10th Maths Sample Paper-4 (CBSE Board Exam 2018)

Time Allowed: 3 Hours   **Max. Marks: 80**

Section A

Questions from 1 to 6 carry 1 mark each.

1. Solve graphically, the pair of linear equations: $x + y = 0$; $x - y = 0$.

2. Find the first negative term of the arithmetic progression: $19, 18\frac{1}{5}, 17\frac{2}{5}, \dots$.

3. How many multiples of 4 lie between 10 and 250?

4. In the given figure, AP and AQ are the two tangents to a circle with centre O, so that $\angle POQ = 100°$. What is the angle PAQ?
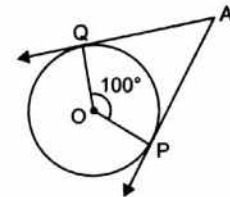
5. If $\sin(5° - 2\alpha) = \cos(5\alpha - 5°)$ find the value of α.

6. Evaluate: $\csc 31° - \sec 59°$

Section B

Questions from 7 to 12 carry 2 marks each.

7. Express: $\dfrac{68}{2^4 \times 5^3}$ in decimal form.

8. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial $g(x)$, the quotient and remainder are $x - 2$ and $4 - 2x$ respectively. Find $g(x)$.

9. Determine the positive value of k for which both the equations $x^2 + kx + 64 = 0$ and $x^2 - 8x + k = 0$ will have real roots.

10. If $\triangle ABC$ and $\triangle DEF$ are similar such that $2AB = DE$ and $BC = 8$ cm, then what is the length of EF?

11. Cards marked with numbers 1, 2, 3, ..., 50 are placed in a box and mixed thoroughly. If a card is drawn, find the probability that the number on the card is a perfect square number.

12. A bag contains 12 balls out of which x are white. If one ball is drawn at random, what is the probability that it will be a white ball?

Section C

Questions from 13 to 22 carry 3 marks each.

13. Evaluate all zeros of the polynomial $12x^4 - 49x^3 + 15x^2 + 3x - 1$ if two of its zeros are $2 + \sqrt{3}$, $2 - \sqrt{3}$.

14. Solve for x and y by cross multiplication method:

    $6(ax + by) = 3a + 2b$

    $6(bx - ay) = 3b - 2a$.

15. The sum of first n terms of an AP is $5n^2 - 3n$. Find its nth and 10th terms.

16. In what ratio does the point $(-4, 6)$ divide the line segment joining the points $A(-6, 10)$ and $B(3, -8)$?

17. Find the length of the median through the vertex A of a triangle whose vertices are $A(-1, 3)$, $B(1, -1)$ and $C(5, 1)$.

18. Prove that $\sqrt{\dfrac{1 + \cos\theta}{1 - \cos\theta}} + \sqrt{\dfrac{1 - \cos\theta}{1 + \cos\theta}} = 2\csc\theta$.

19. Prove that $\dfrac{\sec\theta - 1}{\sec\theta + 1} = (\cot\theta - \operatorname{cosec}\theta)^2$.

20. An equilateral triangle is inscribed in a circle of radius r cm. Show that the area of the portion of the circle not included in the triangle is $r^2\left(\pi - \dfrac{3\sqrt{3}}{4}\right)$ sq cm.

21. A well of diameter 3 m is dug 14 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment. $\left(\text{Take } \pi = \dfrac{22}{7}.\right)$

22. For the following data, construct cumulative frequency curves (ogives) by *less than* and *more than* method on the same axes.

Scores	Number of Candidates
400–450	20
450–500	35
500–550	40
550–600	32
600–650	24
650–700	27
700–750	18
750–800	24

Section D

Questions from 23 to 30 carry 4 marks each.

23. What is the smallest number, which when divided by 35, 56 and 91, leaves the remainder 7 in each case?

24. Find two consecutive positive integers, sum of whose squares is 365.

25. In $\triangle ABC$, D and E are two points lying on the side AB such that AD = BE. If DP ∥ BC and EQ ∥ AC, then prove that PQ ∥ AB.
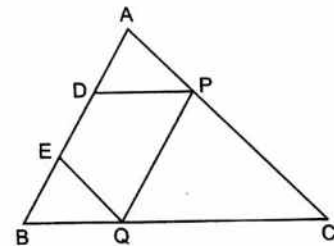
26. Prove that *the opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.*

27. Construct a triangle ABC in which BC = 8 cm, $\angle B = 45°$ and $\angle C = 30°$. Construct another triangle similar to $\triangle ABC$ such that its sides are $\dfrac{3}{4}$th of the corresponding sides of $\triangle ABC$.

28. A gunner observed the angle of elevation of an unidentified jet fighter from a point P on the ground as 60°. After a flight of 15 seconds, the angle of elevation changed to 30° as the gunner fired a warning shot. If the jet was flying with a speed of 720 km/h, find the height at which the jet was flying. What value is reflected in gunner's action?

29. A bucket is in the form of a frustum of a cone which can hold 56,980 cu cm of water. If the radii of the upper and lower circular bases are 28 cm and 21 cm, find the height of the bucket. $\left(\text{Use } \pi = \dfrac{22}{7}.\right)$

30. Find the missing frequencies in the following distribution. It is given that the median of the distribution is 41 and the total number of observations is 82.

Class Interval	10–20	20–30	30–40	40–50	50–60	60–70
Frequency	10	f_1	15	20	f_2	11