

10th CBSE MATHEMATICS 2018

Keshav Roy

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

- 2.1. 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.
- 2.2. 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.
- 2.3. Using Euclid's Division Algorithm, find the HCF of 225 and 867
- 2.4. If the point $(0, 2)$ is equidistant from the points $(3, k)$ and $(k, 5)$ find the value of k .
- 2.5. Find the value of 'a' for which the pair of linear equation $2x + 3y = 7$ and $4x + ay = 14$

has infinitely many solutions.

- 2.6. 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

- 3.1. Show that any positive odd integer is of the form $4q + 1$ or $4q + 3$ for some integer q .
- 3.2. 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.
- 3.3. (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 point $Q(2, -5)$ and $R(-3, 6)$, find the coordinates.

- 3.4. Show that $1, \frac{1}{2}$, and -2 are the zeroes of the polynomial $2x^3 + x^2 - 5x + 2$.
- 3.5. 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.
- 3.6. 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 $9AD^2 = 7AB^2$.

3.7. Prove that :

$$\frac{1}{\operatorname{cosec} \theta + \cot \theta} - \frac{1}{\sin \theta} = \frac{1}{\sin \theta} - \frac{1}{\operatorname{cosec} \theta - \cot \theta}$$

OR

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

3.8. 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 $\pi = 3.14$, $\sqrt{3} = 1.73$)

3.9. 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.

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

Class :	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60-70
Frequency :	5	15	20	23	17	11	9

Find the mean and mode of the above data.

3.11. 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

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

3.13. 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.

3.14. 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 $\triangle ABC$.

3.15. 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.

3.16. Prove that :

$$\left(\frac{\sin A}{1 - \cos A} - \frac{1 - \cos A}{\sin A} \right) \cdot \left(\frac{\cos A}{1 - \sin A} - \frac{1 - \sin A}{\cos A} \right) = 4$$

3.17. 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 $\sqrt{3} = 1.73$)

3.18. 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 $\pi = \frac{22}{7}$).

3.19. The median of the following data is 52.5. If the total frequency is 100, find the values of x and y .

Class :	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60-70	70-80	80 -90	90 -100
Frequency :	2	5	x	12	17	20	y	7	9	4