

Class 10 Maths Practice Quiz

Comprehensive Questions & Detailed Answers

General Instructions:

- This practice quiz covers all major chapters of the Class 10 Mathematics syllabus including Algebra, Geometry, Trigonometry, Statistics, and Probability.
- Section A contains 15 Multiple Choice Questions (MCQs).
- Section B contains 5 Short Answer Questions.
- Try to solve all questions independently before checking the detailed Answer Key provided at the end of the document.

Section A: Multiple Choice Questions (MCQs)

Select the correct option for each of the following questions.

1. If the HCF of 24 and b is 12, and their LCM is 72, what is the value of b ?

(a) 12 (b) 24 (c) 36 (d) 48

2. The sum of the zeroes of the quadratic polynomial $2x^2 - 8x + 6$ is:

(a) -4 (b) 3 (c) 4 (d) -3

3. For what condition do the linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have a unique solution?

(a) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ (c) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
(b) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (d) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

4. The discriminant of the quadratic equation $3x^2 - 2x + \frac{1}{3} = 0$ is:

(a) 0 (b) 1 (c) -1 (d) 2

5. What is the 10th term of the Arithmetic Progression (A.P.): 2, 7, 12, 17, ...?

(a) 42 (b) 47 (c) 52 (d) 57

6. The distance of the point $P(3, 4)$ from the origin is:

- (a) 3 units (b) 4 units (c) 5 units (d) 7 units
7. The value of $\sin^2 30^\circ + \cos^2 30^\circ$ is:
- (a) 0 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{\sqrt{3}}{2}$
8. The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower, is 30° . The height of the tower is:
- (a) $10\sqrt{3}$ m (b) $15\sqrt{3}$ m (c) $20\sqrt{3}$ m (d) 30 m
9. The maximum number of tangents that can be drawn to a circle from an external point is:
- (a) 1 (b) 2 (c) 3 (d) Infinite
10. The area of a sector of a circle with radius 6 cm if angle of the sector is 60° is:
- (a) 6π cm² (b) 12π cm² (c) 36π cm² (d) 3π cm²
11. Which of the following formulas represents the volume of a cylinder with base radius r and height h ?
- (a) $\frac{1}{3}\pi r^2 h$ (b) $\pi r^2 h$ (c) $2\pi r h$ (d) $\frac{4}{3}\pi r^3$
12. The empirical relationship between the three measures of central tendency is:
- (a) $3 \text{ Median} = \text{Mode} + 2 \text{ Mean}$ (c) $\text{Mode} = 3 \text{ Mean} - 2 \text{ Median}$
(b) $2 \text{ Median} = \text{Mode} + 3 \text{ Mean}$ (d) $\text{Mean} = 3 \text{ Median} - \text{Mode}$
13. The probability of getting a prime number when a fair die is thrown once is:
- (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) $\frac{1}{6}$
14. The decimal expansion of the rational number $\frac{17}{8}$ will terminate after how many places of decimals?
- (a) 1 (b) 2 (c) 3 (d) 4
15. If $\triangle ABC \sim \triangle DEF$ such that $AB = 1.2$ cm and $DE = 1.4$ cm, the ratio of the areas of $\triangle ABC$ and $\triangle DEF$ is:
- (a) 16 : 25 (b) 36 : 49 (c) 6 : 7 (d) 49 : 36

Section B: Short Answer Questions

Solve the following questions with proper steps.

16. Find the roots of the quadratic equation $x^2 - 5x + 6 = 0$ using factorization.
17. Evaluate: $\frac{\tan 65^\circ}{\cot 25^\circ}$.
18. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is red?
19. Find the coordinates of the midpoint of the line segment joining the points $A(4, -1)$ and $B(-2, 5)$.
20. What is the probability of a sure event? Give a brief explanation.

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Section C: Detailed Answer Key & Solutions

Answers to Section A (MCQs)

1. (c) **36**. *Explanation:* We know that $\text{HCF} \times \text{LCM} = a \times b$. So, $12 \times 72 = 24 \times b \implies b = \frac{12 \times 72}{24} = 36$.
2. (c) **4**. *Explanation:* For a polynomial $ax^2 + bx + c$, the sum of zeroes is $-\frac{b}{a}$. Here, $-\frac{-(-8)}{2} = \frac{8}{2} = 4$.
3. (b) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$. *Explanation:* This is the standard condition for a pair of linear equations to intersect at a single point (unique solution).
4. (a) **0**. *Explanation:* Discriminant $D = b^2 - 4ac = (-2)^2 - 4(3)(\frac{1}{3}) = 4 - 4 = 0$.
5. (b) **47**. *Explanation:* $a = 2$, $d = 7 - 2 = 5$. The 10th term $a_{10} = a + 9d = 2 + 9(5) = 2 + 45 = 47$.
6. (c) **5 units**. *Explanation:* Distance $= \sqrt{(3-0)^2 + (4-0)^2} = \sqrt{9+16} = \sqrt{25} = 5$.
7. (b) **1**. *Explanation:* By the standard trigonometric identity, $\sin^2 \theta + \cos^2 \theta = 1$ for any angle θ .
8. (a) $10\sqrt{3}$ m. *Explanation:* $\tan 30^\circ = \frac{\text{Height}}{\text{Base}} \implies \frac{1}{\sqrt{3}} = \frac{h}{30} \implies h = \frac{30}{\sqrt{3}} = 10\sqrt{3}$ m.
9. (b) **2**. *Explanation:* From any external point, exactly two tangents can be drawn to a circle.
10. (a) $6\pi \text{ cm}^2$. *Explanation:* Area of sector $= \frac{\theta}{360^\circ} \times \pi r^2 = \frac{60^\circ}{360^\circ} \times \pi \times 6^2 = \frac{1}{6} \times 36\pi = 6\pi$.
11. (b) $\pi r^2 h$. *Explanation:* Standard formula for the volume of a right circular cylinder.
12. (a) **3 Median = Mode + 2 Mean**. *Explanation:* This is the standard empirical formula relating central tendencies.
13. (b) $\frac{1}{2}$. *Explanation:* Prime numbers on a die are 2, 3, 5 (three numbers). Probability $= \frac{3}{6} = \frac{1}{2}$.
14. (c) **3**. *Explanation:* $\frac{17}{8} = \frac{17}{2^3}$. Since the highest power of 2 in the denominator is 3, it terminates after 3 decimal places.
15. (b) **36 : 49**. *Explanation:* Ratio of areas of similar triangles is equal to the square of the ratio of their corresponding sides. $(\frac{1.2}{1.4})^2 = (\frac{6}{7})^2 = \frac{36}{49}$.

Solutions to Section B (Short Answers)

16. Roots of $x^2 - 5x + 6 = 0$:

By splitting the middle term:

$$\begin{aligned} x^2 - 3x - 2x + 6 &= 0 \\ x(x-3) - 2(x-3) &= 0 \\ (x-2)(x-3) &= 0 \end{aligned}$$

Therefore, the roots are $x = 2$ and $x = 3$.

17. Evaluate $\frac{\tan 65^\circ}{\cot 25^\circ}$:

We know that $\cot \theta = \tan(90^\circ - \theta)$.

Therefore, $\cot 25^\circ = \tan(90^\circ - 25^\circ) = \tan 65^\circ$.

Substituting this in the expression:

$$\frac{\tan 65^\circ}{\tan 65^\circ} = 1$$

18. Probability of drawing a red ball:

Number of red balls = 3

Number of black balls = 5

Total number of balls = $3 + 5 = 8$

Probability $P(\text{Red}) = \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}} = \frac{3}{8}$.

19. Midpoint of line segment joining $A(4, -1)$ and $B(-2, 5)$:

The midpoint formula is given by $M(x, y) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.

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

$$y = \frac{-1 + 5}{2} = \frac{4}{2} = 2$$

The coordinates of the midpoint are $(1, 2)$.

20. Probability of a sure event:

The probability of a sure (or certain) event is 1.

Explanation: A sure event is an event that is guaranteed to happen. Since probability is the ratio of favorable outcomes to total outcomes, and for a sure event, all possible outcomes are favorable, the ratio is exactly 1.

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