

Bihar Board Class 10th Mathematics - 2023 Question Paper

Time Allowed :3 Hour 15 mins	Maximum Marks :50	Total Questions :100
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. Question Nos. 1 to 100 have four options, out of which only one is correct. Answer any 50 questions. You have to mark your selected option on the OMR-Sheet.

1. What is the distance of the point $(15, 8)$ from the origin?

- (1) 15
 - (2) 16
 - (3) 17
 - (4) 18
-

2. The graph of the straight line $y = 2x - 3$ passes through which of the following points?

- (1) $(2, 2)$
 - (2) $(3, 4)$
 - (3) $(4, 1)$
 - (4) $(5, 7)$
-

3. The point on the x -axis which is equidistant from the points $(-2, 0)$ and $(6, 0)$ is:

- (1) $(0, 2)$
 - (2) $(2, 0)$
 - (3) $(3, 0)$
 - (4) $(0, 3)$
-

4. The distance of the point $(13, 15)$ from the y -axis is:

- (1) 13
 - (2) 15
 - (3) 2
 - (4) 28
-

5. The coordinates of the ends of a diameter of a circle are $(-10, 6)$ and $(6, -10)$. Then the coordinates of its centre are:

- (1) $(-8, -8)$
 - (2) $(-8, 4)$
 - (3) $(-2, -2)$
 - (4) $(2, 4)$
-

6. The coordinates of the vertices of a triangle are $(2, 4)$, $(0, 6)$ and $(4, -1)$. Then the coordinates of the centroid of the triangle are:

- (1) $(2, 3)$
 - (2) $(3, 2)$
 - (3) $(3, 3)$
 - (4) $(2, 2)$
-

7. The length of the perpendicular from the point $(13, 19)$ to the x -axis is:

- (1) 13
 - (2) 19
 - (3) 32
 - (4) 6
-

8. The mid-point of the line segment joining the points $(-2, 8)$ and $(-6, -4)$ lies in which quadrant?

- (1) First
 - (2) Second
 - (3) Third
 - (4) Fourth
-

9. If $P(0, 0)$, $Q(8, 0)$ and $R(0, 12)$ are the vertices of $\triangle PQR$, then the area of $\triangle PQR$ is:

- (1) 40
 - (2) 48
 - (3) 20
 - (4) 4
-

10. The coordinates of the vertices of a triangle are $(0, 6)$, $(0, 0)$ and $(8, 0)$. Then the

perimeter of the triangle is:

- (1) 14
 - (2) 24
 - (3) 42
 - (4) none of these
-

11. If the graphs of two linear equations are coincident lines, then how many solutions do they have?

- (1) One solution
 - (2) No solution
 - (3) Infinitely many solutions
 - (4) None of these
-

12. The graphs of the equations $2x - y - 3 = 0$ and $12x + 7y - 5 = 0$ are which type of straight lines?

- (1) Coincident straight lines
 - (2) Parallel straight lines
 - (3) Intersecting straight lines
 - (4) None of these
-

13. Which type of straight line will be the graph of $x - y = 0$?

- (1) Parallel to x -axis
 - (2) Parallel to y -axis
 - (3) Passing through origin
 - (4) None of these
-

14. Which of the following is a quadratic equation?

- (1) $(x + 2)(x - 2) = x^2 - 4x^3$
 - (2) $(x + 2)^2 = 3(x + 4)$
 - (3) $(2x^2 + 3) = (5 + x)(2x^2 - 3)$
 - (4) $2x + \frac{1}{2x} = 4x^2$
-

15. If one root of the quadratic equation $2x^2 + px - 3 = 0$ is -3 , then the value of p will be:

- (1) 3
 - (2) 5
 - (3) 4
 - (4) 6
-

16. For what values of k are the roots of the quadratic equation $9x^2 + 3kx + 4 = 0$ real and equal?

- (1) ± 4
 - (2) ± 7
 - (3) ± 9
 - (4) ± 6
-

17. If α, β are the roots of the equation $x^2 + 3px + 2p^2 = 0$ and $\alpha^2 + \beta^2 = 5$, then the value of p is:

- (1) ± 3
 - (2) ± 2
 - (3) ± 1
 - (4) ± 5
-

18. The roots of the quadratic equation $a^2p^2x^2 - q^2 = 0$ are:

- (1) $\frac{a^2p^2}{q^2}$
 - (2) $\frac{ap}{q}$
 - (3) $\frac{q^2}{ap}$
 - (4) $\pm \frac{q}{ap}$
-

19. The ratio of the sum of the roots and the product of the roots of the quadratic equation $x^2 - 15x + 50 = 0$ is:

- (1) 3 : 10
 - (2) 3 : 25
 - (3) 3 : 50
 - (4) 5 : 3
-

20. If -5 and -1 are the roots of a quadratic equation, then the equation will be:

- (1) $x^2 + 6x + 5 = 0$
 - (2) $x^2 - 6x + 5 = 0$
 - (3) $x^2 - 6x - 5 = 0$
 - (4) $x^2 + 6x - 5 = 0$
-

21. Evaluate $\frac{\cos 60^\circ + 1}{\cos 60^\circ - 1}$.

- (1) 2
 - (2) -2
 - (3) 3
 - (4) -3
-

22. If $\frac{A}{5} = 12^\circ$, then the value of $3 \csc^2 A$ will be:

- (1) $2\sqrt{3}$
 - (2) 3
 - (3) 4
 - (4) $4\sqrt{3}$
-

23. Evaluate $\sin 54^\circ - \cos 36^\circ$.

- (1) 0
 - (2) 1
 - (3) 2
 - (4) -1
-

24. Evaluate $\cos 1^\circ \cdot \cos 2^\circ \cdot \cos 3^\circ \cdots \cos 90^\circ$.

- (1) 0
 - (2) 1
 - (3) -1
 - (4) $\sqrt{2}$
-

25. The value of $\frac{\cos 37^\circ}{\sin 53^\circ} + \frac{\cot 34^\circ}{\tan 56^\circ}$ is:

- (1) 0

- (2) 1
 - (3) 2
 - (4) -1
-

26. Evaluate $2(\sin 45^\circ - \cos 45^\circ)$.

- (1) 0
 - (2) 1
 - (3) 2
 - (4) -2
-

27. The value of $\csc^2 \theta - \cot^2 \theta$ **is:**

- (1) 1
 - (2) 7
 - (3) 49
 - (4) 0
-

28. If $\sin 48^\circ = p$, **then the value of** $\tan 48^\circ$ **is:**

- (1) $\frac{p}{\sqrt{1-p^2}}$
 - (2) $\frac{\sqrt{1-p^2}}{p}$
 - (3) $\frac{p}{\sqrt{1+p^2}}$
 - (4) $\frac{\sqrt{1+p^2}}{p}$
-

29. If $\tan 27^\circ \cdot \tan 63^\circ = \sin A$, **then the value of** A **is:**

- (1) 27°
 - (2) 63°
 - (3) 90°
 - (4) 36°
-

30. Evaluate $\frac{\sin^2(90^\circ - \theta) + \sin^2 \theta}{\csc^2(90^\circ - \theta) - \tan^2 \theta}$.

- (1) 1

- (2) 0
 - (3) 2
 - (4) -1
-

31. If the radius of a wheel is $\frac{35}{44}$ metre, then the distance covered in 2 revolutions is:

- (1) 10 m
 - (2) 35 m
 - (3) 22 m
 - (4) 40 m
-

32. If O is the centre and r is the radius of a circle and $\angle AOB = \theta$ (in degrees), then the length of arc AB is equal to:

- (1) $\frac{\pi r^2 \theta}{180}$
 - (2) $\frac{\pi r \theta}{360}$
 - (3) $\frac{\pi r \theta}{180}$
 - (4) $\frac{\pi r^2 \theta}{360}$
-

33. How many solid spheres of radius 1 cm can be made from a solid sphere of radius 8 cm (assuming no loss of material)?

- (1) 256
 - (2) 512
 - (3) 1024
 - (4) 576
-

34. The base diameter of a cone is 10 cm and its height is 12 cm. Then the volume of the cone is:

- (1) $400\pi \text{ cm}^3$
 - (2) $300\pi \text{ cm}^3$
 - (3) $100\pi \text{ cm}^3$
 - (4) $200\pi \text{ cm}^3$
-

35. The external radius of a metallic pipe is 4 cm and its internal radius is 3 cm.

If its length is 10 cm, then the volume of metal is:

- (1) 120 cm^3
 - (2) 220 cm^3
 - (3) 440 cm^3
 - (4) 1540 cm^3
-

36. The areas of the bases of a cone and a cylinder are equal and their curved surface areas are also equal. If the height of the cylinder is 2 metre, then the slant height of the cone is:

- (1) 2 metre
 - (2) 3 metre
 - (3) 4 metre
 - (4) 5 metre
-

37. If the volume of a cube is 125 cm^3 then the ratio of the side of the cube and the space diagonal of the cube is:

- (1) $1 : \sqrt{3}$
 - (2) $5 : \sqrt{3}$
 - (3) $25 : \sqrt{3}$
 - (4) $15 : \sqrt{3}$
-

38. If the total surface area of a hemisphere is 462 cm^2 , then its diameter is:

- (1) 7 cm
 - (2) 14 cm
 - (3) 21 cm
 - (4) 22 cm
-

39. The radii of two cylinders are in the ratio $2 : 3$ and their heights are in the ratio $5 : 3$. Then the ratio of their volumes is:

- (1) $27 : 20$
 - (2) $20 : 27$
 - (3) $4 : 9$
 - (4) $9 : 4$
-

40. If the radius of a sphere becomes 3 times, then its volume will become:

- (1) 3 times
 - (2) 6 times
 - (3) 9 times
 - (4) 27 times
-

41. $\frac{\sqrt{81}}{2}$ is:

- (1) a rational number
 - (2) an irrational number
 - (3) an integer
 - (4) none of these
-

42. What is the exponent of 2 in the prime factorization of 192?

- (1) 2
 - (2) 3
 - (3) 6
 - (4) 5
-

43. If in the division algorithm $a = bq + r$, $a = 72$, $q = 8$ and $r = 0$, then what is the value of b ?

- (1) 9
 - (2) 8
 - (3) 7
 - (4) 4
-

44. Which of the following has a terminating decimal expansion?

- (1) $\frac{2}{15}$
 - (2) $\frac{11}{160}$
 - (3) $\frac{17}{60}$
 - (4) $\frac{6}{35}$
-

45. If q is a positive integer, which of the following is *not* an odd positive integer?

- (1) $8q + 1$
 - (2) $8q + 4$
 - (3) $8q + 3$
 - (4) $8q + 7$
-

46. The HCF of two consecutive even numbers is:

- (1) 0
 - (2) 1
 - (3) 2
 - (4) 4
-

47. The sum of a rational number and an irrational number is which type of number?

- (1) An integer
 - (2) Irrational number
 - (3) Natural number
 - (4) None of these
-

48. The product of two numbers is 8670 and their HCF is 17. What is their LCM?

- (1) 102
 - (2) 85
 - (3) 107
 - (4) 510
-

49. Which of the following is a rational number?

- (1) $\sqrt{64 + 36}$
 - (2) $\sqrt{25 + 25}$
 - (3) $\sqrt{49 + 49}$
 - (4) $\sqrt{36 + 36}$
-

50. If $130 = 15 \times 8 + 10$ and $15 = 5 \times 3 + 0$, then $\text{HCF}(130, 15)$ will be:

- (1) 8
- (2) 5

- (3) 130
 - (4) 15
-

51. Simplify $1 - \sin^4 \theta$:

- (1) $\cos^2 \theta (1 + \sin^2 \theta)$
 - (2) $\cos^2 \theta (1 - \sin^2 \theta)$
 - (3) $\cos^2 \theta (1 - \cos^2 \theta)$
 - (4) $\sin^2 \theta (1 + \sin^2 \theta)$
-

52. In $\triangle ABC$, points X on AB and Y on AC satisfy $XY \parallel BC$. If $AX : XB = 2 : 3$, then $AY : YC = ?$

- (1) 3 : 2
 - (2) 2 : 3
 - (3) 1 : 3
 - (4) 3 : 1
-

53. The ratio of the areas of two similar triangles is 121 : 64. The ratio of their corresponding medians is:

- (1) 11 : 8
 - (2) 8 : 11
 - (3) 121 : 64
 - (4) 12 : 91
-

54. Two similar triangles have perimeters 30 cm and 20 cm. If a side of the first triangle is 18 cm, the corresponding side of the second is:

- (1) 10 cm
 - (2) 8 cm
 - (3) 9 cm
 - (4) 12 cm
-

55. The area of an equilateral triangle is $36\sqrt{3} \text{ cm}^2$. Its side is:

- (1) 6 cm
- (2) $3\sqrt{3}$ cm
- (3) 12 cm

(4) $\sqrt{3}$ cm

56. The number of common tangents of two intersecting circles is:

- (1) 4
 - (2) 2
 - (3) 1
 - (4) 3
-

57. A circle has radius 7 cm. From external point P , tangent $PT = 24$ cm. If O is centre, find OP .

- (1) 30 cm
 - (2) 28 cm
 - (3) 25 cm
 - (4) 18 cm
-

58. From an external point P , the length of one tangent to a circle is 17 cm. The other tangent from P to the same circle has length:

- (1) 34 cm
 - (2) 51 cm
 - (3) 17 cm
 - (4) $17/2$ cm
-

59. A circle has radius 7 cm. If the area of a minor sector is 14 cm^2 , find the area of the major sector.

- (1) 140 cm^2
 - (2) 150 cm^2
 - (3) 125 cm^2
 - (4) 200 cm^2
-

60. The area of a circle is 154 cm^2 . Its diameter is:

- (1) 14 cm
- (2) 28 cm
- (3) 7 cm
- (4) 21 cm

61. The discriminant of the quadratic equation $x^2 + 4x + b = 0$ is

- (1) $16 - 4b$
 - (2) $4b - 16$
 - (3) $b^2 - 16$
 - (4) $16 - b^2$
-

62. Which of the following are in A.P.?

- (1) 0.4, 0.44, 0.444, ...
 - (2) 1, 11, 111, ...
 - (3) 2, 4, 8, 16, ...
 - (4) 0, -4, -8, -12, ...
-

63. The common difference of an A.P. $\sqrt{18}, \sqrt{50}, \sqrt{98}, \sqrt{162}, \dots$ is

- (1) 2
 - (2) $2\sqrt{2}$
 - (3) 3
 - (4) $2\sqrt{3}$
-

64. What is the 11th term of the A.P. 2, 5, 8, 11, ...?

- (1) 24
 - (2) 30
 - (3) 32
 - (4) 14
-

65. If the n th term of an A.P. is $8n - 2$, then the 7th term is

- (1) 54
 - (2) 50
 - (3) 30
 - (4) 40
-

66. If in an A.P. $a_{30} - a_{20} = 50$, then the common difference is

- (1) 4
 - (2) 15
 - (3) 5
 - (4) 10
-

67. If $(2x - 1)$, $(3x + 2)$ and $(6x - 1)$ are three consecutive terms of an A.P., then the value of x is

- (1) 3
 - (2) 2
 - (3) 4
 - (4) 1
-

68. The number of terms in the A.P. 2, 6, 10, 14, ..., 82 is

- (1) 15
 - (2) 21
 - (3) 20
 - (4) 22
-

69. Which term of the A.P. 72, 63, 54, ... is zero?

- (1) 8th
 - (2) 9th
 - (3) 10th
 - (4) 11th
-

70. Distance between the points $(a \cos \theta, 0)$ and $(0, a \sin \theta)$ is

- (1) a
 - (2) $2a$
 - (3) $3a$
 - (4) $4a$
-

71. If $p(x) = 3x^3 + x^2 + 2x + 5$ is divided by $q(x) = x^2 + 2x + 1$, then the degree of the quotient will be

- (1) 1
- (2) 2

- (3) 3
 - (4) 4
-

72. If polynomial $g(x) = 3x^2 - 7x + 2$, then the value of $g(-1)$ is

- (1) -8
 - (2) 12
 - (3) -12
 - (4) 0
-

73. The zeroes of the polynomial $x^2 - 16$ are

- (1) $+4, -4$
 - (2) $+4, +4$
 - (3) $-4, -4$
 - (4) none of these
-

74. If α and β are zeroes of the polynomial $p(x) = x^2 - 3x + 5$, then the value of $4(\alpha + \beta)$ is

- (1) 12
 - (2) -12
 - (3) 20
 - (4) -20
-

75. If the product of zeroes of a polynomial $x^2 - 9x + 2a$ is 8 , then the value of a will be

- (1) 4
 - (2) -4
 - (3) 9
 - (4) -9
-

76. If one zero of a polynomial $p(x)$ is -1 , then a factor of $p(x)$ will be

- (1) $x - 1$
- (2) $x + 1$
- (3) $\frac{1}{x + 1}$

(4) $\frac{1}{x-1}$

77. Which of the following quadratic polynomials has sum of zeroes -3 and product of zeroes 2 ?

- (1) $x^2 + 3x + 2$
 - (2) $x^2 + 2x - 3$
 - (3) $x^2 - 3x - 2$
 - (4) $x^2 - 3x + 2$
-

78. If α, β, γ are zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d = 0$, then the value of $\alpha\beta\gamma$ is

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

79. The degree of the polynomial $(y^2 - 3y + 1)(y^5 - 4y^3 + y^2 + 3y)$ is

- (1) 6
 - (2) 7
 - (3) 3
 - (4) 4
-

80. If $3x - 2y = 12$ and $4x - 5y = 16$, then

- (1) $x = 4, y = 0$
 - (2) $x = 0, y = 4$
 - (3) $x = 4, y = 2$
 - (4) $x = 1, y = 10$
-

81. The perimeter of a semicircle whose radius is $3r$ is

- (1) $3\pi r + 3r$
- (2) $3\pi r + 6r$
- (3) $3\pi r + 9r$

(4) $3\pi r$

82. Which of the following numbers is not the probability of any event?

- (1) 0.7
 - (2) 2.5
 - (3) 75%
 - (4) $\frac{4}{5}$
-

83. If E' is the complementary event of an event E , then which of the following is true?

- (1) $P(E) = P(E')$
 - (2) $P(E) + P(E') = 0$
 - (3) $P(E) + P(E') = 1$
 - (4) None of these
-

84. In throwing a die one time, what is the probability of not appearing 2?

- (1) 0
 - (2) 16
 - (3) $\frac{5}{6}$
 - (4) $\frac{1}{2}$
-

85. A card is drawn at random from a well-shuffled deck of 52 cards. What is the probability of getting a black king?

- (1) $\frac{1}{13}$
 - (2) $\frac{1}{26}$
 - (3) $\frac{2}{39}$
 - (4) None of these
-

86. If the median of 24, 27, 28, 31, 34, x , 37, 40, 42, 45, 50 is 35, then the value of x is

- (1) 35
- (2) 36
- (3) 34.5
- (4) 35.5

87. The cumulative frequency table is useful in the determination of the following?

- (1) Mean
- (2) Median
- (3) Mode
- (4) None of these

88. Which relationship is true for Mean, Median and Mode?

- (1) Mean - Mode = 3 (Mean - Median)
- (2) Mean - Mode = 3 (Mean + Median)
- (3) Mean - Mode = 3 (Mode - Median)
- (4) None of these

89. In the following distribution, what is the modal class?

Class	Frequency
0 – 10	15
10 – 20	20
20 – 30	45
30 – 40	15
40 – 50	25

- (1) 10-20
- (2) 20-30
- (3) 40-50
- (4) None of these

90. If the mean of $x + 2, 2x + 3, 4x + 5, 5x + 2$ is 18, then the value of x is

- (1) 5
- (2) 6
- (3) 3
- (4) 15

91. If point $R(a, b)$ lies on the line segment joining $P(0, 0)$ and $Q(0, 2)$, which of the following is true?

- (1) $a = 0$
 - (2) $a = 2$
 - (3) $b = 0$
 - (4) None of these
-

92. The point of intersection of the straight lines $x = 2$ and $y = -3$ is

- (1) $(2, -3)$
 - (2) $(-2, -3)$
 - (3) $(2, 3)$
 - (4) $(3, -2)$
-

93. If $\tan \theta = \frac{15}{8}$, then the value of $\sin \theta$ will be

- (1) $\frac{8}{17}$
 - (2) $\frac{8}{15}$
 - (3) $\frac{15}{17}$
 - (4) $\frac{17}{8}$
-

94. If $(\tan \theta + \cot \theta) = 6$, then the value of $\tan^2 \theta + \cot^2 \theta$ is

- (1) 25
 - (2) 27
 - (3) 24
 - (4) 34
-

95. If $\sec \theta + \tan \theta + 1 = 0$, then the value of $\sec \theta - \tan \theta$ is

- (1) 1
 - (2) -1
 - (3) 0
 - (4) 2
-

96. If $\sin \theta = \frac{\sqrt{3}}{2}$, then the value of $\csc \theta + \cot \theta$ is

- (1) $2 + \sqrt{3}$

- (2) $2\sqrt{3}$
 - (3) $\sqrt{2}$
 - (4) $\sqrt{3}$
-

98. If $\sin \theta = \cos \theta$, $0^\circ \leq \theta \leq 90^\circ$, then the value of θ is

- (1) 30°
 - (2) 45°
 - (3) 60°
 - (4) 90°
-

99.
$$\frac{\sin 30^\circ + \cos 45^\circ - \tan 60^\circ}{\cot 30^\circ - \sin 45^\circ - \cos 60^\circ} =$$

- (1) -1
 - (2) 0
 - (3) 1
 - (4) 2
-

100. $\tan 30^\circ \cdot \sin 30^\circ \cdot \cot 60^\circ \cdot \csc 30^\circ =$

- (1) $1/\sqrt{3}$
 - (2) $\sqrt{3}$
 - (3) $1/(2\sqrt{3})$
 - (4) $1/3$
-