

10th CBSE MATHEMATICS

2018

1 SECTION A

1.1. Find the value of k for which the roots of a quadratic equation $(k-5)x^2 + 2(k-5)x + 2 = 0$ are equal ?

1.2. Find the value of y for which the distance between the points $(2, -3)$ and $(10, y)$ is 10 units.

1.3. Write whether the rational number $\frac{13}{3125}$ has a decimal expansion which is terminating or non-terminating repeating.

1.4. Write the n^{th} term of the A.P $\frac{1}{k}, \frac{1+k}{k}, \frac{1+2k}{k}, \dots$

1.5. If $\sin\theta + \cos\theta = \sqrt{2}\cos(90^\circ - \theta)$, find the value of $\cot\theta$.

1.6. DE is drawn parallel to the base BC of $\triangle ABC$, meeting AB at D and AC at E if $\frac{AB}{CD} = 4$ and $CE = 2\text{cm}$, find AE.

2 SECTION B

2.7. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is three times that of the red ball, find the number of blue balls in the bag.

2.8. The 5^{th} and 15^{th} terms of an A.P are 13 and -17 respectively. Find the sum of first 21 terms of the A.P.

2.9. Using Euclid's Division Algorithm, find the HCF of 225 and 867

2.10. If the point $(0, 2)$ is equidistant from the points $(3, k)$ and $(k, 5)$ find the value of k .

2.11. Find the value of 'a' for which the pair of linear equation $2x + 3y = 7$ and $4x + ay = 14$

has infinitely many solutions.

2.12. 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.

3 SECTION C

3.13. Show that any positive odd integer is of the form $4q + 1$ or $4q + 3$ for some integer q .

3.14. The ten's digit of a number is twice its unit's digit. The number obtained by interchanging the digits is 36 less than the original number. Find the original number.

3.15. (i) The line segment joining the points $A(2, 1)$ and $B(5, -8)$ is trisected at the points P and Q, where P is nearer to A. If P lies on the line $2x - y + k = 0$, find the value of k .

or

(ii) 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.

3.16. Show that $1, \frac{1}{2}$, and -2 are the zeroes of the polynomial $2x^3 + x^2 - 5x + 2$.

3.17. 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 center.

3.18. S and T are points on the sides PR and QR of $\triangle PQR$ such that $\angle P = \angle RTS$. Show that $\triangle RPQ \sim \triangle RTS$.

or

In an equilateral $\triangle ABC$, D is a point on the side BC such that $BD = \frac{1}{3}BC$. Prove that $9AD^2 = 7AB^2$.

3.19. Prove that : $\frac{1}{\frac{1}{\operatorname{cosec} \theta + \cot \theta} - \frac{1}{\sin \theta}} = \frac{1}{\sin \theta} - \frac{1}{\operatorname{cosec} \theta - \cot \theta}$

OR

If $\tan \theta + \sin \theta = m$, $\tan \theta - \sin \theta = n$ show that $m^2 - n^2 = 4\sqrt{mn}$

3.20. A chord of a circle, of radius 15 cm, subtends an angle of 60° at the centre of the circle. Find the area of major and minor segments (Take $\pi = 3.14$, $\sqrt{3} = 1.73$)

3.21. A sphere of diameter 12 cm 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 $3\frac{5}{9}$ cm. Find the diameter of the cylindrical vessel.

OR

A cylinder whose height is two-third of its diameter, has the same volume as that of a sphere of radius 4 cm. Find the radius of base of the cylinder.

3.22. The following table gives the daily income of 50 labourers :

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

Find the mean and mode of the above data.

3.23. 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.

OR

3.24. Solve for x : $\frac{x+1}{x-1} - \frac{x-1}{x+1} = \frac{5}{6}$, $x \neq 1, -1$

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

OR Prove that in a triangle, if the square of one side is equal to sum of the square of the other two sides, the angle opposite the first side is a right angle.

3.26. 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 $\triangle ABC$.

3.27. The sum of the first n terms of an A.P. is $5n^2 + 3n$. If its m^{th} term is 168, find the value of m . Also find the 20^{th} term of the A.P.

OR

The 4^{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^{rd} term.

3.28. Prove that : $\left(\frac{\sin A}{1 - \cos A} - \frac{1 - \cos A}{\sin A} \right) \cdot \left(\frac{\cos A}{1 - \sin A} - \frac{1 - \sin A}{\cos A} \right) = 4$

3.29. A statue, 1.46 m tall, stands on a pedestal. From a point on the ground the angle of elevation of the top of the statue is 60° and from the same point angle of elevation of the top of the pedestal is 45° . Find the height of the pedestal. (use $\sqrt{3} = 1.73$)

3.30. Sudhakar donated 3 cylindrical drums to store cereals to an orphanage. If radius of each drum is 0.7 m and height 2 m, find the volume of each drum. If m^3 , find the amount spent by Sudhakar for orphanage. What value is exhibited in the question. (Use $\pi = \frac{22}{7}$).

3.31. The median of the following data is 52.5. If the total frequency is 100, find the values 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