ICSE 2027 EXAMINATION

SPECIMEN QUESTION PAPER

MATHEMATICS

Maximum Marks: 80

Time allowed: Three hours

1. *Answers to this Paper must be written on the paper provided separately.*
2. *You will not be allowed to write during first 15 minutes.*
3. *This time is to be spent in reading the question paper.*
4. ***The time given at the head of this Paper is the time allowed for writing the answers.***

5. *Attempt **all** questions from **Section A** and **any four** questions from **Section B**.*
6. ***All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.***
7. ***Omission of essential working will result in loss of marks.***
8. *The intended marks for questions or parts of questions are given in brackets [ ].*
9. ***Mathematical tables are provided**.*

Instruction for the Supervising Examiner

Kindly read aloud the Instructions given above to all the candidates present in the Examination Hall.

NOTE:

The Specimen Question Paper in the subject provides a realistic format of the Board Examination Question Paper and should be used as a practice tool. The questions for the Board Examination can be set from any part of the syllabus. However, the format of the Board Examination Question Paper will remain the same as that of the Specimen Question Paper.

CISCE

SECTION A (40 Marks)

*(Attempt **all** questions from this Section.)*

Question 1

Choose the correct answers to the questions from the given options. [15]

(Do not copy the question, write the correct answers only.)

(i) A customer pays a total GST of ₹ 600 on an article in an intra-state sale, and the tax rate is 12%. The price of the article is:

(a) ₹ 2,000

(b) ₹ 3,000

(c) ₹ 5,000

(d) ₹ 7,200

[Understanding & Evaluation]

(ii) **Assertion (A):** In a recurring deposit account, a man deposits ₹ 1000 per month for 1 year. On maturity he receives ₹ 13500. The amount of interest he earns is ₹1500.

Reason (R): Interest earned = Maturity value − Total amount deposited.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

[Application]

(iii) A man buys 50, ₹ 100 shares of a company at ₹ 125 paying 6% dividend per annum. At the end of the year, the company will pay a total dividend on:

(a) ₹ 100

(b) ₹ 125

(c) ₹ 5000

(d) ₹ 6250

[Understanding & Analysis]

CISCE

(iv) If the roots of the quadratic equation $x^2 - 8x + p^2 = 0$ are equal, then the positive value of *p* is:

(a) 16

(b) 8

(c) 4

(d) 2

[Understanding & Application]

(v) 12, 18 and $\boldsymbol{x}$ are in continued proportion. The value of $\boldsymbol{x}$ is:

(a) 24

(b) 27

(c) 30

(d) 36

[Understanding & Evaluation]

(vi) $(x + 2)\ and\ (x + 3)$ are the factors of $x^3 + 4x^2 + x - 6$. The third factor of the given polynomial is:

(a) $(x - 1)$

(b) $(x - 4)$

(c) $(x + 1)$

(d) $(x + 4)$

[Understanding & Application]

(vii) Given two matrices A and B, where A= $[-1 \quad 2]$ and B= $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$ then product AB is:

(a) $\begin{bmatrix} -3 \\ 8 \end{bmatrix}$

(b) 5

(c) [5]

(d) $[-3 \quad 8]$

[Understanding & Evaluation]

CISCE

(viii) If the n^{th} term of a Geometric Progression (G.P.) is given by 5×2^n then the common ratio is:

(a) 2

(b) 5

(c) 10

(d) 20

[Analysis & Application]

(ix) The line $y = 2x$ passes through which pair of coordinates?

(a) (0, 0) and (2, 2)

(b) (0, 2) and (2, 4)

(c) (1, 2) and (-1, -2)

(d) (2, 2) and (-2, -2)

[Application]

(x) On a map of scale 1: 50,000, a rectangular plot has sides 4 cm by 3 cm. The actual area of the plot on ground is:

(a) 3 km^2

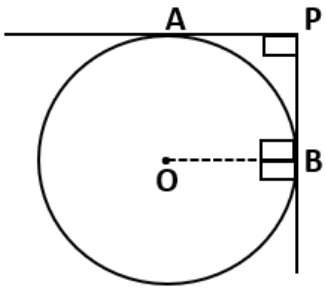
(b) 9 km^2

(c) 12 km^2

(d) 16 km^2

[Application & Evaluation]

(xi) In the given diagram, the radius of the circle with centre O is 3 cm. PA and PB are the tangents to the circle which are at right angle to each other. The length of OP is:



(a) $\frac{3}{\sqrt{2}}\ cm$

(b) 3 cm

(c) $3\sqrt{2}$ cm

(d) $6\sqrt{2}$ cm

[Analysis & Evaluation]

CISCE

(xii) A conical tent with a capacity of 616 m^3 has a base area 154 m^2. The height of the tent is:

(a) 3 m

(b) 4 m

(c) 7 m

(d) 12 m

[Understanding, Analysis & Evaluation]

(xiii) **Assertion (A):** If $sec\theta + tan\theta = a$ and $sec\theta - tan\theta = b$, then $ab = 1$.

Reason (R): $sec^2\theta - tan^2\theta = 1$

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

[Understanding & Analysis]

(xiv) Consider the following distribution 30, 34, 35, 36, 37, 38, 39, 40. If the value 35 is removed from the given data, then the median changes by:

(a) 0.5

(b) 1.0

(c) 1.5

(d) 2.0

[Analysis & Evaluation]

(xv) A game of chance consists of spinning an arrow which is equally likely to come to rest pointing to one of the numbers 1, 2, 3……12. The probability that it will point to an odd number is:

(a) $\frac{1}{6}$

(b) $\frac{1}{12}$

(c) $\frac{1}{2}$

(d) $\frac{5}{12}$

[Understanding & Analysis]

Question 2

(i) Three students **A, B** and **C** of Class 10 are each given an equal amount of **Play- Dough** to form different shaped solids for a mathematics project. **A** forms a **cone** of radius **7** cm and height **28** cm. **B** forms a sphere of radius ***r*** and **C** forms a cylinder of radius **14** cm. Find the: [4]

(a) radius ***r*** of the sphere so formed.

(b) height of the cylinder so formed.

(c) Volume of the dough given to each of them.

Give your answers to **(b)** and **(c)** correct to the nearest **whole number**. (Use $\pi = \frac{22}{7}$)

[Analysis, Application & Evaluation]

(ii) Solve the quadratic equation $(x-2)^2 + 11x - 7 = 0$ and give your answer correct to 3 significant figures. [4]

[Application]

(iii) A line is formed joining the two points $\mathbf{P(-4, 1)}$ and $\mathbf{Q(11, -2)}$. Straight line **PQ** intersects the $\boldsymbol{x-axis}$ **at R.** Find the: [4]

(a) ratio **PR : RQ**.

(b) coordinates of the point **R**.

(c) equation of the line perpendicular to **PQ at R**.

[Analysis & Evaluation]

Question 3

(i) A shopkeeper marked an article at ₹ 2000. The rate of GST on the article is 18%. The customer has only ₹ 1888 with him and he requests the shopkeeper to reduce the price so that he can buy the article at ₹ 1888 including GST. What percent discount must the shopkeeper give to do so? [4]

[Analysis & Evaluation]

(ii) An Arithmetic Progression (A.P.) consists of all whole numbers which are divisible by 3 and 5. [4]

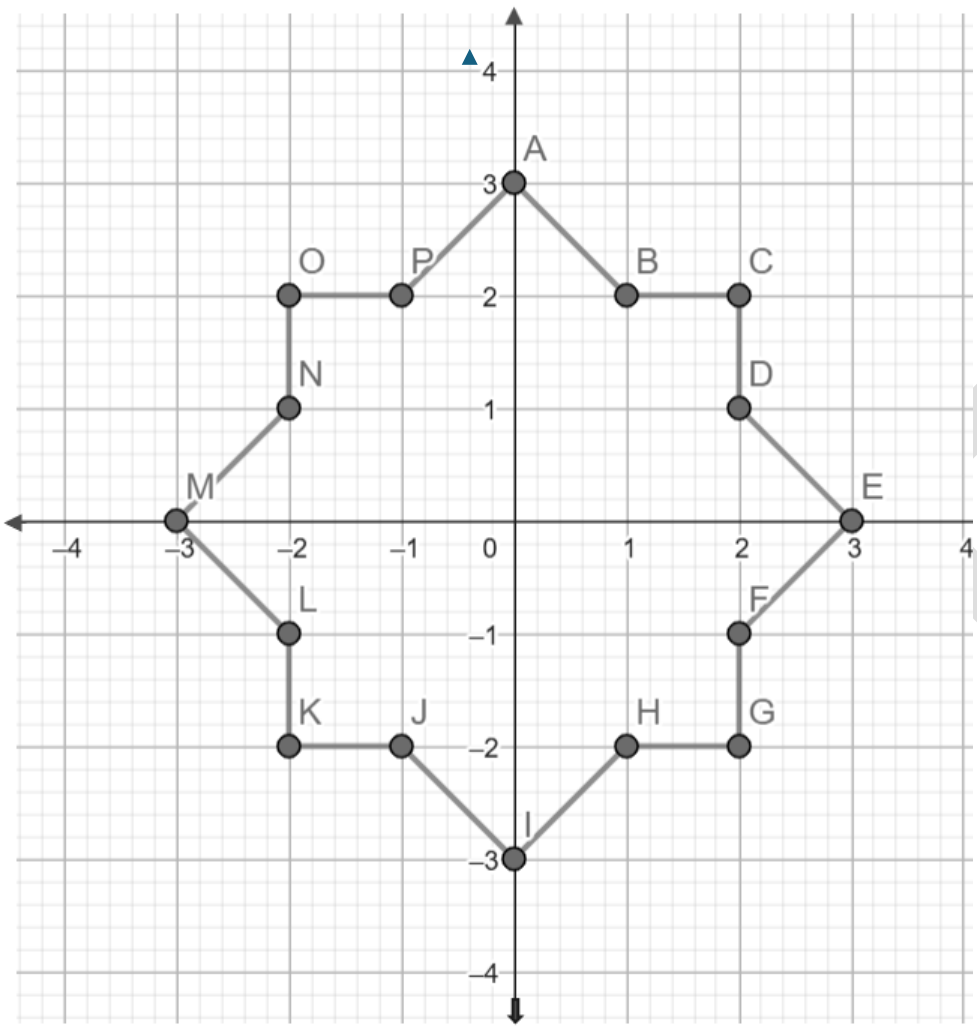
(a) Write its first term and the common difference.

(b) Find the 10^{th} term of the A.P.

(c) Find the sum of the first 10 terms of the A.P.

[Application & Evaluation]

(iii) Study the graph and answer the given questions: [5]



(a) Write down the coordinates of A, B, C, D and E.

(b) Write down the image of A under reflection on the y- axis.

(c) Name the point, with its coordinates, which is the image of C under reflection through the origin.

(d) What is the image of the polygon ABCDEFGHI when reflected on the y-axis? **[Analysis & Creativity]**

(e) Write down the equation of the line joining the points N and D.

SECTION B (40 Marks)

*(Attempt **any four** questions from this Section.)*

Question 4

(i) A man opened a recurring deposit account in a bank. He deposits ₹ 1000 per month for 2 years. The matured value is equal to 26 times the amount he pays per month. Find the: [3]

(a) interest paid by the bank.

(b) rate of interest per annum that the bank was paying for the recurring deposit account. **[Application & Evaluation]**

(ii) Given, matrix A = $\begin{bmatrix} x & 1 \\ 2 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} x \\ x-2 \end{bmatrix}$, such that AB is a null matrix. Find the: [3]

(a) order of the null matrix.

(b) value of x, given that $x > 0$. **[Analysis & Evaluation]**

(iii) Prove the following trigonometric identity: [4]

$$\frac{cos^2\theta}{1-tan\theta} + \frac{sin^2\theta}{1-cot\theta} = 1 + cos\theta sin\theta$$

[Application & Analysis]

Question 5

(i) Ms. Kaur invested ₹ 8000 in buying ₹ 100 shares of a company paying 6% dividend at ₹ 80. After a year, she sold these shares at ₹ 75 each and invested the proceeds including the dividend received during the first year in buying ₹ 20 shares paying 15% dividend at ₹ 27 each. Find the: [3]

(a) dividend received by her during the first year.

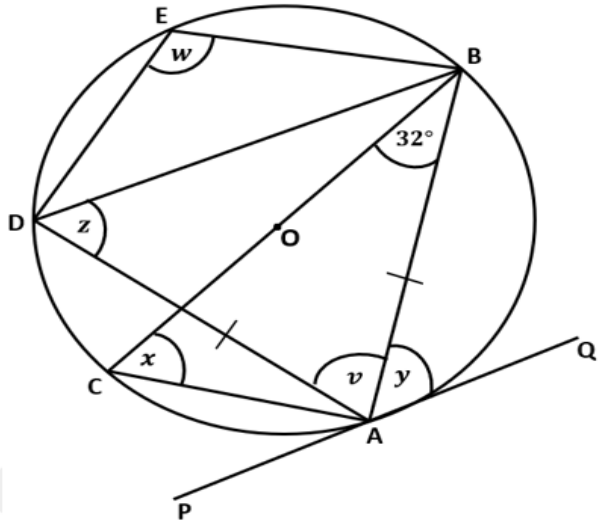
(b) number of shares she purchased using the total proceeds including the dividend. **[Understanding, Application & Evaluation]**

(ii) Solve the following inequation, write the solution set and represent it on the real number line. [3]

$-6 + \frac{12x}{5} \leq \frac{7x}{5} - 3 < \frac{2}{5} + 2x,\ x \in \text{R}.$

[Application, Evaluation & Creativity]

(iii) In the given figure, O is the centre of the circle and $AD = AB$. If $\angle ABC = 32^\circ$, find the angles x, y, z, v and w. [4]



[Application, Analysis & Evaluation]

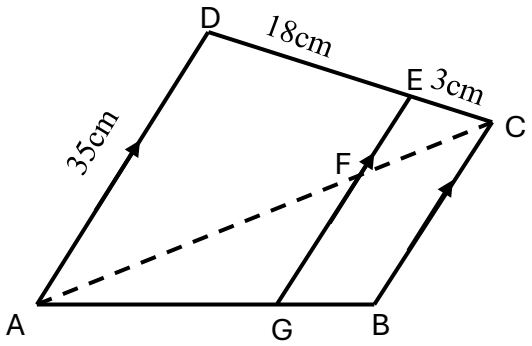
Question 6

(i) Using Remainder and Factor Theorem, factorise the following polynomial: [3]

$2x^3 + 5x^2 - 28x - 15.$

[Analysis & Application]

(ii) In the given diagram, AD ∥ GE ∥ BC, DE = 18 cm, EC = 3 cm, AD = 35 cm. [3]



Find:

(a) AF: FC and AG: GB

(b) length of EF

(c) area (trapezium ADEF): area (Δ EFC)

[Analysis & Application]

(iii) Use ruler and compass for this question: [4]

(a) Draw line segment $\boldsymbol{AB}$ of length 6 cm.

(b) Construct the locus of points which are equidistant from **A** and **B**. Mark a point on the locus which is 4.5 cm from **A**. Name this point as **O**.

(c) Construct the locus of all points which are 4.5 cm from **O**.

(d) Mark the point of intersection of loci (b) and (c) as P, which is on the same side of $\boldsymbol{AB}$ as **O**.

(e) Construct the locus of points which are equidistant from $\boldsymbol{AP}$ and $\boldsymbol{AB}$.

[Analysis & Creativity]

Question 7

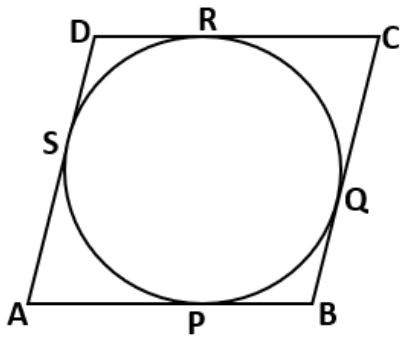
(i) A bag contains identical cards numbered 1 to 50. A card is selected randomly. Find the probability that the card selected, is: [3]

(a) divisible by 6.

(b) not divisible by 2 and 3.

[Application & Evaluation]

(ii) In the given figure, the parallelogram ABCD circumscribes a circle, touching the circle at P, Q, R and S. Prove that: [3]



(a) AB = BC

(b) diagonals AC and BD bisect each other at right angles.

[Analysis & Application]

(iii) Given, $\frac{a+2b+x}{a-2b+x} = \frac{(a+b)^2}{(a-b)^2}$ [4]

Using properties of proportion, find the value of x.

[Understanding & Application]

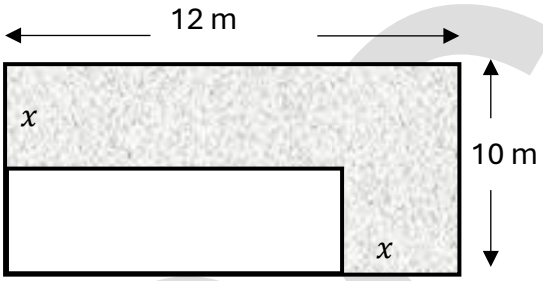
Question 8

(i) The mean of the following distribution is 27 and the sum of all the frequencies is 50. Find the missing frequencies x and y. [3]

$Class$	$0 - 10$	$10 - 20$	$20 - 30$	$30 - 40$	$40 - 50$
$Frequency$	8	x	12	13	y

[Application & Evaluation]

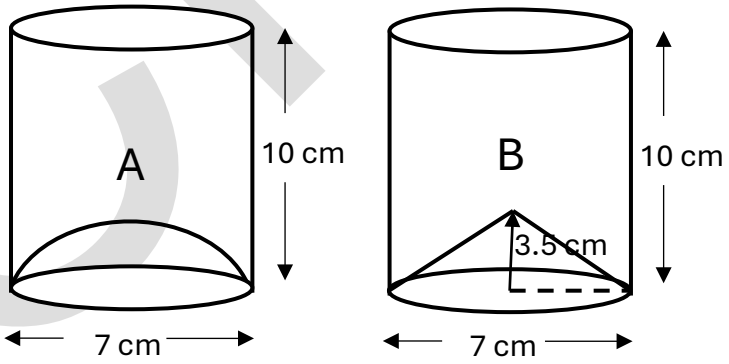
(ii) In the given diagram, the area of the shaded region is 57 m^2. Form an equation in x and solve it to find the possible value of x. [3]



[Application, Analysis & Evaluation]

(iii) Two beakers (drinking glasses) are cylindrical in shape having diameter and height 7 cm and 10 cm respectively. Glass A has hemispherical raised bottom, and glass B has a conical raised bottom of height 3.5 cm. Determine which glass has a greater capacity and calculate the difference in their capacities. Give your answer correct to 2 decimal places. [4]

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



[Analysis, Application & Evaluation]

Question 9

(i) The distribution given below represents marks obtained by 200 students in a Mathematics Examination with maximum marks 80. [5]

Marks	No. of students
0 – 10	8
10 – 20	12
20 – 30	16
30 – 40	24
40 – 50	29
50 – 60	38
60 – 70	42
70 – 80	31

Using graph paper draw an ogive for the given distribution. Along one axis take 2 cm equal to 10 marks and along the other axis take 1cm equal to 10 students.

Use your graph to find the following:

(a) Median

(b) Number of students who scored above 75 marks

(c) If the pass percentage is 35%, find the number of students who scored 35% and below.

[Understanding, Application & Creativity]

(ii) Draw the necessary diagram for this question. [5]

A man on the top of a lighthouse observes the angle of depression of two ships on the opposite sides of the lighthouse as 32° and 58° respectively. If the height of the lighthouse is 120 m, find the distance between the two ships. Give your answer correct to the nearest meter.

[Understanding, Creativity, Application & Evaluation]

CISCE

Question 10

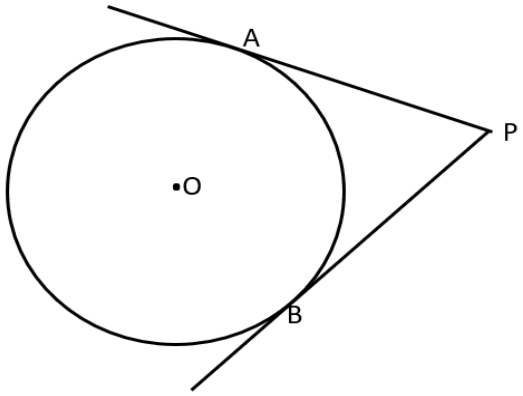
(i) A finite Geometric Proportion (G.P.) series contains 10 terms. The sum of the first three terms is 7 and that of the last three terms is 896. Find the *first term* and the *common ratio*. [3]

[Application & Evaluation]

(ii) In a circle with centre O, PA and PB are tangents drawn from an external point P. If PA = 9 cm and $\angle APB = 60^{\circ}$, find the: [3]

(a) length of PB.

(b) radius of the circle.



[Application & Evaluation]

(iii) The table given below shows a record of the weight in kilogram of 100 students of a school. [4]

Weight(kg)	No. of Students
30 – 35	5
35 – 40	7
40 – 45	14
45 – 50	21
50 – 55	25
55 – 60	15
60 – 65	7
65 – 70	6

Draw a histogram and find the modal weight.

[Take 2 cm = 5 kg along one axis and 2 cm = 5 students along the other axis]

[Understanding, Application & Creativity]

ICSE 2027 SPECIMEN

DRAFT MARKING SCHEME – MATHEMATICS

Question 1		
(i)	(c) ₹ 5000	[15]
(ii)	(c) Both (A) and (R) are true and (R) is the correct explanation for (A).	
(iii)	(c) ₹ 5000	
(iv)	(c) 4	
(v)	(b) 27	
(vi)	(a) $(x-1)$	
(vii)	(c) [5]	
(viii)	(a) 2	
(ix)	(c) (1, 2) and (- 1, - 2)	
(x)	(a) 3 km^2	
(xi)	(c) $3\sqrt{2}$ cm	
(xii)	(d) 12 m	
(xiii)	(c) Both (A) and (R) are true and (R) is the correct explanation for (A).	
(xiv)	(a) 0.5	
(xv)	(c) $\frac{1}{2}$	
Question 2		
(i)	$(a)\quad \frac{4}{3}\pi r^3 = \frac{1}{3}\pi R^2 H \rightarrow \frac{4}{3}\pi r^3 = \frac{1}{3}\pi 7^2.28 \rightarrow r^3 = 7^3 \rightarrow r = 7cm$ $(b)\quad \frac{4}{3}\pi r^3 = \pi R'^2 H' \rightarrow \frac{4}{3}\times\pi\times 7\times 7\times 7 = \pi\times 14^2\times H' \rightarrow H' = \frac{7}{3}\ cm$ $= 2.33cm = 2cm$ $(c)\quad \frac{1}{3}\pi R^2 H = \frac{1}{3}\times\frac{22}{7}\times 7^2\times 28 = 1437.33 = 1437cm^3$	[4]

(ii)	$(x-2)^2 + 11x - 7 = 0$ $x^2 + 4 - 4x + 11x - 7 = 0$ $x^2 + 7x - 3 = 0$ $x = \frac{-7 \pm \sqrt{49 - 4(1)(-3)}}{2 \times 1} = \frac{-7 \pm \sqrt{61}}{2} = \frac{-7 \pm 7.8102}{2}$ $x = 0.4051, \quad x = -7.4051$ $x = 0.405, \quad x = -7.41$	[4]
(iii)	(a) R $(x, 0)$, $\frac{m(-2)+n(1)}{m+n} = 0 \rightarrow -2m + n = 0 \rightarrow m:n = 1:2$ $\therefore PR:RQ = 1:2$ (b) $x = \frac{1(11)+2(-4)}{1+2} \rightarrow x = 1,$ $R(1, 0)$ (c) $m_{PQ} = \frac{-2-1}{11+4} = -\frac{1}{5}$ $Slope\ of\ line\ perpendicular\ to\ PQ = 5$ $Required\ equation, y - 0 = 5(x - 1)$ $5x - y = 5$	[4]
Question 3		
(i)	Let the reduced price be *x* $x + 18\%\ of\ x = 1888 \quad \rightarrow x =$ ₹ 1600 Reduction in price = ₹ 2000 − ₹1600 = ₹400 Percentage reduction = $\frac{400}{2000} \times 100 = 20\%$	[4]
(ii)	$(a) \quad a = 15\ and\ d = 15$ $(b) \quad T_{10} = a + (10-1)d = 15 + 9 \times 15 = 150$ (c) $S_{10} = \frac{10}{2}[2 \times 15 + 9 \times 15] = 825$	[4]
(iii)	(a) $A(0, 3), B(1, 2), C(2, 2), D(2, 1) and\ E(3, 0)$ (b) $image\ of\ A\ under\ reflection\ on\ the\ y-axis\ is\ A(0, 3)$	[5]

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	(c) $K(-2,-2)$ (d) $APONMLKJI$ (e) $y = 1$	

SECTION – B

Question 4

(i)	P = ₹ 1000, n = 2 yrs, MV = 26 P ∴ MV = ₹ 26000 (a) I = ₹ 26000 - ₹ 24000 = ₹ 2000 (b) $Interest = \frac{1000\times24\times25}{2} \times \frac{r}{100} \times \frac{1}{12} = 2000$ $r = 8\%$	[3]
(ii)	(a) $order\ of\ matrix\ AB\ is\ (2\times1) = order\ of\ null\ matrix$ (b) $AB = \begin{bmatrix} x & 1 \\ 2 & 2 \end{bmatrix}\begin{bmatrix} x \\ x-2 \end{bmatrix}$ $AB = \begin{bmatrix} x^2+x-2 \\ 4x-4 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$ $4x - 4 = 0$ $x = 1$	[3]
(iii)	$LHS = \frac{cos^2\theta}{1-tan\theta} + \frac{sin^2\theta}{1-cot\theta}$ $= \frac{cos^2\theta}{1-\frac{sin\theta}{cos\theta}} + \frac{sin^2\theta}{1-\frac{cos\theta}{sin\theta}}$ $= \frac{cos^3\theta}{cos\theta-sin\theta} + \frac{sin^3\theta}{sin\theta-cos\theta}$ $= \frac{cos^3\theta}{cos\theta-sin\theta} - \frac{sin^3\theta}{cos\theta-sin\theta}$ $= \frac{1}{(cos\theta-sin\theta)}[cos^3\theta - sin^3\theta]$ $\frac{(cos\theta-sin\theta)(cos^2\theta+sin^2\theta+cos\theta sin\theta)}{(cos\theta-sin\theta)} = 1 + sin\theta cos\theta = RHS$	[4]

CISCE

Question 5

(i) [3]

(a) $No.of\ shares = \frac{8000}{80} = 100$

$Annual\ Dividend = \frac{6 \times 100 \times 100}{100} = ₹600$

(b) $Sale\ proceeds = ₹75 \times 100 = ₹7500$

$and\ Total\ proceeds = ₹7500 + ₹600 = ₹8100$

$No.of\ shares = \frac{8100}{27} = 300$

(ii) [3]

$$-6 + \frac{12x}{5} \leq \frac{7x}{5} - 3 < \frac{2}{5} + 2x, x \in R$$

$-6 + \frac{12x}{5} \leq \frac{7x}{5} - 3$

$\frac{12x}{5} - \frac{7x}{5} \leq 6 - 3$

$\frac{5x}{5} \leq 3$

$x \leq 3$

$\frac{7x}{5} - 3 < \frac{2}{5} + 2x$

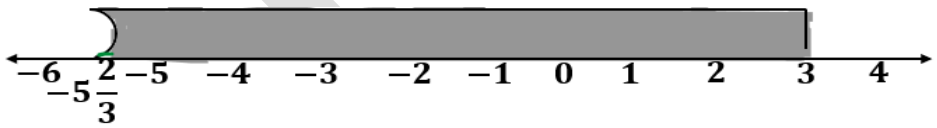
$\frac{7x}{5} - 2x < \frac{2}{5} + 3$

$-\frac{3x}{5} < \frac{17}{5}$

$x > -\frac{17}{3}$

$x > -5\frac{2}{3}$

$Solution: \left\{x: -5\frac{2}{3} < x \leq 3, x \in R\right\}$



(iii) [4]

(a) $In\ \Delta ABC, \angle BAC = 90°\ \ (\angle s\ in\ a\ semi - circle)$

$\therefore x + 90° + 32° = 180°,$

$x = 58°$

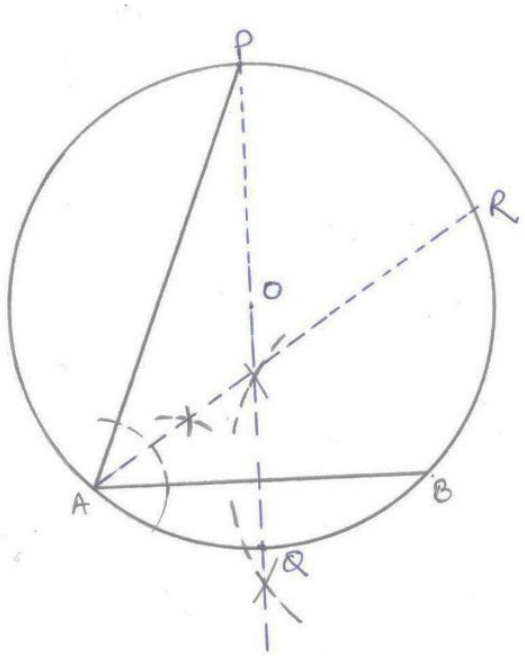
$y = x = 58°\ \ (alt.seg.theorem.)$

$z = x = 58°\ \ (\angle s\ on\ same\ segment)$

CISCE

	$In\ \Delta ADE, AD = AB\ \ (given)$ $\angle ADB = \angle ABD = z = 58°$ $v + z + z = 180° \rightarrow v = 180° - 116°$ $v = 64°$ $In\ quad\ ADEB, v + w = 180°\ \ (opp.\angle s\ of\ cyclic\ quad.\ are\ supp)$ $w = 180° - 64°, \qquad w = 116°$	
Question 6		
(i)	$f(x) = 2x^3 + 5x^2 - 28x - 15$ $f(3) = 2(3)^3 + 5(3)^2 - 28(3) - 15$ $= 54 + 45 - 84 - 15 = 99 - 99 = 0$ $\therefore (x-3)\ is\ a\ factor\ of\ f(x).$ $2x^2 + 11x + 5$ $x - 3 \overline{)\ 2x^3 + 5x^2 - 28x - 15}$ $\underline{2x^3 - 6x^2}$ $11x^2 - 28x$ $\underline{11x^2 - 33x}$ $5x - 15$ $\underline{5x - 15}$ $\times\times$ $f(x) = (x-3)(2x^2 + 11x + 5)$ $f(x) = (x-3)(x+5)(2x+1)$	[3]
(ii)	(a) $In\ \Delta ADC, FE\ is\ parallel\ to\ AD,\ \ given$ $\therefore \frac{AF}{FC} = \frac{DE}{EC} = \frac{18}{3} = \frac{6}{1}\ \ (B.P.T.)$ $AF : FC = 6 : 1$ $similarly, \ \frac{AG}{GB} = \frac{AF}{FC} = \frac{6}{1}, \qquad AG : GB = 6 : 1$	[3]

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	(b) $\Delta ADC \sim \Delta FEC,\ \therefore \frac{EF}{AD} = \frac{EC}{DC} \rightarrow \frac{EF}{35} = \frac{3}{21}\ \therefore EF = 5\ cm$ (c) $\frac{area\ trap.ADEF}{area\ \Delta EFC} = \frac{AD^2 - EF^2}{EF^2} = \frac{35^2 - 5^2}{5^2} = \frac{40 \times 30}{25} \rightarrow \mathbf{48 : 1}$	
(iii)		[4]
Question 7		
(i)	(a) {6,12,18,24,30,36,42,48}, P(divisible by 6) = $\frac{8}{50} = \frac{4}{25}$ (b) P (not divisible by 2 and 3) = $1 - \frac{4}{25} = \frac{21}{25}$	[3]
(ii)	(a) Given, ABCD is a parallelogram, AP = AS (tangents drawn from an external point are equal) BP = BQ (tangents drawn from an external point are equal) CR = CQ (tangents drawn from an external point are equal) DR = DS (tangents drawn from an external point are equal) Adding, (AP+BP) + (CR + DR) = (AS + DS) + (BQ + CQ) AB + CD = AD + BC AB + AB = BC + BC (opp. Sides of parallelogram are equal) 2AB = 2 BC AB = BC	[3]

(b) In quad ABCD, AB = BC= CD = DA

$\therefore ABCD \text{ is a rhombus}$

$\therefore AC \text{ and } BD \text{ bisects each other at } rt.angles \quad (diagonals \text{ of } rhombus)$

(iii) [4]

$$\frac{a+2b+x}{a-2b+x} = \frac{(a+b)^2}{(a-b)^2}$$

Applying C & D, $\frac{a+2b+x+a-2b+x}{a+2b+x-a+2b-x} = \frac{(a+b)^2+(a-b)^2}{(a+b)^2-(a-b)^2}$

$$\frac{2(a+x)}{4b} = \frac{2(a^2+b^2)}{4ab}$$

$$(a+x) = \frac{(a^2+b^2)}{a}$$

$$x = \frac{b^2}{a}$$

Question 8

(i) [3]

Class	x	f	fx
0 – 10	5	8	40
10 – 20	15	x	15 x
20 – 30	25	12	300
30 – 40	35	13	455
40 – 50	45	y	45 y
		x+y+33=50	795+15 x+45 y

$$Mean = \frac{\sum fx}{\sum f} = \frac{795+15x+45y}{50} = 27$$

$$3x + 9y = 111 \qquad and\ x + y = 17$$

$$x = 7\ and\ y = 10$$

(ii) [3]

$$12 \times 10 - (12-x)(10-x) = 57$$

$$120 - 120 + 22x - x^2 = 57$$

$$x^2 - 22x + 57 = 0 \rightarrow (x-19)(x-3) = 0$$

$$x = 19\ is\ not\ possible, \therefore x = 3\ cm$$

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(iii) [4]

$V_A = \pi r^2 h - \frac{2}{3}\pi r^3$

$V_B = \pi r^2 h - \frac{1}{3}\pi r^2 h'$

$V_B - V_A = \left(\pi r^2 h - \frac{1}{3}\pi r^2 h'\right) - \left(\pi r^2 h - \frac{2}{3}\pi r^3\right)$

$= \pi r^2 h - \frac{1}{3}\pi r^2 h' - \pi r^2 h + \frac{2}{3}\pi r^3$

$V_B - V_A = \frac{2}{3}\pi r^3 - \frac{1}{3}\pi r^2 h'$

$= \frac{2}{3} \times \frac{22}{7} \times 3.5^3 - \frac{1}{3} \times \frac{22}{7} \times 3.5^2 \times 3.5$

$= \frac{1}{3} \times \frac{22}{7} \times 3.5^3$

$= 44.916$

$= 44.92\ cm^3$

Glass B has more capacity, by 44.92 cm^3.

Question 9

(i) [5]

Marks	f	cf
$0 - 10$	8	8
$10 - 20$	12	20
$20 - 30$	16	36
$30 - 40$	24	60
$40 - 50$	29	89
$50 - 60$	38	127
$60 - 70$	42	169
$70 - 80$	31	200

(a) $Median = 53 \pm 1$

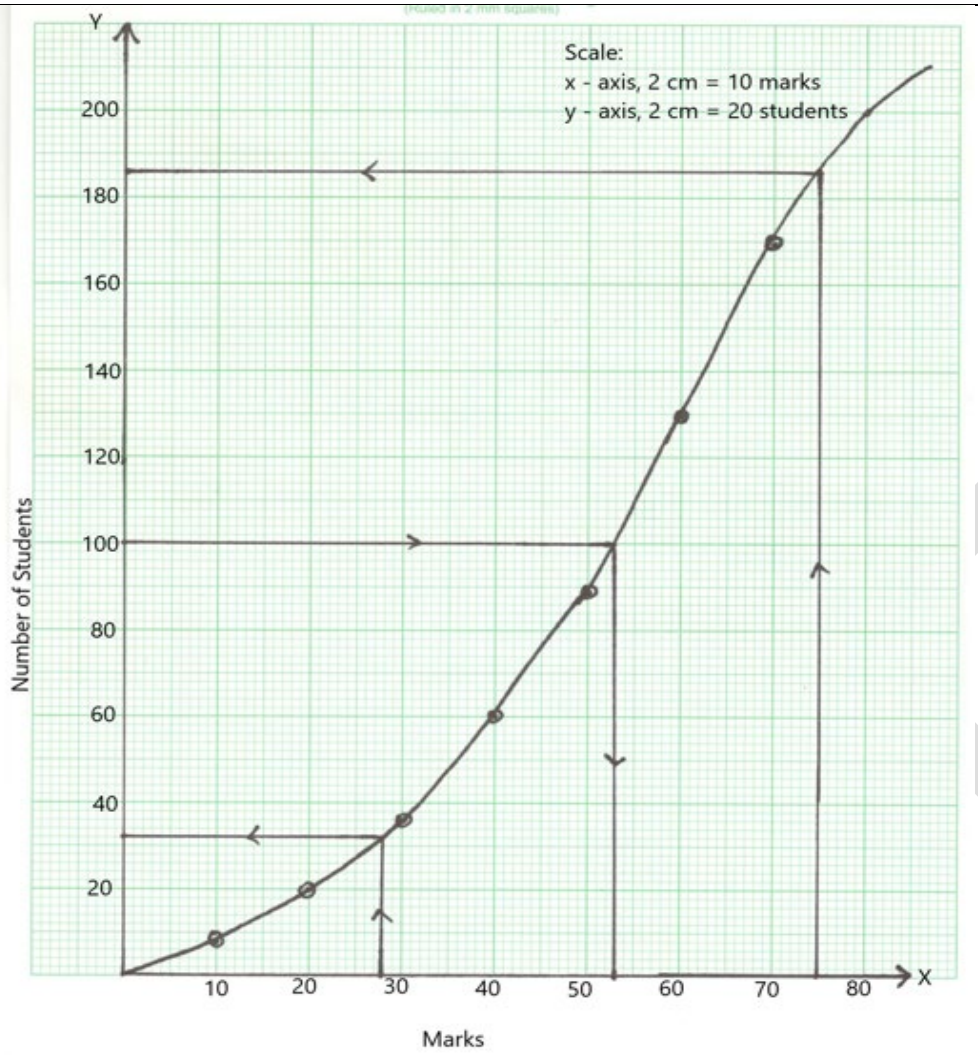
(b) $More\ than\ 75$

$= 200 - 186 = 14\ students$

(c) number of students who scored 35% and below.

$= 34 \pm 2$

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(ii)

$$In\ \Delta ABD,\quad \frac{BD}{AD} = \tan(90° - 32°)$$

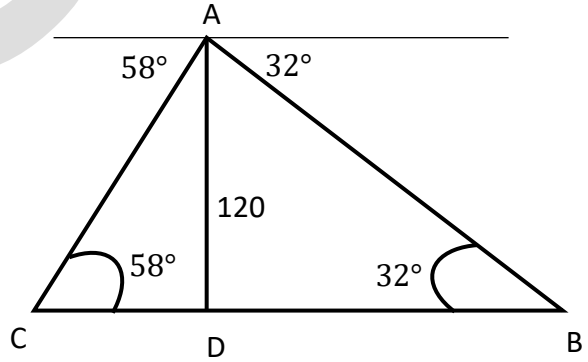
$BD = 120 \times tan58° = 120 \times 1.600$

$$In\ \Delta ACD,\quad \frac{CD}{AD} = \tan(90° - 58°)$$

$CD = 120 \times tan32° = 120 \times 0.6249 = 74.988\ m$

$BC = BD + CD = 120 \times 1.600 + 120 \times 0.6249 = 120 \times 2.2249$

$= 266.988 = 267\ m$



[5]

Question 10

(i) [3]

$Let\ the\ terms\ be\ a, ar, ar^2, \ldots\ldots\ldots ar^9$

$Given, a + ar + ar^2 = 7 \quad and\ ar^7 + ar^8 + ar^9 = 896$

$$\frac{ar^7 + ar^8 + ar^9}{a + ar + ar^2} = \frac{896}{7}$$

$$\frac{ar^7(1 + r + r^2)}{a(1 + r + r^2)} = 128$$

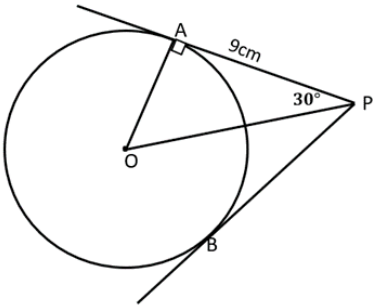
$$r^7 = 128 \rightarrow r = 2$$

$$a(1 + 2 + 2^2) = 7 \rightarrow a = 1$$

(ii) [3]

PA = PB = 9 cm (tangents from the same point)

$In\ \Delta OAP, \frac{OA}{PA} = tan\ 30° = \frac{1}{\sqrt{3}}$

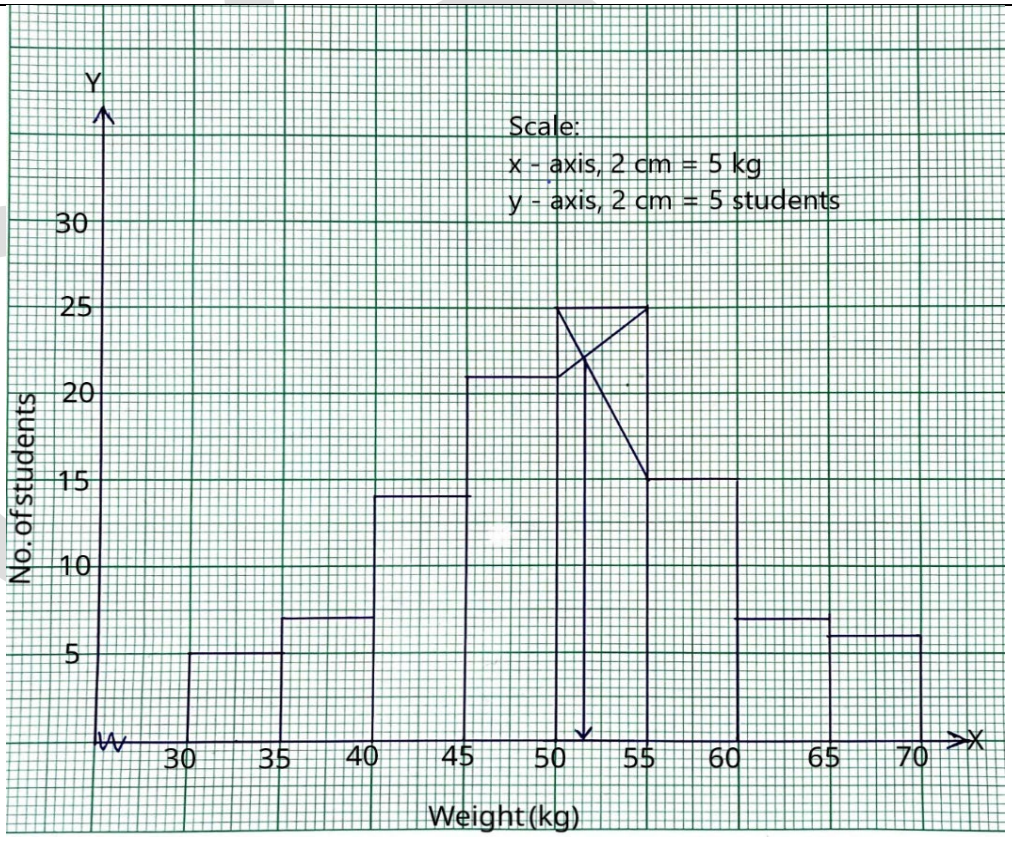


$radius = OA = 9 \times \frac{1}{\sqrt{3}} = 3\sqrt{3} = 3 \times 1.7321$

$= 5.1963$

$= 5.2\ cm$

(iii) [4]



Mode: 51.5kg.