the rickshaw and of the bus.

27. The angle of elevation of the top of a tower at a point is 45°. After moving a distance p towards the foot of the tower, the angle of elevation of the top of the tower is found to be θ. Prove that the height of the tower is:

$$\frac{p\tan\theta}{\tan\theta - 1}.$$

28. Prove that if a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.

Using the above theorem, prove that the line joining the mid-points of any two sides of a triangle is parallel to the third side.

Or

Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

29. Water is flowing at the rate of 15 km/h through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of water in pond rise by 21 cm?

Or

A solid iron cuboidal block of dimensions 4.4 m × 2.6 m × 1 m is recast into a hollow cylindrical pipe of internal radius 30 cm and thickness 5 cm. Find the length of the pipe.

30. The weights of tea in 70 packets are shown in the following table :

Weight (g)	200-201	201-202	202-203	203-204	204-205	205-206
Number of packets	13	17	18	10	1	1

Find the mean weight of packets.

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Er Manish Bhadoria's Interactions Study Circle
Strong Foundation for a bright future

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Mathematics

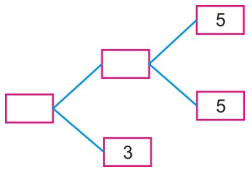
(Sample Paper - V)

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

Section - A

(1 mark questions)

1. Complete the missing entries in the given factor tree.



2. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and –3, then what are the values of a and b?

3. If one of the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ is zero, then what is the product of other two zeroes?

4. If $\alpha = \frac{-b+\sqrt{b^2-12c}}{k}$ and $\beta = \frac{-b-\sqrt{b^2-12c}}{k}$ be two roots of the quadratic equation $3x^2 + bx + c = 0$, write the value of k.

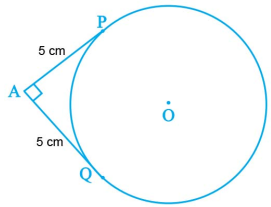
5. What is the area of the square that can be inscribed in a circle of radius 8 cm?

6. If two tangents inclined at an angle 60° are drawn to a circle of radius 3 cm, then what is the length of each tangent?

7. Write the empirical relationship between Median, Mode and Mean of a data.

8. If the probability of an event is p, what is the probability of its complementary event?

9. In the given Fig., the pair of tangents AP and AQ drawn from an external point A to a circle with centre O are perpendicular to each other and length of each tangent is 5 cm. What is the radius of the circle?



10. A pole, 6 m high, casts a shadow $2\sqrt{3}$ m long on the ground. What is the elevation of the Sun?

Section - B
(2 marks questions)

11. If 7 times the 7th term of an AP is equal to 11 times its 11th term, then find the 18th term of this AP.

12. Prove the identitiy:

$$\cos^2 A + \frac{1}{1+\cot^2 A} = 1$$

Or

If $\sin(A + 2B) = \frac{\sqrt{3}}{2}$ and $\cos(A + 4B) = 0$, find A and B.

13. Corresponding sides of two similar triangles are in the ratio of 2 : 3. If the area of the smaller triangle is 48 cm², find the area of the larger triangle.

14. If (a, b) is the mid-point of the line segment joining the points A (10, –6) and B (k, 4) and a – 2b = 18, find the value of k and the distance AB.

15. At a fete, cards bearing numbers 1 to 1000, one number on one card, are put in a box. Each player selects one card at random and that card is not replaced. If the selected card has a perfect square greater than 500, the player wins a prize. What is the probability that
(i) the first player wins a prize?
(ii) the second player wins a prize, if the first has won?

Section - C
(3 marks questions)

16. What must be subtracted from the polynomial $p(x) = x^4 + 2x^3 - 13x + 10$, so that the rusulting polynomial is exactly divisible by the polynomial $u(x) = x^2 - 4x + 3$ and the degree of the polynomial to be added must be less than degree($u(x)$).

17. Using Euclid's division algorithm, find the HCF of 56, 96 and 404.

18. Draw the graphs of the pair of linear equations:

$x - y + 2 = 0$

$4x - y - 4 = 0$.

Calculate the area of the triangle formed by the lines so drawn and the x-axis.

Or

Two numbers are in the ratio 5 : 6. If 8 is subtracted from each of the numbers, the ratio becomes 4 : 5. Find the numbers.

19. The sum of the first three terms of an AP is 33. If the product of the first and the third term exceeds the second term by 29, find the AP.

Or

Which term of the AP: 53, 48, 43,... is the first negative term?

20. In ΔABC, right angled at B, BC = 5 cm and AC – AB = 1 cm. Evaluate $\frac{1+\sin C}{\cos C}$.

21. Find the ratio in which the point $P\left(\frac{3}{4}, \frac{5}{12}\right)$ divides the line segment joining the points $A\left(\frac{1}{2}, \frac{3}{2}\right)$ and B(2, -5).

Or

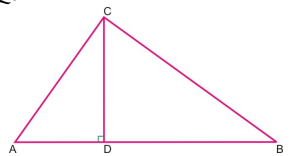
What type of a quadrilateral do the points A (2, –2), B (7, 3), C (11, –1) and D (6, –6) taken in that order, form?

22. The length of a line segment $12\sqrt{2}$ units. If one end is (- 3, 2) and the ordinate of the second end is -10, find its abscissa.

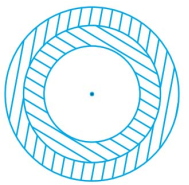
23. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q.

24. In the given Fig., ∠ACB = 90° and CD ⊥ AB.

Prove that $\frac{BC^2}{AC^2} = \frac{BD}{AD}$.



25. An archery target has three regions formed by three concentric circles as shown in the Fig. If the diameters of the concentric circles are in the ratio 1:2:3, then find the ratio of the areas of three regions.



Section - D
(6 marks questions)

26. Ankit travels 14 km to his home partly by rickshaw and partly by bus. He takes half an hour if he travels 2 km by rickshaw, and the remaining distance by bus. On the other hand, if he travels 4 km by rickshaw and the remaining distance by bus, he takes 9 minutes longer. Find the speed of