SHREE RADHEY COACHING CENTER

Class 10 - Mathematics

FINAL EXAM

Maximum Marks: 80 **Time Allowed: 3 hours**

General Instructions:

- ATTEMPT ALL THE QUESTIONS
- DRAW FIGURES WHERE NEEDED

Section A

1. All non-terminating and non-recurring decimal numbers are **1**

   a) rational numbers b) irrational numbers
   c) integers d) natural numbers

2. For every natural number 'n', 6^n always ends with the digit **1**

   a) 4 b) 8
   c) 6 d) 0

3. Every positive odd integer is of the form 2q + 1, where 'q' is some **1**

   a) None of these b) whole number
   c) natural number d) integer

4. The prime factors of 196 are **1**

   a) 2×7 b) 2×7^2
   c) $2^2 \times 7$ d) $2^2 \times 7^2$

5. If 'α' and 'β' are the zeroes of the polynomial $x^2 - 6x + 8$, then the value of $\alpha^3 + \beta^3$ is **1**

   a) 76 b) 72
   c) 74 d) 80

6. Check whether the pair of equations x + 3y = 6, 2x - 3y = 12 is consistent. **1**

7. $9x^2 + 12x + 4 = 0$ have **1**

   a) Real and Distinct roots b) No real roots
   c) Distinct roots d) Real and Equal roots

   OR

   InΔABC, if $\angle C = 3\angle B = 2(\angle A + \angle B)$, $then \angle C =$

   a) 90° b) 150°
   c) 120° d) 60°

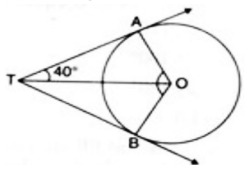
8. The list of numbers – 10, – 6, – 2, 2, ... is **1**

   a) not an AP b) an AP with d = – 4
   c) an AP with d = 4 d) an AP with d = 8

9. Write the expression for the common difference of an A.P. whose first term is a and nth term is b. **1**

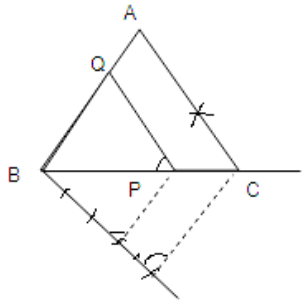
10. If $\triangle$ABC and $\triangle$DEF are triangles such that $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{4}{7}$. Find $\frac{\text{area } \triangle ABC}{\text{area } \triangle DEF}$. **1**

11. In the given, if$\angle ATO = 40^\circ$, then the measure of $\angle AOB$ is **1**



a) 80° b) 100°
c) 120° d) 90°

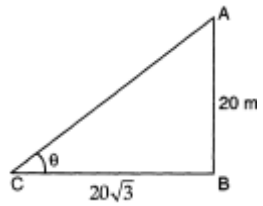
12. In the given figure, $\triangle BPQ$ is similar to $\triangle BCA$ with sides $\frac{x}{y}$ of the corresponding sides of $\triangle BCA$. Then , find the value of $\frac{x}{y}$. **1**



13. If A and B are acute angles and sin A = cos B, then the value of (A + B) is **1**

a) 0° b) 90°
c) 30° d) 60°

14. In figure, a tower AB is 20 m high and BC, its shadow on the ground, is $20\sqrt{3}$ m long Find the Sun's altitude. **1**



15. The circumference of a circle exceeds its diameter by 120cm, then its radius is **1**

a) 56cm b) 14cm
c) 28cm d) 42cm

16. The radius of the circle whose area is equal to the sum of the areas of the two circles of radii 24cm and 7cm is **1**

a) 24cm b) 7cm
c) 25cm d) 31cm

17. During the conversion of a solid from one shape to another, the volume of the new shape will **1**

a) be doubled b) remain unaltered
c) increase d) decrease

18. If the mean and mode of a frequency distribution be 53.4 and 55.2 respectively, find the median. **1**

19. A card is drawn from a well shuffled deck of the 52 playing cards. Find the probability that the card will not be an ace. **1**

20. If (a, 0) , (0, b) and (x, y) are collinear, then **1**

a) ay – bx = 1 b) ax + by = 1
c) ay + bx = ab d) ax – by = ab

Section B

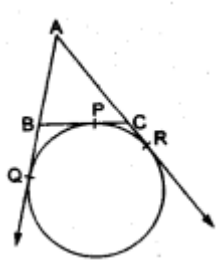
21. Define HCF of two positive integers and find the HCF of the pairs of numbers: 18 and 24. **2**

22. Find the roots of the equation, if they exist, by applying the quadratic formula: $2x^2 - 2\sqrt{2}x + 1 = 0$. **2**

23. Triangles ABC and DEF are similar. If area (ΔABC)= 9 cm^2, area (ΔDEF)= 64 cm^2 and DE = 5.1 cm, find AB. **2**

OR

A circle is touching the side BC of $\triangle ABC$ at P and touching AB and AC produced at Q and R respectively. Prove that $AQ = \frac{1}{2}(\text{perimeter of } \Delta ABC)$.

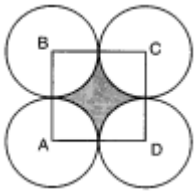


24. Prove the trigonometric identity: **2**

$\tan^2 A - \tan^2 B = \frac{\cos^2 B - \cos^2 A}{\cos^2 B \cos^2 A} = \frac{\sin^2 A - \sin^2 B}{\cos^2 A \cos^2 B}$

25. Find the distance between the points (0, 0) and (36, 15). Also, find the distance between towns A and B if town B is located at 36 km east and 15 km north of town A. **2**

26. The points A, B, C and D are the centres of four circumcircles each having a radius of length one unit. If a point is selected at random from the interior of square ABCD. What is the probability that the point will be chosen from the shaded region **2**



Section C

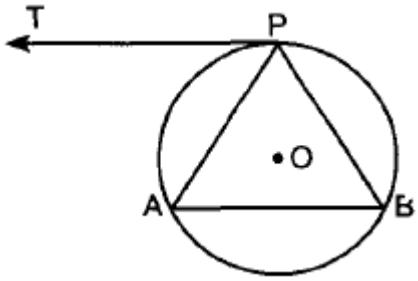
27. If one zero of the polynomial $2x^2 + 3x + \lambda$ is $\frac{1}{2}$, find the value of λ and other zero. **3**

28. Solve: **3**

$x = \frac{1}{2-\frac{1}{2-\frac{1}{2-x}}}, x \neq 2$

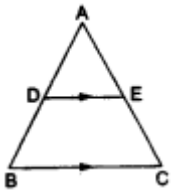
29. Find the sum of first 20 terms of an A.P., in which 3rd term is 7 and 7^{th} term is two more than thrice of its 3rd term. **3**

30. A tangent PT is drawn parallel to a chord AB as shown in figure. Prove that APB is an isosceles triangle. **3**



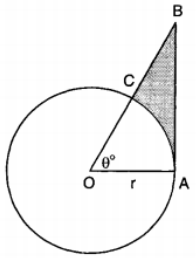
OR

In the given figure, $DE \| BC$, AD = 2 cm, BD = 2.5 cm, AE = 3.2 cm and DE = 4 cm. Find AC and BC.



31. Draw a circle of radius 2.5 cm and take a point P outside it, Without using the centre of the circle, draw two tangents to the circle from the point P. **3**

32. Figure shows a sector of a circle, centre O, containing an angle θ°. Prove that: **3**

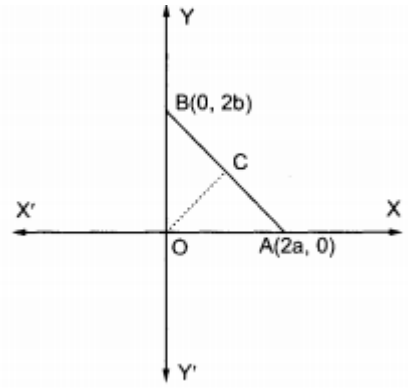


i. Perimeter of the shaded region is $r\left(\tan\theta + \sec\theta + \frac{\pi\theta}{180} - 1\right)$

ii. Area of the shaded region is $\frac{r^2}{2}\left(\tan\theta - \frac{\pi\theta}{180}\right)$

33. A rectangle ABCD is inscribed in a circle whose length is 8 units and breadth is 6 units. Diagonal AC of the given rectangle is diameter of the circle . Apart from the rectangle rest of the interior of the circle is shaded . If a dart is thrown and lands in the interior of the circle. What is the probability that the dart will land in the shaded region? **3**

34. A right triangle BOA is given. C is the mid-point of the hypotenuse AB. Show that it is equidistant from the vertices O, A and B. **3**



Section D

35. Solve: $\frac{1}{2(2x+3y)} + \frac{12}{7(3x-2y)} = \frac{1}{2}$ $\frac{7}{2x+3y} + \frac{4}{3x-2y} = 2$, where 2x + 3y $\neq$ 0 and 3x - 2y $\neq$ 0. **4**

36. In trapezium ABCD, $AB \| DC$ and DC = 2AB. EF drawn parallel to AB cuts AD in F and BC in E such that $\frac{BE}{EC} = \frac{3}{4}$. Diagonal DB intersects EF at G. Prove that 7 FE = 10 AB. **4**

37. Prove the trigonometric identity: **4**

If cosecθ - sinθ = a^3, secθ - cosθ = b^3, prove that $a^2 b^2(a^2 + b^2) = 1$

38. A window of a house is h metre above the ground. From the window, the angles of elevation and depression of the top and bottom of another house situated on the opposite side of the lane are found to be α and β respectively. Prove that the height of the house is h (1 + tanα cotβ) metres. **4**

39. A tent is in the form of a right circular cylinder surmounted by a cone. The diameter of the base of the cylinder or the cone is 24 m. The height of the cylinder is 11 m. If the vertex of the cone is 16 m above the ground, find the area of the canvas required for making the tent. (Use π = 22/7) **4**

40. The following table gives the marks obtained by 50 students in a class test: **4**

Marks	11 - 15	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40	41 - 45	46 - 50
Number of students	2	3	6	7	14	12	4	2

Calculate the mean and median for the above data.