CBSE Assignment 30-1-1

January 4, 2024

1 Algebra

1. For what values of k, the roots of the equation $x^2 + 4x + k = 0$ are real?
2. Find the value of k for which the roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other.
3. How many two digits numbers are divisible by 3 ?
4. Find a rational number between $\sqrt{2}$ and $\sqrt{3}$.
5. Find the HCF of 1260 and 7344 using Euclid's algorithm.
6. Show that every positive odd integer is of the form $(4q + 1)$ or $(4q + 3)$, where q is some integer.
7. Which term of the AP $3, 15, 27, 39, ...$ will be 120 more than its 21st term?
8. If S_n ,the sum of first n terms of an AP is given by $S_n = 3n^2 - 4n$, find the nth term.
9. Find c if the system of equations $cx + 3y + (3 - c) = 0$; $12x + cy - c = 0$ has infinitely many solutions.
10. Find the value of k such that the polynomial $x^2 - (k + 6)\, x + 2\,(2k - 1)$ has sum of its zeros equal to half of their product.

11. A father's age is three times the sum of the ages of his two children. After 5 years his age will be two times the sum of their ages. Find the present age of the father.

12. Water in a canal, 6 m wide and 1.5 m deep,is flowing with a speed of 10 km/hr. How much area will it irrigate in 30 minutes; if 8 cm standing water is needed?

13. Two water taps together can fill a tank in $1\frac{7}{8}$ hours. The tap with longer 8 diameter takes 2 hours less than the tap with smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately.

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

15. If the sum of first four terms of an AP is 40 and that of first 14 terms is 280. Find the sum of its first n terms.

16. A man in a boat rowing away from a light house $100m$ high takes 2 minutes to change the angle of elevation of the top of the light house from 60° to 30°. Find the speed of the boat in metres per minute. [Use $\sqrt{3} = 1.732$]

17. Two poles of equal heights are standing opposite each other on either side of the road, which is $80m$ wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° to 30° respectively. Find the height of the poles and the distances of the point from the poles.

18. A bucket open at the top is in the form of a frustum of a cone with a capacity of $12308.8cm^3$. The radii of the top and bottom of circular ends of the bucket are $20cm$ and $12cm$ respectively. Find the height of the bucket and also the area of the metal sheet used in making it. (Use $\pi = 3.14$)

19. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator.Find the fraction.

20. Prove that $\sqrt{2}$ is an irrational number.

21. Prove that

$$(\sin\theta + \csc\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$$

.

22. Prove that

$$(1 + \cot A - \csc A)(1 + \tan A + \sec A) = 2$$

.

23. Prove that

$$\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{1}{\sec A - \tan A}$$

24. Find A if

$$\tan 2A = \cot(A - 24^\circ)$$

25. Find the value of

$$(\sin^2 33^\circ + \sin^2 57^\circ)$$

2 Geometry

1. Find the coordinates of a point **A**, where **AB** is diameter of a circle whose center is $(2, -3)$ and **B** is the point $(1, 4)$.

2. Find the ratio in which the segment joining the points $(1, 3)$ and $(4, 5)$ is divided by $x - axis$? Also find the coordinates of this point on x-axis.

3. Construct a $\triangle ABC$ in which $CA = 6cm$, $AB = 5cm$ and $BAC = 45^\circ$. Then construct a triangle whose sides are $\frac{3}{5}$ of the corresponding sides of $\triangle ABC$.

4. Prove that in a right angle triangle, the square of the hypotenuse is equal the sum of squares of the other two sides.

5. In Figure 1, $DE \parallel BC$, $AD = 1cm, BD = 2cm$. What is the ratio of the area of $\triangle ABC$ to the area of $\triangle ADE$?

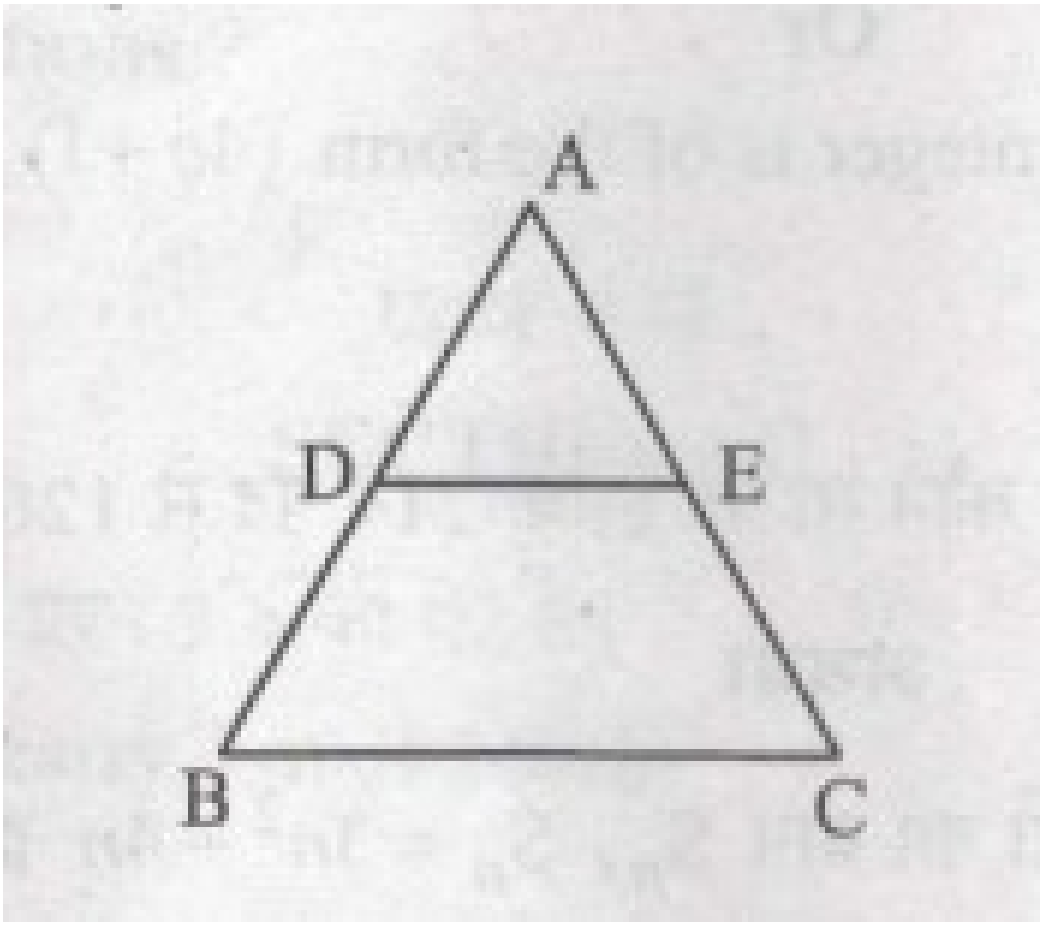

Figure 1

6. In Figure 2, PQ is a chord of length $8cm$ of a circle of radius $5cm$ and centre **O**. The tangents at P and Q intersect at point T. Find the length of TP.

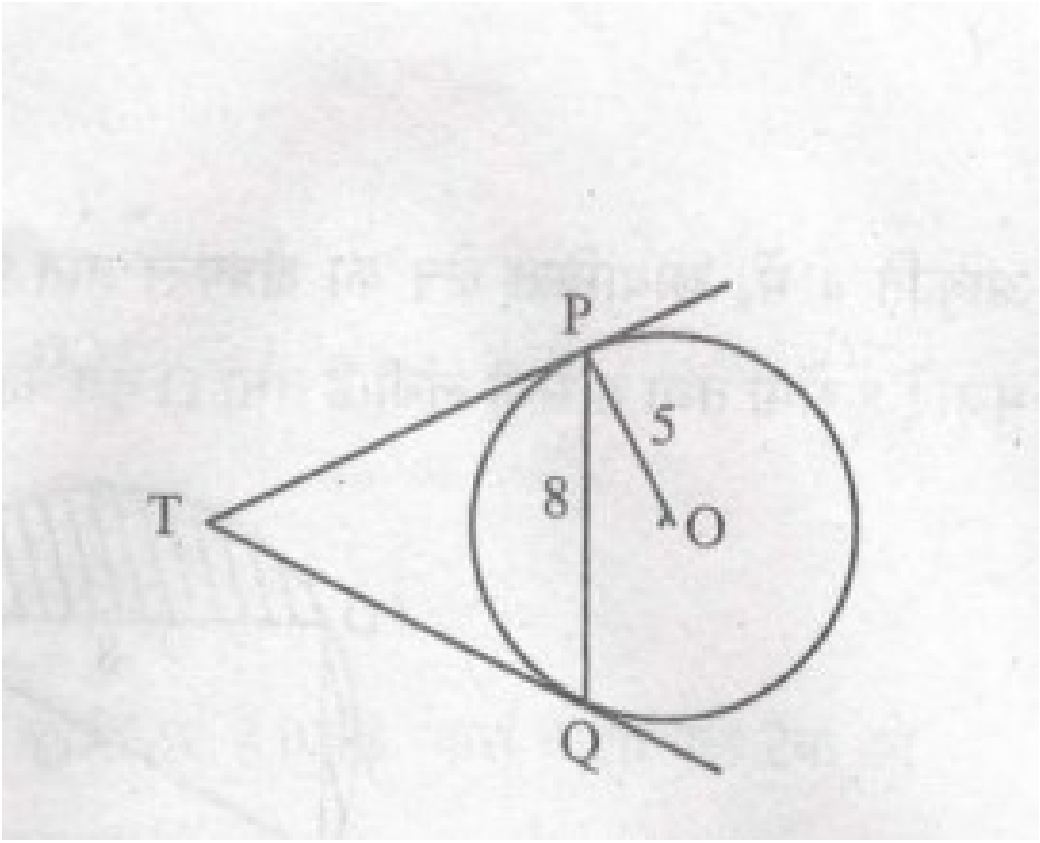

Figure 2

7. In Figure 3, angle $ACB = 90°$ and $CD \perp AB$, prove that $CD^2 = BD \times AD$.

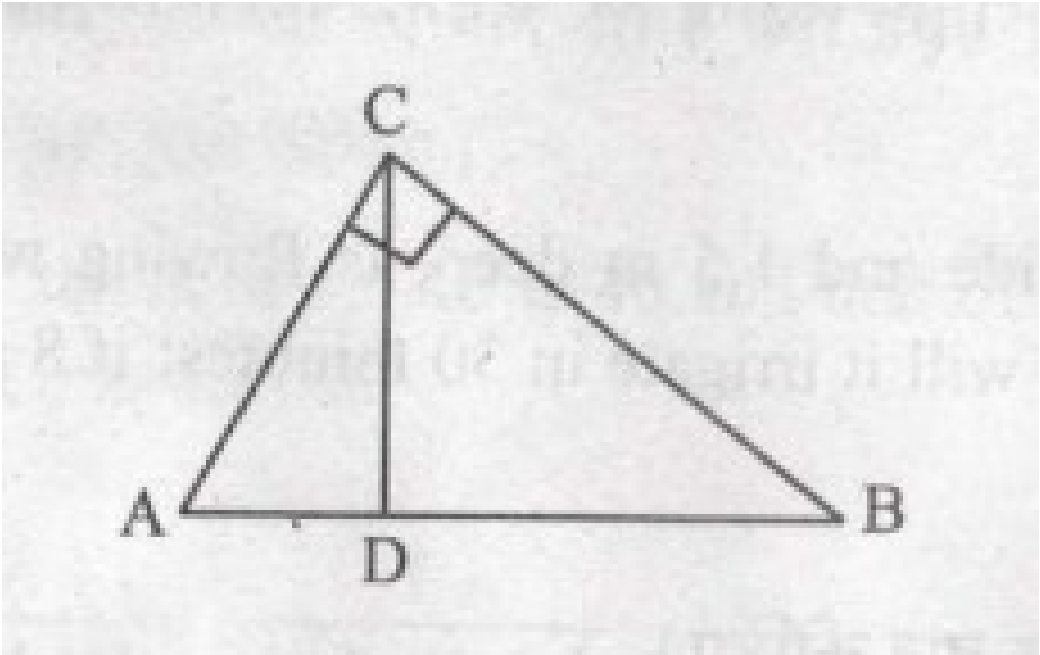

Figure 3

8. Find the area of the shaded region in Figure 4, if $ABCD$ is a rectangle with sides $8cm$ and $6cm$ and **O** is the centre of circle. ($\pi = 3.14$)

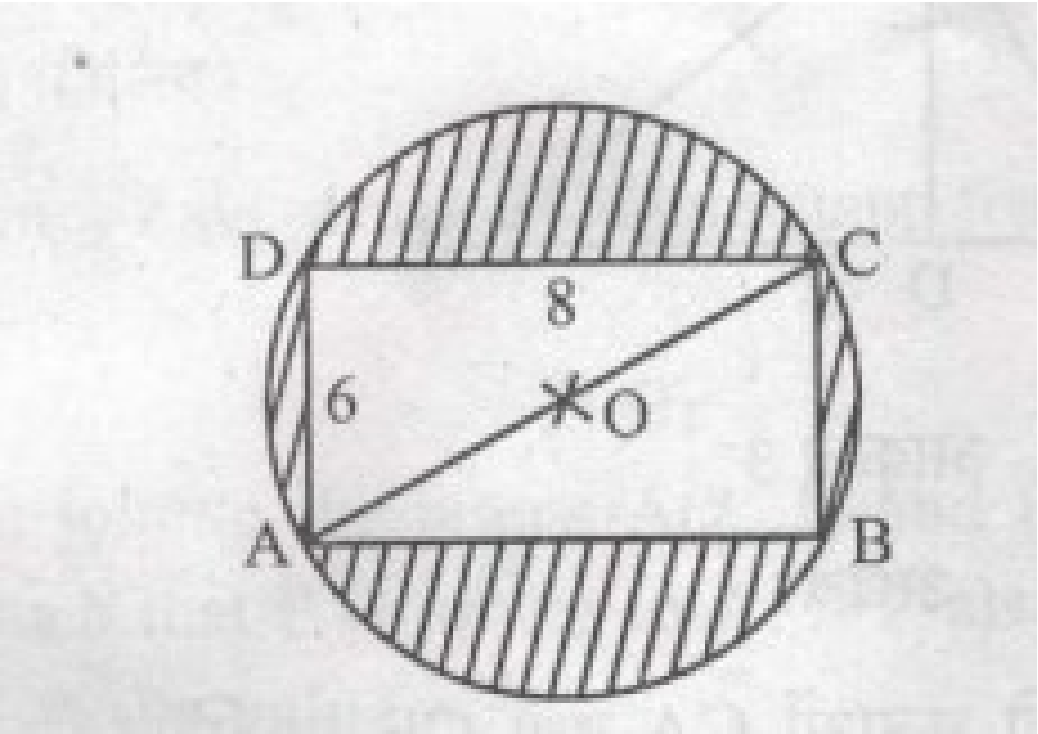

Figure 4

9. Find the point on $y - axis$ which is equidistant from the points $(5, -2)$ and $(-3, 2)$.

10. The line segment joining the points **A** $(2, 1)$ and **B** $(5, -8)$ is trisected at the points **P** and **Q** such that **P** is nearer to **A**. If **P** also lies on the line given by $2x - y + k = 0$, find the value of k.

11. If P and Q are the points on side CA and CB respectively of ABC, right angled at C, prove that $\left(AQ^2 + BP^2\right) = \left(AB^2 + PQ^2\right)$

3 Probability

1. A game consists of tossing a coin 3 times and noting the outcome each time. If getting the same result in all the tosses is a success, find the probability of losing the game.

2. A die is thrown once. Find the probability of getting a number.

   I. which is a prime number

   II. lies between 2 and 6.