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ENGLISH MEDIUM SENIOR SECONDARY SCHOOL, RISALI
MODEL EXAMINATION 2022-23
CLASS-X SUBJECT-MATHEMATICS

TIME- 3 HRS.

MM. 80

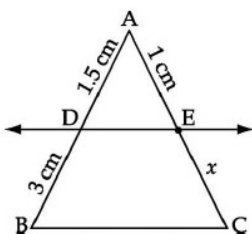
General Instructions:

- i). Question paper comprises five Sections – A, B, C, D and E.
- ii) Section A consists of 20 objective type questions carrying 1 mark each.
- iii). Section B consists of 5 Questions carrying 2 marks each.
- iv) Section C consists of 6 Questions carrying 3 marks each.
- v) Section D consists of 4 questions carrying 5 marks each.
- vi) Section E consists of 3 case based integrated units of assessment (4 marks each) with subparts of the marks 1, 1 and 2 each respectively.
- vi). All questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 questions of 5 marks has been provided.

SECTION – A

Section A consists of 20 questions of 1 marks each

1. Given that $HCF(156, 78) = 78$, $LCM(156, 78)$
(A) 156 (B) 78 (C) 156×78 (D) 156×2
2. The roots of the equation $x^2 - 3x - m(m+3) = 0$, where m is constant are
(A) m, m + 3 (B) m + 3, -m (C) $-(m+3)$, -m (D) m, $-(m+3)$
3. If α and β are the zeroes of the polynomial $x^2 + x + 1$, then $\frac{1}{\alpha} + \frac{1}{\beta} =$
(A) 0 (B) 1 (C) -1 (D) None of these
4. The pair of equations $2x - 3y = 1$ and $3x - 2y = 4$ has _____ solution.
(A) One (B) two (C) no (D) many
5. The distance between the points $(-5, 7)$ and $(-1, 3)$ is
(A) $4\sqrt{2}$ units (B) 4 units (C) $2\sqrt{13}$ units (D) 2 units
6. What is the largest number that divides each one of 1152 and 1664 exactly?
(A) 32 (B) 64 (C) 128 (D) 256
7. If $\cos A = \frac{4}{5}$, then the value of $\tan A$ is:
(A) $\frac{3}{5}$ (B) $\frac{3}{4}$ (C) $\frac{4}{3}$ (D) $\frac{5}{3}$
8. If $x \tan 60^\circ \cos 60^\circ = \sin 60^\circ \cot 60^\circ$, then x =
(A) $\cos 30^\circ$ (B) $\tan 30^\circ$ (C) $\sin 30^\circ$ (D) $\cot 30^\circ$
9. In the figure, if $DE \parallel BC$, then x equal to:



- (A) 2.5cm (B) 2 cm (C) 1.4 cm (D) 4 cm

10. In $\triangle ABC$ and $\triangle DEF$, $\frac{AB}{DE} = \frac{BC}{FD}$ then $\triangle ABC \sim \triangle DEF$, If

- (A) $\angle A = \angle D$ (B) $\angle B = \angle E$ (C) $\angle B = \angle D$ (D) $\angle A = \angle F$

11. The area of the circle is numerically equal to its circumference, then radius of the circle is:

- (A) 7 units (B) 4 units (C) 2 units (D) 1 unit

12. If the sum of the areas of the two circles with radius R_1 and R_2 is equal to the area of the circle with radius R then,

- (A) $R_1 + R_2 = R$ (B) $R_1^2 + R_2^2 = R^2$ (C) $R_1 + R_2 < R$ (D) $R_1^2 + R_2^2 < R^2$

13. The surface area of a sphere is 616 cm^2 , its radius is

- (A) 19 cm (B) 7 cm (C) 14 cm (D) 6 cm

14. If the mode of a data is 18 and the mean is 24, then median is :

- (A) 10 (B) 15 (C) 22 (D) 24

15. How many tangents can a circle have ?

- (A) 2 (B) 1 (C) infinitely many (D) None of these

16. Consider the following frequency distribution of the heights of 60 students of a class

Height(incm)	150-155	155-160	160-165	165-170	170-175	175-180
No. of students	15	13	10	8	9	5

The upper limit of the median class in the given data is

- (A) 165 (B) 155 (C) 160 (D) 170

17. Which of the following cannot be the probability of an event?

- (A) $\frac{1}{3}$ (B) 0.1 (C) 0.3 (D) $\frac{17}{16}$

18. $\sin 2A = 2 \sin A$ is true when $A =$

- (A) 0° (B) 30° (C) 45° (D) 60°

In the question number 19 and 20, a statement of assertion(A) is followed by a statement of Reason (R)

Choose the correct option:

(A) Both assertion(A) and Reason(R) are true and reason (R) is the correct explanation of assertion (A)

(B) Both assertion(A) and Reason(R) are true and reason (R) is not the correct explanation of assertion (A)

(C) Assertion (A) is true but reason (R) is false.

(D) Assertion (A) is false but reason (R) is true.

19. Assertion (A): If product of two numbers is 5780 and their HCF is 17, then their LCM is 340.

Reason (R): HCF is always a factor of LCM.

20. Assertion (A): The point (0,6) lies on y-axis.

Reason (R): The x co-ordinate on the point on y-axis is zero

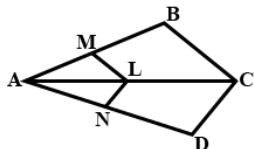
SECTION -B

Section B consists of 5 questions of 2 marks each.

21. Solve for x and y :

$$2x - y + 3 = 0, \quad 3x - 5y + 1 = 0$$

22. In the figure, if $LM \parallel CB$ and $LN \parallel CD$, prove that $\frac{AM}{AB} = \frac{AN}{AD}$.



23. The length of a tangent from a point A at distance 5 cm from the centre of the circle is 4 cm. Find the radius of the circle.

24. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

25. If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$: $0^\circ < A + B \leq 90^\circ$: $A > B$, Find A and B.

OR

If $\operatorname{cosec}^2 \theta (1 + \cos \theta)(1 - \cos \theta) = \alpha$, then find the value of α

SECTION- C

Section C consists of 6 questions of 3 marks each.

26. Prove that $\sqrt{3}$ is an irrational number.

27. Find the zeroes of the quadratic polynomial $3x^2 - x - 4$ and verify the relationship between the zeroes and the coefficients.

28. Draw the graphs of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis, and shade the triangular region.

OR

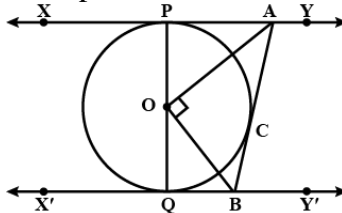
A fraction becomes $\frac{9}{11}$, if 2 is added to both the numerator and the denominator. If, 3 is added to both the numerator and the denominator it becomes $\frac{5}{6}$. Find the fraction.

29. Prove that: $\frac{\cos A}{1 + \sin A} + \frac{1 + \sin A}{\cos A} = 2 \sec A$

30. Prove that a parallelogram circumscribing a circle is a rhombus

OR

In the figure XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B, prove that $\angle AOB = 90^\circ$



31. Three coins are tossed simultaneously. What is the probability of getting

- (i) all tails
- (ii) two tails
- (iii) at least two tails

SECTION D

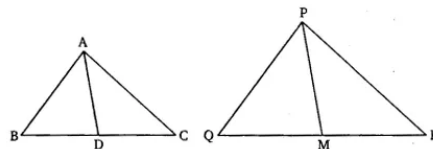
Section D consists of 4 questions of 5 marks each.

32. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

OR

Sum of the areas of two squares is 468 m^2 . If the difference of their perimeters is 24 m, find the sides of the two squares.

33. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of triangle PQR. Show that $\triangle ABC \sim \triangle PQR$.



34. A vessel is in the form of a hollow hemisphere mounted by a hollow cylinder. The diameter of the hemisphere is 14 cm and the total height of the vessel is 13 cm. Find the inner surface area of the vessel.

OR

A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter of the hemisphere can have? Find the surface area of the solid

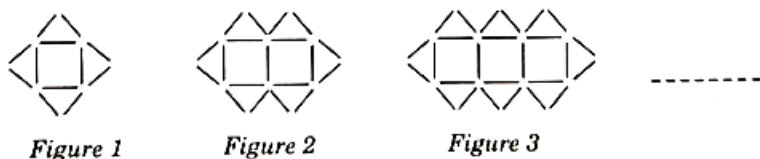
35. The median of the following data is 28.5. Find the values of X and Y, if the frequency is 60.

Class interval	frequency
0-10	5
10-20	X
20-30	20
30-40	15
40-50	Y
50-60	5
Total	60

SECTION- E

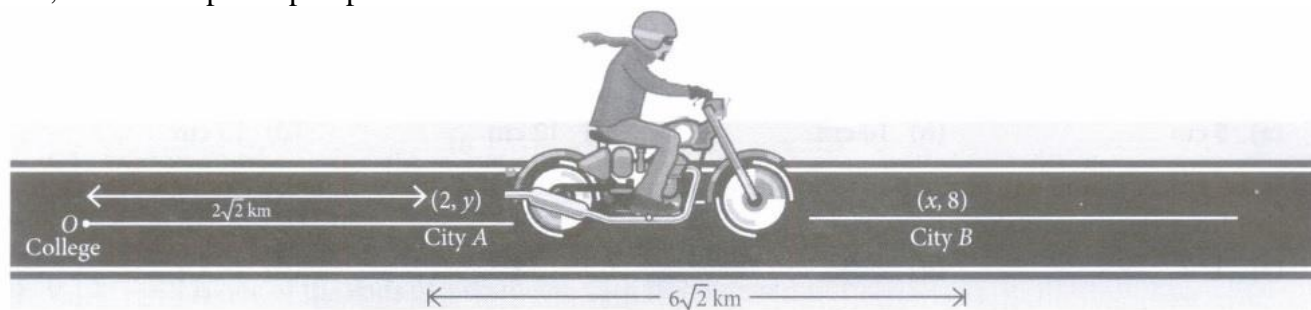
Case study based questions are compulsory

36. In Mathematics, relations can be expressed in various ways. The matchstick patterns are based on linear relations. Different strategies can be used to calculate the number of matchsticks used in different figures. One such pattern is shown below. Observe the pattern and answer the following questions using Arithmetic Progression:



- (a) Write the AP for the number of triangles used in the figures. Also, write the n th term of this AP.
 (b) Which figure has 61 matchsticks?

37. A person is riding his bike on a straight road towards East from his college to city A and then to city B. At some point in between city A and city B, he suddenly realises that there is not enough petrol for the journey. Also, there is no petrol pump on the road between these two cities.



Based on the above information, answer the following questions.

- (i) Find the value of X and Y
 (ii) If M is any point exactly in between city A and city B, find the coordinates of M.
 (iii) What is the ratio in which A divides the line segment joining the points O and M

38. A circus artist is climbing through a 15 m long rope which is highly stretched and tied from the top of a vertical pole to the ground as shown below. Based on the above information, answer the following questions.



- (i) Find the height of the pole, if angle made by rope to the ground level is 45° .

(ii) If the angle made by the rope to the ground level is 45° , then find the distance between artist and pole at ground level