

5.1 Objectives

Mathematics I - Part A

01. Shades the area showing the intersection set when a Venn diagram of two intersecting sets is given.
02. Solves an inequality of the type $ax - b > cx + b$; $a, b, c \in \mathbb{Z}$.
03. When the exterior angle formed by producing a side of a triangle and one of the two interior opposite angles are given, finds the value of the remaining angle.
04. Calculates the total number of students using a given histogram.
05. Given the value of an angle of a parallelogram, writes down its opposite angle.
06. Finds the value of the remaining element given three elements of the product of two given 2×2 matrices.
07. Completes the steps of showing the congruence of two triangles given the figurative information.
08. Finds the initial amount when the annual interest rate, time and interest are given.
09. Given a diagram showing a line joining the mid points of two sides of a triangle, writes two relationships between that line joining the mid points and the other remaining sides.
10. Divides an algebraic fraction with an algebraic term in the denominator by another algebraic fraction with an algebraic term in the denominator.
11. Calculates the value of one angle when a pair of opposite angles of a cyclic quadrilateral are given in algebraic terms.
12. Finds the radius of a circle when the length of a chord of the circle and the perpendicular distance from the centre of the circle to the chord are given.
13. Finds the gradient of a straight line, given a diagram with the coordinates of a point on the straight line and the coordinates of the point of intersection of that line and the y -axis.
14. Finds the perimeter of a sector, given its radius and the angle.
15. Finds the number of man days required for the remaining part of a work after completion of a part of it, given the number of people and the number of days required for that work.
16. Finds the sum of unknowns without solving a pair of simultaneous equations and finding the values of the two unknowns separately.

17. Finds the value of angles given in algebraic symbols when the angle subtended by a chord of a circle at the centre and the circumference are given in algebraic symbols and one of the two angles between the lines joining the ends of the chords and the centre are given.
18. Finds the distance travelled during a certain period of time when the starting time of journey and the uniform speed are given.
19. When an angle indicated by a symbol and the lengths of the sides of a right angled triangle are given, writes the sine of that angle and the cosine of the complementary angle.
20. Given the successive terms of an arithmetic progression with an unknown, (i) finds the common difference (ii) writes the value of a certain term in terms of the unknown.
21. Writes a pair of sides equal to a side of the quadrilateral, given a quadrilateral with a diagonal and two equal angles in each of the two triangles separated by the diagonal.
22. When the sample space related to the event of tossing a fair coin twice is given in a grid, finds the probability of getting the same side on two occasions.
23. Calculates the height of a cylinder given the area of the curved surface and radius.
24. Solves a simple equation containing algebraic fractions with algebraic terms in the numerator.
25. Indicates as a power of 2, a required term of a geometric progression in which the common difference is 2 and the initial term is a power of two.

Part B

1. (a) When a given fraction of a sum of money is divided into equal parts, simplifies each part as a fraction of the initial sum.
- (b) Given the number of students scoring below a certain mark as a fraction, the number of students scoring above another mark as a percentage and the remaining number of students sitting a certain examination,
 - (i) writes the number of students scoring above a given mark as the simplest fraction of the total number of students.
 - (ii) writes the number of students scoring between two given marks as a fraction of the total number of students.
 - (iii) finds the total number of students in the class.
 - (iv) finds the total expenditure for awarding prizes of a certain value for a selected sector of students.

2. When a square is included in a circle of a given radius and given that the circle is divided into four equal parts
- (i) finds the angle subtended at the centre by one such part.
 - (ii) finds the area of a sector.
 - (iii) finds the area of $\frac{1}{4}$ th the square.
 - (iv) finds the area of the section not covered by the square.
 - (v) finds the perimeter of the shaded area of a sector.
3. (a) Given the annual property value of a house and the annual rates percentage,
- (i) calculates the annual rates for the house.
 - (ii) finds the rate paid for a quarter for the house.
 - (iii) calculates the annual property value of the house given the rates paid for a quarter for another house in the same regional authority.
- (b) Calculates the price of an imported television before paying the tariff, given the tariff percentage and the price with tariff.
4. Given the probability of passing and qualifying for university admissions of students in a school sitting the Advanced Level examination,
- (i) finds the probability of failing the examination.
 - (ii) draws the tree diagram showing the passing and failing in the examination.
 - (iii) extends the tree diagram to indicate admission and non-admission to the university.
 - (iv) finds the probability of admitting to the university having passed the examination.
 - (v) finds the number entering university given the number of students appeared for the examination.
5. For a grouped frequency distribution of marks scored by a group of students
- (a) completes the cumulative frequency column.
 - (b) draws the cumulative frequency curve using it.
 - (c)
 - (i) Finds the median using the cumulative frequency curve.
 - (ii) Finds the mark that demarcates the 25% of students scoring the highest marks.
 - (iii) Calculates the percentage of students scoring less than a given mark.

Mathematics II

Part A

1. Given the annual simple interest rate,
- (i) writes the interest for Rs. 100.
 - (ii) calculates the total amount received after depositing a certain amount for a certain period of time.
 - (iii) given the interest charged for a certain period of time, finds the amount deposited.
 - (iv) given the interest charged for a certain amount, finds for which period it is.
 - (v) shows that the total amount is a given algebraic expression given the initial amount and time in algebraic symbols.

2. When an incomplete table of values is given for a function that represents the projectile motion of an object with vertical height as h and time as t ,
 - (i) finds the value of the unknown.
 - (ii) finds the height of the light house.
 - (iii) calibrates the axes correctly and draws the graph.
 - (iv) finds the maximum value of the function using the graph.
 - (v) finds the values of t corresponding to a given value of h using the graph.

3. (a) Solves a simple equation with algebraic fractions.

(b) Given a diagram indicating in algebraic symbols the width of a road of uniform width running a round a rectangular land of known length and breadth, and the area of the road, constructs a suitable quadratic equation. Shows that the width of the road is the expression given.

4. Of a pair of towers drawn in a diagram, calculates the height of the taller tower given the distance between the two towers and the angles of elevation of the two towers as seen by a man.

5. (a) (i) Constructs a pair of simultaneous equations in two unknowns based on the information given with regard to the prices of two items.
(ii) Finds the values of the two unknowns by solving the two equations.
(b) Factorises a given algebraic expression.

6. Given that the diameters of a cylinder, cone and a sphere are equal and the perpendicular height of the cone is half the height of the cylinder,
 - (i) writes the radius of the bottom of the cylinder.
 - (ii) calculates the ratio between the volumes of the cylinder and the sphere.
 - (iii) shows that the slant height of the cone is a value given as a surd.
 - (iv) calculates the area of the curved surface of the cone using logarithms.

Part B

7. (a) Given the n^{th} term of an arithmetic progression in the form of an algebraic expression,
 - (i) writes the first three terms of the progression.
 - (ii) finds a given term of that progression.
 - (iii) given the value of a certain term, finds which term it is in the progression.
 - (iv) finds the sum of a given number of terms in that progression.
(b) Finds a required term, given the first term and the common difference of a geometric progression.

8. Using a compass and a ruler with a cm/mm scale,
 - (i) draws a quadrilateral based on given data .
 - (ii) draws a circle which goes through three points of the quadrilateral.
 - (iii) measures and writes the radius of the circle drawn in (ii).
 - (iv) draws a tangent to the circle at a given point on it.

9. Given a grouped frequency distribution indicating the scores obtained,
- writes the class interval that includes the median.
 - calculates the true mean taking the mid point of the median class as the assumed mean.
 - based on the mean found above, predicts the total score that can be expected to be obtained in several competitions.
10. Given the number of elements related to three non disjoint sets,
- draws a Venn diagram and includes given information in it.
 - using the Venn diagram shows that the probability of an event is greater than the given percentage.
11. Given that in an isosceles triangle, a line drawn parallel to the unequal side intersects the other two sides and given two angles which are equal,
- draws a diagram including the information given.
 - shows that two named triangles are congruent.
12. When four points on a circle and the angle subtended at the centre by the arc obtained by joining two of those points are given,
- finds the value of a named angle.
 - writes the theorem which is based to find the value of the angle in (i) above.
 - writes the relationship between two named angle.
 - verifies a relationship among three angles.

5.2 Question Paper

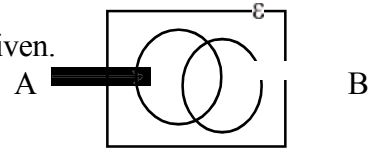
Mathematics I

Time 2 hours

Answer all the questions on this paper itself

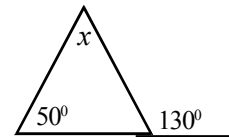
Part A

01. Shade the area corresponding to $A \cap B$ in the Venn diagram given.

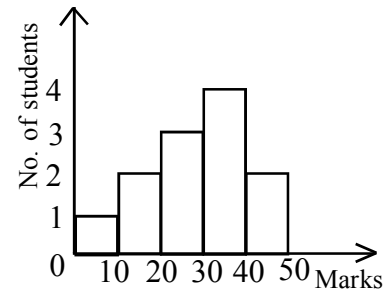


02. Solve the inequality $2x - 1 > x + 1$.

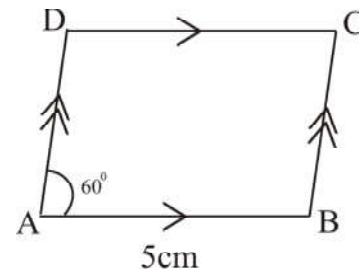
03. Find the value of x based on the information given in the diagram.



04. The histogram shows the marks scored by a group of students. What is the total number of students included in the histogram?



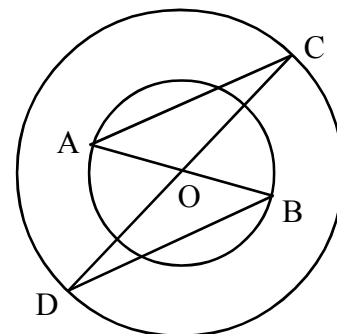
05. Write down the value for \hat{BCD} in terms of the information given in the diagram.



06. If $\begin{pmatrix} 2 & 0 \\ -1 & 1 \end{pmatrix} \begin{pmatrix} 3 & -1 \\ 2 & 1 \end{pmatrix} = \begin{pmatrix} 6 & -2 \\ p & 2 \end{pmatrix}$ find the value of p .

07. There are two concentric circles with centre O. Fill in the blanks below to show that AOC and BOD are congruent.

- OA =(.....)
- \hat{AOC} =(.....)
- OC = OD (Radius of the large circle)
- Therefore, $\triangle AOC \cong \triangle BOD$ (S.A.S)



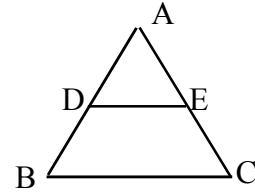
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Mathematics Question Paper - 5

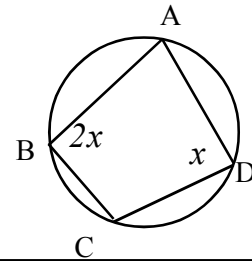
08. Asitha deposited a certain amount of money for two years in a bank which pays 10% annual simple interest and earned Rs. 4,000 as the interest. Find the amount he deposited in the bank.

09. The mid points of the sides AB and AC of the triangle ABC are D and E respectively. Write two relationships between the sides BC and DE.

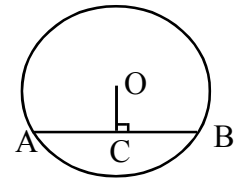


10. Simplify $\frac{4}{3x} \div \frac{1}{6xy}$

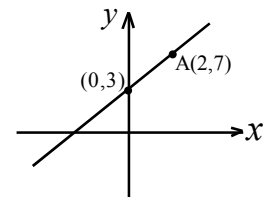
11. A, B, C and D are four points located on the same circle. Find the value of x .



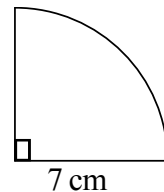
12. In the circle with centre O, $AB = 16$ cm, $OC = 6$ cm and $\angle OCB = 90^\circ$. Find the radius of the circle.



13. According to the data given, find the gradient of the straight line shown.



14. The radius of the sector shown in the diagram is 7 cm. Find the perimeter of this sector. (Take $\pi = \frac{22}{7}$)



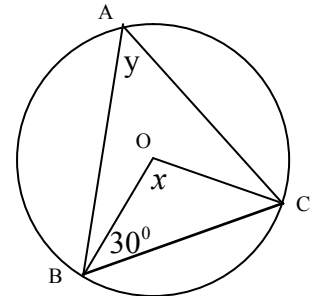
15. Six people can cut a drain in four days. Three people worked for two days. How many man days are needed for the remaining work?

16. Without finding the values x and y values separately, find the value of $x + y$.

$$2x + 7y = 10$$

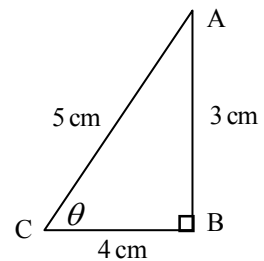
$$3x - 2y = 5$$

17. The vertices of the triangle ABC are located on the circle of centre O . If $\widehat{OBC} = 30^\circ$, find x and y .



18. A vehicle starting from town A at 8.00 a.m, runs with uniform speed of 30 kmh^{-1} . Find the distance travelled by the vehicle when the time is 11.00 a.m.

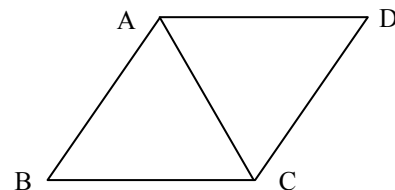
19. Using the given figure, find $\sin \theta$ and $\cos(90 - \theta)$.



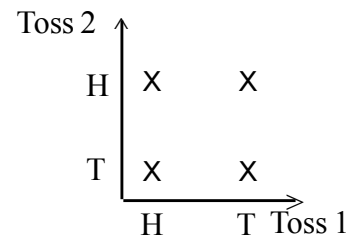
20. $x, x + 3, x + 6, \dots$ are the first three terms of an arithmetic progression. In the progression,

- i find the common difference.
- ii. indicate the 15th term using x .

21. In the diagram $\widehat{ABC} = \widehat{BAC}$ and $\widehat{ACD} = \widehat{ADC}$.
Name two sides equal to side BC .



22. The following grid shows the sample space related to the experiment of tossing a coin twice. What is the probability of getting the same side on both occasions?



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23. The area of the curved surface of a cylinder of radius 7 cm is 440 cm^2 . Find the height of the cylinder. (Take $\pi = \frac{22}{7}$)

24. Solve $\frac{a}{2} - \frac{a}{3} = 1$.

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25. Indicate the 18th term of the geometric progression 8, 16, 32, as a power of two.

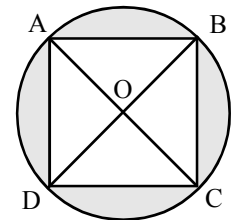
Part B

Answer all the questions on this paper itself.

- 01.(a) A community organisation decided to divide $\frac{2}{3}$ of its funds equally among four social service organisations. What fraction of the initial fund is due for each organisation?
- (b) $\frac{2}{3}$ of the students sitting a mathematics paper scored less than 40 marks. 25% of the students scored more than 75 marks. The balance is 40 students.
- i. Write the number of students who scored more than 75 marks as a fraction of the total number of students in the simplest way.
 - ii. Indicate the number of students scoring from 40 to 75 marks as a fraction of the total number of students.
 - iii. What is the total number of students who sat the paper?
 - iv. If each of $\frac{1}{10}$ of the total students who scored high marks were given Rs.500 worth prizes, find the amount of money needed to be spent on prizes.

02. A square shaped exhibition camp was constructed on a circular plot of land of 70 m radius. The land is divided into four equal parts as shown in the diagram.

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



- i. What is the angle at the centre of the sector shaped plot AOB ?
- ii. Find the area of the sector shaped plot AOB.
- iii. What is the area of the triangular plot of land AOB belonging to the camp?
- iv. Find the area of the shaded part not belonging to the camp.
- iv. What is the perimeter of the shaded part of the sector AOB? (Take $\sqrt{2} = 1.4$)

03. (a) The annual estimated value of a house is Rs. 15 000. The urban council charges an annual rates of 8% for this property.
- (i) What is the annual rates charged for the house?
 - (ii) What is the rates is paid for a quarter?
 - (iii) If the rates charged for a quarter for another house in the same authorised area is Rs. 460, what is the annual estimated value of that house?
- (b) A tariff of 30% is charged for an imported television. The price of the television with the tariff is Rs. 65 000. What is the value of the television before imposing the tariff?
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04. The probability of a randomly selected student who has sat the G.C.E Advanced Level examination during a particular year, passing the examination is $\frac{3}{5}$. The probability of randomly selected student who has passed the examination gaining admission to a university is $\frac{1}{5}$.
- (i) What is the probability of a randomly selected student from those who sat the examination during a particular year failing Advanced Level examination?
 - (ii) Draw a tree diagram to represent the events of passing and failing the Advanced Level examination.
 - (iii) Extend the previous tree diagram to indicate the probabilities of a student who has passed gaining university admissions or not
 - (iv) Find the probability of a student selected at random of those who sat in particular year passing the Advanced Level Examination and gaining admission to the university .
 - (v) If 150 students appeared for the Advanced Level examination from a particular school, find the number of students who can be expected to gain admission to a university .

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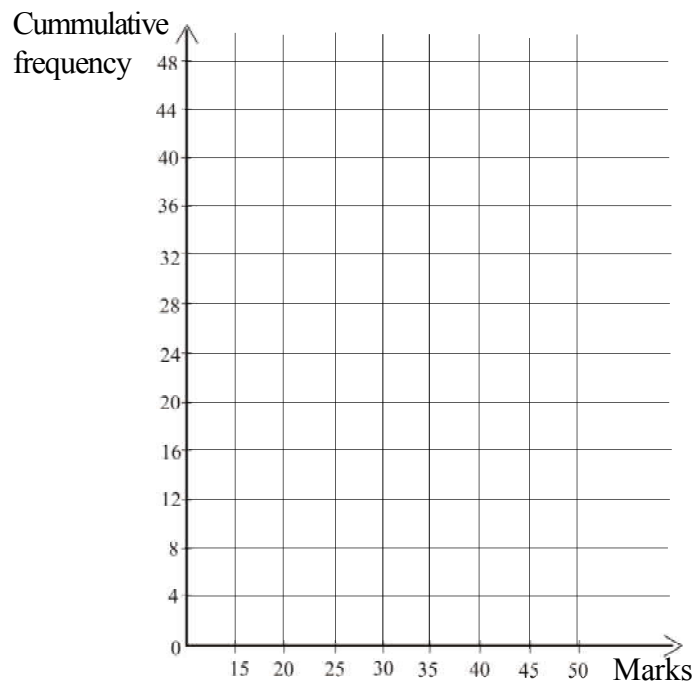
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Mathematics Question Paper - 5

05' A frequency distribution of the marks awarded for an assignment is given below.

Class interval	Frequency	Cumulative frequency
15 - 20	3	3
20 - 25	5	8
25 - 30	9	
30 - 35	14	
35 - 40	8	39
40 - 45	6	45
45 - 50	3	

- a) Complete the cumulative frequency column.
- b) Draw the cumulative frequency curve on the following coordinate plane.



- c) i) Find the mean score of a student using the cumulative frequency curve.
- ii) When selecting the 25% of this group who scored the highest marks, what is the minimum score that should be obtained by a student to be selected?
- iii) Find the percentage of students who scored less than 25 marks.

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Mathematics Question Paper - 5

Mathematics II

Three hours

- Select five questions each from both A and B and answer 10 questions.
- 10 marks are awarded to each question.
- The volume of a right circular cylinder is $\pi r^2 h$ when the radius of the base is r and height is h .
- Volume of a sphere is $\frac{4}{3}\pi r^3$ when its radius is r .

Part A

Answer only five questions.

01. A bank pays 15% simple annual interest for fixed deposits.
- (i) How much interest do you receive for Rs.100.00 ?
 - (ii) If Rs.25,000 is deposited for two years, what is the total amount you will get at the end of two years ?
 - (iii) If a certain amount of money was deposited for three years, and Rs.18,000 was received as the interest, what was the amount deposited in the bank?
 - (iv) How long will it take to get Rs.9,000 as the interest for Rs.30,000 ?
 - (v) If Rs. P is deposited for a period of ' t ' year, then show that $P\left(1 + \frac{3t}{20}\right)$ is the total amount which will be received at the end of the time period ' t '.

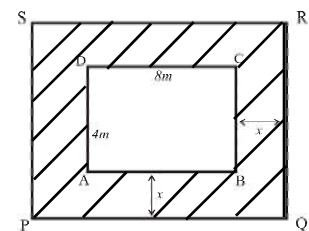
02. The motion of a stone thrown from a lighthouse to the sea is given by $h = 2(9 + 5t - t^2)$. h is the height from sea level to the rock and t is the time of motion of the stone.
Given below is a table with h values relevant to t values to draw the graph of the function of h .

t	0	1	2	2.5	3	4	5	6	7
h	18	26	30	30.5	P	26	18	6	-10

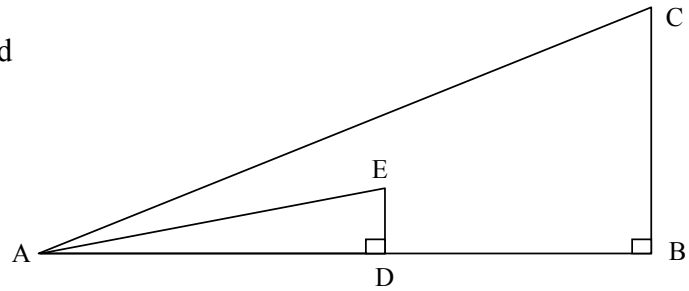
- (i) Find the value of P .
- (ii) Find the height of the lighthouse.
- (iii) Calibrate the axes so that 10 small squares represent one unit on the x axis and 10 small squares represent five units on the y axis and draw the graph of the function h .
- (iv) Calculate the maximum height that can be reached by the stone using the graph.
- (v) Find the time the stone moved at a height of 25 m above the ground.

03. (a) Solve $\frac{x^2}{x+2} + \frac{4}{x+2} = 2$.

- (b) A flower bed ABCD 8 m long and 4 m wide is given in the diagram. The road around it is shown by the shaded portion. Area of the road is 24 m^2 . Using the information given in the diagram, derive a quadratic equation and show that when it is solved, the value of x is $(\sqrt{15} - 3) \text{ m}$.

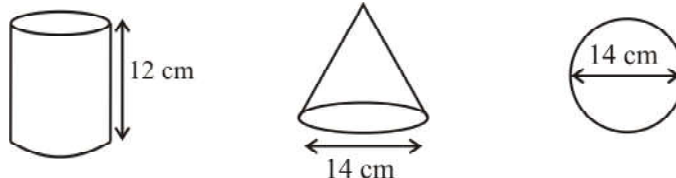


04. A man on a flat land at point A, sees the top C of a tower BC located at a point B on the same ground at an angle of elevation of 65° . He also sees the top of another tower 5 m high erected at a point D in between A and B at an angle of elevation of 30° . The horizontal distance between D and B is 25 m. Calculate the height of the tower BC using trigonometric ratios assuming that the man and the two towers are on the same plane.



05. a) The price of five oranges and seven apples is Rs. 335. Five apples can be bought for the amount spent for six oranges.
- (i) Develop a pair of simultaneous equations based on the above information considering that the price of an orange is Rs. x and the price of an apple is Rs. y .
- (ii) By solving those two simultaneous equations, find the price of an orange and the price of an apple separately.
- b) Find the factors of $8a^3 - 50ab^2$.

06.



The diagram shows a cylinder with a 14 cm base diameter and 12 cm height, a right circular cone, with half the height of the cylinder and with 14 cm base diameter and a sphere with 14 cm diameter.

- (i) What is the radius of the base of the cylinder?
- (ii) Show that the ratio between the volume of the cylinder and the volume of the sphere is 9:7.
- (iii) Show that the slant height of the cone is $\sqrt{85}$ cm.
- (iv) Find the surface area of the curved surface of the cone using the logarithms tables.
(Take $\pi = 3.14$)

Part - B

Answer only five questions.

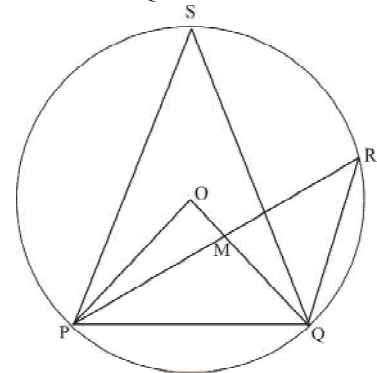
07. (a) The n^{th} term of an arithmetic progression is $5n-3$.
- (i) Write the first three terms of the progression.
 - (ii) Find the 10th term of the progression.
 - (iii) Which term of the progression assumes the value 57?
 - (iv) Find the sum of the first 10 terms of the progression.
- (b) If the first term of a geometric progression is 3 and the common ratio is (-2), find the 7th term.
08. Do the following constructions using the ruler and the compass only. Show the construction lines clearly.
 In a quadrilateral ABCD, $AB = 4$ cm, $\hat{B}AD = 120^{\circ}$ and $AD = 5$ cm. Point C is equidistant from points B and D and 4 cm from E, the mid point of BD. C is located on the side opposite to that of A with respect to BD.
- (i) Construct the quadrilateral ABCD satisfying the above requirements.
 - (ii) Construct the circle which passes through points B,C and D.
 - (iii) Measure and write the radius of the circle.
 - (iv) Draw a tangent to the circle through B.
09. The table given below shows the scores of Pubudu who participated in a few cricket matches within the first nine months of the year.

Score (Class interval)	No. of matches (Frequency f)
00 - 20	1
20 - 40	3
40 - 60	5
60 - 80	11
80 - 100	5
100 - 120	4
120 - 140	1

- (i) What is the class interval which includes the median?
- (ii) Considering the mid value of the class interval having the median as the assumed mean, calculate the mean score of Pubudu.
- (iii) If Pubudu were to participate in 40 matches, what would be his expected total runs scored from all 40 matches?

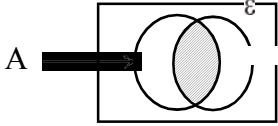

10. Given below is the information collected in a survey conducted about the language ability of workers serving in an office.
- Of them, 39 can work in Sinhala, 35 in Tamil and 25 in English.
 - The number able to work in English and Tamil only is 6.
 - The number who can work in Tamil and Sinhala is twice the number who can work in Tamil and English.
 - 11 are able to work in Sinhala and English.
 - Five can work only in Tamil.
 - All workers can work in at least one language of these three languages.
- (i) Include the above information in a Venn diagram.
- (ii) Show that the probability of a randomly selected worker being able to work in at least two languages is greater than 60%.
11. In the isosceles triangle ABC, $AB = AC$. Line PS drawn parallel to BC intersects AB and AC at Q and R respectively. $\hat{P}BQ = \hat{S}CR$.
- (i) Draw a diagram including the above information.
- (ii) Show that the triangles PBQ and RCS are congruent.

12. The points P, Q, R and S are on the circle of which the centre is O. $\hat{P}OQ = 60^\circ$.



- (i) Find $\hat{P}SQ$.
- (ii) Write the theorem used to get the above answer.
- (iii) What is the relationship between the angles $\hat{P}SQ$ and $\hat{P}RQ$? Give reasons for your answer.
- (iv) Shows that $\hat{P}RQ = \hat{M}QR - \hat{O}PM$.

Paper - I
Part A

- (1)  A  B ---- ②
2. $2x - x > 1 + 1$ --- 1
 $x > 2$ --- 1 ---- ②
3. $x + 50^0 = 130^0$ --- 1
 $x = 80^0$ --- 1 ---- ②
4. $1 + 2 + 3 + 4 + 2$ --- 1
 12 --- 1 ---- ②
5. $\hat{BCD} = 60^0$ ---- ②
6. $P = -1$ --- 1
- $\begin{pmatrix} 6 & -2 \\ -1 & 2 \end{pmatrix}$ --- 1 ---- ②
7. OB (radius of the small circle) --- 1
 \hat{DOB} (vertically opposite angle) --- 1 ---- ②
8. $\frac{4000 \times 100}{10 \times 2}$ --- 1
 Rs. 20000 --- 1 ---- ②
9. $DE = \frac{1}{2} BC$ --- 1
 BC//DE --- 1 ---- ②
10. $\frac{4}{3x} \times \frac{6xy}{1}$ --- 1
 $8y$ --- 1 ---- ②
11. $2x + x = 180^0$ --- 1
 $3x = 180^0$
 $x = 60^0$ --- 1 ---- ②
12. $OB^2 = 6^2 + 8^2$ --- 1
 $OB^2 = 36 + 64$
 $OB^2 = 100$
 $OB = 10 \text{ cm}$ --- 1 ---- ②
13. Gradient = $\frac{7-3}{2-0}$ --- 1
 $= \frac{4}{2} = 2$ --- 1 ---- ②

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14. Perimeter = $7 + 7 + \frac{90}{360} \times 2 \times \frac{22}{7} \times 7$ --- 1
 $= 14 + \frac{1}{4} \times 2 \times \frac{22}{1} \times 1$
 $= 14 + 11$
 $= 25 \text{ cm}$ --- 1 ---- ②
15. $6 \times 4 = 24 \text{ man days}$ --- 1
 work done = $3 \times 2 = 6 \text{ man days}$
 Remaining work = $24 - 6 = 18 \text{ man days}$ --- 1 ---- ②
16. $5x + 5y = 15$ --- 1
 $x + y = 3$ --- 1 ---- ②
17. $x = 180^\circ - (30^\circ + 30^\circ)$ --- 1
 $x = 120^\circ$
 $y = 60^\circ$ --- 1 ---- ②
18. Distance = $30 \text{ kmh}^{-1} \times 3h$ --- 1
 $= 90 \text{ km}$ --- 1 ---- ②
19. $\sin \theta = \frac{3}{5}$ --- 1
 $\cos(90 - \theta) = \frac{3}{5}$ --- 1 ---- ②
20. i) $x + 3 - x = 3$ --- 1
 ii) $T_{15} = x + 14 \times 3$
 $= x + 42$ --- 1 ---- ②
21. $AC = AD$ ---- ②
22. $\frac{2}{4} = \frac{1}{2}$ ---- ②
23. $2 \times \frac{22}{7} \times 7 \times h = 440$ --- 1
 $44h = 440$
 $h = 10 \text{ cm}$ --- 1 ---- ②
24. $\frac{a}{2} - \frac{a}{3} = 1$
 $\frac{a}{\cancel{2}_1} \times \cancel{6}^3 - \frac{a}{\cancel{3}_1} \times \cancel{6}^2 = 1 \times 6$ --- 1
 $3a - 2a = 6, \quad a = 6$ --- 1 ---- ②
25. $T_{18} = 8 \times 2^{18-1}$ --- 1
 $= 2^3 \times 2^{17} = 2^{20}$ --- 1 ---- ②

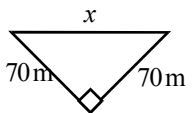
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Mathematics Question Paper - 5

Question No.	Answer	Marks	Other			
01.	(a)	$\frac{2}{3} \div 4$	1			
		$= \frac{2}{3} \times \frac{1}{4}$				
		$= \frac{1}{6}$	1		②	
	(b) (i)	$25\% = \frac{1}{4}$	1		①	
		(ii)	$1 - \left(\frac{2}{3} + \frac{1}{4}\right)$		1	
		$1 - \frac{11}{12}$	1			
		$\frac{1}{12}$	1		③	
	(iii)	$\frac{1}{12} \rightarrow 40$	1			
		$\frac{12}{12} \rightarrow 40 \times 12$	1			
		Number of students = 480	1		②	
(iv)	$480 \times \frac{1}{10} = 48$	1				
	$= 48 \times 500$ $= 24\ 000$	1	②			
			⑩			

Question No.	Answer	Marks	Other	
02.	(i)	90°	1	①
	(ii)	$\frac{1}{4} \times \frac{22}{7} \times 70 \times 70$	1	
		$= 3850\text{ m}^2$	1	②
	(iii)	$\frac{1}{2} \times 70 \times 70$	1	
		$= 2450\text{ m}^2$	1	②
	(iv)	$(3850 - 2450) \times 4$	1	
		$= 1400 \times 4 = \underline{\underline{5600\text{ m}^2}}$	1	②
	(v)	Length of Arc. $= \frac{1}{4} \times 2 \times \frac{22}{7} \times 70$	1	
		$= 110\text{m}$		
		Length of chord $= 98\text{ m}$	1	
Perimeter $= 110 + 98$ $= 208\text{ m}$		1	③	
			⑩	



$x^2 = 70^2 + 70^2$
 $x = 70\sqrt{2}$
 $x = 70 \times 1.4$
 $x = 98\text{ m}$

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Question No.		Answer	Marks		Other
03	(i)	$15\,000 \times \frac{8}{100}$ Rs. 1200	1		
	(ii)	$\frac{1200}{4}$ Rs. 300	1	②	
	(iii)	$\frac{460 \times 4}{8} \times 100$ Rs. 23 000	2		
	(iv)	$\frac{65\,000}{130} \times 100$ Rs. 50 000	1	③	⑩

Question No.		Answer	Marks		Other
04	(i)	$\frac{2}{5}$	1	①	
	(ii)	$\frac{3}{5}$ pass $\frac{2}{5}$ fail	2	②	
	(iii)	$\frac{3}{5}$ pass $\frac{1}{5}$ admitted $\frac{2}{5}$ fail $\frac{4}{5}$ not admitted	1		
	(iv)	$\frac{3}{5} \times \frac{1}{5} = \frac{3}{25}$	1	③	
	(v)	$150 \times \frac{3}{25}$ = 18	1	②	⑩

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Question No.		Answer	Marks	Other	
05.	(a)	17, 31 , 48 for 3 correct answers - 2 for 2 correct answers - 1	2	② $\triangle 2$	
	(b)	Marks the point (15,0) Marks 6 points correctly Smooth curve	1 1	 ③ $\triangle 3$	
	(c)	(i)	$Q_2 = 33$	1	①
		(ii)	38 or 39	2	②
		(iii)	$\frac{8}{48} \times 100\%$ $\frac{100}{6} = 16.6\%$	1 1	 ② $\triangle 5$
				⑩	

**Mathematics - II
Part A**

Question No.		Answer		Marks	Other
01	(i)	Rs.15	1	①	
	(ii)	$\frac{15}{100} \times 25\,000 \times 2$ $= 7\,500$ $25\,000 + 7\,500 = \text{Rs.}32\,500$	1 1 1	③	
	(iii)	$\frac{18\,000 \times 100}{3 \times 15}$ Rs. 40 000	1 1	②	
	(iv)	$t = \frac{9\,000 \times 100}{30\,000 \times 15}$ 2 years	1 1	②	Interest for 1 year
	(v)	Interest for Rs.P = $\frac{15}{100} \times P \times t = \frac{3}{20} Pt$ Total amount = $P + \frac{3Pt}{20}$ Total amount = $P \left(1 + \frac{3t}{20} \right)$	1 1	②	$30\,000 \times \frac{15}{100} = 4\,500$ $\frac{9\,000}{4\,500} = 2 \text{ years}$
			10		

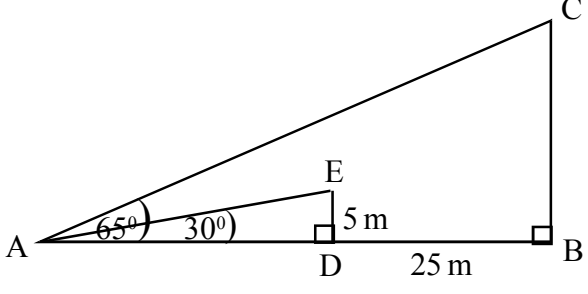
Question No.		Answer		Marks	Other
02	(i)	30	1	①	
	(ii)	18m (when t = 0)	2	②	
	(iii)	Drawing the graph	3	③	
	(iv)	30.5 m (± 0.1)	2	②	
	(v)	t ₁ = 0.8 seconds, t ₂ = 4.2 seconds	2	②	⑩

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Question No.		Answer		Marks	Other	
(3)	(a)	$\frac{x^2}{x+2} + \frac{4}{x+2} = 2$				
		$x^2 + 4 = 2(x+2)$	1			
		$x^2 - 2x = 0$	1			
		$x(x-2) = 0$	1	③	△	
		$x = 0$ or $x = 2$				
	(b)	$(8+2x)(4+2x) - 32 = 24$	2			Area of the road - 1
		$32 + 16x + 8x + 4x^2 - 32 = 24$				Equation - 1
		$4x^2 + 24x - 24 = 0$	1			$x^2 + 6x - 6 = 0$
		$x^2 + 6x - 6 = 0$	1			$x = \frac{-6 \pm \sqrt{36 + 4 \times 1 \times 6}}{2}$
		$x^2 + 6x + 9 = 6 + 9$	1			$x = \frac{-6 \pm \sqrt{36 + 24}}{2}$
		$(x+3)^2 = 15$	1			$x = \frac{-6 \pm \sqrt{60}}{2}$
		$(x+3) = \pm\sqrt{15}$	1			$x = -3 \pm \sqrt{15}$
		$x = \pm\sqrt{15} - 3$	1			$\therefore x = (\sqrt{15} - 3) \text{ m}$
		$x = +\sqrt{15} - 3$ or $-\sqrt{15} - 3$				
Since $x > 0$		1				
$\therefore x = (\sqrt{15} - 3) \text{ m}$			⑦	△		
			⑩			

Question No.	Answer	Marks	Other
04.	 <p>Marks data on the figure</p> <p>From $\triangle ADE$</p> $\tan 30^\circ = \frac{DE}{AD}$ $0.5774 = \frac{5}{AD}$ $AD = \frac{5}{0.5774}$ $AD = 8.66 \text{ m}$ $AB = 25 + 8.66 = 33.66$ <p>From $\triangle ABC$</p> $\tan 65^\circ = \frac{BC}{AB}$ $2.145 = \frac{BC}{33.66}$ $BC = 2.145 \times 33.66$ $BC = 72.20 \text{ m}$ <p>Height of the tower = 72.2 m</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>10</p>

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Mathematics Question Paper - 5

Question No.			Answer	Marks			Other
05.	(a)	(i)	$5x + 7y = 335$	1			
			$6x = 5y$	1	②		
		(ii)	$\begin{cases} 25x + 35y = 1675 \\ 42x - 35y = 0 \end{cases}$	1			
			$67x = 1675$	1			
			$x = 25$	1			
			$5y = 6 \times 25$	1			
			$y = 30$	1	⑤	△7	
	(b)		$8a^3 - 50ab^2$				
			$2a(4a^2 - 25b^2)$	1			
			$2a(2^2a^2 - 5^2b^2)$	1			
		$2a(2a + 5b)(2a - 5b)$	1	③	△3	⑩	

Question No.			Answer	Marks			Other
06.	(i)		7 cm	1	①		
		(ii)	Ratio between the volumes of cylinder and sphere				
		$= \pi \times 7^2 \times 12 : \frac{4}{3} \times \pi \times 7^3$	1+1				
		$= 9 : 7$	1	③			
	(iii)		$l^2 = 7^2 + 6^2$	1			
			$= 49 + 36$				
			$= 85$				
			$l = \sqrt{85} \text{ cm}$	1	②		
	(iv)		Area of the curved surface (A) = $\pi r l$				
			$= 3.14 \times 7 \times \sqrt{85}$	1			
		$\lg A = \lg 3.14 + \lg 7 + \frac{1}{2} \lg 85$					
		$\lg A = 0.4969 + 0.8451 + \frac{1.9284}{2}$	1				
		$A = \text{anti log } 2.3062$	1				
	$A = 202.4 \text{ cm}^2$	1	④	⑩			

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Question No.			Answer	Marks			Other
07.	(a)	(i)	2, 7, 12	1			
		(ii)	$T_{10} = 50 - 3$ $= 47$	1	②		
		(iii)	$5n - 3 = 57$ $5n = 60$ $n = 12$	1			
		(iv)	$S_{10} = \frac{10}{2}[2 + 47]$ $= 5 \times 49$ $= 245$	1			
	(b)		$T_n = ar^{(n-1)}$				
			$T_7 = 3 \times (-2)^{(7-1)}$	1			
			$T_7 = 3 \times (-2)^6$				
			$T_7 = 3 \times 64$	1			
			$T_7 = 192$	1	③	△	
				1	③	△	⑩

Question No.			Answer	Marks			Other
08.	(i)		Construction of AB	1			
			Construction of 120°	1			
			Construction of AD	1			
			Construction of the perpendicular bisector of BD	1			
			Construction of point C	1	⑤		
	(ii)		Obtaining the centre of the circle	1			
			Construct the circle	1	②		
	(iii)		Measures the radius	1	①		
	(iv)		Construction of tangent	2	②	△	⑩

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Question No.	Answer	Marks	Other																																									
09.	<table border="1" style="margin-left: 20px;"> <thead> <tr> <th>class interval</th> <th>f</th> <th>x</th> <th>d</th> <th>fd</th> </tr> </thead> <tbody> <tr><td>0 - 20</td><td>1</td><td>10</td><td>- 60</td><td>-60</td></tr> <tr><td>20 - 40</td><td>3</td><td>30</td><td>- 40</td><td>-120</td></tr> <tr><td>40 - 60</td><td>5</td><td>50</td><td>- 20</td><td>-100</td></tr> <tr><td>60 - 80</td><td>11</td><td>70</td><td>0</td><td>0</td></tr> <tr><td>80 - 100</td><td>5</td><td>90</td><td>20</td><td>100</td></tr> <tr><td>100 - 120</td><td>4</td><td>110</td><td>40</td><td>160</td></tr> <tr><td>120 - 140</td><td>1</td><td>130</td><td>60</td><td>60</td></tr> </tbody> </table> <p align="right" style="margin-left: 20px;">$\Sigma fd = 40$</p> <p>(i) 60-80</p> <p>(ii) column x column d column fd</p> <p align="right" style="margin-left: 20px;">$\Sigma fd = 40$</p> <p>Mean = $70 + \frac{40}{30}$ = 71.33</p> <p>(iii) $71.33 \times 40 = \text{score } 2853.2$ = score 2853</p>	class interval	f	x	d	fd	0 - 20	1	10	- 60	-60	20 - 40	3	30	- 40	-120	40 - 60	5	50	- 20	-100	60 - 80	11	70	0	0	80 - 100	5	90	20	100	100 - 120	4	110	40	160	120 - 140	1	130	60	60	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>1</p>	<p>①</p> <p>⑦</p> <p>⑩</p>	
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80 - 100	5	90	20	100																																								
100 - 120	4	110	40	160																																								
120 - 140	1	130	60	60																																								

Question No.	Answer	Marks	Other	
10.	<p>(i)</p> <p>$x + x + 12 + 6 + 5 = 35$ $2x = 12$ $x = 6$</p> <p>Number who can work in all three languages = 6</p> <p>(ii)</p> <p>$\frac{35}{58}$ Obtain 35 obtain 58</p> <p>Percentage = $\frac{35}{58} \times 100\%$ = 60.34%</p> <p>$\therefore 60.34 > 60$</p>	<p>4</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>⑥</p> <p>④</p> <p>⑩</p>	<p>Correct all 6 areas - 4 Correct 4,5 areas - 3 Correct 2,3 areas - 2 Correct 1 area - 1</p>

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Question No.	Answer	Marks	Other
11.	(i) Figure $\hat{A}BC = \hat{A}CB$ (because $AB = AC$) $\hat{A}BC = \hat{A}QR$ (corresponding angles $BC // PS$) $\hat{A}CB = \hat{A}RQ$ (corresponding angles $BC // PS$) $\hat{A}QR = \hat{A}RQ$ $\therefore AQ = AR$ $AB = AC$ (data) $AQ = AR$ (proved) $AB - AQ = AC - AR$ $\therefore BQ = RC$ $\hat{P}QB = \hat{A}QR$ (vertically opposite angles) $\hat{S}RC = \hat{A}RQ$ (vertically opposite angles) $\therefore \hat{P}QB = \hat{C}RS$ Comparing triangles PQB and RCS $BQ = RC$ (verified) $\hat{P}BQ = \hat{R}CS$ (data) $\hat{P}QB = \hat{C}RS$ (verified) $\triangle PQB \cong \triangle RCS$ (A.A.S)	2 1 1 1 1 1 1 1 1 1	10

Question No.	Answer	Marks	Other
12.	(i) 30° (ii) The angle subtended at the centre of a circle by an arc is equal to twice the angle subtended on the circumference by the same arc. (iii) $\hat{P}SQ = \hat{P}RQ$ (angle in the same segment of a circle are equal) (iv) $\hat{M}QR + \hat{P}RQ = \hat{P}MQ$ (External angle by producing side of a triangle) $\hat{O}PM + \hat{P}OM = \hat{P}MQ$ („) $\therefore \hat{M}QR + \hat{P}RQ = \hat{O}PM + \hat{P}OM$ But $\hat{P}OM = 2\hat{P}RQ$ $\hat{M}QR + \hat{P}RQ = \hat{O}PM + 2\hat{P}RQ$ $\hat{P}RQ = \hat{M}QR - \hat{O}PM$	1 1 1+1 1 1 1 1 1 1	① ① ② ⑥ 10