

Question 1: Which fraction gives a terminating decimal?

- a) $\frac{3}{8}$
- b) $\frac{3}{7}$
- c) $\frac{7}{11}$
- d) $\frac{2}{9}$

Question 2: In triangle ABC, AB = AC. Point D lies on BC such that BD = DC. If $\angle ABC = 50^\circ$, find $\angle ADC$.

- a) 100°
- b) 90°
- c) 60°
- d) 80°

Question 3: The height of a tower is 20 m. From a point $20\sqrt{3}$ m away, the angle of elevation is

- a) 30°
- b) 45°
- c) 60°
- d) 90°

Question 4: If $x + \frac{1}{x} = 2$. Find the value of $x^5 + \frac{1}{x^5}$

- a) 0
- b) 1
- c) 2
- d) 5

Question 5: Sum and product of zeros of $2x^2 - 7x + 5 = 0$. Find $S^2 - 4P$.

- a) $\frac{1}{3}$
- b) $\frac{4}{9}$
- c) $\frac{9}{4}$
- d) 15

Question 6: The following data shows marks obtained by 10 students:

12, 15, 18, 20, 12, 18, 15, 20, 15, 18, 15

What is the mode of this data set?

- a) 12
- b) 15
- c) 18
- d) 20

Question 7: Representing $\sqrt{2}$ on the number line: which is true?

- a) $\sqrt{2}$ equals 1.41 exactly
- b) $\sqrt{2}$ is rational because it lies between two rationals
- c) $\sqrt{2}$ is between 1 and 2 and is irrational
- d) $\sqrt{2}$ equals 2

Question 8: You need to construct the perpendicular bisector of segment AB. Which construction step is unnecessary?

- a) With center B and same radius draw an arc intersecting the first
- b) Draw the line through the intersection points of the arcs
- c) With center A and radius $> AB/2$ draw an arc
- d) Draw a line through A perpendicular to AB

Question 9: If $\sin A = \frac{3}{5}$, then $\tan A = ?$

- a) $\frac{3}{4}$
- b) $\frac{3}{5}$
- c) $\frac{4}{5}$
- d) $\frac{5}{3}$

Question 10: If α and β are the roots of $x^2 - 3x + 1 = 0$, then the value of $\alpha^3 + \beta^3$ is

- a) 12
- b) 10
- c) 16
- d) 18

Question 11: Roots of $x^2 - 8x + k = 0$ are equal. Find k .

- a) 8
- b) 16
- c) 12
- d) 4

Question 12: A survey of 100 households shows that 60 have a car, 25 have a bike, 15 have neither. If one household is chosen at random, what is the probability that it has neither car nor bike?

- a) 0.40
- b) 0.60
- c) 0.25
- d) 0.15

Question 13: If p and q are integers with $q \neq 0$ and p/q is in lowest terms, which q produce terminating decimal for p/q ?

- a) q is odd
- b) q is even and divisible by 3
- c) q is prime other than 2 or 5
- d) q has only prime factors 2 and/or 5

Question 14: In right triangle ABC ($\angle C = 90^\circ$), $\sin A = \frac{3}{5}$. Find $\tan B$.

- a) $\frac{3}{4}$
- b) $\frac{4}{3}$
- c) $\frac{3}{5}$
- d) $\frac{5}{3}$

Question 15: If $5 \sin^2 A + 3 \cos^2 A = 4$, find $\sin^2 A$.

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

Question 16: If $p(x) = 2x^3 + 3x^2 - 8x + k$ is exactly divisible by $(x - 2)$, then when $p(x)$ is divided by $(x + 1)$, the remainder is

- a) 0
- b) -3
- c) 5
- d) -6

Question 17: The quadratic equation $x^2 + 2x + 3 = 0$ has

- a) Two distinct real roots
- b) Two equal real roots
- c) No real roots
- d) One real root and one imaginary root

Question 18: In a class, the heights (in cm) of 6 students are: 150, 152, 148, 151, 149, 153. What is the range?

- a) 5 cm
- b) 3 cm
- c) 4 cm
- d) 2 cm

Question 19: Which of the following fractions is equivalent to 0.121212...?

- a) $\frac{12}{100}$
- b) $\frac{121}{1000}$
- c) $\frac{12}{99}$
- d) $\frac{1}{8}$

Question 20: If a tangent at point T to a circle meets chord AB at point P, then $\angle PTA$ equals which angle in the circle?

- a) Angle subtended by AB at the center
- b) Angle in the opposite arc subtended by AB
- c) Angle in the alternate segment
- d) Right angle

Question 21: If $\sin \theta = \frac{3}{5}$, then find $2\sin\theta.\cos\theta$.

- a) $\frac{24}{25}$
- b) $\frac{12}{25}$
- c) $\frac{3}{5}$
- d) $\frac{4}{5}$

Question 22: The sum of the first n terms of an arithmetic progression is given by $S_n = 3n^2 + 5n$. Find the common difference of the AP.

- a) 3
- b) 5
- c) 6
- d) 9

Question 23: Zeros of $3x^2 - 4x + 2$ are α, β . Find $\alpha^2 + \beta^2$.

- a) $\frac{4}{9}$
- b) $\frac{10}{7}$
- c) $\frac{10}{9}$
- d) $\frac{8}{9}$

Question 24: In $\triangle ABC$, if $\angle A = \angle B = 60^\circ$, which of the following statements is true?

- a) $\triangle ABC$ is an isosceles triangle
- b) $\triangle ABC$ is a scalene triangle
- c) $\triangle ABC$ is an equilateral triangle
- d) $\triangle ABC$ is a right-angled triangle

Question 25: Which is correct regarding multiplicative inverse of irrational numbers?

- a) Reciprocal is undefined
- b) Reciprocal of a nonzero irrational is irrational
- c) Reciprocal is always rational
- d) Reciprocal is always integer

Question 26: In triangle ABC , $AB : AC = 2 : 3$ and AD is an internal angle bisector of $\angle A$ meeting BC at D . If $BC = 30$ cm, find BD .

- a) 18 cm
- b) 15 cm
- c) 10 cm
- d) 12 cm

Question 27: In the unit circle (radius 1), the coordinate of point corresponding to angle 60° is $(\frac{1}{2}, \frac{\sqrt{3}}{2})$. Then $\tan 60^\circ =$

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

Question 28: If $x^2 + kx + 1 = 0$ and x_1, x_2 are its roots, then $x_1^4 + x_2^4$ equals

- a) $k^4 - 2k^2 + 2$
- b) $k^4 - 4k^2 + 2$
- c) $k^2 - 2$
- d) $k^4 - 3k^2 + 1$

Question 29: If one root of the quadratic equation is $x^2 - kx + 3 = 0$ is three times the other, then the value of k is

- a) -2
- b) 3
- c) 6
- d) +4

Question 30: A set of data is 5, 8, 12, 20, 25.
Compute median.

- a) 8
- b) 12
- c) 25
- d) 35

Question 31: Which is true: the square root of a rational non-square is

- a) Negative
- b) Irrational
- c) Rational
- d) Always integer

Question 32: In $\triangle ABC$, perpendiculars from vertex A meet sides BC and AC at points E and F respectively. If $AE = 6$, $AF = 8$, and the area of the triangle is 24, find BC.

- a) 10
- b) 12
- c) 8
- d) 6

Question 33: Which of the following is true for any acute angle θ ?

- a) $\sin \theta + \cos \theta = 1$
- b) $\sin^2 \theta + \cos^2 \theta = 1$
- c) $\sin^2 \theta - \cos^2 \theta = 1$
- d) $\sin^2 \theta + \cos^2 \theta = 0$

Question 34: The value of $\frac{x^4 - 1}{x^2 - 1}$ when $x = \frac{3}{2}$ is

- a) $\frac{3}{2}$
- b) $\frac{4}{3}$
- c) $\frac{13}{4}$
- d) $\frac{65}{12}$

Question 35: Factorize $2x^2 + 7x + 3 = 0$.

- a) $(x + 2)(2x + 1)$
- b) $(2x + 1)(x + 3)$
- c) $(x + 1)(2x + 3)$
- d) $(2x + 3)(x + 2)$

Question 36: The circumcenter of a triangle is

- a) The point of intersection of the angle bisectors
- b) The point of intersection of the perpendicular bisectors of the sides
- c) The point where the altitudes meet
- d) The point where the medians meet.

Question 37: Which equality is correct?

- a) (p/q) in lowest terms with q dividing 10^k gives terminating decimal
- b) If q divides 3^k only then decimal terminates
- c) If p is even decimal repeats
- d) If p is odd decimal terminates

Question 38: In triangle ABC, the incenter is the intersection of which lines?

- a) Perpendicular bisectors
- b) Medians
- c) Altitudes
- d) Angle bisectors

Question 39: If the height of a tree is 10 m and its shadow is 10 m long, then the angle of elevation of the sun is

- a) 30°
- b) 40°
- c) 45°
- d) 60°

Question 40: If $3x - 4y = 7$ and $4x + 3y = 1$, then the value of $x^2 + y^2$ is

- a) 1
- b) 2
- c) 3
- d) 4

Question 41: If the roots are $\frac{2}{3}$ and $\frac{-3}{2}$. Find quadratic equation.

- a) $6x^2 + 5x + 9 = 0$
- b) $6x^2 + 5x - 6 = 0$
- c) $6x^2 + 5x - 9 = 0$
- d) $9x^2 + 5x - 6 = 0$

Question 42: For the quadratic equation $2x^2 + 4x + 2 = 0$, what is the nature of its roots?

- a) Real and Equal
- b) Real and Unequal
- c) Imaginary
- d) Complex

Question 43: If $x = \sqrt{8} + \sqrt{18}$, then x can be simplified as

- a) $5\sqrt{2}$
- b) $4\sqrt{2}$
- c) $3\sqrt{2}$
- d) $6\sqrt{2}$

Question 44: A circle of radius r has an inscribed equilateral triangle. The side of the triangle equals

- a) $2r$
- b) $\frac{\sqrt{3}r}{2}$
- c) $\frac{r}{\sqrt{3}}$
- d) $r\sqrt{3}$

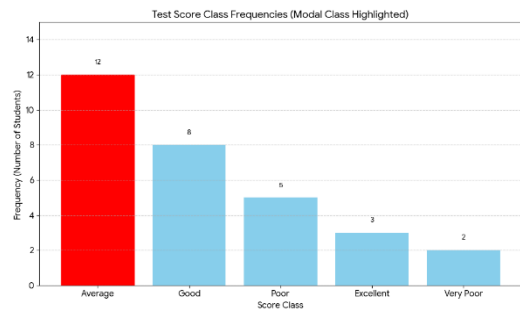
Question 45: If θ is an acute angle such that $\sin \theta = 0.6$, what is $\cot \theta$?

- a) $\frac{3}{4}$
- b) $\frac{5}{3}$
- c) $\frac{4}{3}$
- d) $\frac{4}{5}$

Question 46: If one root of $ax^2 + bx + c = 0$ is twice the other, then the condition between a, b, c is

- a) $2b^2 = 9ac$
- b) $b^2 = 8ac$
- c) $b^2 = 4ac$
- d) $b^2 = 2ac$

Question 47: Study the picture and find the modal class?



- a) Average
- b) Good
- c) Poor
- d) Excellent

Question 48: A frequency polygon is obtained by joining.

- a) Midpoints of upper boundaries of classes
- b) Midpoints of class intervals at class marks
- c) Heights of rectangles in histogram
- d) Lower boundaries of classes

Question 49: If $x = \frac{7}{8}$ and $y = \frac{11}{4}$, then xy equals

- a) $\frac{78}{32}$
- b) $\frac{77}{30}$
- c) $\frac{75}{32}$
- d) $\frac{77}{32}$

Question 50: The length of a tangent from an external point to a circle with radius 12 cm is 16 cm. Find the distance from the point to the center.

- a) 18 cm
- b) 19 cm
- c) 17 cm
- d) 20 cm

Question 51: Which of these numbers is irrational?

- a) 1.25
- b) $3\sqrt{2}$
- c) $\frac{8}{27}$
- d) $\frac{125}{100}$

Question 52: The quadratic equation whose roots are the squares of the roots of $2x^2 + 3x - 5 = 0$ is

- a) $2x^2 - 3x + 5 = 0$
- b) $4x^2 - 29x + 25 = 0$
- c) $5x^2 - 3x - 2 = 0$
- d) $5x^2 + 3x - 2 = 0$

Question 53: In a dice roll, what is the probability of getting a number less than or equal to 4?

- a) $\frac{2}{3}$
- b) $\frac{1}{2}$
- c) $\frac{5}{6}$
- d) $\frac{4}{5}$

Question 54: In a deck of 52 cards, what is the probability of drawing a red card, given that the card drawn is a face card?

- a) $\frac{1}{2}$
- b) $\frac{6}{52}$
- c) $\frac{6}{13}$
- d) $\frac{1}{4}$

Question 55: Which of the following is closest to $\sqrt{10}$?

- a) 3.10
- b) 3.12
- c) 3.16
- d) 3.18

Question 56: In $\triangle ABC$, $\angle B = 90^\circ$, and $BD \perp AC$. If $AD = 4$ cm and $DC = 9$ cm, find AB .

- a) 12 cm
- b) 6 cm
- c) $2\sqrt{13}$ cm
- d) 7 cm

Question 57: If $\tan A = \sqrt{3} \tan B$ and $A = 2B$, then $A + B = \underline{\hspace{1cm}}$

- a) 45°
- b) 60°
- c) 90°
- d) 120°

Question 58: If one zero of the polynomial $p(x) = 3x^2 - 10x + k$ is 2, find the other zero

- a) 2
- b) $\frac{4}{3}$
- c) $\frac{k}{6}$
- d) $3k$

**Question 59: Divide $2x^3 - 3x^2 + x - 5$ by $x - 1$.
What is the quotient?**

- a) $2x^2 - x$, Remainder = -1
- b) $2x^2 - x$, Remainder = -5
- c) $2x^2 + x$, Remainder = -1
- d) $2x^2 + x$, Remainder = -5

Question 60: A histogram has rectangles of unequal heights. The tallest rectangle represents.

- a) Mode
- b) Median
- c) Mean
- d) Range

ROUGH WORK

(NOT TO BE EVALUATED)

DATE

[illegible]