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Maths ICSE 2014

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2014

MATHEMATICS*(Two hours and a half)**Answers to this Paper must be written on the 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.**Attempt **all** questions from 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)***Attempt **all** questions from this Section.***Question 1**

- (a) Ranbir borrows ₹ 20,000 at 12% per annum compound interest. If he repays ₹ 8400 at the end of the first year and ₹ 9680 at the end of the second year, find the amount of loan outstanding at the beginning of the third year. [3]
- (b) Find the values of x , which satisfy the inequation $-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \leq 2$, $x \in W$. Graph the solution set on the number line. [3]
- (c) A die has 6 faces marked by the given numbers as shown below:

1	2	3	-1	-2	-3
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The die is thrown once. What is the probability of getting
(i) a positive integer.
(ii) an integer greater than -3.
(iii) the smallest integer. [4]

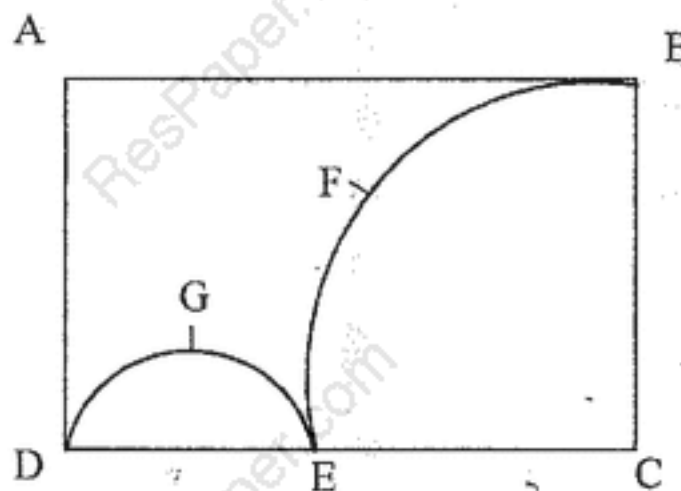
This paper consists of 7 printed pages and 1 blank page.**T14 511****© Copyright reserved.****Turn over**

Question 2

- (a) Find x, y if $\begin{bmatrix} -2 & 0 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} -1 \\ 2x \end{bmatrix} + 3 \begin{bmatrix} -2 \\ 1 \end{bmatrix} = 2 \begin{bmatrix} y \\ 3 \end{bmatrix}$. [3]
- (b) Shahrukh opened a Recurring Deposit Account in a bank and deposited ₹800 per month for $1\frac{1}{2}$ years. If he received ₹15,084 at the time of maturity, find the rate of interest per annum. [3]
- (c) Calculate the ratio in which the line joining A(-4, 2) and B(3, 6) is divided by point P(x, 3). Also find (i) x (ii) Length of AP. [4]

Question 3

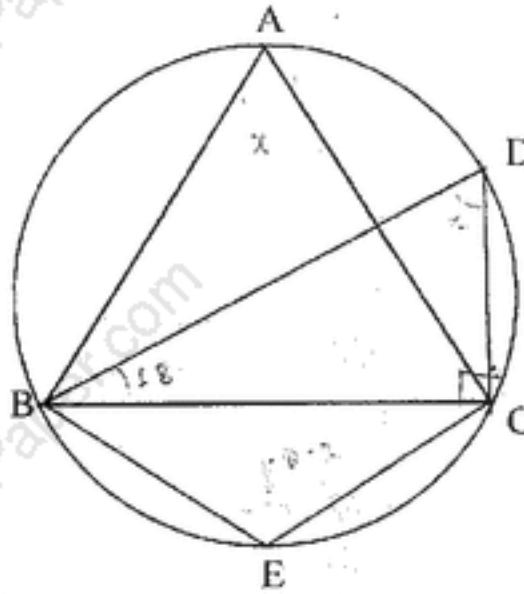
- (a) Without using trigonometric tables, evaluate $\sin^2 34^\circ + \sin^2 56^\circ + 2 \tan 18^\circ \tan 72^\circ - \cot^2 30^\circ$. [3]
- (b) Using the Remainder and Factor Theorem, factorise the following polynomial: $x^3 + 10x^2 - 37x + 26$. [3]
- (c) In the figure given below, ABCD is a rectangle. AB = 14cm, BC = 7cm. From the rectangle, a quarter circle BFEC and a semicircle DGE are removed. Calculate the area of the remaining piece of the rectangle. (Take $\pi = 22/7$) [4]

**Question 4**

- (a) The numbers 6, 8, 10, 12, 13, and x are arranged in an ascending order. If the mean of the observations is equal to the median, find the value of x . [3]

(b) In the figure, $\angle DBC = 58^\circ$. BD is a diameter of the circle. Calculate:

- (i) $\angle BDC$
- (ii) $\angle BEC$
- (iii) $\angle BAC$



[3]

(c) Use graph paper to answer the following questions. (Take 2cm = 1 unit on both axis)

- (i) Plot the points A(-4, 2) and B(2, 4)
- (ii) A' is the image of A when reflected in the y-axis. Plot it on the graph paper and write the coordinates of A'. (4, 2)
- (iii) B' is the image of B when reflected in the line AA'. Write the coordinates of B'. (8, 2)
- (iv) Write the geometric name of the figure ABA'B'.
- (v) Name a line of symmetry of the figure formed.

[4]

SECTION B (40 Marks)

Attempt any **four** questions from this Section

Question 5

(a) A shopkeeper bought a washing machine at a discount of 20% from a wholesaler, the printed price of the washing machine being ₹18,000. The shopkeeper sells it to a consumer at a discount of 10% on the printed price. If the rate of sales tax is 8%, find:

- (i) the VAT paid by the shopkeeper.
- (ii) the total amount that the consumer pays for the washing machine.

[3]

(b) If $\frac{x^2 + y^2}{x^2 - y^2} = \frac{17}{8}$, then find the value of:

(i) $x : y$

(ii) $\frac{x^3 + y^3}{x^3 - y^3}$

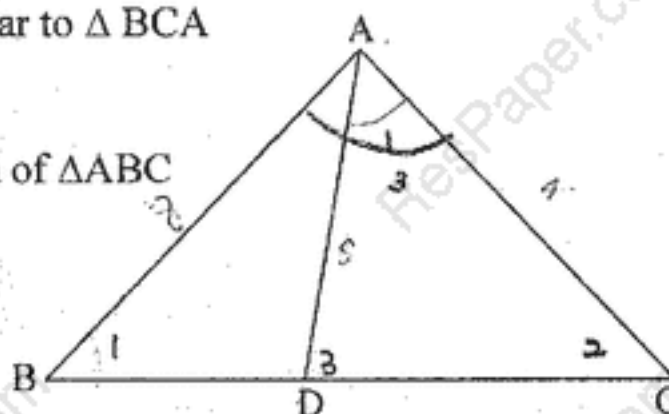
[3]

(c) In $\triangle ABC$, $\angle ABC = \angle DAC$. $AB = 8\text{cm}$, $AC = 4\text{cm}$, $AD = 5\text{cm}$.

(i) Prove that $\triangle ACD$ is similar to $\triangle BCA$

(ii) Find BC and CD

(iii) Find area of $\triangle ACD$: area of $\triangle ABC$



[4]

Question 6

(a) Find the value of 'a' for which the following points $A(a, 3)$, $B(2, 1)$ and $C(5, a)$ are collinear. Hence find the equation of the line.

[3]

(b) Salman invests a sum of money in ₹ 50 shares, paying 15% dividend quoted at 20% premium. If his annual dividend is ₹ 600, calculate:

(i) the number of shares he bought.

(ii) his total investment.

(iii) the rate of return on his investment.

[3]

(c) The surface area of a solid metallic sphere is 2464 cm^2 . It is melted and recast into solid right circular cones of radius 3.5cm and height 7cm. Calculate:

(i) the radius of the sphere.

(ii) the number of cones recast. (Take $\pi = 22/7$)

[4]

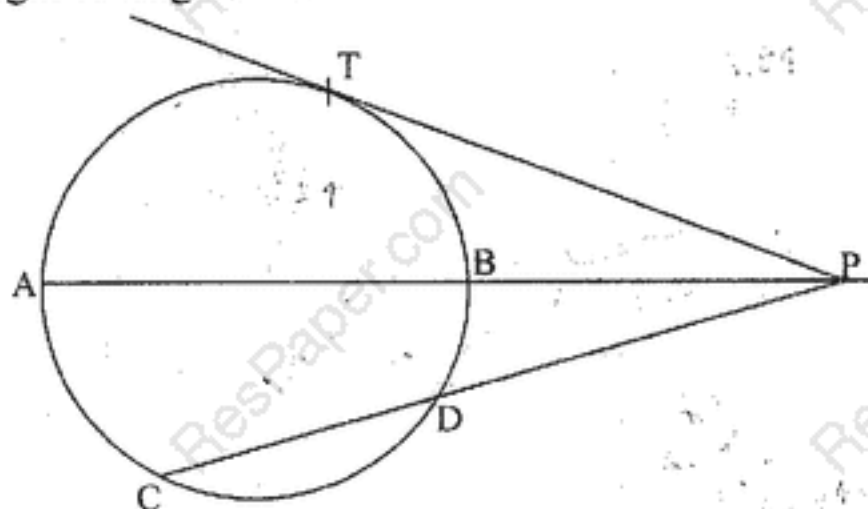
Question 7

(a) Calculate the mean of the distribution given below using the short cut method.

Marks	11-20	21-30	31-40	41-50	51-60	61-70	71-80
No. of students	2	6	10	12	9	7	4

[3]

- (b) In the figure given below, diameter AB and chord CD of a circle meet at P. PT is a tangent to the circle at T. $CD = 7.8\text{cm}$, $PD = 5\text{cm}$, $PB = 4\text{cm}$. Find:
- AB.
 - the length of tangent PT.



- (c) Let $A = \begin{bmatrix} 2 & 1 \\ 0 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 1 \\ -3 & -2 \end{bmatrix}$ and $C = \begin{bmatrix} -3 & 2 \\ -1 & 4 \end{bmatrix}$.

Find $A^2 + AC - 5B$.

[4]

Question 8

- (a) The compound interest, calculated yearly, on a certain sum of money for the second year is ₹1320 and for the third year is ₹1452. Calculate the rate of interest and the original sum of money. [3]
- (b) Construct a ΔABC with $BC = 6.5\text{ cm}$, $AB = 5.5\text{ cm}$, $AC = 5\text{ cm}$. Construct the incircle of the triangle. Measure and record the radius of the incircle. [3]
- (c) (Use a graph paper for this question.) The daily pocket expenses of 200 students in a school are given below:

Pocket expenses (in ₹)	Number of students (frequency)
0 – 5	10
5 – 10	14
10 – 15	28
15 – 20	42
20 – 25	50
25 – 30	30
30 – 35	14
35 – 40	12

Draw a histogram representing the above distribution and estimate the mode from the graph.

[4]

Question 9

- (a) If $(x - 9) : (3x + 6)$ is the duplicate ratio of $4 : 9$, find the value of x . [3]
- (b) Solve for x using the quadratic formula. Write your answer correct to two significant figures. $(x - 1)^2 - 3x + 4 = 0$. [3]
- (c) A page from the savings bank account of Priyanka is given below:

Date	Particulars	Amount withdrawn (₹)	Amount deposited (₹)	Balance (₹)
03/04/2006	B/F			4000.00
05/04/2006	By cash		2000.00	6000.00
18/04/2006	By cheque		6000.00	12000.00
25/05/2006	To cheque	5000.00		7000.00
30/05/2006	By cash		3000.00	10000.00
20/07/2006	By self	4000.00		6000.00
10/09/2006	By cash		2000.00	8000.00
19/09/2006	To cheque	1000.00		7000.00

If the interest earned by Priyanka for the period ending September, 2006 is ₹ 175, find the rate of interest.

[4]

Question 10

- (a) A two digit positive number is such that the product of its digits is 6. If 9 is added to the number, the digits interchange their places. Find the number. [4]
- (b) The marks obtained by 100 students in a Mathematics test are given below:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No of students	3	7	12	17	23	14	9	6	5	4

Draw an ogive for the given distribution on a graph sheet.

Use a scale of 2cm = 10 units on both axis).

Use the ogive to estimate the:

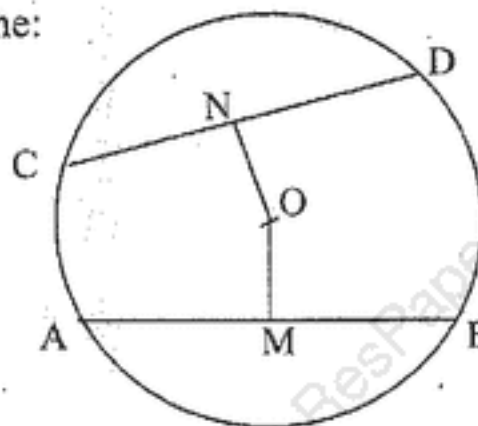
- (i) median.
- (ii) lower quartile.
- (iii) number of students who obtained more than 85% marks in the test.
- (iv) number of students who did not pass in the test if the pass percentage was 35.

[6]

Question 11

- (a) In the figure given below, O is the centre of the circle. AB and CD are two chords of the circle. OM is perpendicular to AB and ON is perpendicular to CD. AB = 24cm, OM = 5cm, ON = 12cm. Find the:

- (i) radius of the circle.
- (ii) length of chord CD.



[3]

- (b) Prove the identity

$$(\sin \theta + \cos \theta)(\tan \theta + \cot \theta) = \sec \theta + \operatorname{cosec} \theta.$$

[3]

- (c) An aeroplane at an altitude of 250 m observes the angle of depression of two boats on the opposite banks of a river to be 45° and 60° respectively. Find the width of the river. Write the answer correct to the nearest whole number.

[4]