MT EDUCARE LTD.

QUEST - I (Semi Prelim I)
(2018-19)

Portion : Triangles, Circles, Constructions, Polynomials, Pair of Linear equations in Two Variables, Quadratic Equations, Arithmetic Progressions

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CBSE - X

Roll No. ⬚⬚⬚⬚⬚⬚⬚

Code No. **30/1**

Series RLH

- Please check that this question paper contains 6 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 30 questions.
- Please write down the serial number of the question before attempting it.

MATHEMATICS

Time allowed : 3 hours   ***Maximum Marks :*** 80

General Instructions:

i) **All questions are compulsory.**

ii) The question paper consists of 30 questions divided in four sections: A, B, C and D.

iii) Section **A** contains 6 questions of 1 mark each,

Section **B** contains 6 questions of 2 marks each,

Section **C** contains 10 questions of 3 marks each,

Section **D** contains 8 questions of 4 marks each.

iv) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, four questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

v) Use of **calculator** is not permitted.

SECTION - A
Question number 1 to 6 carry 1 mark each.

1. If one zero of the polynomial $2x^2 - 3x + k$ is reciprocal of the other then find the value of k.

2. Three sides of a triangle are of length 60 cm, 50 cm and 120 cm. Are these sides of a right angled triangle?

3. Find the nature of the roots of quadratic equation $\sqrt{2}x^2 - \dfrac{3}{\sqrt{2}}x + \dfrac{1}{\sqrt{2}} = 0$.

4. Find the next term of the arithmetic progression $\sqrt{7}$, $\sqrt{28}$, $\sqrt{63}$,⋯ .

   OR

   If k, $2k - 1$, $2k + 1$ are three consecutive terms of an arithmetic progression then find the value of k.

5. If $141x + 93y = 189$ and $93x + 141y = 45$ then find the value of $x + y$.

   OR

   The sum of the digits of a two digit number is 7. If the digits are reversed, the new number decreased by 2 equals twice the original number. Frame the pair of equations using two variables.

6. In the given figure, $\triangle$ABC circumscribes a circle at points F, D and E. If AE = 2.8 cm, BF = 5 cm, CD = 4.6 cm then find the perimeter of $\triangle$ABC.
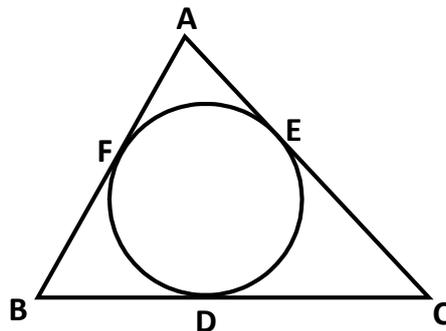
SECTION - B
Question number 7 to 12 carry 2 marks each.

7. AB is a line segment of length 10 cm. Locate a point C on it such that $AC = \frac{1}{3}CB$.

8. If the common difference of an arithmetic progression is 5 then find $a_{18} - a_{13}$.

9. Find a quadratic polynomial whose sum and product of the zeroes are 9 and 18 respectively. Hence, find the zeroes of the polynomial.

10. If 2 is a root of the quadratic equation $3x^2 + px - 8 = 0$ and the quadratic equation $4x^2 - 2px + k = 0$ has equal roots then find the value of k.

    OR

    One day, I asked the son of my close friend about his age. The child replied in a different way. He said, "One year ago, my dad was 8 times as old as me and now his age (in years) is equal to the square of my age". Frame the quadratic equation to represent this situation.
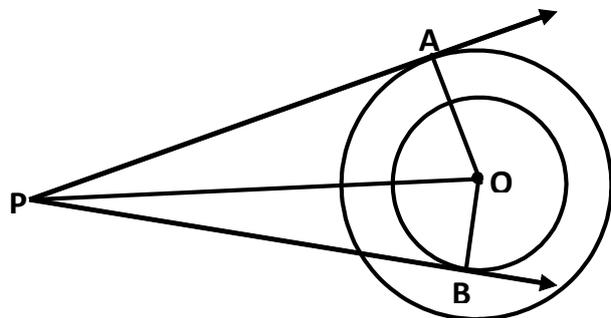
11. In rectangle ABCD, E is the midpoint of AB. If DC = 16 m and AD = 6 m then find ED.

    OR

    In the given figure, AD ⊥ BC at D.
    Prove that $AB^2 + CD^2 = BD^2 + AC^2$.
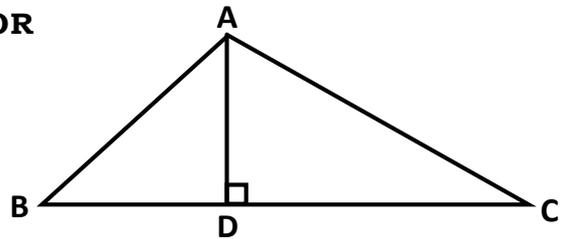
12. In the given figure, two concentric circles are of radii 5 cm and 3 cm and centre at O. Two tangents PA and PB are drawn to two circles from an external point P such that AP = 12 cm. Find BP.

SECTION - C
Question numbers 13 to 22 carry 3 marks each.

13. Draw a pair of tangents to a circle of radius 4.5 cm which are inclined to each other at an angle of 45°.

14. In an arithmetic progression, if sum of its first n terms is $3n^2 + 5n$ and its kth term is 164 then find the value of k.

15. Divide the polynomial $3x^2 - x^3 - 3x + 5$ by the polynomial $x - 1 - x^2$ and verify the division algorithm.

OR

Find the zeroes of the polynomial $5\sqrt{5} x^2 + 30x + 8\sqrt{5}$.

16. Diagonals of a trapezium ABCD with AB || CD intersect each other at point O. If CD = $\dfrac{1}{2}$ AB and area of $\triangle$AOB is 84 cm^2 then find the area of $\triangle$COD.

OR

In $\triangle$PQR, points S and T lies on PQ and PR respectively such that $\dfrac{PS}{SQ} = \dfrac{PT}{TR}$ and $\angle$PST = $\angle$PRQ. Prove that PQR is an isosceles triangle.

17. Find the value of k for which the following pair of linear equations have infinitely many solutions: $kx + 3y - (k - 3) = 0$; $12x + ky - k = 0$.

18. Solve for x : $\dfrac{7x+1}{7x+5} = \dfrac{3x+1}{5x+1}$, where $x \neq \dfrac{-5}{7}, \dfrac{-1}{5}$.

19. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

OR

Prove that in two concentric circles, the chord of larger circle, which touches the smaller circle, is bisected at the point of contact.

20. A sum of ₹ 1000 is invested at 8% simple interest per year. Calculate the interest at the end of each year. Do these interest form an arithmetic progression? If so, find the interest at the end of 30 years making use of this fact.

OR

Find the sum of first 24 terms of an arithmetic progression whose n^{th} term is given by $a_n = 3 + 2n$.

21. Prove that three times the square of one side of an equilateral triangle is equal to four times the square of one of its altitude.

22. Construct a triangle similar to a given ΔABC with its sides equal to $\dfrac{5}{3}$ times the corresponding sides of ΔABC.

SECTION - D
Question numbers 23 to 30 carry 4 marks each.

23. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.

24. Find all the zeroes of the polynomial $2x^4 - 9x^3 + 5x^2 + 3x - 1$ if two of its zeroes are $2+\sqrt{3}$ and $2-\sqrt{3}$.

OR

If α and β are the zeroes of the polynomial $21x^2 - x - 2$ then find a quadratic polynomial whose zeroes are 2α and 2β.

25. ΔABC is a right angled at B in which AB = 6 cm, BC = 8 cm and BD ⊥ AC. The circle through B, C and D is drawn. Construct the tangents from A to this circle.

26. A boat goes 30 km upstream and 44 km downstream in 10 hours. It can go 40 km upstream and 55 km downstream in 13 hours. Determine the speed of the stream and that of the boat in still water.

27. An arithmetic progression consist of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.

28. In the given figure, ΔABC circumscribes a circle with centre O having radius 3 cm at points F, D and E such that the segments BD and DC are respectively of lengths 6 cm and 9 cm. If the area of ΔABC is 54 cm² then find AB and AC.
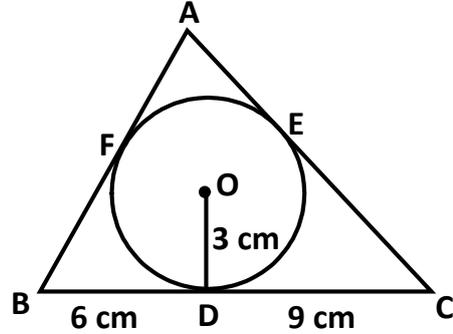
OR

A circle is inscribed in ΔABC right angled at B. If AB = 6 cm and BC = 8 cm then find the radius of the circle.

29. Solve for x : 1 + 4 + 7 + 10 + ... + x = 287.

OR

Find the sum of the two middle most terms of the arithmetic progression:

$$-\frac{4}{3}, -1, -\frac{2}{3}, ..., 4\frac{1}{3}$$

30. Some students planned a picnic. The total budget for hiring a bus was ₹ 1440. Later on, eight of these refused to go and instead paid their total share of money towards the fee of one economically weaker student of their class and thus the cost of each member who went for picnic increased by ₹ 30.
    (i) How many students attended the picnic?
    (ii) How much money in total was paid towards the fee?
    (iii) Which value is reflected in the question?

All the Best 👍