

LA MARTINIÈRE FOR BOYS, KOLKATA
FINAL EXAMINATION 2022-23

SUBJECT: MATHEMATICS
CLASS: IX

TIME: 2 hours 30 min + 15 min reading time
FULL MARKS: 80

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

You will not be allowed to write during 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 []

SECTION A

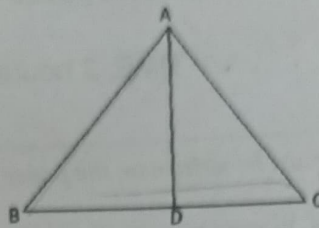
(Attempt all questions from this section)

Question 1

[10]

- (i) The solution of the simultaneous equations $3x - 2y = 5$ and $x + 2y = -1$ is:
(a) $x = 1, y = 1$ (b) $x = 1, y = -1$ (c) $x = -1, y = 1$ (d) $x = -4, y = -1$.
- (ii) $\log_3 \left(\frac{1}{27} \right) = ?$
(a) 3 (b) $\frac{1}{3}$ (c) $-\frac{1}{3}$ (d) -3.
- (iii) In $\triangle ABC$, $\angle A + \angle B = 80^\circ$ and $\angle B + \angle C = 120^\circ$, then $\angle C = ?$
(a) 20° (b) 100° (c) 60° (d) 90° .

- (iv) $\triangle ABC$ is a triangle as shown in the figure, and AD is a median. If the area of $\triangle ABC$ is 36 cm^2 , then the area of $\triangle ACD$ is :



- (a) 36 cm^2 (b) 18 cm^2 (c) 72 cm^2 (d) 24 cm^2 .
- (v) $\cos(90^\circ - A) = \dots\dots\dots$
 (a) $\cos A$ (b) $\sin A$ (c) $\operatorname{cosec} A$ (d) $\tan A$.
- (vi) The number $(3 - \sqrt{5})^2$ is:
 (a) a natural number (b) a rational number (c) an integer (d) An irrational number.
- (vii) If $\sin 2A = 1$, then A is:
 (a) 45° (b) 90° (c) 30° (d) 60° .
- (viii) The slope of the line $2x - 3y + 5 = 0$ is
 (a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) 1 (d) $\frac{5}{3}$.
- (ix) An open box is made up of square card boards. The total surface area of the box if each of its edge is 4 cm is :
 (a) 64 cm^2 (b) 80 cm^2 (c) 96 cm^2 (d) none of these.
- (x) The lengths of the diagonals of a rhombus are 5 cm and 12 cm. The length of each side of the rhombus is:
 (a) 13 cm (b) 6.5 cm (c) 6.25 cm (d) none of these.

Question 2

- (a) The mean of 20 observations is 30. On checking, it was found that two observations were wrongly recorded as 27 and 32 while the correct observations were 31 and 38. Find the correct mean. [3]
- (b) Given $\sec A = \frac{29}{21}$, evaluate: $\sin A - \frac{1}{\tan A}$. [3]
- (c) The base of an isosceles triangle is 24 cm and its area is 192 cm^2 . Find its perimeter. [4]

Question 3

- (a) Find the slope and y-intercept of the line $3x - 2y = 10$. [3]
- (b) Solve for x : $\left(\sqrt{\frac{5}{3}}\right)^{x-8} = \left(\frac{27}{125}\right)^{2x-3}$. [3]

- (c) Prove that: $7\log \frac{16}{15} + 5\log \frac{25}{24} + 3\log \frac{81}{80} = \log 2$. [4]

Question 4

- (a) Evaluate: $3 \cos 80^\circ \operatorname{cosec} 10^\circ + 2 \sin 59^\circ \sec 31^\circ$. [3]
- (b) The length, breadth and height of a rectangular solid are in the ratio 5 : 4 : 2. If the total surface area of the solid is 1216 cm^2 , find the length, breadth and height of the solid. [3]
- (c) In a parallelogram ABCD, the bisectors of $\angle A$ and $\angle B$ meet at E, which lies on DC. Prove that $AB = 2AD$. [4]

SECTION B

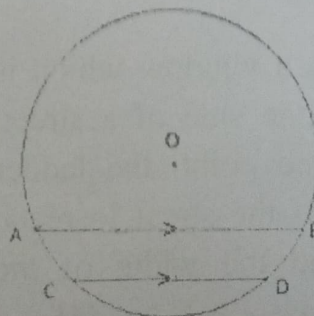
(Attempt any four questions from this section)

Question 5

- (a) Find the value of $\frac{4}{3} \tan^2 30^\circ + \sin^2 60^\circ - 3 \cos^2 60^\circ + \frac{3}{4} \tan^2 60^\circ - 2 \tan^2 45^\circ$. [3]
- (b) What sum of money will amount to ₹27,783 in one and a half years at 10% p.a. compounded half-yearly? [3]
- (c) Solve the following equations simultaneously:
 $3x - 7y + 10 = 0$, $y - 2x = 3$. [4]

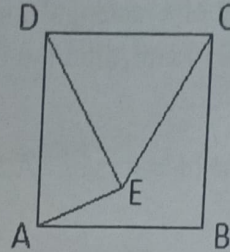
Question 6

- (a) Which point on the x-axis is equidistant from the points (7, 6) and (-3, 4)? [3]
- (b) If the mean of the observations $a, a + 2, a + 4, a + 6$, and $a + 8$ is 11, then find the median. [3]
- (c) In a circle of radius 17 cm, two parallel chords of length 30 cm and 16 cm are drawn on the same side of the centre. Find the distance between the chords. [4]



Question 7

- (a) Find the values of a and b if $\frac{5+3\sqrt{2}}{5-3\sqrt{2}} = a + b\sqrt{2}$. [3]
- (b) In the given figure, $\square ABCD$ is a square and $\triangle CDE$ is an equilateral triangle. Find (i) $\angle AED$ (ii) $\angle EAB$ (iii) reflex $\angle AEC$. [3]



- (c) Using ruler and compass only, construct a rhombus $ABCD$ with $AB = 6$ cm and diagonal $AC = 7$ cm. [4]

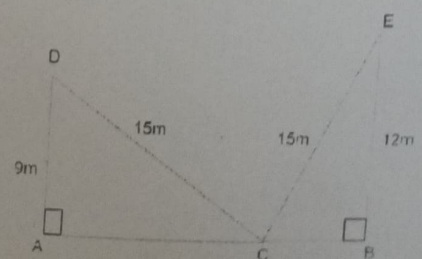
Question 8

- (a) Solve for x : $\sin^2 x + \cos^2 30^\circ = \frac{5}{4}$. [3]
- (b) Factorize: $25a^2 - 9b^2 + 12bc - 4c^2$. [3]
- (c) Draw a frequency polygon from the following data: [4]

Age (in years)	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
No of doctors	40	60	50	35	20

Question 9

- (a) Three cubes are joined adjacently, edge to edge. If the edge of each cube is 7 cm, find the total surface area of the resulting cuboid. [3]
- (b) The circumference of a given circular park is 55 m. It is surrounded by a path of uniform width 3.5 m. Find the area of the path. [3]
- (c) A ladder 15 m long reaches a window which is 9 m above the ground on one side of a street. Keeping its foot at the same point, the ladder is turned to the other side of the street to reach a window 12 m high. Find the width of the street. [4]



Question 10

- (a) If $a^2 + \frac{1}{a^2} = 47$ and $a \neq 0$ then find $a^3 + \frac{1}{a^3}$. [3]
- (b) The angles of a pentagon are in the ratio 4 : 8 : 6 : 4 : 5. Find each angle of the pentagon. [3]
- (c) Solve the following equations graphically:
 $x + y + 3 = 0$; $3x - 2y + 4 = 0$. [4]

Question 11

- (a) Simplify : $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} \times \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} \times \left(\frac{x^c}{x^a}\right)^{c^2+ca+a^2}$. [3]
- (b) A cubical cistern of side 1.2 m is filled with water. If 64 buckets of water is taken out from it, then one-third of the cistern remains filled. How many litres of water does the bucket hold? [3]
- (c) The sum of a two-digit number and the number formed by reversing the digits is 88. If the difference of the digits of the number is 2, find the number by forming two equations in two variables. [4]
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