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SAMPLE PAPER 03 FOR PERIODIC TEST II EXAM (2019-20)

SUBJECT: MATHEMATICS **MAX. MARKS : 80**

CLASS : X **DURATION : 3 HRS**

General Instructions:

(i). **All** questions are compulsory.

(ii). This question paper contains 4**0** questions divided into four Sections A, B, C and D.

(iii). **Section A** comprises of 20 questions of **1 mark** each. **Section B** comprises of 6 questions of **2 marks** each. **Section C** comprises of 8 questions of **3 marks** each and **Section D** comprises of 6 questions of **4 marks** each.

(iv). There is no overall choice. However, an internal choice has been provided in two questions of 2 marks each, two questions of 3 marks each and two questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.

(v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 20 carry 1 mark each.

1. Areas of two similar triangles are in the ratio 4 : 9. Sides of these triangles are in the ratio

(a) 2 : 3 (b) 4 : 9 (c) 81 : 16 (d) 16 : 81

2. Distance of the point (4, a) from x-axis is half its distance from y-axis then a =

(a) 2 (b) 8 (c) 4 (d) 6

3. The value of $\sin 60^0 \cos 30^0 - \cos 60^0 \sin 30^0$ is

(a) 1 (b) –1 (c) 0 (d) none of these

4. If the altitude of the sun is at 60^0, then the height of the vertical tower that will cast a shadow of length 30m is

(a) $30\sqrt{3}$ m (b) 15 m (c) $\frac{30}{\sqrt{3}}$ m(d) 15 $\sqrt{2}$ m

5. If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$; a, b being prime numbers, then LCM (p, q) is

(a) ab (b) a^2b^2 (c) a^3b^2 (d) a^3b^3

6. A quadratic polynomial whose zeroes are $\frac{3}{5}$ and $\frac{-1}{2}$ is

(a) $10x^2 - x - 3$ (b) $10x^2 + x - 3$ (c) $10x^2 - x + 3$ (d) none of the above.

7. The value of k for which the system of equations $x + 2y = 3$ and $5x + ky + 7 = 0$ has no solution is

(a) 10 (b) 6 (c) 3 (d) 1

8. If the equation $ax^2 + bx + c = 0$ has equal roots then c =

(a) $\frac{-b}{2a}$ (b) $\frac{b}{2a}$ (c) $\frac{-b^2}{4a}$ (d) $\frac{b^2}{4a}$

9. 7th term of an AP is 40. The sum of its first 13th terms is

(a) 500 (b) 510 (c) 520 (d) 530

10. Which term of the AP 4, 9, 14, 19, ….. is 109?

(a) 14th (b) 18th (c) 22nd (d) 16th

11. Find the [HCF × LCM] for the numbers 100 and 190.

12. Write the sum of exponents of prime factors in the prime factorisation of 250.

13. A girl walks 200 towards East and then she walks 150m towards North. Find the distance of the girl from the starting point.

14. For what values of *k* will the following pair of linear equations have infinitely many solutions? $kx + 3y - (k - 3) = 0$ and $12x + ky - k = 0$

15. The angles of a quadrilateral are in AP whose common difference is 10^0. Find the angles.

16. Find the values of *k* for quadratic equation $2x^2 - x + k = 0$, so that they have two equal roots.

17. Find the sum of the zeroes of quadratic polynomial $x^2 + 7x + 10$.

18. If the mid-point of the line segment joining the points P(6, b – 2) and Q(– 2, 4) is (2, – 3), find the value of b.

19. A tower is $100\sqrt{3}$ m high. Find the angle of elevation if its top from a point 100 m away from its foot.

20. If $\tan\theta = \frac{15}{8}$, find the value of $\sin\theta$.

SECTION – B

Questions 21 to 26 carry 2 marks each.

21. Which term of the AP 24, 21, 18, 15, …. is first negative term?

22. Show that 6^n cannot end with the digit 0 or 5 for any natural number *n*.

OR

Find the HCF of 96 and 404 by the prime factorisation method. Hence, find their LCM.

23. Evaluate : $4\cot^2 45° - \sec^2 60° + \sin^2 60° + \cos^2 90°$.

OR

If $\cos\alpha = \frac{1}{2}$ and $\tan\beta = \frac{1}{\sqrt{3}}$, Find $\sin(\alpha + \beta)$ where α and β are both acute angles.

24. Solve for x and y: $2x + 3y = 9$; $4x + 6y = 15$

25. Find the value of m for which the pair of linear equations $2x + 3y - 7 = 0$ and $(m - 1)x + (m + 1)y = (3m - 1)$ has infinitely many solutions.

26. Find the coordinates of the point which divides the line segment joining the points (4, – 3) and (8, 5) in the ratio 3 : 1 internally.

SECTION – C

Questions 27 to 34 carry 3 marks each.

27. If $\cos(A - B) = \frac{\sqrt{3}}{2}$ and $\sin(A + B) = 1$, then find the value of A and B.

28. If α , β are the zeroes of the polynomials $f(x) = x^2 - 3x + 6$, then find the value of

$$\frac{1}{\alpha} + \frac{1}{\beta} + \alpha^2 + \beta^2 - 2\alpha\beta$$

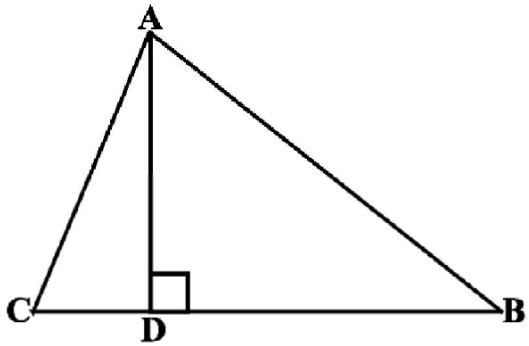
OR

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

29. Solve for x and y: $\frac{1}{2(2x+3y)} + \frac{12}{7(3x-2y)} = \frac{1}{2}$; $\frac{7}{(2x+3y)} + \frac{4}{(3x-2y)} = 2$.

30. Evaluate: $\frac{2\sin 68^0}{\cos 22^0} - \frac{2\cot 15^0}{5\tan 75^0} - \frac{3\tan 45^0 \tan 20^0 \tan 40^0 \tan 50^0 \tan 70^0}{5}$

31. The perpendicular from A on side BC of a ABC intersects BC at D such that DB = 3 CD (see the below figure). Prove that $2AB^2 = 2AC^2 + BC^2$.



32. Prove that $\sqrt{3}$ is an irrational number.

33. Find the point on the *x*-axis which is equidistant from (2, –5) and (–2, 9).

OR

Show that points A(7, 5), B(2, 3) and C(6, – 7) are the vertices of a right triangle. Also find its area.

34. Find the roots of the equation $\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}$, $x \neq -4, 7$.

SECTION – D

Questions 35 to 40 carry 4 marks each.

35. Prove that, in a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides.

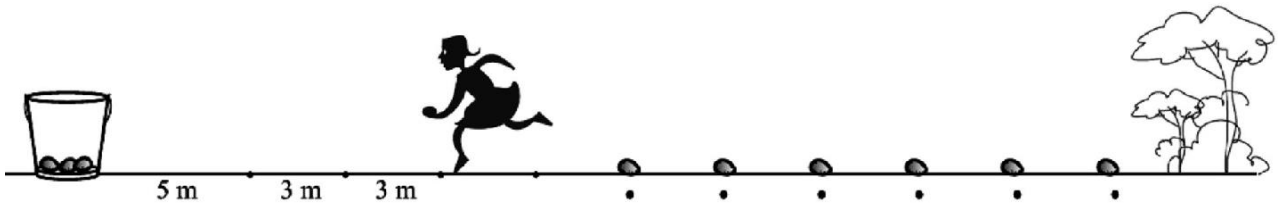
OR

Prove that "The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides."

36. Find all the zeroes of the polynomial $2x^4 + 7x^3 - 19x^2 - 14x + 30$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

37. Find the area of the triangle formed by joining the mid-points of the sides of the triangle whose vertices are (0, –1), (2, 1) and (0, 3). Find the ratio of this area to the area of the given triangle.

38. In a potato race, a bucket is placed at the starting point, which is 5 m from the first potato, and the other potatoes are placed 3 m apart in a straight line. There are ten potatoes in the line (see the below figure).



A competitor starts from the bucket, picks up the nearest potato, runs back with it, drops it in the bucket, runs back to pick up the next potato, runs to the bucket to drop it in, and she continues in the same way until all the potatoes are in the bucket. What is the total distance the competitor has to run?

39. The angles of depression of the top and the bottom of an 8 m tall building from the top of a multi-storeyed building are 30° and 45°, respectively. Find the height of the multi-storeyed building and the distance between the two buildings.

OR

As observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships.

40. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.