Mishra tutorial

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Class 10 - Mathematics

Sample paper

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

General Instructions:

i. All the questions are compulsory.

ii. The question paper consists of 40 questions divided into 4 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. 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 1 mark each, two questions of 2 marks each, three questions of 3 marks each, and three 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

1. The decimal expansion of number $\frac{441}{2^2 \times 5^3 \times 7}$ has **1**

   a) None of these
   b) non-terminating and non-repeating decimal
   c) terminating decimal
   d) non-terminating repeating decimal

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

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

3. The mode of 4, 5, 6, 8, 5, 4, 6, 5, 6, x, 8 is 6. The value of 'x' is **1**

   a) 8
   b) 6
   c) 5
   d) 4

4. The discriminant of $4x^2 + 3x - 2 = 0$ is **1**

   a) – 23
   b) 41
   c) 39
   d) – 31

5. The angle of elevation of the sun when the shadow of a pole of height 'h' metres is $\sqrt{3}$h metres long is **1**

   a) 60°
   b) 45°
   c) None of these
   d) 30°

6. Choose the correct option and justify your choice: $\frac{1-\tan^2 45^\circ}{1+\tan^2 45^\circ}$ **1**

   a) tan 90°
   b) 1
   c) sin 45°
   d) 0

7. If $sin\ \theta\ -\ cos\ \theta\ =\ 0$, then the value of is **1**

   a) 60°
   b) 30°
   c) 45°
   d) 90°

8. A number 'x' is chosen at random from the numbers -4, -3, -2, -1, 0, 1, 2, 3, 4, 5. The probability that $|x| < 3$ is **1**

a) 1 b) 0

c) $\frac{1}{2}$ d) $\frac{7}{10}$

9. Three consecutive vertices of a parallelogram ABCD are A(1, 2), B(1, 0) and C(4, 0). The co – ordinates of the fourth vertex D are **1**

a) (– 4, 2) b) (4, – 2)

c) (4, 2) d) (– 4, – 2)

10. If the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ is divided by a point P in the ratio 1 : k internally, then the co – ordinates of the point P are **1**

a) $\left(\frac{x_2-kx_1}{1+k}, \frac{y_2-ky_1}{1+k}\right)$ b) $\left(\frac{x_2+kx_1}{1+k}, \frac{y_2+ky_1}{1+k}\right)$

c) $\left(\frac{x_2+kx_1}{1-k}, \frac{y_2+ky_1}{1-k}\right)$ d) $\left(\frac{x_1+kx_2}{1+k}, \frac{y_1+ky_2}{1+k}\right)$

11. Fill in the blanks: **1**

The shape of a glass tumbler is usually in the form of _____.

12. Fill in the blanks: **1**

Factors of $3x^3 - x^2 - 3x + 1$ are _____.

OR

Fill in the blanks:

The remainder when $x^4 + x^3 - 2x^2 + x + 1$ is divided by x - 1 is _____.

13. Fill in the blanks: **1**

A number is chosen from 1 to 100, then the probability that it is a prime number is _____.

14. Fill in the blanks: **1**

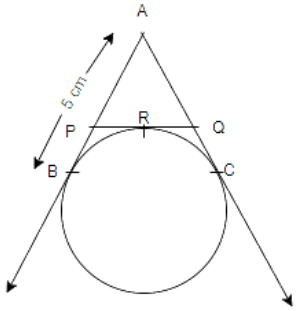
The sum of the AP, 1 + 2 + 3 + 4 + 5 + 6 + ---- 10 is _____.

15. Fill in the blanks: **1**

A diameter of a circle divides it into _____ equal parts.

16. Find the simplest form of $\frac{1095}{1168}$. **1**

17. In the given figure,AB, AC and PQ are tangents. If AB = 5 cm, then find the perimeter of $\triangle APQ$. **1**



18. If a line intersects a circle in two distinct points, what is it called? **1**

19. Find the 10^{th} term of the AP 2, 7, 12,... **1**

OR

Find 11^{th} term of the A.P. 10.0,10.5,11.0,11.5,.....

20. Find the nature of the roots of the quadratic equation: $2x^2 - 8x + 5 = 0$ **1**

Section B

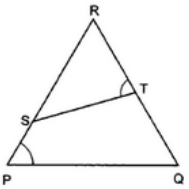
21. Two different dice are tossed together. Find the probability: **2**

i. of getting a doublet

ii. of getting a sum 10, of the numbers on the two dice.

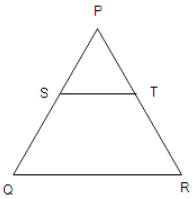
22. From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25 cm. Find the radius of the circle. **2**

23. In Fig. if ∠P = ∠RTS, prove that △RPQ ~ △RTS. **2**



OR

In the given figure, S and T are points on the sides PQ and PR respectively of $\triangle PQR$, such that PT = 2 cm, TR = 4 cm and $ST \parallel QR$. Find the ratio of the areas of $\triangle PST$ and $\triangle PQR$



24. A straight highway leads to the foot of a tower. A man standing on its top observes a car at an angle of depression of 30^o, which is approaching the foot of the tower with a uniform speed. 6 seconds later, the angle of depression of the car becomes 60^o. Find the time taken by the car to reach the foot of tower from this point. **2**
25. Solve the quadratic equations by factorization method: **2**

$x^2 - 4ax + 4a^2 - b^2 = 0$

OR

A natural number, when increased by 12, equals 160 times its reciprocal. Find the number.

26. A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm. Find the height of the cylinder. **2**

Section C

27. Prove that $(3+\sqrt{2})$ is irrational. **3**

OR

Find the HCF of the following polynomials: $2\left(x^4-y^4\right), 3\left(x^3+2x^2y-xy^2-2y^3\right)$

28. Show that the points A (2,-2), B(14,10), C (11, 13) and D(-1, 1) are the vertices of a rectangle. **3**
29. Find two numbers such that the sum of twice the first and thrice the second is 92, and four times the first exceeds seven times the second by 2. **3**

OR

Find the values of a and b for which the following system of equations has infinitely many solutions:

2x - (2a + 5)y =5

(2b + 1)x - 9y =15

30. Find the zeros of $f(v) = v^2 + 4\sqrt{3}v - 15$ and verify the relationship between the zeros and their coefficients. **3**
31. If the m^{th} term of an AP be $\frac{1}{n}$ and its nth term be $\frac{1}{m}$, then show that its (mn)th term is 1. **3**
32. Evaluate the following: $\frac{\sec^2(90^\circ-\theta)-\cot^2\theta}{2\left(\sin^2 25^\circ+\sin^2 65^\circ\right)} - \frac{2\cos^2 60^\circ \tan^2 28^\circ \tan^2 62^\circ}{3\left(\sec^2 43^\circ-\cot^2 47^\circ\right)}$. **3**

OR

If $\sin\theta + \cos\theta = \sqrt{2}$, then evaluate $\tan\theta + \cot\theta$.

33. A chord of a circle of radius 14 cm subtends an angle of 120° at the centre. Find the area of the corresponding minor segment of the circle. [Use $\pi = \frac{22}{7}$ and $\sqrt{3}$ = 1.73]. **3**
34. The king, queen and jack of club are removed from a deck of 52 cards. Then the cards are well-shuffled. One card is drawn at random from the remaining cards. Find the probability of getting **3**

i. a heart

ii. a king

iii. a club

iv. a '10 'of hearts.

Section D

35. 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. **4**

OR

Construct a triangle ABC in which BC = 6 cm, $\angle BAC = 60^o$ and median through A is 4.5 cm. Construct a $\triangle A'BC'$ similar to $\triangle ABC$ with BC' = 8 cm. Write steps of construction.

36. If in a triangle, the square on one side is equal to the sum of the squares on the remaining two sides, prove that the angle opposite to the first side is a right angle. **4**

Use the above and prove:

In a $\triangle$ABC, BD $\perp$AC such that BD^2 = DC. AD. Prove that $\triangle$ABC is a right angled triangle.

37. Draw the graphs of the pair of linear equations: **4**

x + 2y = 5 and 2x - 3y = - 4

Also find the points where the lines meet the x-axis.

OR

For Uttarakhand flood victims two sections A and B of class X contributed Rs 1,500. If the contribution of X-A was Rs 100 less than that of X-B, find graphically the amounts contributed by both the sections.

38. How many spherical bullets can be made out of a solid cube of lead whose edge measures 44 cm, each bullet being 4 cm in diameter. **4**

OR

A cone made of paper has height 3h and vertical angle 2α. It contains two other cones of height 2h and h and vertical angles 4α and 6α respectively. Find the ratio of the two volumes in between the cones.

39. From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower **4**

40. The median of the following data is 16. Find the missing frequencies a and b if the total of frequencies is 70. **4**

Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40
Frequency	12	a	12	15	b	6	6	4