

Exam: Annual Examination 2019-20
Grade: X
Subject: MATHEMATICS
Max. Marks:
Duration: 80
Roll No.: 3 Hrs.

General Instructions:

- (i) There are 4 sections in this question paper
- (ii) Section A (Q. no 1- 20) carries 1 mark each
- (iii) Section B (Q. no 21-26) carries 2 marks each
- (iv) Section C (Q.no 27-34) carries 3 marks each
- (v) Section D (Q. no 35- 40) carries 4 marks each.
- (vi) Use of calculator is not permitted.

SECTION – A (Each question carry one mark)

1. The decimal expansion of the rational number $\frac{43}{2^4 \times 5^3}$ will terminate after how many decimal places?
2. Find a quadratic polynomial whose sum and product of zeroes are respectively $\sqrt{2}$ and $\frac{1}{3}$
3. Check whether the following systems of linear equations: $x - 2y = 2$ and $4x - 2y = 5$ is consistent or not.
4. Find the value of k for which the quadratic equation $x^2 - kx + 4 = 0$ has equal roots.
5. Find the 8th term from the end of the AP: 7, 10, 13,....., 184.
6. In a ΔABC , D and E are points on the sides AB and AC respectively such that $DE \parallel BC$ and if $\frac{AD}{BD} = \frac{4}{5}$ and $EC = 2.5$ cm, find AE.
7. A circle touches all the four sides of a quadrilateral ABCD whose sides are $AB = 6$ cm, $BC = 9$ cm and $CD = 8$ cm. Find the length of AD.
8. Find the value of $\tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ$.
9. If AP is a tangent to the circle with centre O touching the circle at A, such that $OP = 4$ CM and $\angle OPA = 30^\circ$, then find the length of AP.
10. Find the value of $4 \cot^2 45^\circ - \sec^2 60^\circ + \sin^2 60^\circ + \cos^2 90^\circ$
11. The tangents passing through the ends of two radii of a circle intersect each other at 45° . What is the angle between the two radii?

12. The probability that it will rain tomorrow is 0.85. What is the probability that it will not rain tomorrow.
13. If $HCF(26,196) = 13$, then find the $LCM(26,196)$.
14. For what value of k , is 3 a zero of the polynomial $2x^2 + x + k$
15. Find the value of k , for which the system of equations $2x + 3y = 5$ and $4x + ky = 10$ has infinite number of solutions.
16. Find the common difference of an AP whose n^{th} term $a_n = 3n + 7$.
17. A man goes 24 m due west and then 7 m due north. How far is he from the starting point?
18. Find the acute angle θ , satisfying the equation $\sqrt{3} \sin \theta = \cos \theta$
19. A number is selected from numbers 1 to 25. What is the probability that it is a prime number?
20. What is the relation between the areas of the equilateral triangles described on one of the diagonals and on one side of a square?

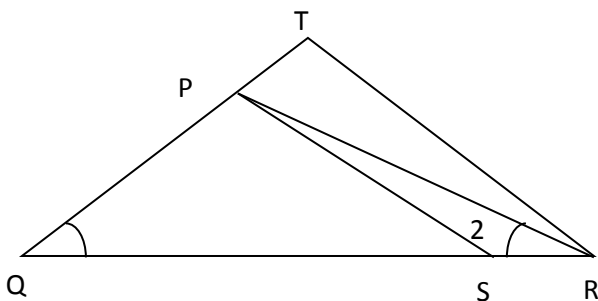
SECTION – B (Each question carries two marks)

21. Use Euclid's division algorithm to find the HCF of 216 and 1176.
22. Solve by elimination method: $x - y = 8$ and $3x - 2y = 16$
23. If $2x, x + 10$ and $3x + 2$ are in AP, then find the value of x .

OR

How many terms are there in the sequence 3, 6, 9, ..., 111.

24. In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$. show that $\Delta PQS \sim \Delta TQR$.

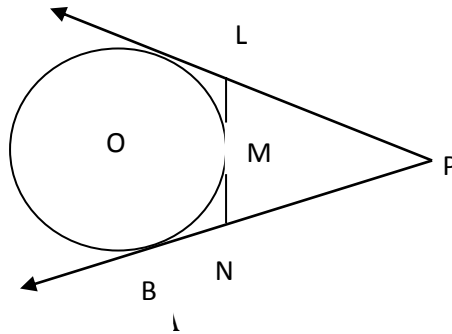


OR

D, E and F are respectively the mid-points of sides AB, BC and CA of ΔABC . Find the ratio of the areas of ΔDEF and ΔABC

25. If α and β are the zeroes of the quadratic polynomial $x^2 - 4\sqrt{3}x + 3$, then find the value of $\alpha + \beta - \alpha\beta$.

26. In the given figure, PA and PB are tangents from an external point P to a circle with centre O. LN touches the circle at M. Prove that $PL + LM = PN + MN$.



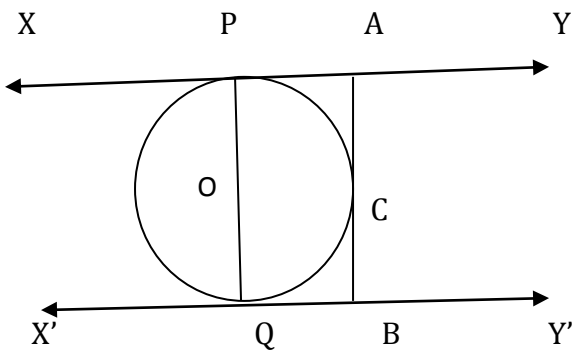
OR

If all the sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.

SECTION - C (Each question carries three marks)

27. Find the value of x , if $4\left(\frac{\sec^2 59^\circ - \cot^2 31^\circ}{3}\right) - \frac{2}{3} \sin 90^\circ + 3 \tan^2 56^\circ \times \tan^2 34^\circ = \frac{x}{3}$

28. In the given figure, if XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90^\circ$



29. A passenger train takes 2 hours less for a journey of 300 km, if its speed is increased by 5 km/hr from its usual speed. Find its usual speed.

OR

Solve the equation: $\frac{x-1}{x-2} + \frac{x-3}{x-4} = 3\frac{1}{3}$

30. The perpendicular from A on side BC of a ΔABC intersects BC at D such that $DB = 3 CD$. Prove that $2 AB^2 = 2 AC^2 + BC^2$.

31. Prove that $\tan^2 A - \tan^2 B = \frac{\cos^2 B - \cos^2 A}{\cos^2 A \cos^2 B}$

32. Construct a ΔABC whose sides are 7.5 cm, 7cm and 6.5 cm. construct another triangle similar to ΔABC and with its sides $\frac{2}{3}$ of the corresponding sides of ΔABC .

OR

Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangent to each circle from the centre of the other circle.

33. All the 3 face cards of spades are removed from a well shuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting:

- (a) a black face card (b) a queen (c) a black card

OR

When two dice are thrown, find the probability of getting:

- (a) a total of 6 (b) the sum as a prime number (c) the sum greater than 7

34. Find the zeroes of the polynomial $6x^2 - 3$ and verify the relationship between zeroes and their coefficients.

OR

If α and β are the zeroes of the quadratic polynomial $x^2 - (k + 6)x + 2(2k - 1)$ find the value of k , if $\alpha + \beta = \frac{1}{2} \alpha\beta$.

SECTION - D (Each question carries four marks)

35. Prove that $\sqrt{7}$ is an irrational number.

36. 200 logs are stacked in such a manner that 20 logs in the bottom row, 19 in the next row and 18 in the row next to it and so on. In how many rows are the 200 logs placed and how many logs are in the top row?

37. Represent the following pairs of equations $x + 3y = 6$ and $2x - 3y = 12$ graphically and write the coordinates of points where the lines intersect y-axis.

OR

If twice the son's age in years is added to the father's age, the sum is 70. But if twice the father's age is added to the son's age, the sum is 95. Find their present ages.

38. Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank separately. Find the time in which each tap can separately fill the tank.

39. State and prove basic proportionality theorem

OR

State and prove Pythagoras theorem.

40. Prove that $\frac{\tan \theta}{1-\cot \theta} + \frac{\cot \theta}{1-\tan \theta} = 1 + \sec \theta \operatorname{cosec} \theta$

OR

If $\tan \theta + \sin \theta = m$ and $\tan \theta - \sin \theta = n$, show that $m^2 - n^2 = 4\sqrt{mn}$

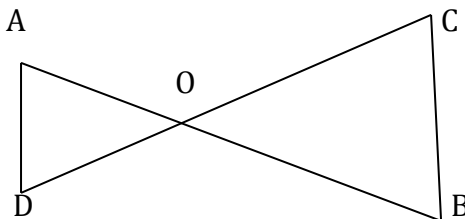
CORE

10. Find the value of $7(\sec^2 \theta - \tan^2 \theta)$

20. Let $\Delta ABC \sim \Delta DEF$ and their areas be respectively 64 cm^2 and 121 cm^2 . If $EF = 15.4 \text{ cm}$, find BC .

22. What is the condition for the pair of linear equations $a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$ to have unique solution?

24. In the given figure, $\frac{OA}{OC} = \frac{OD}{OB}$ Show that $\angle A = \angle C$ and $\angle B = \angle D$



OR

Diagonals of a trapezium ABCD with $AB \parallel DC$ intersect each other at the point O. If $AB = 2 CD$, find the ratio of the areas of triangles AOB and COD.

30. D and E are points on the sides CA and CB respectively of a triangle ΔABC right angled at C. Prove that $AE^2 + BD^2 = AB^2 + DE^2$.

31. Given $\sec \theta = \frac{13}{12}$, calculate all other trigonometric ratios.

36. Find the sum of the first 20 terms of the AP: 1, 4, 7, 10,...

38. Check whether the equation $3x^2 - 5x + 2 = 0$ has real roots and if yes, find them.