10th Maths Sample Paper-5 (CBSE Board Exam 2018)

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

Section A

Questions from 1 to 6 carry 1 mark each.

1. In a $\triangle ABC$, $\angle C = 3\angle B = 2(\angle A + \angle B)$. Find the angles.

2. The 5th term of an A.P. is 26 and the 10th term is 51. Determine the 15th term of the A.P.

3. For what value of n the nth terms of the two A.Ps: 63, 65, 67, ... and 3, 10, 17, ... are equal?

4. In the given figure, O is the centre of the circle. AB and AC are tangents drawn to the circle. If $\angle BAC = 55°$, then find $\angle BOC$.
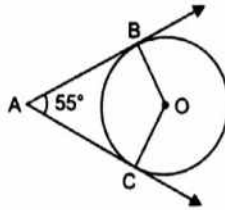

5. If $\operatorname{cosec} A = \sqrt{2}$, find the value of $\left[\cot A + \dfrac{\sin A}{1 + \cos A} \right]$.

6. Find the value of $\tan 21° \tan 30° \tan 69°$.

Section B

Questions from 7 to 12 carry 2 marks each.

7. Show that $5 - \sqrt{3}$ is an irrational number.

8. On dividing $3x^3 + 4x^2 + 5x - 13$ by a polynomial $g(x)$, the quotient and remainder are $3x + 10$ and $16x - 43$ respectively. Find $g(x)$.

9. Solve for x by factorisation method, $x^2 + 5x - (a^2 + a - 6) = 0$.

10. In the given figure, ABC is a triangle, PD $\parallel$ BC and $\dfrac{AD}{DC} = \dfrac{CE}{BE}$. Prove that PE $\parallel$ AC.
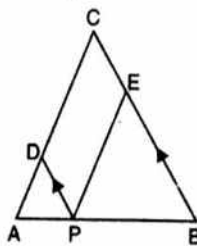
11. Find the probability of getting 53 Fridays in a leap year.

12. Find the probability of getting neither an ace nor a king from a pack of 52 cards.

Section C

**Questions from 13 to 22 carry 3 marks each.**

13. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2 + 4x + 1$, the remainder comes out to be $(ax + b)$. Find 'a' and 'b'.

14. Solve for x and y:

$$\frac{a}{x} - \frac{b}{y} = 0$$

$$\frac{ab^2}{x} - \frac{a^2b}{y} = a^2 + b^2.$$

15. If T_m, T_{m+n} and T_{m-n} are respectively mth, $(m + n)$th and $(m - n)$th terms of an A.P., then prove that $T_{m+n} + T_{m-n} = 2 T_m$.

16. The vertices of a triangle are $(-7, p - q)$, $(p + q, 8)$ and $(2, -1)$. If its centroid is the point $(1, 3)$, then find the values of p and q.

17. The points D, E and F are the mid-points of the sides BC, CA and AB of $\triangle ABC$ respectively. If the coordinates of A, D and E are $(-2, 3)$, $(1, -4)$ and $(-5, 2)$ respectively, find the coordinates of F.

18. Prove that $\dfrac{\tan\theta}{1 - \cot\theta} + \dfrac{\cot\theta}{1 - \tan\theta} = 1 + \sec\theta\,\csc\theta$.

19. If $\sec\theta = x + \dfrac{1}{4x}$, show that $\sec\theta + \tan\theta = 2x$ or $\dfrac{1}{2x}$.

20. ABCD is a square of side x cm. With A and C as centres, arcs BLD and DMB are drawn. Show that the area of the shaded portion is $\left(\dfrac{\pi}{2} - 1\right)x^2$ sq cm.
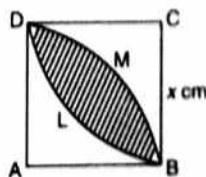
21. A milk container is made of metal sheet in the shape of frustum of a cone whose volume is $10{,}459\dfrac{3}{7}$ cu cm. The radii of its lower and upper circular ends are 8 cm and 20 cm respectively. Find the cost of metal sheet used in making the container at the rate of ₹ 1.40 per sq cm. $\left(\text{Use } \pi = \dfrac{22}{7}\right)$

22. For the following data, draw *more than* ogive and find the *median* from the ogive.

| Age (in years)	0–10	10–20	20–30	30–40	40–50	50–60	60–70
Number of Persons	5	15	20	23	17	11	9

Section D

Questions from 23 to 30 carry 4 marks each.

23. State Fundamental Theorem of Arithematic. Using it, find the HCF and LCM of 1560, 1755 and 2925.

24. The speed of a boat in still water is 11 km/h. It can go 12 km upstream and downstream to the original point in 2 hours 45 minutes. Find the speed of the stream.

25. Prove that *if a line is drawn parallel to one side of a triangle, the other two sides are divided in the same ratio.*

Using the above theorem, prove the following:

In the adjoining figure, DE ∥ AB and EF ∥ DB. Prove that $DC^2 = CF \times AC$.
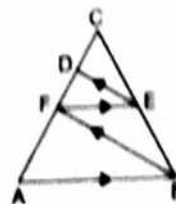
26. Prove that *the tangent at any point of a circle is perpendicular to the radius through the point of contact.*
Using the above theorem, prove:
From a point P, two tangents PA and PB are drawn to a circle with centre O. If OP is equal to the diameter of the circle, then the $\triangle$ PAB is equilateral.

27. Construct a triangle ABC similar to a given equilateral triangle PQR with side 5 cm such that each of its sides is $\frac{6}{7}$ th of the corresponding side of $\triangle$ PQR.

28. The angle of elevation θ of the top of a lighthouse as seen by a person on the ground is such that $\tan\theta = \frac{5}{12}$. When the person moves a distance of 240 m towards the lighthouse, the angle of elevation becomes ϕ such that $\tan\phi = \frac{3}{4}$. Find the height of the lighthouse.

29. In the given figure, a model of a solid which is drawn to a scale 1 : 200 is shown. Calculate:
    (i) its total surface area in π sq m, and
    (ii) its volume in π cu m.
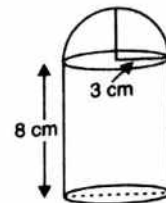
30. Marks obtained by 400 students in an examination are as follows:

Marks	Number of Students
0–10	10
10–20	20
20–30	22
30–40	40
40–50	55
50–60	75
60–70	80
70–80	58
80–90	28
90–100	12

Draw 'more than' and 'less than' ogives for the above data and therefrom determine the median marks. What value do you attach to the performance of these students?