

MATHEMATICS

(Two hours and a half)

Answers to this paper must be written on paper provided separately.

You will NOT be allowed to write during the first 15 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this paper is the time allowed for writing the answers.

Answer all questions in Section A and any four questions from Section B.

All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks.

The intended marks for questions or parts of questions, are given in brackets [].

Mathematical tables are provided.

SECTION A (40 Marks)

Answer all questions from this Section.

Question 1

- (a) A colour T.V. is marked for sale for Rs.17,600/-, which includes sales tax at 10%. Calculate the sales tax in rupees. [2]
- (b) Calculate the compound interest for the second year on Rs.8000/- invested for 3 years at 10% p.a. [3]

Question 2

- (a) Find the remainder when $2x^3 - 3x^2 + 7x - 8$ is divided by $x - 1$. [2]
- (b) Given $\frac{a}{b} = \frac{c}{d}$, prove that $\frac{3a - 5b}{3a + 5b} = \frac{3c - 5d}{3c + 5d}$ [2]

This paper consists of 10 printed pages.

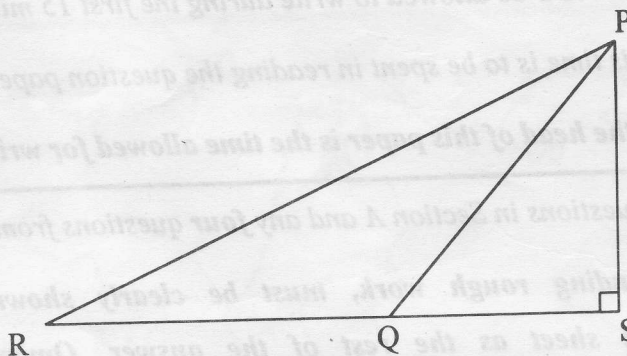
Question 3

- (a) Evaluate, without the use of trigonometrical tables:

$$3 \frac{\sin 72^\circ}{\cos 18^\circ} - \frac{\sec 32^\circ}{\operatorname{cosec} 58^\circ}$$

[2]

- (b)



In the figure: $\angle PSR = 90^\circ$, $PQ = 10$ cm, $QS = 6$ cm, $RQ = 9$ cm.

Calculate the length of PR.

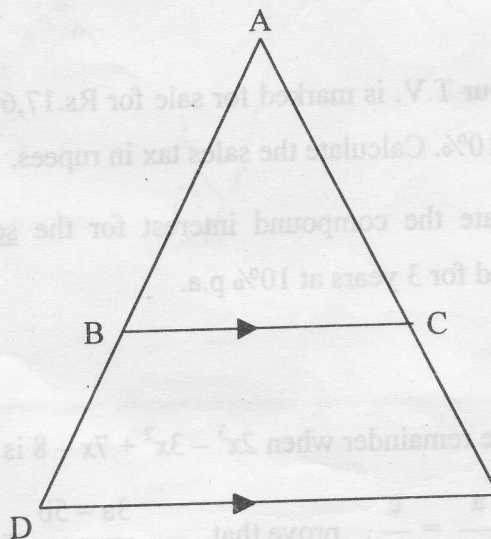
[2]

Question 4

- (a) Solve the inequation: $-3 \leq 3 - 2x < 9$, $x \in \mathbb{R}$. Represent your solution on a number line.

[3]

- (b)



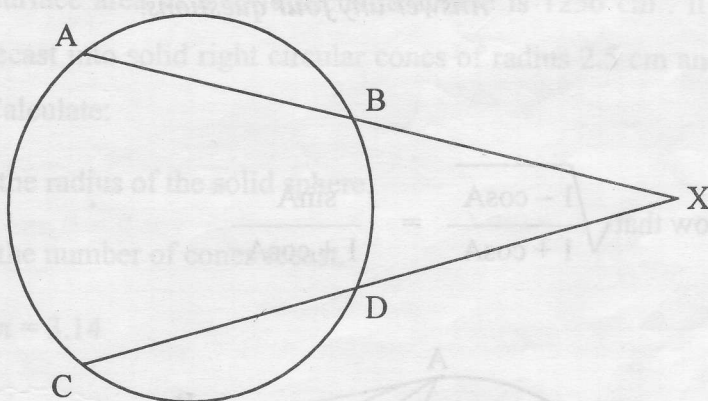
In the figure above, BC is parallel to DE. Area of triangle ABC = 25 cm^2 , area of trapezium BCED = 24 cm^2 , $DE = 14$ cm. Calculate the length of BC.

[4]

Question 5

- (a) Calculate the ratio in which the line joining $A(6, 5)$ and $B(4, -3)$ is divided by the line $y = 2$. [2]
- (b) Write down the coordinates of the image of the point $(3, -2)$ when:
- reflected in the x axis,
 - reflected in the y axis,
 - reflected in the x axis followed by reflection in the y axis,
 - reflected in the origin. [3]

Question 6



- In the figure, chords AB and CD when extended meet at X . Given $AB = 4\text{ cm}$, $BX = 6\text{ cm}$, $XD = 5\text{ cm}$, calculate the length of CD . [3]
- (b) Construct triangle ABC , with $AB = 7\text{ cm}$, $BC = 8\text{ cm}$ and $\angle ABC = 60^\circ$. Locate by construction the point P such that:
- P is equidistant from B, C and
 - P is equidistant from AB and BC .
 - Measure and record the length of PB . [3]

Question 7

- (a) Calculate the mean, the median and the mode of the following numbers: [3]
 3, 1, 5, 6, 3, 4, 5, 3, 7, 2.
- (b) Given $A = \begin{bmatrix} 1 & 1 \\ 8 & 3 \end{bmatrix}$, evaluate $A^2 - 4A$. [3]
- (c) Use graph paper for this question. Plot the points A(8, 2) and B(6, 4). These two points are the vertices of a figure which is symmetrical about $x = 6$ and $y = 2$. Complete the figure on the graph. Write down the geometrical name of the figure. [3]

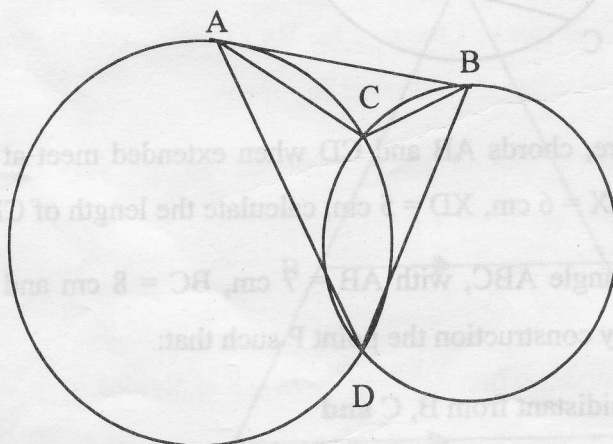
SECTION B (40 Marks)

Answer any **four** questions.

Question 8

- (a) Show that $\sqrt{\frac{1 - \cos A}{1 + \cos A}} = \frac{\sin A}{1 + \cos A}$ [3]

(b)



In the Figure, AB is a common tangent to two circles intersecting at C and D. Write down the measure of $(\angle ACB + \angle ADB)$. Justify your

[3]

(c) Solve graphically the simultaneous equations:

$x - 2y = 1$; $x + y = 4$. Use 2 cm = 1 unit on both axes and plot only three points per line.

[4]

Question 9

(a) Only ruler and compass may be used in this question.

- (i) Construct $\triangle ABC$ such that $AB = AC + 7\text{cm}$ and $BC = 5\text{cm}$.
- (ii) Draw AX , the perpendicular bisector of side BC .
- (iii) Draw a circle with centre A and radius 3 cm cutting AX at Y .
- (iv) Construct another circle to touch the circle with centre A externally at Y and passing through B and C .

[5]

(b) The surface area of a solid metallic sphere is 1256 cm^2 . It is melted and recast into solid right circular cones of radius 2.5 cm and height 8 cm. Calculate:

- (i) the radius of the solid sphere,
- (ii) the number of cones recast.

Take $\pi = 3.14$

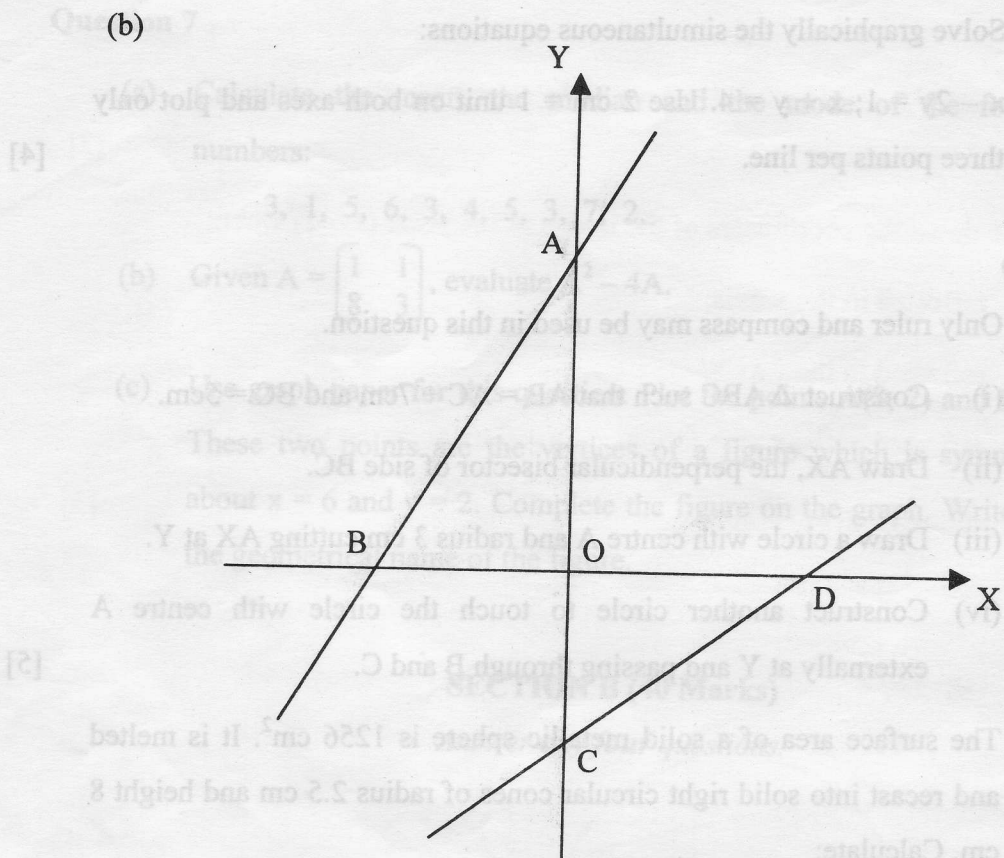
[5]

Question 10

(a) A dividend of 9% was declared on Rs.100/- shares selling at a certain price. If the rate of return is $7\frac{1}{2}\%$, Calculate:

- (i) the market value of the share;
- (ii) the amount to be invested to obtain an annual dividend of Rs.630/-.

[4]



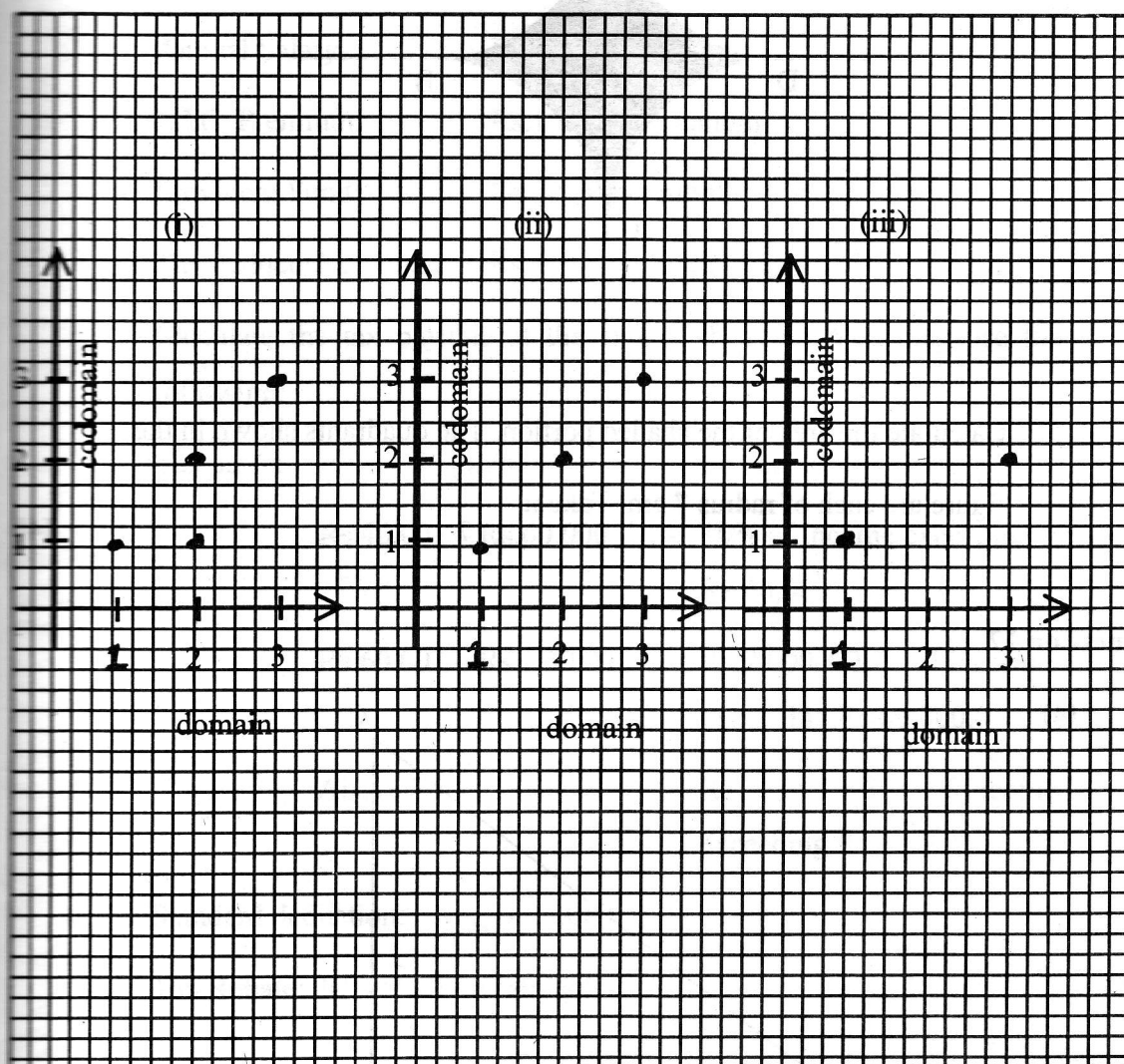
In the figure, AB and CD are the lines $2x - y + 6 = 0$ and $x - 2y = 4$ respectively.

- (i) Write down the coordinates of A, B, C and D;
- (ii) Prove that triangles OAB and ODC are similar;
- (iii) Is figure ABCD cyclic? Give reasons for your answer.

[6]

Question 11

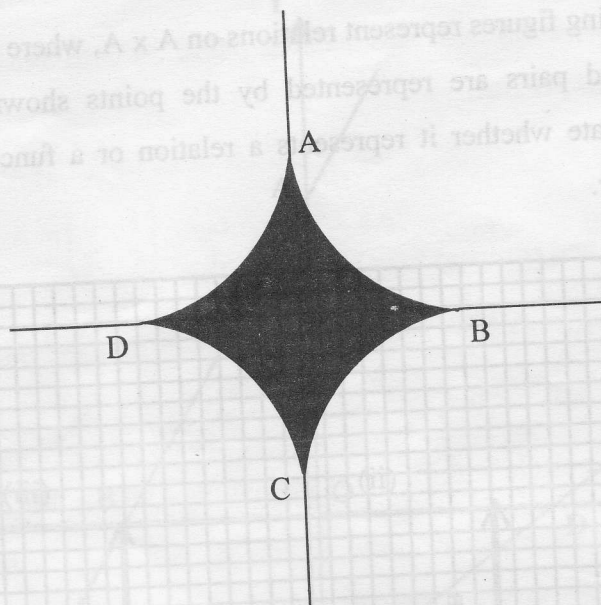
- (a) The following figures represent relations on $A \times A$, where $A = \{1, 2, 3\}$. The ordered pairs are represented by the points shown. For each diagram, state whether it represents a relation or a function. Justify your answer. [3]



- (b) $A = \{\text{real number}\}$. On A , a relation R is defined by:

For all $a, b \in A$, $a R b$ holds if and only if the difference between a and b is less than 2. Is R an equivalence relation? Justify your answer. [3]

(c)

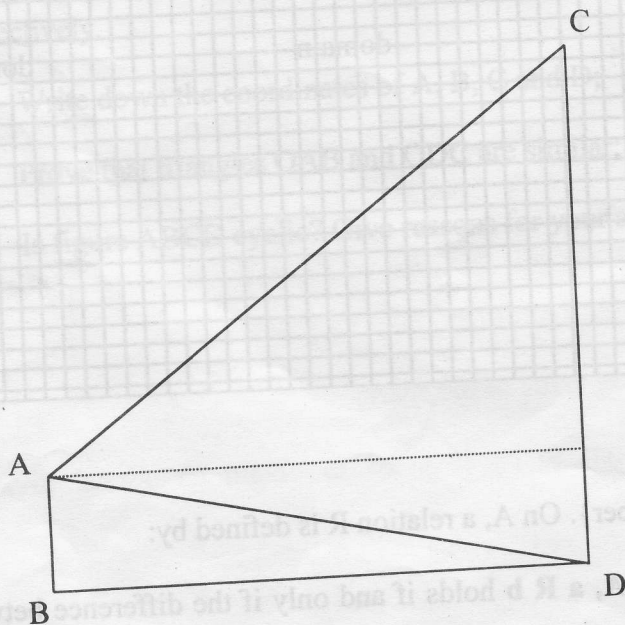


Calculate the area of the shaded portion. The quadrants shown in the figure are each of radius 7 cm. Take $\pi = \frac{22}{7}$.

[4]

Question 12

(a)



From a window A, 10 m above ground the angle of elevation of the top C of a tower is x° , where $\tan x = 5/2$ and the angle of depression of

the foot D of the tower is y° , where $\tan y = 1/4$. See the figure given above.

Calculate the height CD of the tower in metres.

[5]

- (b) The following are the details of income and investments of Mr. Mathur for a particular year.

Annual Salary. Rs.1,50,000

L.I.C. Premium: Rs.18,000 per annum

Provident Fund: Rs.1,500 per month

Tax deducted at source: Rs.500 per month

Calculate the tax payable at the end of the year. You may use the following:

Tax slabs:	Re.1 – Rs.40,000	– no tax
	Rs.40,001 – Rs.60,000	– 10% of income exceeding Rs.40,000.
	Rs.60,001 – Rs.1,50,000	– Rs.2,000 + 20% of income exceeding Rs.60,000.
	Above Rs.1,50,000	– Rs.20,000 + 30% of income exceeding Rs.1,50,000.

Standard deduction: Rs.20,000

Tax Rebate: 20% of all investments.

[5]

Question 13

- (a) The hotel bill for a number of people for overnight stay is Rs.4800/- If there were 4 more, the bill each person had to pay would have reduced by Rs.200/-. Find the number of people staying overnight.

[5]

- (b) The following table shows the distribution of the heights of a group of factory workers.

Ht (cm)	150-155	155-160	160-165	165-170	170-175	175-180	180-185
Number of workers	6	12	18	20	13	8	6

- (i) Determine the cumulative frequencies;
- (ii) Draw the cumulative frequency curve on a graph paper.
Use 2 cm = 5 cm height on one axis and 2 cm = 10 workers on the other.
- (iii) From your graph, write down the median height in cm. [5]

Question 14

- (a) ABCD is a rhombus. The coordinates of A and C are (3, 6) and (-1, 2) respectively. Write down the equation of BD. [4]
- (b) Given below are the entries in a Savings bank a/c pass book.

Date	Particulars	Withdrawal	Deposit	Balance
Feb 8	B/F			Rs.8,500
Feb 18	To self	Rs.4,000		
April 12	By cash		Rs.2,238	
June 15	To self	Rs.5,000		
July 8	By cash		Rs.6,000	

Calculate the interest for the six months February to July, at $4\frac{1}{2}\%$ p.a. on minimum balance on or after the 10th day of each month. [6]