the number of cubes in the next two rows separately.
 - (ii) identifies the relationship between the terms in the number pattern and writes the progression to which it belongs.
 - (iii) when the number of rows of that progression is given, calculates the number of cubes in the last row.

- (b) When two terms of a geometric progression is given
- (i) finds the common ratio.
 - (ii) finds the first term.
3. Given the time required to fill a tank separately with two taps and the time required to empty that tank completely by another tap,
- (i) finds the time taken to fill half of that tank when both the inlet taps are opened.
 - (ii) calculates what amount of the tank gets filled in one hour if all the three taps are kept open.
 - (iii) finds the time taken to fill the tank if all the three taps are opened when exactly half of the tank has already been filled.
4. Given a histogram illustrating the marks obtained by a group of students for an assignment,
- (i) tabulates the number of students in each interval.
 - (ii) draws the frequency polygon on the given histogram.
 - (iii) when the sector angle corresponding to the number of students of one class interval is given for displaying this information by a pie chart, calculates the sector angles to display the other intervals.
 - (iv) finds the fraction relating to one event based on the information in the histogram.
5. (a) When a Venn diagram with a universal set and two intersecting sets is given,
- (i) finds the number of elements in a named set by indicating the given numbers of elements in two sets in the Venn diagram.
 - (ii) shades in the Venn diagram a named area that does not belong to one set.
 - (iii) finds the number of elements in another named set when the number of elements in the universal set and the number of elements in one set are given.
- (b)
- (i) Writes a formula for $n(A \cup B)$ in terms of $n(a), n(b), n(A \cap B)$.
 - (ii) Finds the number of elements in $n(A \cup B)$ by substituting given values in that formula.

1. (a) Given the value of a share, the annual dividend payable for a share and the amount invested to buy shares,
 - (i) finds the number of shares that can be bought for the amount invested.
 - (ii) calculates the income received from shares when the number of shares and the dividend paid for a share are given.
 - (iii) finds the value of shares when the income from another number of shares is given.
- (b) Given the annual compound interest percentage, the loan amount and the time taken to settle the loan,
 - (i) calculates the total amount that should be paid at the end of the stipulated period to settle the loan.
 - (ii) presents reasons for the fact that getting a loan under a given annual simple interest rate is not more profitable than getting the loan under compound interest.
2. Given a graph of a quadratic function drawn within a given interval of values of x , using the graph,
 - (i) finds the value of y for a given value of x .
 - (ii) writes the interval of values of x in which the function increases positively.
 - (iii) finds the value of k when the function takes the form $y = k - (x + a)^2$.
 - (iv) writes the roots of a given quadratic equation.
 - (v) writes the function when the maximum value and the coordinates of the turning point and coefficient of x^2 are given.
3. (a)
 - (i) Writes the order of a given matrix.
 - (ii) Multiplies two given matrices of order 2×2 and writes the product.
- (b) Given how two people buy two items in different quantities and the amount of money required for it,
 - (i) constructs a pair of simultaneous equations using given unknown terms.
 - (ii) finds the price of each item separately by solving those equations.
 - (iii) states giving reasons whether one can agree with the statement that 'equal quantities of the above items can be bought for a certain sum of money'
4. (a) Given the angle of elevation of a mountain top from a certain place, and the angle of elevation to view the same after walking a given distance from that place towards the mountain,
 - (i) draws a scale diagram to a given scale.
 - (ii) finds the length of the segment of the line that represents the height of the mountain in the diagram drawn.
 - (iii) calculates the true height of the mountain using it.

- (b) When a distance-time graph of two objects starting from the same point at two occasions and moving in two parallel straight lines is given,
- (i) finds the distance traveled by one object.
 - (ii) finds the speeds of the two objects separately.
 - (iii) when one object overtakes the other, shows that the ratio of the motion-time ratio of the two objects is equal to a given ratio.
5. Finds the average speed of a driver given his mean speed of driving a vehicle between two cities as an algebraic expression and also the distance between the two cities, the difference between the speeds of the two drivers and how much more time the second driver takes to complete the journey than the first.
6. Using the mean, confirms that a given statement about the extra expenditure to be borne is true, given a grouped frequency distribution of data collected on the number of units of water consumed daily, the cost to produce one unit of water and the amount charged for a unit of water.

Part B

7. (a) Given the radius of the bottom and the height of a cylinder,
- (i) indicates the area of the curved surface in terms of the radius and the height.
 - (ii) indicates its volume in terms of the radius and height.
- (b) States in terms of radius and height, the volume of a cone whose radius of the bottom and height are equal.
- (c) (i) Finds the volume of the substance used to make the above cylinder in terms of π and a when a relationship between the height and the radius is given.
- (ii) Calculates how many spheres of radius a can be made by melting the whole amount of the substance above.
8. Using the compass and a ruler with the cm/mm scale
- (i) constructs a circle of given radius.
 - (ii) marks a point on that circle and constructs a tangent that touches the circle at that point.
 - (iii) constructs another tangent to the circle from a point at a given distance on the tangent.
 - (iv) constructs the circle that passes through the two points at which the tangents drawn from the external point to the circle touch the circle, the external point and the centre of the circle. Measures and writes its radius.
9. Given the price of an item, initial payment, annual interest rate and the number of installments, and also that the interest is calculated on the reducing balance, calculates the value of a monthly instalment.

10. (a) Explains a given theorem by way of a diagram.
- (b) Given a diagram where the mid points of the three sides of a triangle are joined,
- shows that a named quadrilateral formed by the mid points of the sides and a vertex point is a parallelogram.
 - shows that the perimeter of the triangle is twice the perimeter of the triangle formed by joining the mid points.
 - proves that the parallelogram in (i) is a rhombus given that two sides of the triangle are equal.
11. (a) Draws a triangle so that a named angle is a right angle and writes Pythagoras' relationship in relation to that triangle.
- (b) Draws a diagram to include the information given that, in a given right angled triangle, points dividing the sides which include the right angle in the ratio 1 : 2 are located, and derives a relationship between those sides.
12. Given that from a bag containing items of equal size and shape, two items are taken out on two occasions randomly without replacement,
- displays the sample space on a grid.
 - from it, calculates the probability of an event asked.
 - given the tree diagram relevant to the first occasion, extends it for the second occasion.
 - calculates the probability of a dependent event using the tree diagram.
 - using the above tree diagram, presents reasons for the truth or falsehood of a statement made with regard to mutually exclusive events.

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Mathematics Question Paper - 4

4.2 Question paper

Mathematics I

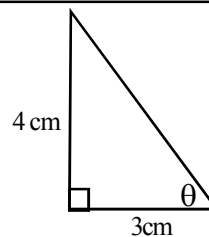
Answer all the questions on this paper itself.

Time: Two hours

Part A

1. Write the next two terms in the number pattern 7, 11, 15,

2. According to the measurements given in the diagram find $\sin \theta$.

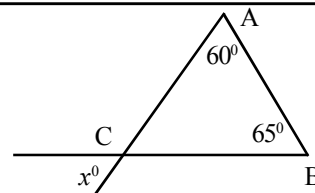


3. Factorise $x^2 + 5x + 6$.

4. Select continuous data from the data given in the following table and write '✓' against them.

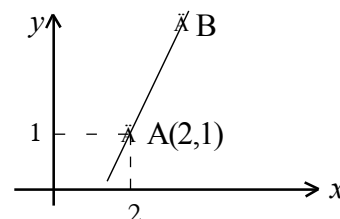
Data	Continuous
Heights of students in a class	
Number of members in a family	
Runs scored in a cricket match	
Ages of students in a class	

5. Find the value of x according to the data given in the diagram.



6. Simplify $\frac{1}{x} - \frac{2}{3x}$.

7. The equation of the straight line AB is given by $y = mx - 5$. Find the value of m according to the information given.



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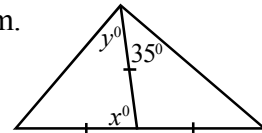
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Mathematics Question Paper - 4

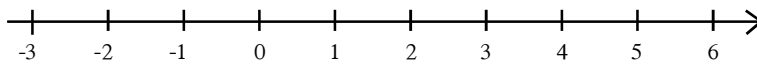
8. $A = \{\text{integers from 1 to 10}\}$
 $B = \{\text{multiples of 2 less than 10}\}$. Write with elements the set $A \cap B$.

9. Find the least common multiple. $4ab^2, 6a^2bc$

10. Find the values of x and y as per the information given in the diagram.

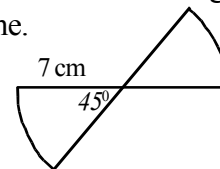


11. Indicate on the number line the solution of the inequality $3x + 5 \geq 2$

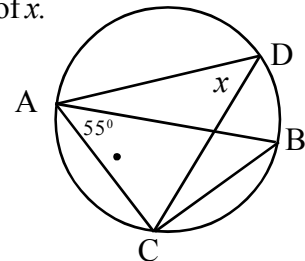


12. The diagram shows a wire frame with two sectors, each of radius 7 cm and central angle 45° . Find the minimum length of wire required to make the wire frame.

(take $\pi = \frac{22}{7}$)

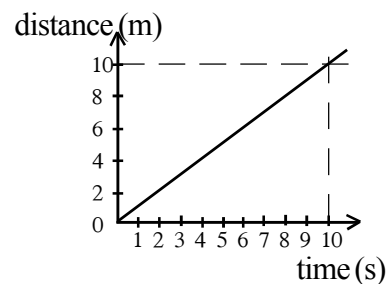


13. AB is a diameter of the given diagram. $\hat{BAC} = 55^\circ$. Find the value of x .

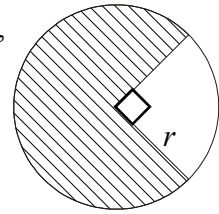


14. An interest of Rs. 5 is charged per month for a loan of Rs. 500. Find the annual simple interest rate.

15. Given in the figure is a distance -time graph that shows the motion of a moving object during 10 s. Calculate the speed of the object in ms^{-1} .



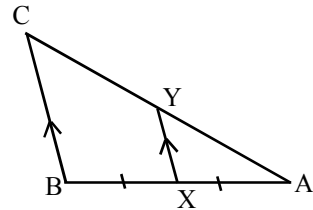
16. The diagram shows a sector of radius r . According to the information given, write an expression for the area of the shaded portion in terms of π and r .



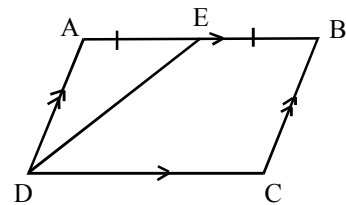
17. The following table gives the number of students in a class with the respective blood group. If a student is randomly selected, find the probability of his/her blood group being B.

Blood group	A	AB	B	O
Number of students	10	13	12	5

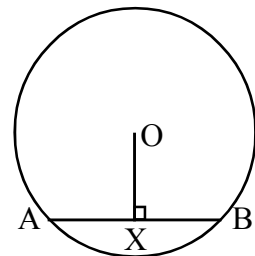
18. In the triangle ABC, $AB = 10$ cm, $AC = 14$ cm and $BC = 12$ cm. If the mid point of AB is X and $BC \parallel XY$, find the perimeter of the triangle AXY.



19. According to the information given in the diagram, find the ratio between the area of the triangle AED and the area of the parallelogram ABCD.

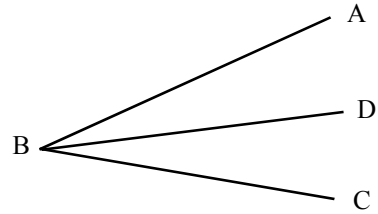


20. The perpendicular drawn from the centre O to the chord AB is OX. If $AB = 8$ cm and $OX = 3$ cm, find the radius of the circle.



21. A work completed by 12 men in 10 days is completed by a bulldozer in 8 hours. How much work in man days is done by the bulldozer in one hour?

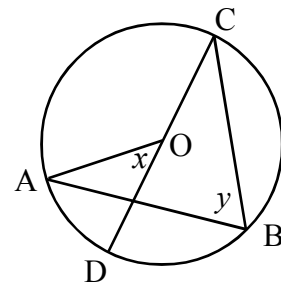
22. The bisector of $\hat{A}BC$ is BD . Using your knowledge on loci show with the aid of a sketch how to find a point 5 cm away from both lines AB and BC .



23. If $2 \log_2 a = b$, write this in the form of indices making a the subject.

24. If $3x - y = 8$ and $x + y = 4$, find the value of $x - y$ without solving the equations.

25. The diagram shows a circle with centre O . According to the information given in it, build up a relationship between x and y .

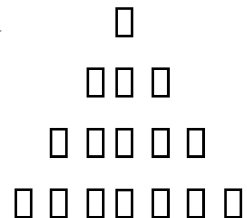


Part B

Answer all the questions on this paper itself

1. (a) The initial part of a certain road is surfaced with tar. The tarred portion is $\frac{2}{7}$ of the entire road. $\frac{3}{4}$ of the rest of the road is made with concrete. The remaining part is covered with gravel.
- (i) Find which fraction of the entire road is the non tarred part.
 - (ii) Find which fraction of the entire road is the concrete-laid part.
 - (iii) Show that the concrete-laid part is three times the gravel- covered part.
 - (iv) If the concrete-laid part is 225 m find the total length of the road.

2. (a) A student arranges empty match boxes in rows and makes structures as those shown in the diagram. There is one box in the first row, 3 boxes in the second row and 5 boxes in the third row.

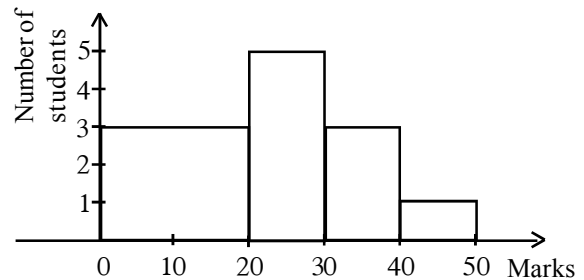


- (i) Write separately the number of match boxes in the 5th and 6th rows in a structure with six rows of boxes.
- (ii) When the number of match boxes in the respective rows are written in sequential order, to what type of progression do they belong?
- (iii) If a structure such as the above is made with 10 rows, how many boxes are in the 10th row?

- (b) The fourth term and the seventh term of a geometric progression are 40 and 320 respectively.
- (i) Find the common ratio of the geometric progression.
 - (ii) Write the first term of the progression.

3. Two taps A and B are fixed to a tank to fill water into it. When only A is opened, the tanks get filled in 8 hours. When only B is kept open, it takes 12 hours to fill the tank. When the outlet tap C is opened, the tank completely empties in 6 hours.
- (i) Find the time taken to fill half of the tank when only A and B are kept open when the tank is empty.
 - (ii) When the tank is empty, what fraction of it gets filled with water in one hour if all the three taps A, B and C are opened?
 - (iii) Find the time taken to fill the tank completely with water if all three taps were opened when the tank is exactly half-filled with water.

4. Presented here is a histogram based on the marks scored by students out of 50 for a mathematics assignment.



- (i) Complete the following table using the histogram.

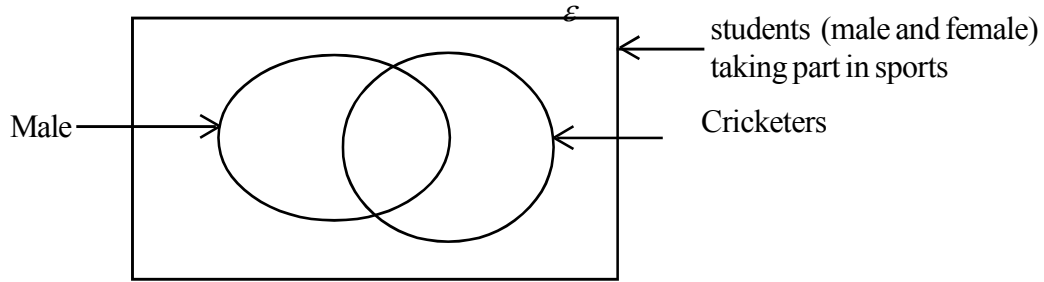
Marks	0-20	20-30	30-40	40-50
Number of students	1

- (ii) Draw the frequency polygon on the above histogram.
- (iii) It was thought to indicate the above information in a pie chart. The angle of the sector used to represent the number of students scoring 40-50 was 24° . Find the angles of the other sectors representing the other intervals of marks and complete the following table.

Marks	0-20	20-30	30-40	40-50
Sector angle	24°

- (iv) If the students scoring above 30 marks for the assignment are considered to have achieved the expected achievement level, find what fraction of these students have reached the expected achievement level.

5. (a) The following Venn diagrams shows the information on the students taking part in sports in a school.



- (i) If the number playing cricket is 38 and the number of boys playing cricket is 18, indicate relevant information in the Venn diagram and find the number of girls playing cricket.
 - (ii) In the Venn diagram, shade the area representing the girls not playing cricket.
 - (iii) If the number of boys and girls taking part in sports is 60 and the number of girls not taking part in cricket is 10, how many boys participate in sports?
- (b) (i) Write a formula for $n(A \cup B)$ in terms of $n(A)$, $n(B)$ and $n(A \cap B)$.
- (ii) Find the value of $n(A \cup B)$ if $n(A) = 8$, $n(B) = 10$ and $n(A \cap B) = 6$.

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Mathematics Question Paper - 4

Mathematics II

Three hours

- Answer 10 questions selecting five questions from part A and five questions from part B.
- Every question is worth 10 marks.
- The volume of a right circular cylinder of base radius r and height h is $\pi r^2 h$. The volume of a right circular cone of base radius r and height h is $\frac{1}{3} \pi r^2 h$
- The volume of a sphere of radius r is $\frac{4}{3} \pi r^3$.

Part A

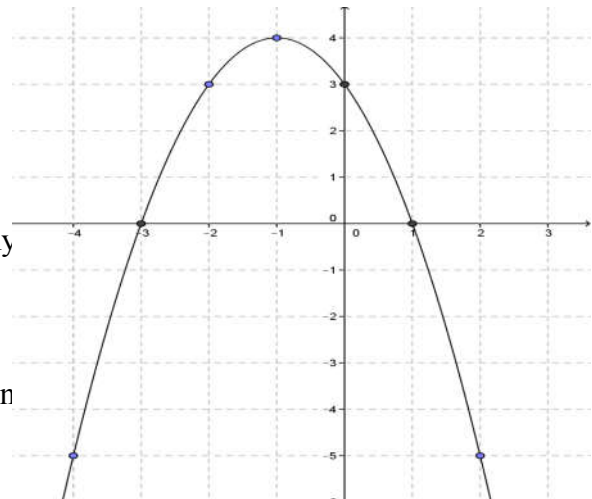
Answer five questions only

1. (a) In a company, the market price of a share is Rs.50. The company pays dividends of Rs.2 per share per year. Sarath invests Rs. 25 000 to buy shares of the company.
- (i) Find the number of shares to which Sarath is entitled.
 - (ii) What is the income of Sarath in that year from his shares?
 - (iii) If Kamal earns an income of Rs.2 500 for the shares in that company, find the investment made by Kamal in the company.
- (b) A man takes a loan of Rs. 50 000 for a period of two years at an annual compound interest rate of 10%.
- (i) Find the amount that should be paid at the end of two years to settle the loan.
 - (ii) Give reasons for the fact that taking the same loan for the same period at an annual simple interest rate of 11% is disadvantageous.

2. The figure shows the graph of a quadratic function drawn within the range $-4 \leq x \leq 2$.

Using the graph,

- (i) write the value of y when $x = 0$.
- (ii) write the interval of values of x in which the function increases positively
- (iii) find the value of k if this quadratic function takes the form $y = k - (x+1)^2$.
- (iv) According to the above value of k , find the roots of the equation $k - (x+1)^2 = 0$.

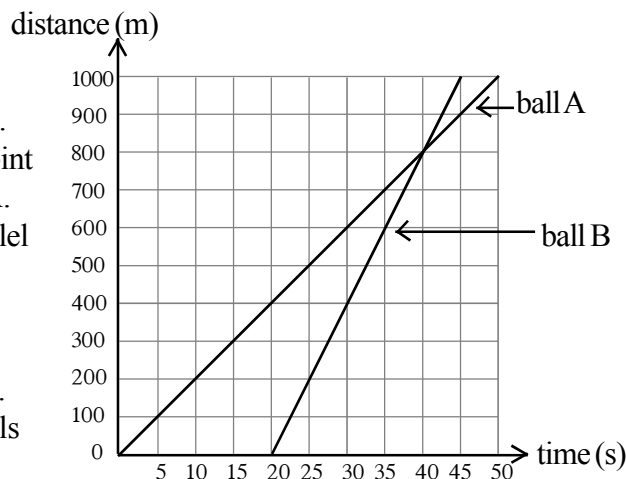


- (v) Write the function of which the coordinates of the maximum point is $(-2,0)$ and the coefficient of x^2 is 1.

3. (a) (i) Write the order of the matrix $A = \begin{pmatrix} 2 & 1 \\ -1 & 0 \end{pmatrix}$.
- (ii) If $B = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$ find the product AB .

- (b) Varuni bought 2 guava fruits and 3 naran fruits for Rs. 48. Sandali bought 4 guava fruits and two naran fruits for Rs. 64 from the same vendor.
- Construct a pair of simultaneous equations taking the price of a guava fruit as x and the price of a naran fruit as y .
 - Find separately the price of a guava fruit and of a naran fruit by solving the above equations.
 - Varuni says that an equal number of guava fruits and naran fruits can be obtained by giving Rs. 100 to the vendor. Do you agree with this? Give reasons.
4. (a) Amal sees a mountain top due east at an angle of elevation of 30° . When he walks 100 m towards the east Amal sees the same mountain top at an angle of elevation of 60° . Using a 1 : 2000 scale ,
- draw a scale diagram to indicate these information.
 - find the length of the line segment in the scale diagram representing the height of the mountain.
 - find the true height from the ground to the mountain top.

- (b) The diagram indicates a distance time graph drawn to illustrate the motion of two balls A and B used in an experiment. Both balls start motion from the same point and B starts to move 20 seconds after A. Both balls move in rectilinear paths parallel to each other.



- What is the distance in metres traveled by B in the first 5 seconds after starting to move .
 - Find the speeds of A and B balls separately.
 - Till the moment when B goes past A, show that the ratio of the times during which the balls A and B moved is 2 : 1.
- 5 The distance between the two towns X and Y is 120 km. To reach town Y from X , a driver A drives his vehicle at the average speed of $x \text{ km h}^{-1}$. A driver B drives his vehicle at a speed of 20 km h^{-1} less than that of A and comes to town Y from X. If B takes one hour more than A for the journey, find the average speed of A.
6. The following frequency distribution shows the information collected on the number of units of water used daily by the residents of a housing scheme.

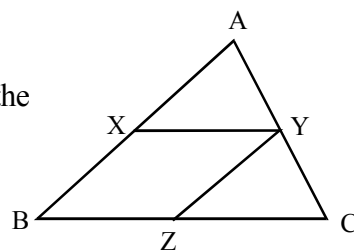
Number of units of water	20-25	25-30	30-35	35-40	40-45	45-50
Number of days	2	4	10	8	5	1

A local government authority charges Rs. 7 for a single unit of water while the supply of a unit of water costs the authority Rs. 12. The manager at the monthly meeting proclaims that it costs an extra sum of Rs. 8650 per day to supply water to 50 houses . Using the mean, substantiate the manager's statement.

Part B

7. (a) The radius of the base of a solid cylinder is $2a$ and its height is $3h$.
- (i) Find the area of the curved surface of the cylinder in terms of π , a and h
 - (ii) Indicate the volume of that cylinder in terms of π , a and h
- (b) The radius of the base of a right circular cone is $2a$ and its height is $2a$. Find its volume in terms of π and a .
- (c) (i) If the cylinder and the cone are made of the same material, indicate the volume of the material from which the cylinder and the cone are made in terms of π and a when $h = 2a$.
- (ii) The cylinder and the cone are melted and spheres of radius a are made without wastage. Find the number of spheres that are made.
8. (i) Draw a circle of radius 3.5 cm. Name its centre O.
- (ii) Mark a point on the circle and name it A. Construct the tangent that touches the circle at point A.
 - (iii) Mark point B on the tangent, 6 cm away from point A. Construct another tangent to the circle from point B. Name the point at which that tangent touches the circle as C.
 - (iv) Construct the circle passing through A, B, C and O. Measure and write its radius.
9. A man when buying a television set worth Rs. 40 000, first pays Rs. 10 000 in cash. He promises to pay the remaining amount by way of reducing balance under the annual interest rate of 12% within a period of 60 months in equal instalments. What is the instalment he should pay monthly?
10. (a) Explain the mid point theorem using a suitable diagram.

- (b) In the triangle ABC shown in the diagram, the mid points of the sides AB, AC and BC are X, Y and Z respectively.

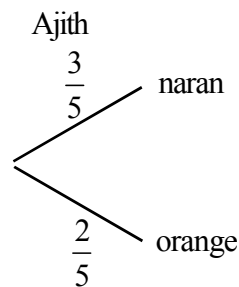


- (i) Show that XYZB is a parallelogram.
 - (ii) Show that $AB + AC + BC = 2(XY + YZ + XZ)$.
 - (iii) Prove that XYZB is a rhombus if $AB = BC$.
11. (a) Draw the right angled triangle ABC so that \hat{B} is a right angle. Write Pythagoras' theorem with respect to this triangle.
- (b) ABC is a triangle in which \hat{B} is a right angle. In it, point X is located on BA and point Y

is located on BC so that $2BX = AX$ and $2BY = YC$. Draw a diagram including the above data and show that $9(CX^2 + AY^2) = 10AC^2$.

12. A bag contains 3 naran - flavoured toffees and 2 orange flavoured toffees of identical shape and size. Ajith took a toffee randomly from the bag and tasted it. Afterwards Kamal also took a toffee from the bag and tasted it.
- (i) Indicate the sample space on a grid.
 - (ii) Using it, calculate the probability of both getting the same flavoured toffees.

Amith had a thought of representing these information in a tree diagram. An incomplete tree diagram drawn for this is shown here.



- (iii) Copy this tree diagram in your paper and complete the rest of it.
- (iv) Using that diagram, find the probability of both getting naran flavoured toffees.
- (v) Amith says that there is a greater probability of both receiving toffees of the same flavour rather than toffees of different flavours. Give reasons to show that this statement is not true.

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Mathematics Question Paper - 4

Answers and the Marking scheme

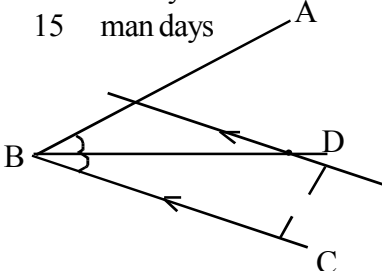
Paper I - Part A

Question No.	Answer	Marks											
(1)	19, 23		②										
(2)	Length of hypotenuse 5 cm	01											
	$\sin \theta = \frac{4}{5}$	02	②										
(3)	$(x + 2)(x + 3)$		②										
(4)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Data</th> <th></th> </tr> </thead> <tbody> <tr> <td>Heights of students in a class</td> <td align="center">√</td> </tr> <tr> <td>Ages of studentes in a class</td> <td align="center">√</td> </tr> <tr> <td>Number of family members</td> <td></td> </tr> <tr> <td>Runs scored in a cricket match</td> <td></td> </tr> </tbody> </table>	Data		Heights of students in a class	√	Ages of studentes in a class	√	Number of family members		Runs scored in a cricket match			②
Data													
Heights of students in a class	√												
Ages of studentes in a class	√												
Number of family members													
Runs scored in a cricket match													
(5)	$x = 180^{\circ} - (60^{\circ} + 65^{\circ}) = 180^{\circ} - 125^{\circ} = 55^{\circ}$	01											
	$x = 55^{\circ}$	02	②										
(6)	$= \frac{3-2}{3x}$	01											
	$\frac{1}{3x}$	02	②										
(7)	$1 = m \times 2 - 5$	01											
	$6 = 2m$												
	$m = 3$	02	②										
(8)	$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $B = \{2, 4, 6, 8\}$ For the elements of A and B	01											
	$A \cap B = \{2, 4, 6, 8\}$	02	②										
(9)	$12a^2b^2c$	02	②										
(10)	$x = 70^{\circ}$	01											
	$y = 55^{\circ}$	01	②										
(11)		02	②										
(12)	$\frac{1}{4} \left(2 \times \frac{22}{7} \times 7 \right) + 7 \times 4$	01											
	39 cm	02	②										

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Mathematics Question Paper - 4

Question . No	Answers	Marks	
(13)	$\hat{CBA} = 35^{\circ}$ $x = 35^{\circ}$	01 02	②
(14)	$\frac{5 \times 12}{500} \times 100\%$ 12%	01 02	②
(15)	$\frac{10}{10} \text{ ms}^{-1}$ 1 ms^{-1}	01	②
(16)	$\frac{3}{4} \pi r^2$		②
(17)	$\frac{12}{40}$ or $\frac{3}{10}$		②
(18)	$AX=5 \text{ cm}, AY=7 \text{ cm}, XY=6 \text{ cm}$ Perimete of $AXY\Delta = 18 \text{ cm}$	01	②
(19)	$1 : 4$		②
(20)	$OB^2=3^2+4^2$ $OB=5 \text{ cm}$	01	②
(21)	120 man days 15 man days	01	②
(22)		01 01	②
(23)	$\lg_2 a = \frac{b}{2}$ $a = 2^{\frac{b}{2}}$	01	②
(24)	$2x - 2y = 4$ $x - y = 2$	01	②
(25)	$\hat{AOC} = 2y$ $2y + x = 180^{\circ}$	01	②

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Mathematics Question Paper - 4

1 - B - Answers

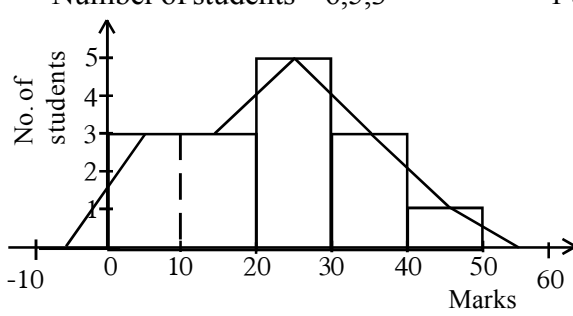
Question No.	Answers	Marks	Other		
1	(i) Part not tarred	$= 1 - \frac{2}{7}$	1		
		$= \frac{5}{7}$	1		②
	(ii) Part laid with concrete	$= \frac{5}{7} \times \frac{3}{4}$	1		②
		$= \frac{15}{28}$	1		
	(iii) Part covered with gravel	$= 1 - \left(\frac{2}{7} + \frac{15}{28} \right)$	1		④
		$= \frac{5}{28}$	1		
	Concrete / gravel	$= \frac{15}{28} \div \frac{5}{28}$	1		④
		$= 3$	1		
	(iv) $\frac{15}{28} \rightarrow 225$ m		1		②
	Total distance of the road	$= 225 \times \frac{28}{15}$ m	1		
	$= 420$ m	1	10		
Question No.	Answers	Marks	Other		
2	(a) (i)	Number of boxes in row 5 = 9	1		
		Number of boxes in row 6 = 11	1		②
	(ii)	An arithmetic progression. The difference between two successive numbers is equal	1		①
	(iii)	$T_{10} = a + (n - 1)d$	1 + 1		②
		$T_{10} = 1 + 9 \times 2 = 19$			
		or has obtained 19 by writing pattern			⑤
		No. of boxes in 10 th row 19	2		
	(b) (i)	4th term in the geometric progression = $ar^3 = 40$	1		④
		7th term in the geometric progression = $ar^6 = 320$	1		
		$\therefore \frac{ar^6}{ar^3} = \frac{320}{40} \Rightarrow r^3 = 8$	1		④
	$r = \underline{\underline{2}}$	1			
(ii)	Substituting the value of r in $ar^3 = 40$	1	①		
	$a \times 8 = 40 \Rightarrow a = \underline{\underline{5}}$	1			
			10		

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Mathematics Question Paper - 4

Question No.	Answers	Marks	Other	
3	(i) If V is the volume of the Tank			
	Volume filled in 1 hour by A = $\frac{V}{8}$	1		
	Volume filled in 1 hour by B = $\frac{V}{12}$	1		
	Volume filled in 1 hour by both taps = $\frac{V}{8} + \frac{V}{12}$			
	$= V\left(\frac{1}{8} + \frac{1}{12}\right)$	1		
	$= \frac{5V}{24}$	1		
	Time to fill half of the tank = $\frac{V}{2} \div \frac{5V}{24}$	1		
	$= \frac{24}{10}$ hours	1	⑥	$\frac{12}{5}$ hours
	(ii) Volume filled in 1 hour when all the taps are opened			
	$= \frac{V}{8} + \frac{V}{12} - \frac{V}{6}$	1		
$= \frac{V}{24}$	1	②		
(iii) Time to fill the other half = $\frac{V}{2} \div \frac{V}{24}$	1			
$= 12h$	1	②		
		10		

Question No.	Answers	Marks	Other
4	(a) (i) Number of students = 6,5,3	---1+1+1	③
	(ii) 		
	Connecting to two axes	2	
	Marking points	1	③
	(iii) Sector angles $144^\circ, 120^\circ, 72^\circ$	---1+1+1	③
	(iv) Percentage of students scoring above 30		
$= \frac{4}{15} \times 100\% = 26.66\%$	1	①	10

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Mathematics Question Paper - 4

Question No.		Answers	Marks	Other
5)	(a)		1 1	
	(i)	20	③	
	(ii)	Shading	①	
	(iii)	$\left[\begin{array}{l} 10 + 20 = 30 \\ 60 - 30 = 30 \end{array} \right]$	②	△6
		∴ Number of boys participating in sports = 30		
(b)	(i)	$n(A \cup B) = n(A) + n(B) - n(A \cap B)$	②	
	(ii)	$n(A \cup B) = 8 + 10 - 6$	1	
		$n(A \cup B) = 12$	1	
			②	△4
				10

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Mathematics Question Paper - 4

Paper II

Question No.			Answers	Marks			Other
1	(a)	(i)	No. of Sarath's shares = $\frac{25\ 000}{50} = 500$	1	①	(b) (i) Total amount after 1 year $= \frac{110}{100} \times 50000 = 55000 - 1$ Total amount after 2 year $= \frac{110}{100} \times 55000 = 60500 - 1 - \textcircled{3}$	
		(ii)	Sarath's income = $2 \times 500 = \text{Rs. } 1\ 000$	1	①		
		(iii)	Value of Kamal's shares = $\frac{2\ 500}{2} \times 50$ = Rs. 62 500	1 1	②		△ 4
	(b)	(i)	Amount due = $50\ 000 \times \frac{110}{100} \times \frac{110}{100}$ = Rs. 60 500	1+1 1	③		
		(ii)	Simple interest = $50\ 000 \times \frac{11}{100} \times 2 = \text{Rs. } 11\ 000$ Amount due = Rs. 50 000 + 11 000 = Rs. 61 000 Under simple interest Rs. 500 more should be paid. The statement is false.	1 1 1	③		△ 6
							10

Question No.			Answers	Marks			Other
(02)		(i)	3		②	10	
		(ii)	$-3 < x < -1$	1+1	②		
		(iii)	$k = 4$		②		
		(iv)	Roots -3 and +1	1+1	②		
		(v)	$y = (x+2)^2$		②		

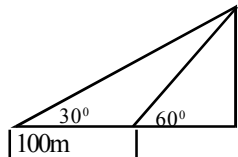
Question No.			Answers	Marks			Other
(03)	(a)	(i)	2×2	1	①		
		(ii)	$\begin{pmatrix} 2 \times 1 + 1 \times 2 & 2 \times 0 + 1 \times 1 \\ -1 \times 1 + 2 \times 0 & -1 \times 0 + 0 \times 1 \end{pmatrix}$ $\begin{pmatrix} 4 & 1 \\ -1 & 0 \end{pmatrix}$	2 1	③		△ 4

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Mathematics Question Paper - 4

Question No.			Answers	Marks		Other
		(ii)	$2x + 3y = 48$ – ① $4x + 2y = 64$ – ② ①×2, $4x + 6y = 96$ – ③ $③ - ②, 4x + 6y - (4x + 2y) = 96 - 64$ $4y = 32$ $y = 8$ Substituting the value of y in ① $2x + (3 \times 8) = 48$ $x = 12$	1	②	
		(iii)	Amount for 5 guavas and 5 naran fruits = $8 \times 5 + 12 \times 5$ =Rs. 100 Agree.	1	③	
						① 6 10

Question No.			Answers	Marks		Other
4	(a)	(i)	Diagram 	2	②	
		(ii)	7cm	1	①	
		(iii)	140 m	1	①	4
	(b)	(i)	200m	1	①	
		(ii)	Speed of ball A = $\frac{200}{10}$ (a suitable value) = 20 ms^{-1}	1		
			Speed of ball B = $\frac{200}{5}$ (a suitable value) = 40 ms^{-1}	1		
		(iii)	40 : 20 2 : 1	1	④	
				1	①	6 10

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Mathematics Question Paper - 4

Question No.	Answers	Marks	Other
5	Time for A $t_1 = \frac{120}{x}$	1	
	Time for B $t_2 = \frac{120}{x-20}$	1	
	②-① $t_2 - t_1 = 1$	1	
	$\frac{120}{x-20} - \frac{120}{x} = 1$	1	
	$2400 = x^2 - 20x$	1	
	$x^2 - 20x - 2400 = 0$		
	$(x-60)(x+40) = 0$	2	
	$x = 60 \quad x = -40$	2	
	x cannot be negative		
	$x = 60 \text{ kmh}^{-1}$	1	

Question No.	Answers	Marks	Other																																
(06)	<table border="1"> <thead> <tr> <th>Units of water</th> <th>Mid value (x)</th> <th>Frequency (f)</th> <th>$f \times x$</th> </tr> </thead> <tbody> <tr><td>20-25</td><td>22.5</td><td>2</td><td>45.0</td></tr> <tr><td>25-30</td><td>27.5</td><td>4</td><td>110.0</td></tr> <tr><td>30-35</td><td>32.5</td><td>10</td><td>325.0</td></tr> <tr><td>35-40</td><td>37.5</td><td>8</td><td>300.0</td></tr> <tr><td>40-45</td><td>42.5</td><td>5</td><td>212.5</td></tr> <tr><td>45-50</td><td>47.5</td><td>1</td><td>47.5</td></tr> <tr> <td align="center" colspan="2"></td> <td align="center">$\sum f = 30$</td> <td align="center">$\sum fx = 1040$</td> </tr> </tbody> </table>	Units of water	Mid value (x)	Frequency (f)	$f \times x$	20-25	22.5	2	45.0	25-30	27.5	4	110.0	30-35	32.5	10	325.0	35-40	37.5	8	300.0	40-45	42.5	5	212.5	45-50	47.5	1	47.5			$\sum f = 30$	$\sum fx = 1040$		
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	Mid value column	1																																	
	$f \times x$ column	1																																	
	Σf	1																																	
	Σfx	1																																	
	Mean = $\frac{\sum fx}{\sum f} = \frac{1040}{30}$	1																																	
	= 34.6	1	⑥																																
Extra cost for a unit = Rs. 12 - 7 = Rs. 5	1																																		
Extra cost for 50 houses = Rs. 5 × 34.6 × 50	1																																		
= Rs. 8650	1																																		
∴ The statement made is true.	1	④	10																																

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Mathematics Question Paper - 4

Question No.	Answers	Marks	Other
07	(a) (i) Area of the curved surface of the cylinder = $2\pi \times 2a \times 3h$ $= 12\pi ah$	1 ①	
	(ii) Volume of the cylinder = $\pi \times (2a)^2 \times 3h$ $= 12\pi a^2 h$	1 ①	2
	(b) Volume of the cone = $\frac{1}{3} \pi (2a)^2 \times 2a$ $= \frac{8}{3} \pi a^3$	1 ②	2
	(c) (i) Volume of substance in cone and cylinder $= 12\pi a^2 h + \frac{8}{3} \pi a^3$ $= \frac{4}{3} \pi a^2 (9h + 2a)$	1 1	
	Total volume when h is $2a = \frac{4}{3} \pi a^2 (9 \times 2a + 2a)$ $= \frac{80}{3} \pi a^3$	1 1 ④	
	(ii) Number of spheres that are made = $\frac{80}{3} \pi a^3 \div \frac{4}{3} \pi a^3$ $= 20$	1 1 ②	6
			10

Question No.	Answers	Marks	Other
08	(i) Drawing the circle	1 ①	
	(ii) Drawing the radius OA Constructing perpendicular to radius OA at A	1 2 ③	
	(iii) Marking distance AB Drawing the arc of radius BA and marking C Drawing BC	1 1 1 ③	
	(iv) Constructing perpendicular bisector of OB Drawing the circle with radius EB Measuring radius (EB = 3.5cm)	1 1 1 ③	

10

