Assignment

CBSE 2017 Mathematics

February 8, 2024

Quadratic Equations

1. Find the value of p, for which one root of the equation

$$px^2 - 14x + 8 = 0$$

is 6 times the other.

2. If the roots of the equation

$$\left(c^2 - ab\right) x^2 - 2\left(a^2 - bc\right) x + b^2 - ac = 0$$

in x are equal, then show that either a=0 or

$$a^3 + b^3 + c^3 = 3abc.$$

3. Solve for x:

$$\frac{1}{2x-3} + \frac{1}{x-5} = 1\frac{1}{9}, x \neq \frac{3}{2}, 5$$

4. A train covers a distance of 300 km at a uniform speed. If the speed of the train is increased by 5 km/hour, it takes 2 hours less in the journey. Find the original speed of the train.

Arithmetic Progressions

5. What is the common difference of an A.P. in which a_{21} - $a_7 = 84$?

6. Which term of the A.P.$8, 14, 20, 26, \ldots$ will be 72 more than its 41^{st} term ?

7. If the 10^{th} term of an A.P. is 52 and the 17^{th} term is 20 more than the 13^{th} term, find the A.P.

8. If the ratio of the sum of the first n terms of two A.Ps is $(7n + 1)$: $(4n + 27)$, then find the ratio of their 9^{th} terms.

Triangles

9. Construct a triangle ABC with side BC = 7 cm, $\angle B$=45°, $\angle A$=105°. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the $\triangle$ ABC.

Coordinate Geometry

10. In what ratio does the point $\left(\frac{24}{11}, y\right)$ divide the line segment joining the points $P\,(2,-2)$ and $Q\,(3,7)$? Also find the value of y.

11. A line intersects the y-axis and x-axis at the points P and Q respectively. If $(2,-5)$ is the mid-point of PQ, then find the coordinates of P and Q.

12. If the distances of $P\,(x,y)$ from $A\,(5,1)$ and $B\,(-1,5)$ are equal, then prove that $3x = 2y$.

13. If the points $A\,(k+1, 2k)$, $B\,(3k, 2k+3)$ and $C\,(5k-1, 5k)$ are collinear, then find the value of k.

Some Applications of trigonometry

14. If a tower 30 m high, casts a shadow $10\sqrt{3}$ m long on a ground, then what is the angle of elevation of the sun ?

15. On a straight line passing through the foot of a tower, two points C and D are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from C and D of the top of the tower are complementary, then find the height of the tower.

16. A man observes a car from the top of a tower, which is moving towards the tower with a uniform speed. If the angle of depression of the car changes from 30° to 45° in 12 minutes, find the time taken by the car now to reach the tower.

Circles

17. If the angle between two tangents drawn from an external point P to a circle of radius a and centre O, is 60°, then find the length of OP.

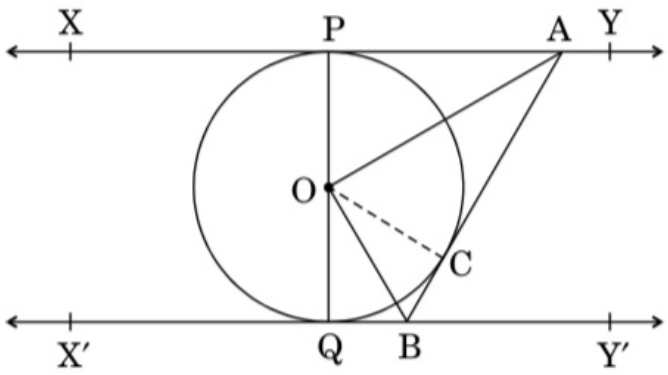
18. Prove that the tangents drawn at the end points of a chord of a circle make equal angles with the chord.

19. A circle touches all the four sides of a quadrilateral $ABCD$. Prove that

$$AB + CD = BC + DA$$

20. Prove that the lengths of two tangents drawn from an external point to a circle are equal.

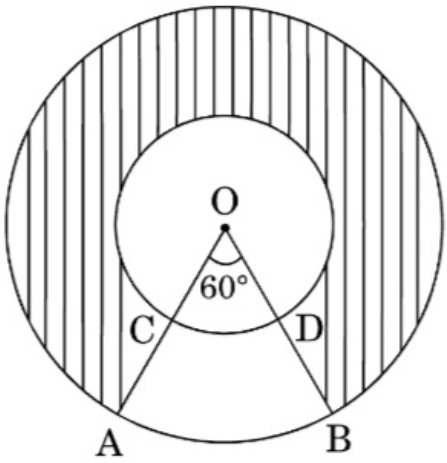
21. In the given figure, XY and $X'Y'$ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C, is intersecting XY at A and $X'Y'$ at B. Prove that $\angle AOB$=90°.



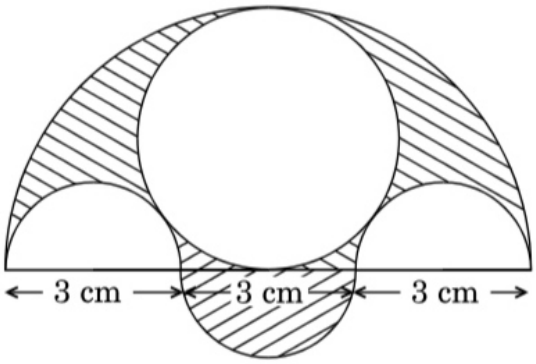
Areas Related Circles

22. In the given figure, two concentric circles with centre O have radii 21 cm and 42 cm. If $\angle AOB$= 60°, find the area of the shaded region.

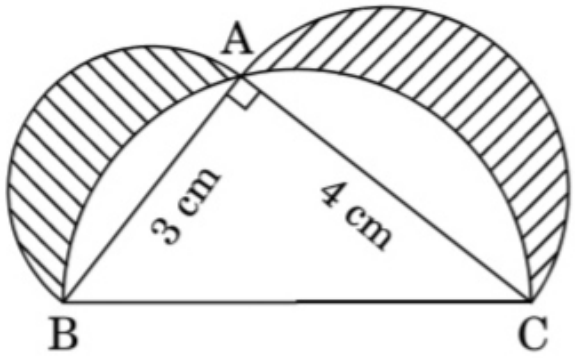
$$\left[Use\ \pi = \frac{22}{7}\right]$$



23. Three semicircles each of diameter 3 cm, a circle of diameter 45 cm and a semicircle of radius 45 cm are drawn in the given figure. Find the area of the shaded region.



24. In the given figure, $\triangle ABC$ is a right-angled triangle in which $\angle A = 90°$. Semicircles are drawn on AB, AC and BC as diameters. Find the area of the shaded region.



Surface Areas and Volumes

25. The dimensions of a solid iron cuboid are 4.4 m × 2.6 m × 1.0 m. It is melted and recast into a hollow cylindrical pipe of 30 cm inner radius and thickness 5 cm. Find the length of the pipe.

26. Water in a canal, 54 m wide and 18 m deep, is flowing with a speed of 25 km/hour. How much area can it irrigate in 40 minutes, if 10 cm of standing water is required for irrigation ?

27. From a solid right circular cylinder of height 24 cm and radius 07 cm, a right circular cone of same height and same radius is cut out. Find the total surface area of the remaining solid.

28. In a rain-water harvesting system, the rain-water from aroof of 22 m × 20 m drains into a cylindrical tank having diameter of base 2 m and height 35 m. If the tank is full, find the rainfall in cm. Write your views on water conservation.

Probability

29. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap ?

30. A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of blackballs in the bag.

31. Two different dice are thrown together. Find the probability that the numbers obtained have

    i even sum, and

    ii even product.