

1. Find the value of  $k$  for which the roots of the quadratic equation  $(k-5)x^2 + 2(k-5)x + 2 = 0$  are equal.
2. Find the value of  $y$  for which the distance between the points  $(2, -3)$  and  $(10, y)$  is 10 units.
3. Write whether the rational number  $\frac{13}{3125}$  has a decimal expansion which is terminating or non-terminating repeating.
4. Write the  $m^{\text{th}}$  term of the A.P.  $\frac{1}{k}, \frac{1+k}{k}, \frac{1+2k}{k}, \dots$
5. if  $\sin \theta + \cos \theta = \sqrt{2} \cos(90^\circ - \theta)$ , find the value of  $\cot \theta$ .
6.  $DE$  is drawn parallel to the base  $BC$  of a  $\triangle ABC$ , meeting  $AB$  at  $D$  and  $AC$  at  $E$ . if  $\frac{AB}{BD} = 4$  and  $CE = 2\text{cm}$ , find  $AE$ .
7. A bag contains 5 red balls and some blue balls. if the probability of drawing a blue balls. if the probability of drawing a blue ball from the bag is three times that of a red ball, find the number of blue balls in the bag.
8. The  $5^{\text{th}}$  and  $15^{\text{th}}$  terms of an A.P. are 13 and  $-17$  respectively. Find the sum of first 21 terms of the A.P.
9. Using Euclid's Division Algorithm, find the HCF of 255 and 867.
10. if the point  $(0, 2)$  is equidistant from the points  $(3, k)$  and  $(k, 5)$ , find the value of  $k$ .
11. Find the value of ' $a$ ' for which the pair of linear equations  $2x + 3y = 7$  and  $4x + ay = 14$  has infinitely many solutions.
12. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability of getting (i) a red king (ii) a queen or a jack.
13. Show that any positive odd integer is of the form  $4q + 1$  or  $4q + 3$  for some integer  $q$
14. The ten's digit of a number is twice its unit's digit obtained by interchanging the digit is 36 less than the original number. Find the original number.
15. The line segment joining the points  $A(2, 1)$  and  $B(5, -8)$  is trisected at the points  $P$  and  $Q$ , where  $P$  lies on the line  $2x - y + k = 0$ , find the value of  $K$ .
16. The x-coordinate of a point  $P$  is twice its y-coordinate. if  $P$  is equidistant from the points  $Q(2, -5)$  and  $R(-3, 6)$ , find the coordinates of  $P$ .
17. show that  $1, \frac{1}{2}$  and  $-2$  are zeros of the polynomial  $2x^3 + x^2 - 5x + 2$ .
18. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre.

19.  $S$  and  $T$  are points on the sides  $PR$  and  $QR$  of  $\triangle PQR$  such that  $\angle P = \angle RTS$ . Show that  $\triangle RPQ \sim \triangle RTS$ .
20. In an equilateral  $\triangle ABC$ ,  $D$  is a point on the side  $BC$  such that  $BD = \frac{1}{3}BC$ . Prove that  $9AD^2 = 7AB^2$ .
21. Prove that :  $\frac{1}{\csc \theta + \cot \theta} - \frac{1}{\sin \theta} = \frac{1}{\sin \theta} - \frac{1}{\csc \theta - \cot \theta}$
22. If  $\tan \theta + \sin \theta = m$ ,  $\tan \theta - \sin \theta = n$ , show that  $m^2 - n^2 = 4\sqrt{mn}$
23. A chord of a circle, of radius 15cm, subtends an angle of  $60^\circ$  at the centre of the circle. Find the area of major and minor segments (Take  $\pi = 3.14$ ,  $\sqrt{3} = 1.73$ )
24. A sphere of diameter 12cm is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, the water level in the vessel rises by  $3\frac{3}{4}$ cm. Find the diameter of the cylindrical vessel.
25. A cylinder whose height is two-third of its diameter, has the same volume as that of a sphere of radius 4cm. Find the radius of base of the cylinder.
26. The following table gives the daily income of 50 labourers:

Daily Income (₹)	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
Number of Labourers	12	14	8	6	10

Find the mean and mode of the above data.

27. Two taps together can fill a tank in 6 hours. The tap of larger diameter takes 9 hours less than the smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately.
28. Solve for  $x$ :  $\frac{x+1}{x-1} - \frac{x-1}{x+1} = \frac{5}{6}$ ,  $x \neq 1, -1$
29. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.
30. Prove that in a triangle, if the square of one side is equal to the sum of the squares of the other two sides, the angle opposite the first side is a right angle.
31. Write the steps of construction for drawing a  $\triangle ABC$  in which  $BC = 8$ cm,  $\angle B = 45^\circ$  and  $\angle C = 30^\circ$ . Now write the steps of construction for drawing a triangle whose sides are  $\frac{3}{4}$  of the corresponding sides of  $\triangle ABC$ .
32. The sum of the first  $n$  terms of an A.P. is  $5n^2 + 3n$ . If its  $m^{\text{th}}$  term is 168, find the value of  $m$ . Also find the  $20^{\text{th}}$  term of the A.P.
33. The  $4^{\text{th}}$  and the last terms of an A.P. are 11 and 89 respectively. If there are 30 terms in the A.P., find the A.P. and its  $23^{\text{rd}}$  term.
34. Prove that :  $(\frac{\sin A}{1-\cos A} - \frac{1-\cos A}{\sin A})(\frac{\cos A}{1-\sin A} - \frac{1-\sin A}{\cos A}) = 4$ .

35. A statue, 1.46m tall, stands on a pedestal. From a point on the ground the angle of elevation of the top of the statue is  $60^\circ$  and from the same point angle of elevation of the top of the pedestal is  $45^\circ$ . Find the height of the pedestal. (use  $\sqrt{3} = 1.73$ )
36. Sudhakar donated 3 cylindrical drums to store cereals to an orphanage. If radius of each drum is 0.7m and height 2m, find the volume of each drum. If each drum costs ₹ 350 per  $m^3$ , find the amount spent by Sudhakar for orphanage. What value is exhibited in the question. (Use  $\pi = \frac{22}{7}$ )
37. The median of the following data is 52.5. If the total frequency is 100, find the value of  $x$  and  $y$ .

classes	frequency
0-10	2
10-20	5
20-30	$x$
30-40	12
40-50	17
50-60	20
60-70	$y$
70-80	9
80-90	7
90-100	4