6.1 Objectives

Paper I - Part A

01. Given one of the two angles opposite the two equal sides of an isosceles triangle, calculates the vertex angle.

02. Given the probability of germination of a sample of seeds, calculates the expected number of seeds that would germinate from a stock of seeds.

03. Shades in a Venn diagram the union of two disjoint sets.

04. Given the time taken by a train running with uniform speed to travel a certain distance in hours, finds the time taken by the same train to travel a given distance with the same speed.

05. Finds the radius of a circle, given the length of a chord and the distance from the centre to the mid point of the chord.

06. Of the given triangles, identifies the pair of triangles that are congruent and writes criteria for congruence.

07. Solves an inequality of the type $ax + b \geq 0$ and indicates the solution on the number line.

08. Given the value of one angle in a given diagram relating to a semi-circle, calculates the value of a named angle.

09. Given the coordinates of a point on a straight line passing through the origin, finds the gradient of that line.

10. Factorises an expression with three terms.

11. Given the figure of a parallelogram and the sum of its two opposite angles, finds the value of one of those angles.

12. Calculates the volume of a right prism whose cross section is a right angled triangle, when the length of the sides which include the right angle and the length of the prism are given.

13. Given the loan amount and the annual simple interest rate, finds the total amount required to settle the loan at the end of the year.

14. Given the mean and the assumed mean, calculates the mean value of the deviations.

15. Given the two sides of a right angled triangle which include the right angle in algebraic terms, writes the tangent of the named angle.

16. Given the number of days taken by a certain number of men to complete a task, finds the number of days taken by another number of men to complete the same task.

17. Calculates the perimeter of a semicircular lamina of known diameter.

18. Calculates the annual rates percentage, given the annual value of a house and the rates charged per a quarter.

19. Finds a named angle in a diagram of a triangle in which the mid points of two sides are given.

20. Subtracts two algebraic fractions with related algebraic terms in the denominator.

21. Finds the sum of two unknowns in two simultaneous equations without solving them.

22. Finds the sequential position of a given term in an arithmetic progression with given initial terms.

23. Calculates the values of two unknowns in two equal matrices of order 2×2 with some unknowns entries.

24. When a diagram of a cyclic quadrilateral with two parallel sides and a side produced is given, finds the value of the exterior angle when the value of an angle of it is given.

25. Given a diagram of an equilateral triangle with its vertices on a circle and another triangle formed by joining two of its vertices to the centre, finds the value of the angle subtended at the centre by the chord formed between the vertices of the triangle joined to the centre.

Part B

1. Given two parts of a whole as fractions
   (i) indicates the sum of those parts as fraction.
   (ii) when the sum of the two parts is removed from the whole, indicates the remainder as a fraction of the whole.
   (iii) indicates as a fraction of the whole, a fraction of the fraction obtained in (ii).
   (iv) indicates the quantity of the whole when the quantity remaining after the fraction in (i) and (iii) above are removed from the whole is given..

2. Given a diagram of a cylindrical block of metal whose radius and height are marked on it,

   (i) finds the area of the curved surface of the block of metal.
   (ii) finds the total surface area of the metal block.
   (iii) finds the volume of the metal block.
   (iv) finds the radius of a cylindrical metal block of given volume and of height equal to that of the former metal block.

3. (a) Given the percentage custom duty and the value of an item,
   (i) finds the custom duty.
   (ii) calculates the value after paying the duty.

   (b) Given the part of the annual income of a businessman which is exempt from tax, his annual income and the income tax percentage,
   (i) calculates the income tax relevant to a given amount.

   Given the amount of income tax and the tax percentage
   (ii) calculates the corresponding income on which the tax is charged.
   (iii) calculate the total annual income.

4. (a) Given the probability of germination of a planted seed,
   (i) draws the tree diagram depicting the events of germinating or not germinating .

   Given the probability of the plant developed from a germinated seed producing new seeds.
   (ii) extends the tree diagram drawn in (i) to show the events of production and non-production of seeds.
   (iii) finds the probability of a planted seed producing new seeds using the tree di.agram.

   (b) Finds the probability of getting the same number in both dice when tossing two dice simultaneously in which equal numbers are written in pairs.

5. Given an incomplete table and incomplete histogram,

   (i) completes the table using the data given in the histogram.
   (ii) completes the histogram using the data given in the table.
   (iii) draws the frequency polygon using the histogram.
   (iv) finds the total number of students using the table or the histogram.
   (v) calculates the percentage of students scoring below a given mark.

Paper II

Part A

1. Given the price of an object, initial payment, number of premiums and that the interest is calculated on the reducing balance,
   (i) calculates the total interest payable when the value of a premium is given.
   (ii) calculates the annual interest rate.

2. (a) When a function is given in the form $y = (x + a)(b - x)$; $a, b \in \mathbb{Z}^+$,
   (i) completes an incomplete table consisting of values of y corresponding to given values of x,
   (ii) decides on a suitable scale for the axes and draws the graph.

   (b) Using the graph drawn,
   (i) writes the equation of the axis of symmetry.
   (ii) finds the maximum value of the function.
   (iii) writes the coordinates of the turning point.

   (c) Using the roots of the equation y = 0, deduces and writes the quadratic function with given roots.

3. (a) (i) Factorises a given algebraic expression with squares.
   (ii) Finds a named matrix when a relationship between matrices is given in the form of an equation.

   (b) (i) Constructs a pair of simultaneous equations according to given information on the basis that opposite sides of a rectangle are equal.
   (ii) Writes the lengths of the named sides of the rectangle by solving those simultaneous equations.

4. (a) Based on given information, draws a diagram according to a given scale and calculates the relevant height.

   (b) Given the angle of elevation at which the top of a post erected on a levelled ground at a given horizontal distance from a person is seen ,

   (i) sketches the information provided.
   (ii) calculates the height of the post.
   (iii) given the distance walked by the person towards the post, calculates the angle of elevation of the top of the post from the person's new position.

5. Given the speed of one train by an algebraic term, the relationship between the speeds of the two trains and the distance between the two trains after a certain period of time with regard to two trains starting from the point at which two perpendicular railway lines meet,
   (i) shows that the given algebraic symbol satisfies a given quadratic equation.
   (ii) finds the speeds of the two trains by solving that equation.

6. (a) Given the diameter of the bottom and the perpendicular height of a cone,
   (i) calculates the radius of the bottom.
   (ii) calculates the area of the curved surface of the cone.

   (b) Using the logarithms table, finds the value of an expression of the type $\frac{a \times b^{\frac{1}{3}}}{c^2}$ where a, b, c are numbers between 0 and 25.

7. When the first term, second term and common difference of an arithmetic progression are given which are related to an event,
   (i) shows that the sum of n terms is a given expression.
   (ii) finds the number of terms when the sum of the terms from the first term onwards is given.

8. Given the length of the hypotenuse and a side of a right angled triangle'
   (i) constructs that triangle.
   (ii) constructs the perpendicular bisector of a side and names the point of intersection of the perpendicular bisector and a named side.
   (iii) constructs a circle touching a given side at a given point and passing through a given point.
   (iv) measures and writes the radius of the circle drawn.
   (v) constructs another tangent to the circle from an external point and writes the theorem on which the construction is based.

9. For a given grouped frequency distribution,
   (i) writes the class interval that includes the mode.
   (ii) writes the class interval that includes the median.
   (iii) calculates the mean of the distribution to the nearest whole number by taking the mid value of the modal class as theassumed mean.
   (iv) shows that a given event is true using the mean.

10. (i) Displays in a Venn diagram the information given about three sets.
   (ii) Writes in set notation the relationship between two given sets.
   (iii) Finds the number of elements in a named sets.
   (iv) Finds the number of elements in the complement of the three sets.

11. (a) States two requirements for a quadrilateral to be a parallelogram.
(b) When data relating to a parallelogram are given, sketches a diagram indicating the given data and shows that a given point is the mid point of a given line segment.

12. According to the information given in a diagram consisting of a circle with the centre marked, a chord of it and a tangent drawn at point on the circle,

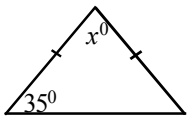
(i) shows that a named pair of triangles is congruent.
(ii) shows that a given line is a tangent to the circle.
(iii) shows that a given quadrilateral is a cyclic quadrilateral.
(iv) determines the centre of the circumcircle of a given cyclic quadrilateral.

6.2 Question Paper

Mathematics I - Part A **Time 2 hours.**

Answer all the questions on this paper itself.

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

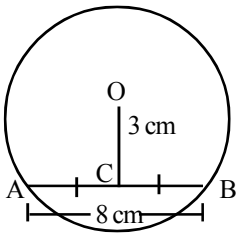


2. It is given that the probability of a seed in a sample of bean seeds germinating is 80%. What is the expected number of germinating seeds are in 200 seeds of that variety of seeds?

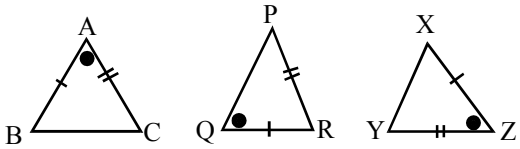
3. A and B are two disjoint sets. Shade $A \cup B$ in a Venn diagram.

4. A train running with uniform speed takes 1/2 an hour to run 60 km. How long will it take to run 80 km?

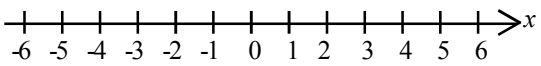
5. AB is a chord in the circle of centre O. Find the radius of the circle as per the information given.



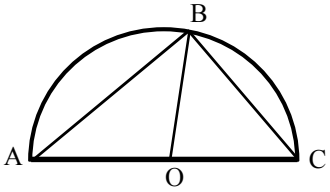
6. Of the triangles given, name the two triangles that are congruent and write the criteria for congruence. (Similar aspects are marked by identical symbols.)



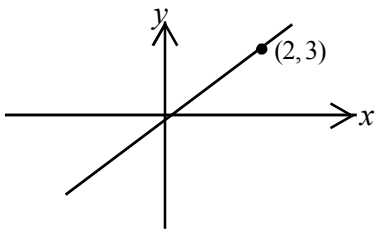
7. Solve the inequality $x + 2 \geq 5$ and indicate the solution on the number line.



8. If $A\hat{B}O = 42^0$ in the semi circle of centre O, find the value of $B\hat{C}O$.

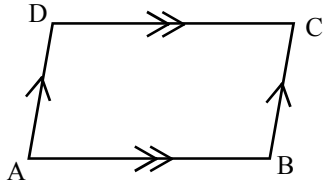


9. The diagram gives the graph of the function $y = mx$.
Find the value of m using the graph.

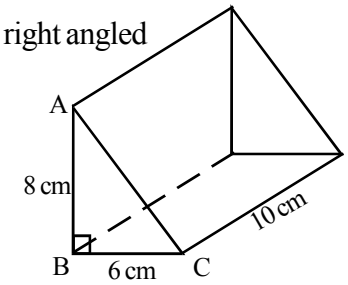


10. Factorise $2x^2 - 9x - 5$.

11. In the parallelogram ABCD, $B\hat{A}D + B\hat{C}D = 104^0$.
Find the value of $B\hat{A}D$.



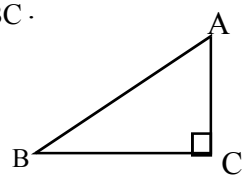
12. The length of the right prism in the figure, whose cross section is a right angled triangle is 10 cm. AB = 8 cm and BC = 6 cm. Find the volume of the prism.



13. Amal takes a loan of Rs. 50 000 at an annual simple interest rate of 12%. Find the total amount that Amal should pay at the end of one year to settle the loan.

14. The true mean of a distribution of numbers is 48.3. If the assumed mean is 49.5 find the mean deviation.

15. In the triangle ABC, AC = $2x$ and BC = $3x$. Find the value of tan $A\hat{B}C$.



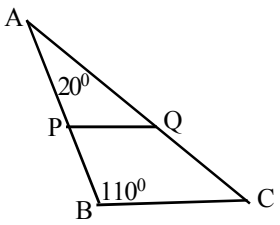
16. 12 people take 6 days to complete a task. How many days will 8 people take to complete the same task?

17. Find the perimeter of the semicircular lamina shown in the diagram.
(Take $\pi = 22/7$)

21 cm

18. Rates of Rs. 500 is paid for a quarter for a house valued Rs. 10 000 for an annum. Calculate the rates percentage charged.

19. In the triangle ABC, the mid point of the sides AB and AC are P and Q respectively. If $A\hat{B}C = 110^0$ and $B\hat{A}C = 20^0$, find the value of $A\hat{Q}P$.



20. Simplify $\frac{3}{2x} - \frac{5}{8x}$.

④⑥⑤

21. If $2a - 3b = 12$ and $a + 6b = -9$, find the value of $(a + b)$ without solving the equation.

22. Which term is 32 in the progression 5, 8, 11, ...

23. If $2\begin{bmatrix} 3 & -2 \\ -5 & x \end{bmatrix} = \begin{bmatrix} 6 & y \\ -10 & 4 \end{bmatrix}$, find the values of x and y.

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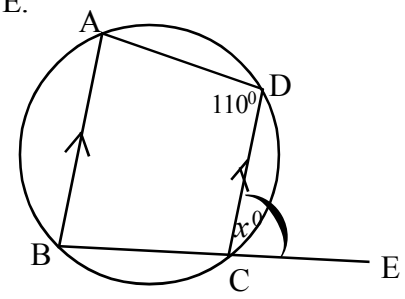
24. In the quadrilateral ABCD, BA//CD. Side BC is produced to E. If $A\hat{D}C = 110^0$, find the value of x.



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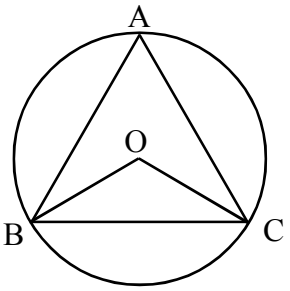
25. The vertices of the equilateral triangle are located on the circle of centre O. Find $B\hat{O}C$.



Part B

1. In a certain year, a tea exporting company exports $\frac{2}{7}$ of their produce to Australia and $\frac{3}{4}$ of the balance to India.

   (i) Of the total produce, what fraction is the amount of tea exported that year?

   (ii) Of the total produce, what fraction is the amount of tea left after exporting?

   (iii) $\frac{3}{5}$ of the amount of tea left after export, was sent to the open market. Of the total produce, what fraction of tea was sent to the open market?

   (iv) The amount of tea left after sending to the open market was 25 metric tons. What is the total amount of tea produced that year in metric tons?

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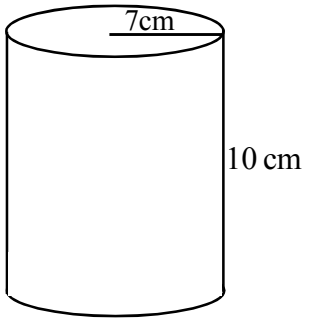
2. The diagram shows a cylindrical metal block of radius 7 cm and height 10 cm. (Take $\pi = {}^{22}\!/_{7}$)

   (i) Find the area of the curved surface of the metal block.

   (ii) Find the area of the whole surface of the metal block.

   (iii) Calculate the volume of the metal block.



   (iv) Find the radius of the cylindrical metal block of volume 6160 cm^3 whose height is equal to the height of the above metal block.

3. (a) 60% is charged as tariff in the import of a vehicle. Varuna imports a vehicle worth Rs. 1 200 000.

(i) How much is the tariff that should be paid?

(ii) What is the value of the vehicle after paying the tariff?

(b) The first Rs. 2 400 000 of the annual income of a businessman is exempted from income tax. An annual income tax of 15% is charged on the income exceeding this amount.

(i) Find the tax that should be paid by a person with an annual income of 3 000 000.

A businessman has paid Rs. 165 000 as income tax.

(ii) Find the income for which tax is paid.

(iii) Find the annual income of the businessman.

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4. (a) The probability of a bean seed selected from a bean seed sample germinating is $\frac{7}{10}$.

(i) Draw a tree diagram to illustrate the events of germination anf non- germination of a planted seed .

The probability of a germinated plant producing beans is $\frac{7}{8}$.

(ii) Extends the tree diagram in (i) above to show the events of the production and non production of beans.

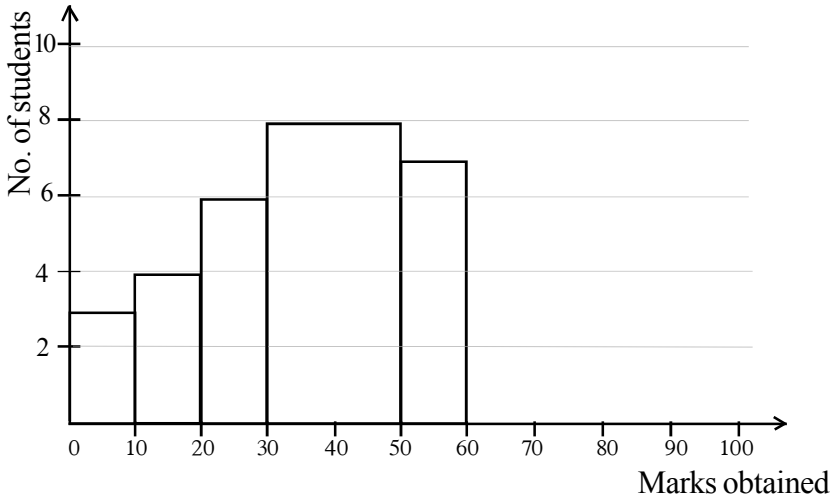
(iii) Using your tree diagram, find the probability ofthe production of beans resulting from a planted bean seed.

(b) Find the probability of getting the same number in both dice when two fair dice numbered 1, 1, 2, 2, 3, 3 are tossed at the same time.

5. An incomplete table containing marks scored by grade 11 students for a test in mathematics is given below.

Marks	Number of students
00 - 10	
10 - 20	
20 - 30	
30 - 50	
50 - 60	7
60 - 100	24

An incomplete histogram drawn to illustrate their marks is given below.



(i) Complete the table using the histogram.

(ii) Complete the histogram according to the data given in the table.

(iii) Draw the frequency polygon using the completed histogram.

(iv) Find the total number of students in the class.

(v) If the students scoring above 60 were passed, indicate the number of failures as a percentage of the total number of students.

Programme of improving G.C.E (O.L.) Examination results

OL/6/32-S-1 **Mathematics Question Paper - 6**

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 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 laptop worth Rs.75 000 is bought by paying $\frac{1}{3}$ its price on the agreement that the rest will be paid in 10 monthly equal installments of Rs.5 412.50. The interest is calculated on the reducing balance .

   (i) What is the total interest payable?

   (ii) Find the annual interest rate.

2. (a) An incomplete table is given below to draw the graph of the function $y = (x+3)(1-x)$.

x	-4	-3	-2	-1	0	1	2
y	-5	0	---	4	3	0	-5

   (i) Find the value of y when $x = -2$.

   (ii) Draw the graph calibrating the axes as appropriate.

   (b) Using the graph,

   (i) write the equation of the axis of symmetry of the graph.

   (ii) find the maximum value of the function.

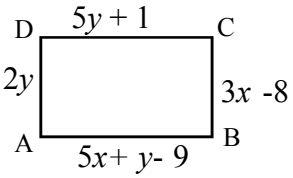
   (iii) write the coordinates of the turning point of the function.

   (c) Find the roots of the equation $y = 0$ and then write the quadratic function $y = (x-a)(x-b)$, $a, b \in \mathbb{Z}$ where y = 0 has roots 2 and -5 .

3. (a) Factorise $a^2 + 2ab + b^2 - c^2$.

   (b) If $3A + \begin{pmatrix} 4 & -1 \\ -2 & 1 \end{pmatrix} = \begin{pmatrix} -2 & 2 \\ 1 & 4 \end{pmatrix}$, find matrix A

   (c) ABCD is a rectangle. The lengths of its sides are given in terms of x and y as indicated in the figure.



   (i) Construct a pair of simultaneous equations, on the basis that the opposite sides of a rectangle are equal.

   (ii) Write the lengths of the sides AB and AD of the rectangle by solving those equations.

4. (a) A man standing on a horizontal ground 75 m away from the base of a communication tower sees its top at an angle of elevation of 30^0. Draw a scale diagram on the scale 1:1500 and find the height of the tower.

(b) A person standing on a flat ground, sees the top of a post situated 10 m away at an angle of elevation of 60^0. (The height of the person is neglected.)

(i) Sketch the above information in a diagram.
(ii) Find the height of the post.
(iii) Find the angle of elevation at which the person sees the top of the post if he walks 4 m towards the post.

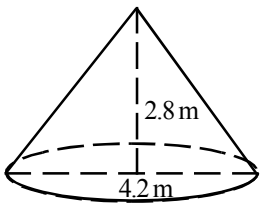
5. From a certain station, two rectilinear railway lines stretch towards the north and the west. Train A heading towards west and train B heading towards north pass the station at the same instance. The uniform speed of B is x km h^{-1} whereas the uniform speed of A is greater by 5 km h^{-1} than that of B. When these two trains had run for 2 hours, the distance between them was 50 km. Based on this information,

(i) show that x satisfies the quadratic equation $x^2 + 5x - 300 = 0$.

(ii) solve that equation and find separately the speed of A and the speed of B.

6. (a) A tent made by a group of scouts is shown in the diagram. It has the shape of a right circular cone. The diameter of the base is 4.2 m and its perpendicular height is 2.8 m.

(i) Find the radius of the base of the tent.
(ii) This tent is fully covered with canvas. Find the area of the canvas used for this in square meters.



(b) Find the value using the logarithms tables . $\dfrac{23.5 \times (0.048)^{\frac{1}{3}}}{(3.824)^2}$

Part B

Answers **five** questions **only**

7. (a) An amateur cyclist practices by cycling along a track, the distance of one round of which is 400 m. He cycles one round on the first day, two rounds on the second day etc, increasing the number of rounds rounds by one every successive day.

(i) If the total distance travelled by the cyclist during n days is S_n, show that $S_n = 200n(n + 1)$

(ii) The trainer of this contender says that he should cycle at least 84 000 m during practice before going to the competition. Find the minium number of days he should practice to meet this requirement.

8. In the following constructions, use a compass and a ruler with a mm/cm scale. Show the lines of construction clearly.

(i) Construct the triangle ABC in which AB = 5 cm, $A\hat{B}C = 90^0$, AC= 6.5 cm.

(ii) Construct the perpendicular bisector of the side BC and name the point it intersects the side AC as X .

(iii) Construct the circle passing through point B touching the side AC at C.

(iv) Measure and write the radius of the circle.

(v) Construct another tangent AE to the circle from point A. Write the theorem used here.

9. Given below is the information regarding the tourists who came to a tourist hotel in year 2013.

No. of tourists	51-60	61-70	71-80	81-90	91-100	101-110	111-120
No. of days	2	4	8	10	12	8	6

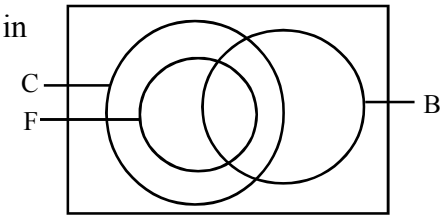
(i) What is the modal class ?

(ii) What is the class interval that includes the median?

(iii) Taking the mid value of the modal class as the assumed mean, find the mean of the number of tourists who visited the hotel in 2013.

(iv) If for 50 days in 2012, the mean of the daily arrival of tourists was 80, show that the arrival of tourists has increased in 2013 by 12.5% compared to 2012.

10. There are 65 members in a school sports club. Of them 40 are in the cricket (C) team, 12 are in the football (F) team and 20 are in the basketball (B) team. All members in the football team belong to the cricket team also. The number of members playing cricket and basketball but not football is 11. The number of members belonging to all the three teams is 4.

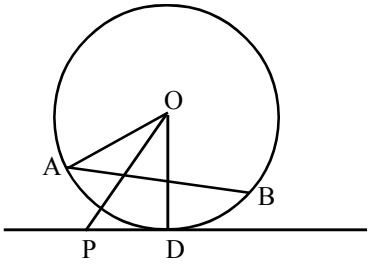


(i) Indicate the above information in a Venn diagram and complete it.
(ii) Write in set notation, the relationship between the sets C and F.
(iii) How many members are playing only basketball?
(iv) How many members do not belong to any of the above three teams?

11. (a) Write two requirements to be satisfied for a quadrilateral to be a parallelogram.

(b) Point X is located within the parallelogram ABCD. The mid point of CX is L. Line BL is produced to Y so that BL = LY. Line AY intersects DX at M. Sketch this information in a diagram and show that the mid point of DX is M.

12. AB is a chord of the circle of centre O in the figure. The tangent drawn to the point D on the circle and the bisector of the angle AOD meet at point P.



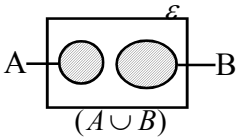
(i) Show that $\triangle$ PAO and $\triangle$ PDO are congruent.
(ii) Show that line PA is a tangent to the circle.
(iii) Show that PAOD is a cyclic quadrilateral.
(iv) What is the location of the centre of the circumcircle of the cyclic quadrilateral PAOD ? Give reasons for your answer.

6.3 Marking Scheme

Mathematics 1 - Part A

1. $x + 70 = 180^0$ 1
   $x = 110^0$ -- ②

2. $200 \times \frac{80}{100}$ 1
   160 -- ②

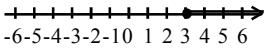
3. 

   $(A \cup B)$ -- ②

4. $\frac{1}{120} \times 80$ . ..1
   $\frac{2}{3}$ h or 40 min ...1 -- ②

5. $B\hat{C}O = 90^0$ ..1
   $OB^2 = 3^2 + 4^2$
   $OB = 5$ ...1 -- ②

6. $\Delta ABC \equiv \Delta XYZ$ (S,A,S) -- ②

7. $x \geq 3$ ...1
   

   ...1 -- ②

8. $O\hat{B}C = 48^0$ 1
   $B\hat{C}O = O\hat{B}C$ (OB=OC radii of the circle)
   $B\hat{C}O = 48^0$ ....1 -- ②

9. Gradient $= \frac{3}{2}$ -- ②

10. $2x^2 - 10x + x - 5$ ...1
    $(x - 5)(2x+1)$ -- ②

11. $B\hat{A}D = B\hat{C}D$ ...1
    $\therefore$ BAD = BCD$= \frac{104}{2} = 52^0$ -- ②

12. $\frac{1}{2} \times 8 \times 6 \times 10$ ...1
    240 cm^3 ...1 -- ②

13. $50\,000 + 50\,000 \times \frac{12}{100}$
    50 000 + 6 000 ...1
    56 000 ...1 -- ②

14. 48.3 = 49.5 + mean deviation ... 1
    48.3 - 49.5 = m.d
    -1.2 = m.d -- ②

15. $\tan A\hat{B}C = \frac{2x}{3x}$ ...1
    $= \frac{2}{3}$ ....1 -- ②

16. $\frac{12 \times 6}{8}$ ... 1
    = 9 -- ②

17. $21 + 2 \times \frac{22}{7} \times \frac{21}{2} \times \frac{1}{2}$ 1
    = 21 + 33
    = 54 cm ... 1 -- ②

18. $\frac{2\,000}{10\,000} \times 100\%$ or 500×4 1
    20% .... 1 -- ②

19. $A\hat{P}Q = 110^0$ ...1
    $A\hat{Q}P = 180^0 - (110^0 + 20^0)$
    $= 180^0 - 130^0$
    $= 50^0$ ...1 -- ②

20. $\frac{12 - 5}{8x}$ ... 1
    $\frac{7}{8x}$ ...1 -- ②

21. $3a + 3b = 3$ ... 1
    $a + b = 1$ .... 1 -- ②

22. $32 = 5 + (n-1) \times 3$.. 1
    $10 = n$ ... 1 -- ②

23. y = -4 ... 1
    $x = 2$ ... 1 -- ②

24. $B\hat{A}D = 70^0$ ...1
    $\therefore x = 70^0$ ...1 -- ②

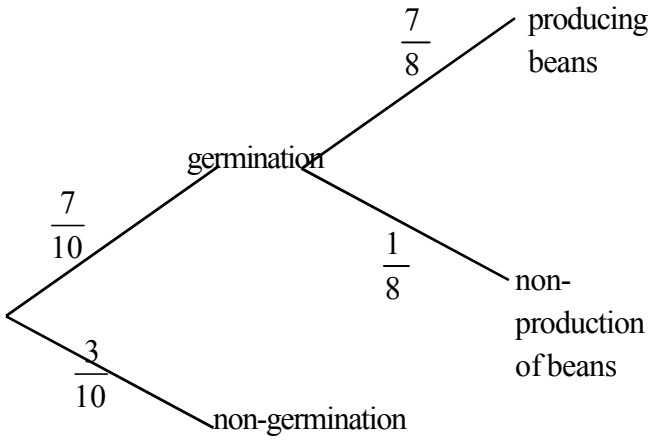
25. $B\hat{A}C = 60^0$ ...1
    $\therefore BOC = 120^0$ ...1 -- ②

Part B

Question No.		Answer	Marks		Other
1.	(i)	$\frac{2}{7}+\left(\frac{3}{4}of\frac{5}{7}\right)$	1		
		$=\frac{8+15}{28}$			
		$=\frac{23}{28}$	1	②	
	(ii)	$1-\frac{23}{28}$	1		
		$\frac{5}{28}$	1	②	
	(iii)	$\frac{5}{28}\times\frac{3}{5}$	1		
		$\frac{3}{28}$	1	②	
	(iv)	$\frac{23}{28}+\frac{3}{28}$	1		
		$=\frac{26}{28}$	1		
		Remainder $=\frac{2}{28}=\frac{1}{14}$			
		Total $= 25 \times 14$	1		
		$= 350$ t	1	④	⑩

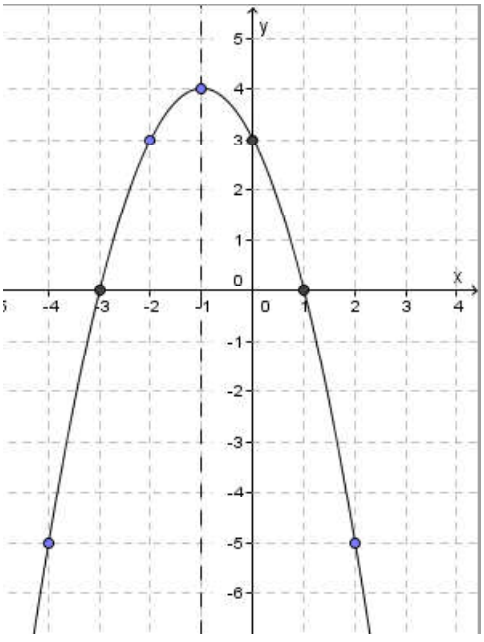
2.	(i)	$2\times\frac{22}{7}\times7\times10$	1		
		$440\ \text{cm}^2$	1	②	
	(ii)	$440+\frac{22}{7}\times7\times7\times2$	1		
		$440 + 308$			
		$= 748\ \text{cm}^2$	1	②	
	(iii)	154×10	1		
		$= 1540\ \text{cm}^2$	1	②	
	(iv)	$\frac{22}{7}\times r^2\times10=6160$	1		
		$r^2=\frac{6160\times7}{22\times10}$	1		
		$r^2=196$			
		$r=\sqrt{196}$	1		
		r = 14 cm	1	④	⑩

3.	(a)	(i)	Tariff payable $=\frac{60}{100}\times 1\ 200\ 000$	1		
			$=$ Rs. 720 000	1	②	
		(ii)	Value after paying tariff = Rs. 1 200 000 - 720 000 = 1 920 000	2	②	
	(b)	(i)	Income for which tax is paid = Rs. 3 000 000 - 2 400 000			
			= Rs. 600 000	1		
			Income tax $= 600\ 000\times\frac{15}{100}=$ Rs 90 000	2	③	
		(ii)	Income for which tax is paid $=\frac{165\ 000}{15}\times 100$ = Rs.1 100 000	2	②	
		(iii)	Total income = Rs. 2 400 000 +1 100 000 = Rs. 3 500 000	1	①	⑩

4.	(a)	(i)		3	③	
		(ii)		3	③	
		(iii)	$\frac{7}{10}\times\frac{7}{8}=\frac{49}{80}$	2	②	
	(b)		$\frac{12}{36}=\frac{1}{3}$	2	②	⑩

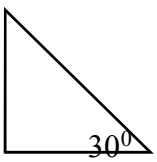
5.	(i)	Completing the histogram	2	②	
	(ii)	No. of students - 3 , 4 , 6 , 16 (if all corect -2)			
		(if 3 are correct- 1)	2	②	
	(iii)	Constructing the frequency polygon	2	②	
	(iv)	60	2	②	
	(iv)	$\frac{36}{60}\times 100\% = 60\%$	1+1	②	⑩

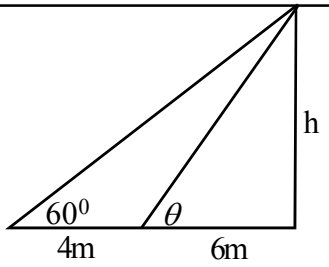
Paper II - Part A

Question No.			Answer	Marks		Other
1.		(i)	Initial payament $= 75\ 000 \times \frac{1}{3}$			
			$= \text{Rs.}25\ 000$	1		
			Monthly loan $= \frac{75\ 000 - 25\ 000}{10}$			
			$= \text{Rs. } 5\ 000$	1		
			Interest per instalment $= 5\ 412.50 - 5\ 000.00$	1		
			$= 412.50$			
			Total interest $= 412.50 \times 10$			
			$= \text{Rs. } 4\ 125$	1	④	
		(ii)	No. of monthly units $= \frac{10(10+1)}{2} = 55$	1		
			Interest per month $= \frac{4\ 125}{55}$	1		
			$= \text{Rs. } 75$	1		
			Interest rate $= \frac{75}{5\ 000} \times 12 \times 100\%$	2		
			$= 18\%$	1	⑥	⑩
2.		(i)	$y = 3$	1	①	
		(ii)				

	(ii)	If two axes are correct	1			
		Marking points	1			
		Drawing correct parabola	1	③		
	(b) (i)	$x = -1$	1	①		
	(ii)	Maximum value = 4	1			
		p = 4	1	②		
	(iii)	(- 1 , 4)	1	①		
	(c)	Roots are $x = -3$ and $x = 1$	1			
		$y = (x - 2)(x + 5)$	1	②	⑩	

3.	(a)	$(a+b)^2 - c^2$	1			
		$= (a+b-c)(a+b+c)$	1	②		
	(b)	$3A = \begin{pmatrix} -6 & 3 \\ 3 & 3 \end{pmatrix}$	1			
		$A = \begin{pmatrix} -2 & 1 \\ 1 & 1 \end{pmatrix}$	1	②		
	(c)	$5x + y - 9 = 5y + 1$				
		$2 \cdot 9 \times 15$				
		$5x - 4y = 10$ --- (1)	1			
		$3x - 8 = 2y$				
		$3x - 2y = 8$ ---(2)	1			
		$(2) \times 2 \quad 6x - 4y = 16$ ---(3)				
		(3)-(1) $x = 6$	1			
		From ② $3(6) - 2y = 8$				
		$-2y = -10$				
		$y = 5$	1			
		AB $= 5 \times 5 + 1 = 26$	1			
		AD $= 2 \times 5 = 10$	1	⑥	⑩	

4.	(a)		1			
		30^0				
		5 cm				
		Height of the tower = 2.9×15	1			
		$= 43.5$ m	1	③		

	(b)	(i)	Figure 	1	①	
		(ii)	If the height of the post is h, $\tan 60^\circ = \frac{h}{10\text{ m}}$	1		
			$\sqrt{3} \times 10m = h$			
			$h = 1.732 \times 10$ m	1		
			$h = 17.32$ m	1	③	
		(iii)	$tan\theta = \frac{17.32\ m}{6\ m}$	1		
			$tan\theta = 2.89$			
			$\theta = tan^{-1}(2.89)$	1		
			$\theta = \underline{\underline{71^0}}$	1	③	⑩
5.		(i)	$(2x)^2 + (2x+10)^2 = 50$	2		
			$8x^2 + 40x - 2400 = 0$	2		
			$x^2 + 5x - 300 = 0$	2	⑥	
		(ii)	$(x+20)(x-15) = 0$	2		
			$x = -20 \quad or \quad x = 15$			
			Speed of B = 15 km h^{-1}	1		
			Speed of A = 20 km h^{-1}	1	④	⑩
6.	(a)	(i)	$\frac{4.2}{2} = 2.1$ m	1	①	
		(ii)	$l^2 = 2.1^2 + 2.8^2$			
			$l = \sqrt{12.25}$			
			$l = 3.5$ m	1		

			Area of canvas = πrl			
			$= \frac{22}{7} \times 2.1 \times 3.5$	1		
			$= 23.1 \text{ m}^2$	1	③	
	(b)		$\lg x = \lg 23.5 + \frac{1}{3}\lg 0.048 - 2\lg 3.824$			
			$= 1.3711 + \frac{1}{3}(\bar{2}.6812) - 2(0.5826)$	2		
			$= 1.3711 + \bar{1}.5604 - 1.1652$	1+1		
			$= 0.9315 - 1.1652$	1		
			$= \bar{1}.7663$			
			$x = anti\log \bar{1}.7663 = 0.5838$	1	⑥	⑩

7.		(i)	400, 800, 1200			
			$a = 400, \quad d = 400$ m			
		Sn	$= \frac{n}{2}[2a + (n-1)d]$			
			$= \frac{n}{2}[2 \times 400 + (n-1)400]$	2		
			$= \frac{400n}{2}[2 + n - 1]$	1		
			$= 200n(n+1)$	1	④	
	(ii)		$200n(n+1) = 84\,000$	1		
			$n(n+1) = 420$	1		
			$n^2 + n - 420 = 0$	1		
			$(n + 21)(n - 20) = 0$	1		
			$n = -21$ or $n = 20$	1		
			20 days	1	⑥	⑩

8.	(i)	Line AB	1		
		$A\hat{B}C = 90^0$	1		
		AC = 6.5 cm	1	③	
	(ii)	Perpendicular bisector BC	1		
		Drawing the perpendicular to AC at C	2	③	
	(iii)	Drawing the circle	1	①	
	(iv)	Radius = 2.8 cm	1	①	
	(v)	Constructing AE	1		
		Tangent drawn to a circle from an external point are equal in length	1	②	⑩

9.	(i)	91 - 100	1	①	
	(ii)	91 - 100	1	①	
	(iii)				

No of tourist	Mid value	d	f	fd
51 - 60	55.5	-40	2	- 80
61 - 70	65.5	-30	4	-120
71 - 80	75.5	-20	8	-160
81 - 90	85.5	-10	10	-100
91 - 100	95.5	0	12	0
101-110	105.5	10	8	80
111-120	115.5	20	6	120
			50	200 - 460

Mid value column		- 260	1	
column d			1	
column fd			1	
Mean	$= 95.5 + \frac{-260}{50}$		1	
	$= 95.5 - 5.2$			
	$= 90.3$		1	
	$= 90$		1	⑥
(iv) Increase	$= \frac{90-80}{80} \times 100\%$		1	
	$= 12.5\%$		1	② ⑩

10	(i)	Marking 5 regions correctly	5	⑤