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MATHEMATICS - 1997

(Two hours and a half)

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SECTION - A (52Marks)

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

Question l

A person invests Rs. 5,600 at 14% p.a. compound interest for 2 years. [2]
Calculate:
(i) The interest for the 1st year.

(ii) The amount at the end of the lst year.. [2]

(iii) The interest for 2nd year, correct to the nearest Rs. [2]

Question 2

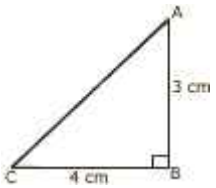
When a discount of 15% is allowed on the marked price of an article, it is sold for Rs. 2,975. [2]
(i) Calculate its marked price.

Given that the marked price is 40% above the cost price of the article, calculate: [2]
(ii) Its cost price;

(iii) The profit, in Rs. made after the sale of the article. [2]

Question 3

On a map drawn to a scale of 1 : 2,50,000, a triangular plot of land has the following measurements: AB = 3cm, BC = 4cm, angel ABC = 90° [3]
Calculate:



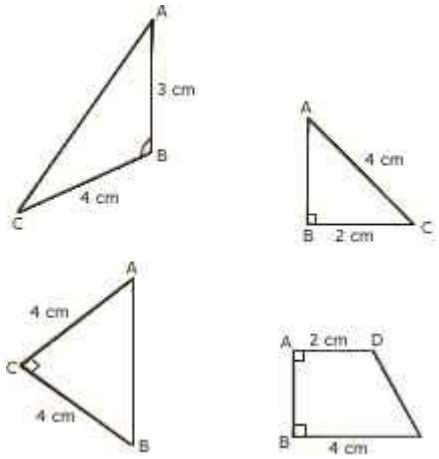
(i) The actual length of AB in km;

(ii) The area of the plot in sq. km. [3]

Question 4

Part of a geometrical figure is given in each of the diagrams below. [8]

Complete the figure so that the line AB in each case is a line of symmetry of the completed figure. Give also the geometrical name for the completed figure.
Recognizable free-hand sketches would be awarded full marks.



Question 5

A bucket is raised from a well by means of a rope which is wound round a wheel of diameter 77 cm. Given that the bucket ascends in 1 minute 28 seconds with a uniform speed of 1.I m/s, calculate the number of complete revolutions the wheel makes in raising the bucket. Take π to be /7. [8]

Question 6

Ruler and compasses only may be used in this question. All construction lines and arcs must be clearly shown, and be of sufficient length and clarity to permit assessment.
(i) Construct triangle ABC, in which BC = 8 cm, AB = 5 cm, angle ABC = 60°; [1]

(ii) Construct the locus of points inside the triangle which are equidistant from BA and BC; [1]

(iii) Construct the locus of points inside the triangle which are equidistant from B and C. [1]

(iv) Mark as P, the point which is equidistant from AB, BC and equidistant from B and C; [1]

(v) Measure and record the length of PB. [1]

Question 7

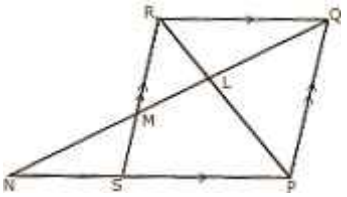
(i) Point P (a, b) is reflected in the x-axis to P' (5, −2). Write down the values of a and b. [2]

(ii) P" is the image of P when reflected in the y-axis. Write down the co-ordinates of P". [2]

(iii) Name a single transformation that maps P' to P". [2]

Question 8 [7]

In the figure, alongside PQRS is a parallelogram; PQ = 16 cm, QR = 10 cm. L is a point on PR such that RL : LP = 2 : 3. QL produced meets RS at M and PS produced at N.



(i) Prove that triangle RLQ is similar to triangle PLN. Hence find PN.
(ii) Name a triangle similar to triangle RLM. Evaluate RM as a fraction.

SECTION - B (48 Marks)

*Answer any **four** questions from this Section.*

Question 9 [4]

(a) State whether the following statements are TRUE or FALSE.

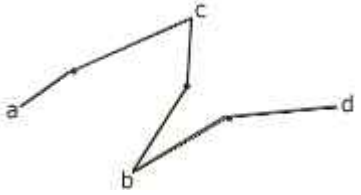
(i) a > b, then a − c > b − e,
(ii) If a < b, then ac < bc.
(iii) If a > b, then a/c > b/c.
(iv) If a − c < b − d, then a + d < b + c. where a, b, c, d are real numbers, c ≠ 0.

Question 9

(b) Evaluate without using tables: [4]

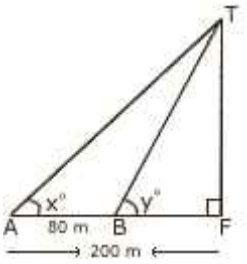
$$\begin{bmatrix} 2\cos 60° - 2\sin 30° & \\ -\tan 45° & \cos 0° \end{bmatrix} \begin{bmatrix} \cot 45° & \operatorname{cosec} 30° \\ \sec 60° & \sin 90° \end{bmatrix}$$

(c) Three arrow are missing from the diagram which partly shows the relation 'is greater than' on the set of integers a,b,c and d. Copy and complete the diagram. State which is the smallest of the four integers. [4]



Question 10 [12]

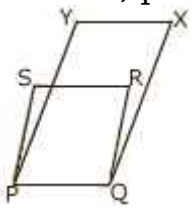
(a) In the alongside figure, not drawn to scale, TF is a tower. The elevation of T from A is $x°$, where tan x = 2/3 and
AF = 200 m. The elevation of T from B, where AB = 80 m. is y°. Calculate:



(i) The height of the tower TF;
(ii) The angle y, correct to the nearest degree.
(b) Ruler and compasses only may be used in this question. All construction lines and arcs must be clearly shown, and be of sufficient length and clarity to permit assessment.
(i) Construct triangle ABC, in which AB = 9 cm; BC = 10 cm and angle ABC = 45°;
(ii) Draw a circle, with centre A and radius 2·5 cm. Let it meet AB at D;
(iii) Construct a circle to touch the circle with centre A externally at D and also to touch the line BC.
(c) Calculate the distance between A (7, 3) and B on the x-axis whose abscissa is 11.

Question 11 [6]

(a) In the figure, alongside PQRS and PQXY are Y X parallelograms. (i) Prove that SX and RY bisect each other; (ii) If SX = RY, prove that angle RSY = 90°.



(b) Car A travels x km for every litre of petrol, while car B travels (x+ 5) krn for every litre of petrol.
(i) Write down the number of litres of petrol used by car A and car B in covering a distance of 400 km.
(ii) If car A uses 4 litre of petrol more than car B in covering the 400 km, write down an equation in x and solve it to determine the number of litre of petrol used by car B for the journey.

Question 12 [12]

(a) The contents of 100 match boxes were checked to determine the number of matches they contained:

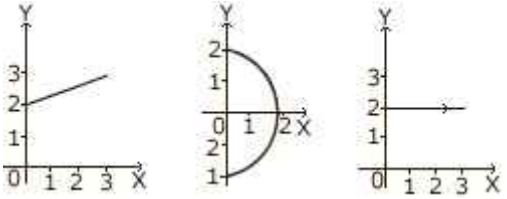
No. of matches :	35	36	37	38	39	40	41
No. of boxes :	6	10	18	25	21	12	8

(i) Calculate, correct to one decimal place, the mean number of matches per box;
(ii) Determine how many extra matches would have to be added to the total contents of the 100 boxes to bring the mean up to exactly 39 matches.
(b) Use a graph paper for this question.
Draw the graphs of $x + y + 2 = 0$ and $3x - 4y = 15$ on the same axes. Use 2 cm =

1 unit on both axes and plot only three points per line. Write down the co-ordinates of the point of intersection of the lines.

Question 13 [12]

(a) Fig. (i), Fig. (ii), Fig. (iii)



The above diagrams represent relation from X to Y. Classify them as relations or functions. If the relation is a function, classify it as 1 - 1, Many - 1.
(b) Attempt this question on a graph paper. The table below shows the distribution of marks gained by a group of students in an examination:

Marks less than :	10	20	30	40	50	60	70	80	90	100
No. of students :	5	10	30	60	105	180	270	355	390	400

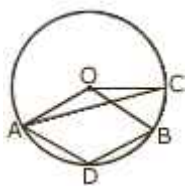
Using a scale of 2 cm to represent 10 marks and 2 cm to represent 50 students, plot these values and draw a smooth curve through the points.
Estimate from the graph:
(i) The median marks,
(ii) The quartile marks.

Question 14 [12]

(a) A lady holds 1,800, Rs.100 shares of a company that pays 15% dividend annually, Calculate her annual dividend. If she had bought these shares at 40% premium, what percentage return does she get on her investment. Give your answer to the nearest integer.
(b) A cylindrical can whose base is horizontal and of radius 3·5 cm contains sufficient water so that when a sphere is placed in the can, the water just covers the sphere. Given that the sphere just fits into the can, calculate:
(i) The total surface area of the can in contact with water when the sphere is in it.
(ii) The depth of water in the can before the sphere was put into the can. Take π to be 22/ 7 and give your answer as proper fractions.

Question 15 [12]

(a) (i) The line $4x - 3y + 12 = 0$ meets the x-axis at A. Write down the coordinates of A.



(ii) Determine the equation of the line passing through A and perpendicular t

o $4x - 3y + 12 = 0$.

(b) In the figure given alongside, A, D, B, C are four points on the circumference of a circle with centre O. Arc AB = 2 Arc. BC and angle AOB = 108°. Calculate in degrees:

(i) Angle ACB,

(ii) Angle CAB,

(iii) Angle ADB,

Justify your calculations.