CBSE · CLASS 10 · MATHEMATICS (BASIC)

CBSE Class 10 Mathematics (Basic) Important Questions 2027

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Real Numbers

1. Prove sqrt(n) irrational

Asked 3× · Board 2025, Board 2026, Sample 2025 · 3 marks

Prove that √3 is an irrational number.

2. HCF/LCM of two numbers

Asked 3× · Board 2023, Board 2024, Sample 2026 · 1/2 marks

Find the smallest number which is divisible by both 306 and 657.

3. Show expression is composite

Asked 2× · Board 2024, Sample 2026 · 2 marks

Show that the number 2 × 5 × 7 × 11 + 11 × 13 is a composite number.

4. LCM of coprime numbers

Asked 2× · Board 2025, Board 2026 · 1 marks

If the HCF of two positive integers a and b is 1, then their LCM is : (A) a + b (B) a (C) b (D) ab

5. Identify rational/irrational

Asked 2× · Board 2025, Board 2026 · 1 marks

The number 3 + √2 is : (A) a rational number (B) an irrational number (C) an integer (D) a natural number

6. AR: HCF divides LCM

Asked 2× · Board 2025, Board 2026 · 1 marks

Assertion (A) : For any two natural numbers a and b, the HCF of a and b is a factor of the LCM of a and b. Reason (R) : HCF of any two natural numbers divides both the numbers. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.

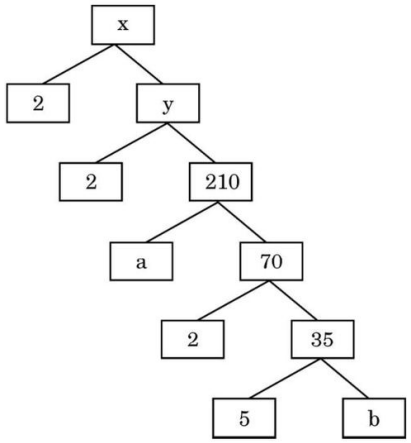
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7. Complete factor tree

Asked 2× · Board 2025, Board 2026 · 3 marks

The factor tree of a number x is shown below : x branches into 2 and y; y branches into 2 and 210; 210 branches into a and 70; 70 branches into 2 and 35; 35 branches into 5 and b. Find the values of x, y, a and b. Hence, write the product of the prime factors of the number x so obtained.

(b) The factor tree of a number x is shown below :



Find the values of x, y, a and b. Hence, write the product of the

8. Prove a+b*sqrt(n) irrational

Asked 2× · Board 2023, Board 2024 · 2/3 marks

Prove that 6 - 4√5 is an irrational number, given that √5 is an irrational number.

Polynomials

9. Form quadratic polynomial from zeroes or sum and product

Asked 3× · Board 2025, Board 2026, Sample 2025 · 1/3 marks

Find a quadratic polynomial whose sum and product of zeroes are 0 and – 9, respectively. Also, find the zeroes of the polynomial so obtained.

Pair of Linear Equations in Two Variables

10. Solve graphically

Asked 3× · Board 2025, Board 2026, Sample 2026 · 3 marks

Solve the following system of equations graphically : x + 3y = 6; 2x – 3y = 12

11. AR: consistency via ratios

Asked 3× · Board 2023, Board 2025, Board 2026 · 1 marks

Assertion (A) : The value of p for which the system of equations 4x + py + 8 = 0 and 2x + 2y + 2 = 0 is consistent is 4. Reason (R) : The system of equations $a_1x + b_1y = c_1$ and $a_2x + b_2y = c_2$ is consistent with infinitely many solutions, if $a_1/a_2 = b_1/b_2 = c_1/c_2$. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A). (C) Assertion (A) is true, but Reason (R) is false. (D) Assertion (A) is false, but Reason (R) is true.

12. Solve pair by elimination

Asked 3× · Board 2023, Board 2025, Board 2026 · 2 marks

Solve the following system of equations for x and y : x/2 + 2y/3 = – 1 and x – y/3 = 3

13. Complementary angles ratio

Asked 2× · Board 2025, Board 2026 · 3 marks

x and y are complementary angles such that x : y = 1 : 2. Express the given information as a system of linear equations in two variables and hence solve it.

14. Supplementary angles differ by 18

Asked 2× · Board 2023, Board 2024 · 1/3 marks

The greater of two supplementary angles exceeds the smaller by 18°. Find measures of these two angles.

Quadratic Equations

15. Determine nature of roots

Asked 3× · Board 2022, Sample 2025, Sample 2026 · 1/2 marks

Find the nature of roots of the quadratic equation $x^2 + 4x - 3\sqrt{2} = 0$.

16. Train speed-distance-time

Asked 2× · Sample 2025, Sample 2026 · 5 marks

A train covers a distance of 300 km at a uniform speed. If the speed of the train is increased by 5 km/hr, it takes 2 hours less in the journey. Find the original speed of the train.

17. Find k for equal roots

Asked 3× · Board 2024, Board 2025, Board 2026 · 1/5 marks

Find the value(s) of k for which the equation $2x^2 + kx + 3 = 0$ has real and equal roots. Hence, find the roots of the equations so obtained.

18. Find the discriminant

Asked 3× · Board 2023, Board 2025, Board 2026 · 1 marks

The discriminant of the quadratic equation $x^2 - 3x - 2 = 0$ is : (A) 1 (B) 17 (C) $\sqrt{17}$ (D) $-\sqrt{17}$

19. Reduce rational eqn, find a-b+c

Asked 2× · Board 2025, Board 2026 · 1 marks

The equation $x + 1/x = 3$ ($x \neq 0$) is expressed as a quadratic equation in the form of $ax^2 + bx + c = 0$. The value of a – b + c is : (A) 5 (B) 2 (C) 1 (D) – 1

20. Difference-of-squares numbers

Asked 2× · Board 2025, Board 2026 · 5 marks

The difference of the squares of two positive numbers is 180. The square of the smaller number is 8 times the greater number. Find the two numbers.

Arithmetic Progressions

21. Find n from a target sum (solve quadratic)

Asked 5× · Board 2022, Board 2023, Board 2024, Board 2025, Board 2026 · 2/5 marks

[Case: Saplings form a spiral of successive semicircles with centres alternately at A and B, starting at A, of radii 50 cm, 100 cm, 150 cm, ...; Spiral 1 has 10 flowers, Spiral 2 has 20, Spiral 3 has 30, and so on.] Till which spiral, will there be a total of 450 saplings ?

22. Find a specific nth term given a and d

Asked 5× · Board 2022, Board 2023, Board 2025, Board 2026 · 1/2 marks

[Case: Saplings form a spiral of successive semicircles with centres alternately at A and B, starting at A, of radii 50 cm, 100 cm, 150 cm, ...; Spiral 1 has 10 flowers, Spiral 2 has 20, Spiral 3 has 30, and so on.] What is the radius of the 13th spiral ?

23. Compute sum of first n terms of an AP

Asked 4× · Board 2022, Board 2023, Board 2025, Board 2026 · 2 marks

[Case: Saplings form a spiral of successive semicircles with centres alternately at A and B, starting at A, of radii 50 cm, 100 cm, 150 cm, ...; Spiral 1 has 10 flowers, Spiral 2 has 20, Spiral 3 has 30, and so on.] Find the total number of saplings till the 11th spiral.

24. Find n given the value of the nth term

Asked 2× · Board 2025, Board 2026 · 1 marks

[Case: Saplings form a spiral of successive semicircles with centres alternately at A and B, starting at A, of radii 50 cm, 100 cm, 150 cm, ...; Spiral 1 has 10 flowers, Spiral 2 has 20, Spiral 3 has 30, and so on.] If the radius of the nth spiral is 500 cm, find the value of n.

Triangles

25. Prove the Basic Proportionality Theorem

Asked 3× · Board 2024, Sample 2025, Sample 2026 · 5 marks

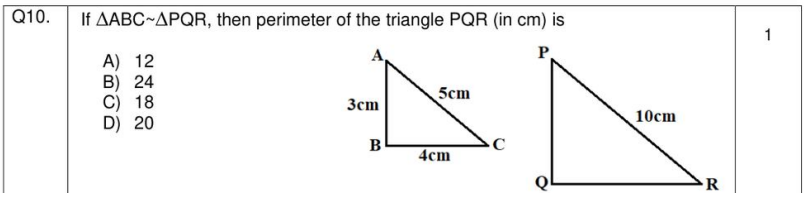
Prove that a line drawn parallel to one side of a triangle intersecting other two sides in distinct points, divides the other two sides in the same ratio.

26. Perimeter/ratio of similar triangles

Asked 2× · Board 2023, Sample 2026 · 1 marks

If ΔABC ~ ΔPQR (with AB = 3 cm, BC = 4 cm, AC = 5 cm and PR = 10 cm as shown), then perimeter of the triangle PQR (in cm) is

A) 12
B) 24
C) 18
D) 20



27. Which is NOT a similarity criterion

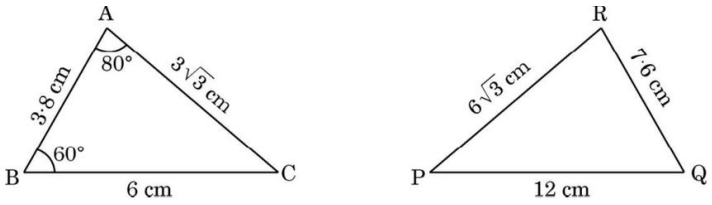
Asked 2× · Board 2025, Board 2026 · 1 marks

Which of the following is not the criterion for similarity of triangles ? (A) AAA (B) SSS (C) SAS (D) RHS

28. Angle P via SAS similarity from two figures

Asked 2× · Board 2025, Board 2026 · 1 marks

From the figures given below, which of the following is true about the measure of ∠ P ? [Triangle ABC with ∠B = 60°, ∠A = 80°, AB = 3.8 cm, AC = 3√3 cm, BC = 6 cm; Triangle PQR with PR = 6√3 cm, RQ = 7.6 cm, PQ = 12 cm] (A) ∠ P = 60° (B) ∠ P = 80° (C) ∠ P = 40° (D) The measure of ∠ P cannot be determined



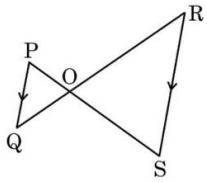
(A) ∠ P = 60°

(B) ∠ P = 80°

29. Prove triangles similar from PQ || RS

Asked 2× · Board 2025, Board 2026 · 2 marks

In the given figure, if PQ ∥ RS, then prove that Δ POQ ~ Δ SOR.



OR

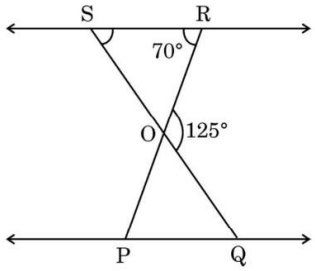
(b) In the given figure, Δ OSR ~ Δ OQP, ∠ ROQ = 125° and

30. Find unknown angles from a given similarity

Asked 2× · Board 2025, Board 2026 · 2 marks

In the given figure, Δ OSR ~ Δ OQP, ∠ ROQ = 125° and ∠ ORS = 70°. Find the measures of ∠ OSR and ∠ OQP.

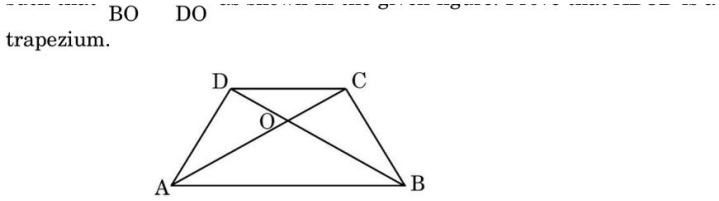
(b) In the given figure, Δ OSR ~ Δ OQP, ∠ ROQ = 125° and ∠ ORS = 70°. Find the measures of ∠ OSR and ∠ OQP.



31. State BPT and prove a trapezium

Asked 2× · Board 2025, Board 2026 · 5 marks

State “Basic Proportionality Theorem” and use it to prove the following : In a quadrilateral ABCD, diagonals AC and BD intersect each other at O such that AO/BO = CO/DO as shown in the given figure. Prove that ABCD is a trapezium.



Coordinate Geometry

32. Distance between two given points

Asked 5× · Board 2023, Board 2024, Sample 2025, Sample 2026 · 1 marks

The distance between the points (cos30°, sin30°) and (cos60°, −sin60°) is
A) 0 unit
B) √3 units
C) 1 unit
D) √2 units

33. Find the midpoint given endpoints

Asked 4× · Board 2024, Board 2025, Board 2026, Sample 2026 · 1 marks

[Case: A circular park has two gates at A(10, 20) and B(50, 50); two fountains at P and Q lie on AB such that AP = PQ = QB.] Find the coordinates of the centre C.

34. Point dividing a segment in a given ratio

Asked 3× · Board 2023, Board 2025, Board 2026 · 2 marks

[Case: A circular park has two gates at A(10, 20) and B(50, 50); two fountains at P and Q lie on AB such that AP = PQ = QB.] Find the coordinates of the point P.

35. Evaluate an expression in abscissa and ordinate

Asked 2× · Board 2025, Board 2026 · 1 marks

For a point (3, – 5), the value of (abscissa – ordinate) is : (A) – 8 (B) – 2 (C) 2 (D) 8

36. Ratio in which the midpoint divides a segment

Asked 2× · Board 2025, Board 2026 · 1 marks

The mid-point of a line segment divides the line segment in the ratio : (A) 1 : 2 (B) 2 : 1 (C) 1 : 1 (D) 1/2 : 2

37. Radius = half the distance between diameter endpoints

Asked 2× · Board 2025, Board 2026 · 1 marks

[Case: A circular park has two gates at A(10, 20) and B(50, 50); two fountains at P and Q lie on AB such that AP = PQ = QB.] Find the radius of the circular park.

38. Distance of a section point from an endpoint

Asked 2× · Board 2025, Board 2026 · 2 marks

[Case: A circular park has two gates at A(10, 20) and B(50, 50); two fountains at P and Q lie on AB such that AP = PQ = QB.] Find the distance of the fountain at Q from gate A.

Introduction to Trigonometry

39. Prove a trigonometric identity
Asked 7× · Board 2023, Board 2024, Board 2025, Board 2026, Sample 2025, Sample 2026 · 3 marks

Prove that : $(1 + \cot^2 A)/(1 + \tan^2 A) = ((1 - \cot A)/(1 - \tan A))^2$

40. Evaluate using Pythagorean identity constant
Asked 3× · Board 2025, Board 2026, Sample 2026 · 1 marks

The value of $(\tan^2 A - 1/\cos^2 A)$ is : (A) more than 1 (B) 1 (C) 0 (D) – 1

41. Find A and B from sum/difference equations
Asked 3× · Board 2025, Board 2026, Sample 2025 · 2 marks

Find the values of A and B ($0 \le A < 90°$, $0 \le B < 90°$), if $\tan (A + B) = 1$ and $\tan (A - B) = 1/\sqrt{3}$.

42. Evaluate expression using standard angle values
Asked 3× · Board 2023, Board 2024, Sample 2025 · 1/2 marks

$(1 - \tan^2 30°)/(1 + \tan^2 30°)$ is equal to (A) cos 60° (B) sin 60° (C) 1 (D) $\tan^2 60°$

43. Find one ratio given another
Asked 2× · Board 2024, Sample 2025 · 1 marks

If $3 \cot A = 4$, where $0° < A < 90°$, then sec A is equal to (A) 5/4 (B) 4/3 (C) 5/3 (D) 3/4

44. Identify false standard-value statement
Asked 2× · Board 2025, Board 2026 · 1 marks

Which of the following statements is false ? (A) $\tan 45° = \cot 45°$ (B) $\sin 90° = \tan 45°$ (C) $\sin 30° = \cos 30°$ (D) $\sin 45° = \cos 45°$

45. Prove tan 45 = 1 geometrically
Asked 2× · Board 2025, Board 2026 · 2 marks

Prove that $\tan 45° = 1$ geometrically.

Some Applications of Trigonometry

46. Ladder length via sine
Asked 4× · Board 2025, Board 2026 · 1/2 marks

[Case: An injured bird is on the roof of a 15 m high building; a fireman uses an adjustable ladder placed at 60° with the ground to reach the roof.] Find the length of the ladder used by the fireman to reach the roof.

47. Ground distance via tangent
Asked 4× · Board 2025, Board 2026 · 1/2 marks

[Case: An injured bird is on the roof of a 15 m high building; a fireman uses an adjustable ladder placed at 60° with the ground to reach the roof.] Find the distance of the point on the ground at which the ladder was fixed from the bottom of the building.

48. Two points, find tower height
Asked 4× · Board 2022, Board 2023, Board 2024, Sample 2025 · 2/5 marks

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. (Use $\sqrt{3} = 1.732$)

49. Elevation of top + depression of foot

Asked 2× · Sample 2025, Sample 2026 · 5 marks

The angle of elevation of the top of a chimney from the foot of a tower is 60° and the angle of depression of the foot of the chimney from the top of the tower is 30°. If the height of the tower is 40 meters, find the height of the chimney. Also, find the length of the wire tied from the top of the chimney to the top of tower.

50. Two depression angles to a building

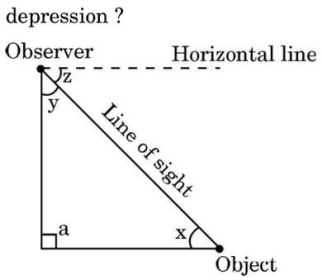
Asked 2× · Board 2024, Sample 2026 · 5 marks

The angles of depression of the top and bottom of a 50m high building from the top of a tower are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building. (Use √3 = 1.73)

51. Identify angle of depression

Asked 2× · Board 2025, Board 2026 · 1 marks

In the given figure, which of the following angles represents the angle of depression ? [Observer at top with horizontal line; line of sight to Object; marked angles x, y, z at observer/horizontal and a at object] (A) x (B) y (C) z (D) a

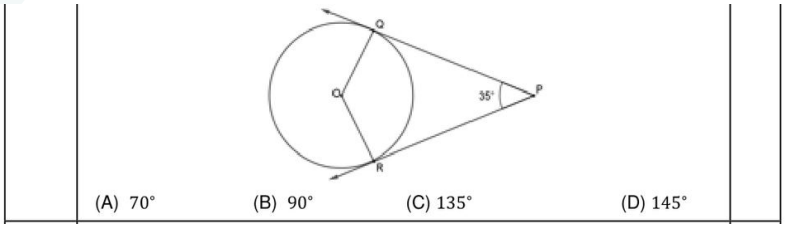


Circles

52. Central angle from angle between two tangents

Asked 3× · Board 2022, Board 2024, Sample 2025 · 1/2 marks

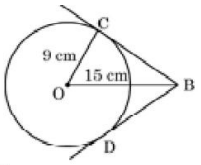
In the given figure, PQ and PR are tangents to a circle centred at O. If ∠QPR = 35° then ∠QOR is equal to (A) 70° (B) 90° (C) 135° (D) 145°



53. Tangent length/radius via Pythagoras

Asked 2× · Board 2023, Sample 2026 · 1 marks

In the given figure, BC and BD are tangents to the circle with centre O and radius 9 cm. If OB = 15 cm, then the length (BC + BD) is : (a) 18 cm (b) 12 cm (c) 24 cm (d) 36 cm



(a) 18 cm (b) 12 cm
(c) 24 cm (d) 36 cm

(Assertion – Reason based questions)

Directions for Q.19 & Q.20 : In question numbers **19** and **20**, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option :

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the

54. Prove tangents from an external point are equal (theorem)

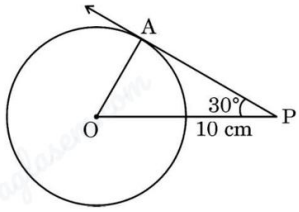
Asked 2× · Board 2023, Sample 2025 · 3 marks

Prove that the lengths of tangents drawn from an external point to a circle are equal.

55. Tangent length via right-triangle trig (given angle)

Asked 2× · Board 2025, Board 2026 · 1 marks

In the given figure, PA is a tangent to a circle with centre O. If OP = 10 cm, then the length of AP is : (A) 10√3 cm (B) 20 cm (C) 5 cm (D) 5√3 cm



(A) $10\sqrt{3}$ cm

(B) 20 cm

56. Chord of larger concentric circle tangent to smaller

Asked 2× · Board 2025, Board 2026 · 2 marks

Two concentric circles are of radii 6 cm and 10 cm. Find the length of the chord of the larger circle which touches the smaller circle.

57. Rectangle circumscribing a circle is a square

Asked 2× · Board 2025, Board 2026 · 3 marks

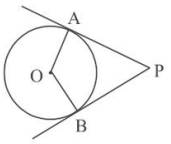
Prove that a rectangle circumscribing a circle is a square.

58. Assertion-Reason on tangent properties

Asked 2× · Board 2023, Board 2024 · 1 marks

Assertion (A): If the PA and PB are tangents drawn to a circle with centre O from an external point P, then the quadrilateral OAPB is a cyclic quadrilateral. Reason (R): In a cyclic quadrilateral, opposite angles are equal. Options: (a) Both A and R are true and R explains A completely. (b) Both A and R are true but R does not explain A. (c) A is true but R is false. (d) A is false but R is true.

(c) Assertion (A) is true but Reason (R) is false.
(d) Assertion (A) is false but Reason (R) is true.

19. 

Areas Related to Circles

59. Area of minor segment

Asked 3× · Board 2024, Board 2025, Board 2026 · 2/5 marks

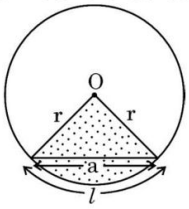
A chord of a circle of diameter 20 cm subtends an angle of 60° at the centre of the circle. Find the area of the corresponding minor segment of the circle. (Use π = 3.14 and √3 = 1.73)

60. Perimeter of shaded sector

Asked 2× · Board 2025, Board 2026 · 1 marks

The perimeter of the shaded region in the given figure is : [Circle with centre O; two radii r bounding a shaded sector, chord a subtending the sector, and arc l] (A) l (B) l + a (C) l + 2r (D) l + 2r + a

13. The perimeter of the shaded region in the given figure is :



61. Ratio of quadrant to circle

Asked 2× · Board 2025, Board 2026 · 1 marks

The ratio of the area of a quadrant of a circle to the area of the same circle is : (A) 1 : 2 (B) 2 : 1 (C) 1 : 4 (D) 4 : 1

Surface Areas and Volumes

62. Surface area of a combined solid

Asked 3× · Board 2022, Board 2024, Sample 2025 · 2/3/4 marks

[Case study: A jumbo pencil, when sharpened, is a combination of a cylinder and a cone. Length of the cylindrical portion is 21 cm, diameter of the base is 1 cm, and height of the conical portion is 1.2 cm.] Find the total surface area of the pencil (in terms of π).

63. Solid with CSA equal to TSA

Asked 2× · Board 2025, Board 2026 · 1 marks

For which of the following solids is the lateral/curved surface area and total surface area the same ? (A) Cube (B) Cuboid (C) Hemisphere (D) Sphere

64. Volume of a cone-on-hemisphere toy

Asked 2× · Board 2025, Board 2026 · 5 marks

A toy is in the form of a cone surmounted on a hemisphere. The cone and hemisphere have the same radii. The height of the conical part of the toy is equal to the diameter of its base. If the radius of the conical part is 5 cm, find the volume of the toy.

65. Cube surmounted by a hemisphere: edge + TSA

Asked 2× · Board 2025, Board 2026 · 5 marks

A cubical block is surmounted by a hemisphere of radius 3.5 cm. What is the smallest possible length of the edge of the cube so that the hemisphere can totally lie on the cube ? Find the total surface area of the solid so formed.

66. Volume of a standard solid

Asked 2× · Board 2023, Board 2024 · 1 marks

The radius of a sphere is 7/2 cm. The volume of the sphere is : (a) 231/3 cu cm (b) 539/12 cu cm (c) 539/3 cu cm (d) 154 cu cm

67. Capacity of a vessel (cylinder + sphere/hemisphere)

Asked 2× · Board 2022, Board 2024 · 3/4 marks

A juice glass is cylindrical in shape with hemi-spherical raised up portion at the bottom. The inner diameter of glass is 10 cm and its height is 14 cm. Find the capacity of the glass. (use π = 3.14)

Statistics

68. Identify the median class or its property

Asked 5× · Board 2024, Board 2025, Board 2026, Sample 2025, Sample 2026 · 1 marks

The class mark of the median class of the following data is : (Class Interval / Frequency) 10–25 : 2, 25–40 : 3, 40–55 : 7, 55–70 : 6, 70–85 : 6, 85–100 : 6. (A) 40 (B) 55 (C) 47.5 (D) 62.5

69. Find the mode of grouped data

Asked 4× · Board 2022, Board 2024, Sample 2025, Sample 2026 · 2/3 marks

The frequency distribution table of agriculture holdings in a village is given below — Area of land (in hectares): 1–3, 3–5, 5–7, 7–9, 9–11, 11–13 with No. of families: 20, 45, 80, 55, 40, 12 respectively. Find the modal agriculture holdings of the village.

70. Find the mean of grouped data

Asked 4× · Board 2022, Board 2025, Board 2026, Sample 2025 · 3/5 marks

The following data gives the information on the observed lifetime (in hours) of 200 electrical components : (Lifetime in hours / Number of electrical components) 0–20 : 10, 20–40 : 35, 40–60 : 50, 60–80 : 60, 80–100 : 30, 100–120 : 15. Find the mean lifetime (in hours) of the electrical components.

71. Lower limit of the modal class

Asked 2× · Board 2025, Board 2026 · 1 marks

The following distribution shows the number of runs scored by some batsmen in test matches : (Runs Scored / Number of Batsmen) 3000–4000 : 5, 4000–5000 : 10, 5000–6000 : 9, 6000–7000 : 8. The lower limit of the modal class is : (A) 3000 (B) 4000 (C) 5000 (D) 6000

72. Find the median of grouped data

Asked 2× · Board 2022, Board 2024 · 2/3 marks

[Case: Grouped frequency of leaf lengths (in mm): 70-80: 3, 80-90: 5, 90-100: 9, 100-110: 12, 110-120: 5, 120-130: 4, 130-140: 2.] Find median of the data.

Probability

73. Sure event on a die

Asked 2× · Board 2025, Board 2026 · 1 marks

In a random experiment of throwing a die, which of the following is a sure event ? (A) Getting a number between 1 and 6 (B) Getting an odd number < 7 (C) Getting an even number < 7 (D) Getting a natural number < 7

74. Defective pens from a lot

Asked 2× · Board 2025, Board 2026 · 3 marks

A lot consists of 200 pens of which 180 are good and the rest are defective. A customer will buy a pen if it is not defective. The shopkeeper draws a pen at random and gives it to the customer. What is the probability that the customer will not buy it ? Another lot of 100 pens containing 80 good pens is mixed with the previous lot of 200 pens. The shopkeeper now draws one pen at random from the entire lot and gives it to the customer. What is the probability that the customer will buy the pen ?

75. Draw a card from 52

Asked 2× · Board 2023, Board 2024 · 1 marks

A card is drawn from a well shuffled deck of 52 playing cards. The probability that drawn card is a red queen, is : (a) 1/13 (b) 2/13 (c) 1/52 (d) 1/26

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