Or

At t minutes past 2 pm, the time needed by the minutes hand of a clock to show 3 PM was found to be 3 minutes less than $\frac{t^2}{4}$ minutes. Find t.

27. The angle of elevation of the top of a tower from a point A due south of the tower is α and from B due east of the tower is β. If $AB = d$, show that the height of the tower is $\frac{d}{\sqrt{\cot^2\alpha + \cot^2\beta}}$.

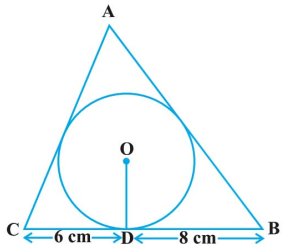
Or

If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its reflection in the lake be β, prove that the distance of the cloud from the point of observation is $\frac{2h\sec\alpha}{\tan\beta - \tan\alpha}$.

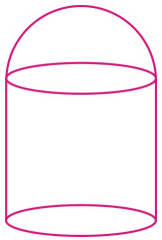
28. Prove that the lengths of tangents drawn from an external point to a circle are equal.

Use the above property to solve the following:

A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively (see Fig.). Find the sides AB and AC.



29. A building is in the form of a cylinder surmounted by a hemispherical dome (see Fig.). The base diameter of the dome is equal to $\frac{2}{3}$ of the total height of the building. Find the height of the building, if it contains $67\frac{1}{21}$ cm³ of air.



30. The median of the following data is 50. Find the values of p and q, if the sum of all the frequencies is 90.

Marks	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	p	15	25	20	q	8	10

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Er Manish Bhadoria's Interactions Study Circle 10th CBSE Mathematics

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Mathematics

(Sample Paper - IV)

Time: 3 hours **Max Marks: 80**

Section - A

(1 mark questions)

1. If the HCF of 65 and 117 is expressible in the form $65m - 117$, then what is the value of m.

2. If one of the zeroes of the quadratic polynomial $(k - 1)x^2 + kx + 1$ is –3, then what is the value of k?

3. Which constant must be added and subtracted to solve the quadratic equation $9x^2 + \frac{3}{4}x - \sqrt{2} = 0$ by the method of completing the square?

4. If $\sin\alpha = \frac{1}{2}$ and $\cos\beta = \frac{\sqrt{3}}{2}$, then what is the value of $\tan(\alpha + \beta)$?

5. What will be the 21st term of the AP whose first two terms are –3 and 4 respectively?

6. If a spherical marble of radius 2.1 cm is put into a cylindrical cup full of water of radius 5 cm and height 6 cm, then how much water flows out of the cylindrical cup?

7. The lengths of the diagonals of a rhombus are 16 cm and 12 cm. Find the length of the side of the rhombus.

8. A point P is 12 cm away from the centre of a circle. If the radius of the circle is 6 cm, find the length of the tangent drawn to the circle from the point P.

9. A student says that if you throw a die, it will show up 1 or not 1. Therefore, the probability of getting 1 and the probability of getting 'not 1' each is equal to ½. Is this correct? Answer in yes or no.

10. If a card is selected at random from a well shuffled deck of 52 playing cards, what is the probability of its being a face card?

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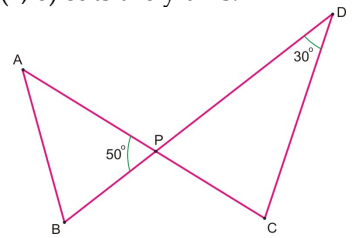
Section - B
(2 marks questions)

11. For what value of k, the lines given by 3x + 2*k*y = 2 and 2x + 5y + 1 = 0 will be parallel?

12. Prove that $\sin^6\theta + \cos^6\theta + 3\sin^2\theta\cos^2\theta = 1$.

13. Find the coordinates of the point where the perpendicular bisector of the line segment joining the points A (1, 5) and B (4, 6) cuts the y-axis.

14. Two line segments AC and BD intersect each other at the point P such that PA = 6 cm, PB = 3 cm, PC = 2.5 cm, PD = 5 cm, ∠APB = 50° and ∠CDP = 30°. Then, find ∠PBA.



15. Two dice are thrown at the same time. Find the probability of getting
(i) same number on both dice *(ii)* different numbers on both dice.

Or

A coin is tossed 3 times. List the possible outcomes. Find the probability of getting
(i) all heads *(ii)* at least 2 heads

Section - C
(3 marks questions)

16. Prove that $\sqrt{2}+\sqrt{3}$ is irrational.

Or

On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?

17. On dividing $6x^3 + 8x^2 - 3x + 8$ by a polynomial $g(x)$, the quotient and remainder were 3 x + 4 and 6 x + 20, respectively. Find $g(x)$.

18. Priyanshi has only Re 1 and Rs 2 coins with her. If the total number of coins that she has is 50 and the amount of money with her is Rs 75, then find the number of Re 1 and Rs 2 coins she has.

19. How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3?

20. If A, B and C are the interior angles of a triangle ABC, show that:

$$\sin\frac{B+C}{2} = \cos\frac{A}{2}.$$

Or

Prove that:

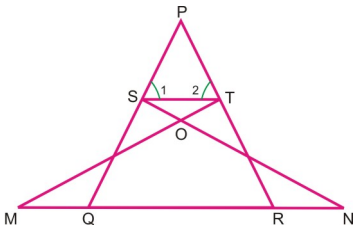
$$\frac{\sin\theta}{1-\cos\theta} + \frac{\tan\theta}{1+\cos\theta} = \sec\theta\,\mathrm{cosec}\,\theta + \cot\theta\,.$$

21. Find the area of the triangle having vertices (a, b + c), (b, c + a) and (c, a + b).

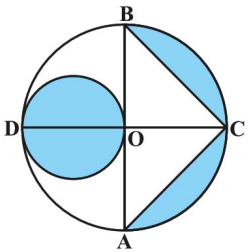
22. If P (9*a* – 2, –*b*) divides line segment joining A (3*a* + 1, –3) and B (8*a*, 5) in the ratio 3 : 1, find the values of *a* and *b*.

23. Construct a right triangle in which the sides containing the right angle are 5 cm and 4 cm. Construct a similar triangle whose sides are $\frac{5}{3}$ times the sides of the above triangle.

24. In the given Fig., if ∠1 = ∠2 and ΔNSQ ≅ ΔMTR, then prove that: Δ PTS ~ Δ PRQ.



25. In the given figure, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If OA = 7 cm, find the area of the shaded region.



Or

A triangular park has sides equal to 20 m, 30 m and 40 m. At each vertex a goat is tied with a rope having a length of 7 m each. Calculate the total area the three goats can graze.

Section - D
(6 marks questions)

26. A train, travelling at a uniform speed for 360 km, would have taken 48 minutes less to travel the same distance if its speed were 5 km/h more. Find the original speed of the train.