

Jharkhand Polytechnic Mathematics

Sample Paper – 6

Duration: 50 Minutes

Maximum Marks: 50

Instructions

- This paper contains **50** Multiple Choice Questions (Single Correct Answer), modelled on the Mathematics section of the **Jharkhand Polytechnic (PECE)** entrance examination conducted by JCECEB.
- Each correct answer carries **+1 mark**. There is a **negative marking of 0.25 mark** for every wrong answer. Unattempted questions carry **no penalty**.
- Only **one** option is correct. Choose carefully.
- This is an offline OMR based test. Darken the correct bubble fully with a blue or black ball pen.
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Q1. The HCF (highest common factor) of 24 and 36 is:

- (A) 6
- (B) 12
- (C) 72
- (D) 4

Q2. The LCM (lowest common multiple) of 10 and 12 is:

- (A) 120
- (B) 30
- (C) 2
- (D) 60



Q3. The largest single-digit prime number is:

- (A) 7
- (B) 9
- (C) 5
- (D) 8

Q4. Which of the following numbers is rational?

- (A) $\sqrt{2}$
- (B) $\sqrt{5}$
- (C) $\sqrt{49}$
- (D) $\sqrt{3}$

Q5. The place value of the digit 4 in the number 4007 is:

- (A) 4
- (B) 4000
- (C) 400
- (D) 40

Q6. If $6x = 42$, then the value of x is:

- (A) 7
- (B) 6
- (C) 48
- (D) 36

Q7. The value of $(a + b)^2$ when $a = 2$ and $b = 4$ is:

- (A) 20
- (B) 12
- (C) 16



(D) 36

Q8. The factors of $x^2 - 49$ are:

(A) $(x - 7)(x - 7)$

(B) $(x - 7)(x + 7)$

(C) $(x + 49)(x - 1)$

(D) $(x - 49)(x + 1)$

Q9. If $8x = 64$, then x equals:

(A) 72

(B) 56

(C) 8

(D) 512

Q10. The roots of the quadratic equation $x^2 - 10x + 21 = 0$ are:

(A) 3, 7

(B) 1, 21

(C) -3, -7

(D) 2, 7

Q11. On simplifying, $10y - 6y$ equals:

(A) $16y$

(B) $60y$

(C) $4y^2$

(D) $4y$

Q12. If $a = 4$, the value of $4a - 5$ is:

(A) 16



- (B) -1
- (C) 11
- (D) 21

Q13. The ratio $27 : 36$ in its simplest form is:

- (A) $4 : 3$
- (B) $3 : 4$
- (C) $9 : 12$
- (D) $2 : 3$

Q14. The average of 8 , 16 and 24 is:

- (A) 16
- (B) 48
- (C) 24
- (D) 12

Q15. The mean proportional between 16 and 25 is:

- (A) 40
- (B) 41
- (C) 20
- (D) 21

Q16. If $5 : 7 = x : 21$, then the value of x is:

- (A) 21
- (B) 35
- (C) 17
- (D) 15

Q17. 35% of 200 is:



- (A) 35
- (B) 70
- (C) 65
- (D) 700

Q18. An article bought for Rs. 600 is sold for Rs. 540. The result of the sale is:

- (A) a loss of 10%
- (B) a profit of 10%
- (C) a loss of 6%
- (D) a loss of 60%

Q19. The fraction $\frac{11}{25}$ expressed as a percentage is:

- (A) 11%
- (B) 25%
- (C) 44%
- (D) 22%

Q20. A jacket marked at Rs. 1500 is sold at a discount of 20%. Its selling price is:

- (A) Rs. 300
- (B) Rs. 1800
- (C) Rs. 1250
- (D) Rs. 1200

Q21. If 40% of a number is 80, then the number is:

- (A) 320
- (B) 200
- (C) 120
- (D) 32



- Q22.** The simple interest on Rs. 1200 at 10% per annum for 3 years is:
- (A) Rs. 360
 - (B) Rs. 120
 - (C) Rs. 3600
 - (D) Rs. 240
- Q23.** The compound interest on Rs. 2000 at 5% per annum for 2 years (compounded annually) is:
- (A) Rs. 200
 - (B) Rs. 2205
 - (C) Rs. 210
 - (D) Rs. 205
- Q24.** At what rate per annum will Rs. 2000 earn a simple interest of Rs. 400 in 4 years?
- (A) 4%
 - (B) 10%
 - (C) 5%
 - (D) 8%
- Q25.** If A can complete a piece of work in 20 days, the part of the work A does in one day is:
- (A) $\frac{1}{20}$
 - (B) 20
 - (C) $\frac{1}{10}$
 - (D) $\frac{1}{40}$
- Q26.** A can do a work in 10 days and B can do the same work in 40 days. Working together, they finish it in:



- (A) 50 days
- (B) 8 days
- (C) 25 days
- (D) 4 days

Q27. A tap can fill a tank in 6 hours. The part of the tank it fills in one hour is:

- (A) 6
- (B) $\frac{1}{12}$
- (C) $\frac{1}{3}$
- (D) $\frac{1}{6}$

Q28. A bus travels 210 km in 3 hours. Its average speed is:

- (A) 630 km/h
- (B) 73 km/h
- (C) 70 km/h
- (D) 60 km/h

Q29. A train 300 m long crosses a pole in 12 seconds. Its speed is:

- (A) 30 m/s
- (B) 25 m/s
- (C) 312 m/s
- (D) 20 m/s

Q30. The distance covered by a vehicle moving at 55 km/h in 2 hours is:

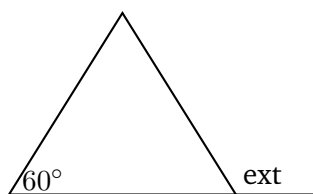
- (A) 110 km
- (B) 55 km
- (C) 27.5 km
- (D) 220 km



Q31. The speed of a boat in still water is 16 km/h and the speed of the stream is 5 km/h. The upstream speed of the boat is:

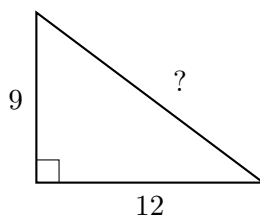
- (A) 21 km/h
- (B) 80 km/h
- (C) 16 km/h
- (D) 11 km/h

Q32. Each exterior angle of the equilateral triangle shown (one interior angle marked 60°) is:



- (A) 60°
- (B) 90°
- (C) 120°
- (D) 360°

Q33. In the right-angled triangle shown, the legs are 9 and 12. The length of the hypotenuse is:



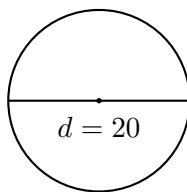
- (A) 15
- (B) 21
- (C) 225
- (D) 13



Q34. Two straight lines intersect. If one of the angles formed is 50° , the angle vertically opposite to it is:

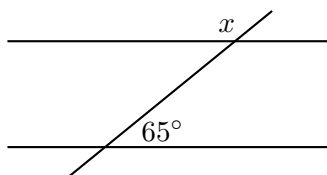
- (A) 130°
- (B) 50°
- (C) 40°
- (D) 90°

Q35. The diameter of the circle shown is 20 cm. Its radius is:



- (A) 40 cm
- (B) 5 cm
- (C) 20 cm
- (D) 10 cm

Q36. In the figure, two parallel lines are cut by a transversal. If one angle is 65° , its corresponding angle x is:



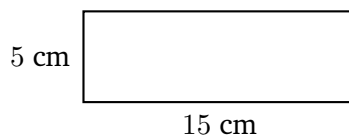
- (A) 65°
- (B) 115°
- (C) 25°
- (D) 35°

Q37. The number of sides of a regular polygon each of whose interior angles measures 90° is:



- (A) 3
- (B) 5
- (C) 4
- (D) 6

Q38. The perimeter of the rectangle shown, of length 15 cm and breadth 5 cm, is:

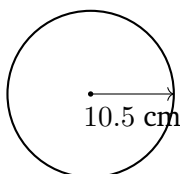


- (A) 75 cm
- (B) 40 cm
- (C) 20 cm
- (D) 35 cm

Q39. The area of a square of side 12 cm is:

- (A) 144 cm^2
- (B) 48 cm^2
- (C) 24 cm^2
- (D) 124 cm^2

Q40. The circumference of a circle of radius 10.5 cm $\left(\text{take } \pi = \frac{22}{7}\right)$ is:

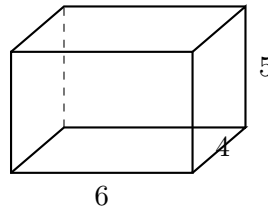


- (A) 33 cm
- (B) 346.5 cm
- (C) 21 cm



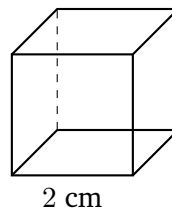
(D) 66 cm

Q41. The volume of the cuboid shown, of dimensions $6 \times 5 \times 4$ cm, is:



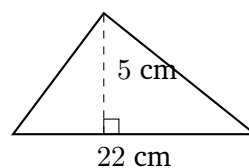
- (A) 15 cm^3
- (B) 60 cm^3
- (C) 120 cm^3
- (D) 240 cm^3

Q42. The volume of the cube shown, of side 2 cm, is:



- (A) 6 cm^3
- (B) 8 cm^3
- (C) 4 cm^3
- (D) 12 cm^3

Q43. The area of the triangle shown, with base 22 cm and height 5 cm, is:



- (A) 110 cm^2
- (B) 27 cm^2



(C) 60 cm^2

(D) 55 cm^2

Q44. The value of $\cot 45^\circ$ is:

(A) 1

(B) 0

(C) $\sqrt{3}$

(D) $\frac{1}{\sqrt{3}}$

Q45. The value of $\sec 0^\circ$ is:

(A) 0

(B) 2

(C) 1

(D) $\frac{1}{2}$

Q46. The value of $\sin^2 45^\circ + \cos^2 45^\circ$ is:

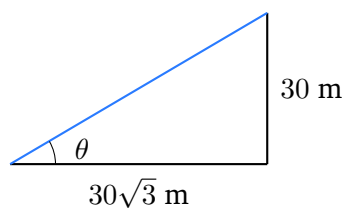
(A) 0

(B) 1

(C) $\frac{1}{2}$

(D) 2

Q47. A tower is 30 m high. From a point on the ground $30\sqrt{3}$ m from its base, the angle of elevation θ of the top of the tower is:

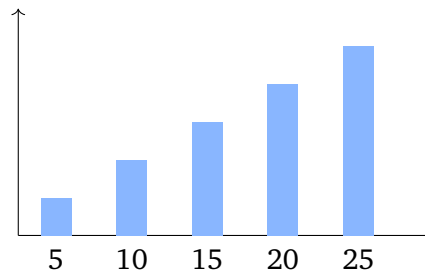


(A) 60°



- (B) 45°
- (C) 90°
- (D) 30°

Q48. The data values 5, 10, 15, 20, 25 are shown as bars below. The mean of this data is:



- (A) 15
- (B) 75
- (C) 25
- (D) 12.5

Q49. The mode of the data 4, 4, 4, 6, 9 is:

- (A) 6
- (B) 9
- (C) 4
- (D) 5

Q50. When a fair die is rolled once, the probability of getting a number less than 3 is:

- (A) $\frac{1}{2}$
- (B) $\frac{1}{3}$
- (C) $\frac{1}{6}$
- (D) $\frac{2}{3}$



Detailed Solutions**Q1.****Solution**

Concept — HCF: The HCF of two numbers is the largest number that divides both of them exactly.

Step 1 — Write the factors: Factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24; factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18, 36.

Step 2 — Pick the greatest common one: The common factors are 1, 2, 3, 4, 6, 12; the greatest is 12.

Why other options are wrong:

- 6 and 4 are common factors but not the highest.
- 72 is the LCM, not the HCF.

Final Answer: $\text{HCF} = 12 \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q1](#)

Q2.**Solution**

Concept — LCM: The LCM of two numbers is the smallest number that is a multiple of both.

Step 1 — List multiples: Multiples of 10: 10, 20, 30, 40, 50, 60, ...; multiples of 12: 12, 24, 36, 48, 60, ...

Step 2 — Find the smallest common one: The smallest common multiple is 60.

Why other options are wrong:

- 120 is a common multiple but not the smallest.
- 30 is not a multiple of 12 and 2 is the HCF.

Final Answer: $\text{LCM} = 60 \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q2](#)



Q3.

Solution

Concept — Prime numbers: A prime number has exactly two factors, 1 and itself.

Step 1 — List single-digit primes: The primes below 10 are 2, 3, 5, 7.

Step 2 — Pick the largest: The largest among them is 7.

Why other options are wrong:

- 9 and 8 are not prime (they have more than two factors).
- 5 is prime but smaller than 7.

Final Answer: The largest single-digit prime is 7 $\Rightarrow$

Answer: (A) [Go Back to Q3](#)

Q4.

Solution

Concept — Rational and irrational numbers: A rational number can be written as a fraction of integers; the square root of a perfect square is rational.

Step 1 — Test each root: $\sqrt{2}$, $\sqrt{5}$ and $\sqrt{3}$ are not perfect squares, so their decimals never end or repeat.

Step 2 — Identify the rational one: $\sqrt{49} = 7$, which is an integer, hence rational.

Why other options are wrong:

- $\sqrt{2}$, $\sqrt{5}$ and $\sqrt{3}$ are all irrational numbers.

Final Answer: $\sqrt{49} = 7$ is rational $\Rightarrow$

Answer: (C) [Go Back to Q4](#)



Q5.

Solution

Concept — Place value: The place value of a digit is the digit multiplied by the value of the place it occupies.

Step 1 — Locate the digit: In 4007, the digit 4 is in the thousands place.

Step 2 — Multiply: Place value = $4 \times 1000 = 4000$.

Why other options are wrong:

- 4 is the face value, not the place value.
- 400 and 40 use the wrong place.

Final Answer: Place value = 4000 $\Rightarrow$ B

Answer: (B) [Go Back to Q5](#)

Q6.

Solution

Concept — Simple equation: Divide both sides by the coefficient of x .

Step 1 — Divide by 6: $x = \frac{42}{6}$.

Step 2 — Compute: $x = 7$.

Why other options are wrong:

- 48 and 36 come from adding or subtracting instead of dividing.
- 6 is the coefficient, not the value of x .

Final Answer: $x = 7 \Rightarrow$ A

Answer: (A) [Go Back to Q6](#)



Q7.

Solution

Concept — Algebraic identity: $(a + b)^2 = a^2 + 2ab + b^2$, or simply square the sum.

Step 1 — Add first: $a + b = 2 + 4 = 6$.

Step 2 — Square the sum: $(6)^2 = 36$.

Why other options are wrong:

- $20 = a^2 + b^2$ forgets the $2ab$ term.
- 16 is $2ab$ only.
- 12 adds a and b wrongly.

Final Answer: $(a + b)^2 = 36 \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q7](#)

Q8.

Solution

Concept — Difference of squares: $a^2 - b^2 = (a - b)(a + b)$.

Step 1 — Write 49 as a square: $x^2 - 49 = x^2 - 7^2$.

Step 2 — Apply the identity: $x^2 - 7^2 = (x - 7)(x + 7)$.

Why other options are wrong:

- $(x - 7)(x - 7) = x^2 - 14x + 49$, which is wrong.
- The other pairs do not multiply back to $x^2 - 49$.

Final Answer: $x^2 - 49 = (x - 7)(x + 7) \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q8](#)



Q9.

Solution

Concept — Simple equation: Divide both sides by the coefficient of x .

Step 1 — Divide by 8: $x = \frac{64}{8}$.

Step 2 — Compute: $x = 8$.

Why other options are wrong:

- 72 and 56 come from adding or subtracting.
- 512 multiplies instead of dividing.

Final Answer: $x = 8 \Rightarrow$ C

Answer: (C) [Go Back to Q9](#)

Q10.

Solution

Concept — Quadratic roots: Factorise the quadratic so that the two factors multiply to +21 and add to -10.

Step 1 — Split the middle term: $x^2 - 10x + 21 = (x - 3)(x - 7)$.

Step 2 — Set each factor to zero: $x - 3 = 0$ or $x - 7 = 0$, giving $x = 3$ or $x = 7$.

Why other options are wrong:

- 1, 21 and 2, 7 do not satisfy the equation.
- -3, -7 would need the equation $x^2 + 10x + 21$.

Final Answer: Roots are 3 and 7 $\Rightarrow$ A

Answer: (A) [Go Back to Q10](#)



Q11.

Solution

Concept — Like terms: Terms with the same variable can be combined by subtracting their coefficients.

Step 1 — Subtract the coefficients: $10 - 6 = 4$.

Step 2 — Attach the variable: $10y - 6y = 4y$.

Why other options are wrong:

- $16y$ adds the coefficients.
- $60y$ multiplies them.
- $4y^2$ wrongly multiplies the variables too.

Final Answer: $10y - 6y = 4y \Rightarrow$ D

Answer: (D) [Go Back to Q11](#)

Q12.

Solution

Concept — Substitution: Replace the variable with its value and follow the order of operations.

Step 1 — Multiply: $4a = 4 \times 4 = 16$.

Step 2 — Subtract 5: $16 - 5 = 11$.

Why other options are wrong:

- 16 forgets to subtract 5.
- -1 subtracts in the wrong order.
- 21 adds 5 instead of subtracting.

Final Answer: $4a - 5 = 11 \Rightarrow$ C

Answer: (C) [Go Back to Q12](#)



Q13.

Solution**Concept — Simplifying ratios:** Divide both terms of the ratio by their HCF.**Step 1 — Find the HCF:** HCF of 27 and 36 is 9.**Step 2 — Divide both terms:** $\frac{27}{9} : \frac{36}{9} = 3 : 4$.**Why other options are wrong:**

- 4 : 3 reverses the ratio.
- 9 : 12 is not in simplest form.
- 2 : 3 is incorrect.

Final Answer: $27 : 36 = 3 : 4 \Rightarrow \boxed{\text{B}}$ **Answer: (B)** [Go Back to Q13](#)

Q14.

Solution**Concept — Average:** $\text{Average} = \frac{\text{sum of values}}{\text{number of values}}$.**Step 1 — Add the values:** $8 + 16 + 24 = 48$.**Step 2 — Divide by the count:** $\frac{48}{3} = 16$.**Why other options are wrong:**

- 48 is the sum, not the average.
- 24 is the largest value.
- 12 uses a wrong divisor.

Final Answer: $\text{Average} = 16 \Rightarrow \boxed{\text{A}}$ **Answer: (A)** [Go Back to Q14](#)

Q15.

Solution

Concept — Mean proportional: The mean proportional between a and b is $\sqrt{a \times b}$.

Step 1 — Multiply the numbers: $16 \times 25 = 400$.

Step 2 — Take the square root: $\sqrt{400} = 20$.

Why other options are wrong:

- 40 takes the root of 1600.
- 41 adds 16 and 25.
- 21 is not the square root of 400.

Final Answer: Mean proportional = 20 $\Rightarrow$

Answer: (C) [Go Back to Q15](#)

Q16.

Solution

Concept — Proportion: In $a : b = c : d$, the cross products are equal: $a \times d = b \times c$.

Step 1 — Write the equation: $5 : 7 = x : 21$ gives $\frac{5}{7} = \frac{x}{21}$.

Step 2 — Cross multiply: $7x = 5 \times 21 = 105$.

Step 3 — Solve: $x = \frac{105}{7} = 15$.

Why other options are wrong:

- 21, 35 and 17 do not satisfy the proportion.

Final Answer: $x = 15 \Rightarrow$

Answer: (D) [Go Back to Q16](#)



Q17.

Solution

Concept — Percentage: $x\%$ of a number $= \frac{x}{100} \times \text{number}$.

Step 1 — Write the fraction: $35\% = \frac{35}{100}$.

Step 2 — Multiply: $\frac{35}{100} \times 200 = 35 \times 2 = 70$.

Why other options are wrong:

- 35 is the percentage value, not the result.
- 65 and 700 use wrong operations.

Final Answer: 35% of $200 = 70 \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q17](#)

Q18.

Solution

Concept — Loss per cent: When SP is less than CP there is a loss; $\text{Loss}\% = \frac{\text{Loss}}{\text{Cost price}} \times 100$.

Step 1 — Find the loss: $\text{Loss} = 600 - 540 = 60$.

Step 2 — Apply the formula: $\text{Loss}\% = \frac{60}{600} \times 100 = 10\%$.

Why other options are wrong:

- It is a loss, not a profit, so a profit of 10% is wrong.
- 6% and 60% use wrong numbers.

Final Answer: A loss of $10\% \Rightarrow \boxed{\text{A}}$

Answer: (A) [Go Back to Q18](#)



Q19.

Solution

Concept — Fraction to percentage: Multiply the fraction by 100 and add the % sign.

Step 1 — Multiply by 100: $\frac{11}{25} \times 100 = 11 \times 4 = 44$.

Step 2 — Add the sign: $\frac{11}{25} = 44\%$.

Why other options are wrong:

- 11% and 25% just read off the numbers.
- 22% multiplies by 50 instead of 100.

Final Answer: $\frac{11}{25} = 44\% \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q19](#)

Q20.

Solution

Concept — Discount: Selling price = marked price – discount, where discount = discount% of marked price.

Step 1 — Find the discount: 20% of 1500 = $\frac{20}{100} \times 1500 = 300$.

Step 2 — Subtract: Selling price = 1500 – 300 = 1200.

Why other options are wrong:

- Rs. 300 is the discount itself.
- Rs. 1800 adds the discount.
- Rs. 1250 uses a wrong discount.

Final Answer: Selling price = Rs. 1200 $\Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q20](#)



Q21.

Solution

Concept — Reverse percentage: If 40% of a number is 80, then $\frac{40}{100}$ of the number equals 80.

Step 1 — Write the equation: $\frac{40}{100} \times x = 80$.

Step 2 — Solve for x : $x = \frac{80 \times 100}{40} = 200$.

Why other options are wrong:

- 320, 120 and 32 do not give 80 as their 40%.

Final Answer: The number is 200 $\Rightarrow$ **B**

Answer: (B) [Go Back to Q21](#)

Q22.

Solution

Concept — Simple interest: $SI = \frac{P \times R \times T}{100}$.

Step 1 — List the data: $P = 1200$, $R = 10$, $T = 3$.

Step 2 — Substitute: $SI = \frac{1200 \times 10 \times 3}{100}$.

Step 3 — Compute: $SI = \frac{36000}{100} = 360$.

Why other options are wrong:

- Rs. 120 uses $T = 1$.
- Rs. 3600 omits the 100.
- Rs. 240 uses $T = 2$.

Final Answer: $SI = \text{Rs. } 360 \Rightarrow$ **A**

Answer: (A) [Go Back to Q22](#)



Q23.

Solution

Concept — Compound interest: $\text{Amount} = P \left(1 + \frac{R}{100}\right)^T$, and $\text{CI} = \text{Amount} - P$.

Step 1 — Find the amount: $A = 2000 \left(1 + \frac{5}{100}\right)^2 = 2000 \times (1.05)^2$.

Step 2 — Compute the power: $(1.05)^2 = 1.1025$, so $A = 2000 \times 1.1025 = 2205$.

Step 3 — Subtract the principal: $\text{CI} = 2205 - 2000 = 205$.

Why other options are wrong:

- Rs. 200 is the simple interest.
- Rs. 2205 is the total amount, not the interest.
- Rs. 210 uses a wrong rate.

Final Answer: $\text{CI} = \text{Rs. } 205 \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q23](#)

Q24.

Solution

Concept — Finding the rate: From $\text{SI} = \frac{PRT}{100}$, we get $R = \frac{\text{SI} \times 100}{P \times T}$.

Step 1 — List the data: $\text{SI} = 400$, $P = 2000$, $T = 4$.

Step 2 — Substitute: $R = \frac{400 \times 100}{2000 \times 4}$.

Step 3 — Compute: $R = \frac{40000}{8000} = 5\%$.

Why other options are wrong:

- 4%, 10% and 8% do not give Rs. 400 interest.

Final Answer: $\text{Rate} = 5\% \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q24](#)



Q25.

Solution

Concept — One day's work: If a person finishes a job in n days, the part done in one day is $\frac{1}{n}$.

Step 1 — Apply with $n = 20$: One day's work = $\frac{1}{20}$.

Step 2 — Confirm: In 20 days, $20 \times \frac{1}{20} = 1$ whole work.

Why other options are wrong:

- 20 is the number of days, not a fraction of work.
- $\frac{1}{10}$ would mean finishing in 10 days and $\frac{1}{40}$ in 40 days.

Final Answer: One day's work = $\frac{1}{20} \Rightarrow \boxed{A}$

Answer: (A) [Go Back to Q25](#)

Q26.

Solution

Concept — Combined work: Add the one-day works and take the reciprocal for the total time.

Step 1 — One day's work each: A does $\frac{1}{10}$, B does $\frac{1}{40}$.

Step 2 — Add them: $\frac{1}{10} + \frac{1}{40} = \frac{4}{40} + \frac{1}{40} = \frac{5}{40} = \frac{1}{8}$.

Step 3 — Take the reciprocal: Time together = 8 days.

Why other options are wrong:

- 50 days adds the two times.
- 25 days and 4 days come from wrong addition.

Final Answer: They finish in 8 days $\Rightarrow \boxed{B}$

Answer: (B) [Go Back to Q26](#)



Q27.

Solution

Concept — Filling rate: A tap that fills a tank in n hours fills $\frac{1}{n}$ of it in one hour.

Step 1 — Apply with $n = 6$: One hour's filling = $\frac{1}{6}$.

Step 2 — Confirm: In 6 hours, $6 \times \frac{1}{6} = 1$ full tank.

Why other options are wrong:

- 6 is the number of hours, not the part.
- $\frac{1}{12}$ and $\frac{1}{3}$ are wrong fractions.

Final Answer: One hour's work = $\frac{1}{6} \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q27](#)

Q28.

Solution

Concept — Speed: $\text{Speed} = \frac{\text{distance}}{\text{time}}$.

Step 1 — List the data: distance = 210 km, time = 3 h.

Step 2 — Divide: $\text{Speed} = \frac{210}{3} = 70 \text{ km/h}$.

Why other options are wrong:

- 630 multiplies instead of dividing.
- 73 and 60 come from wrong division.

Final Answer: Speed = 70 km/h $\Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q28](#)



Q29.

Solution

Concept — Train crossing a pole: The train covers a distance equal to its own length, so $\text{speed} = \frac{\text{length}}{\text{time}}$.

Step 1 — List the data: length = 300 m, time = 12 s.

Step 2 — Divide: $\text{Speed} = \frac{300}{12} = 25 \text{ m/s}$.

Why other options are wrong:

- 30 and 20 come from wrong division.
- 312 adds the values.

Final Answer: Speed = 25 m/s $\Rightarrow$ **B**

Answer: (B) [Go Back to Q29](#)

Q30.

Solution

Concept — Distance: Distance = speed $\times$ time.

Step 1 — List the data: speed = 55 km/h, time = 2 h.

Step 2 — Multiply: Distance = $55 \times 2 = 110 \text{ km}$.

Why other options are wrong:

- 55 ignores the second hour.
- 27.5 divides instead of multiplying.
- 220 uses a wrong time.

Final Answer: Distance = 110 km $\Rightarrow$ **A**

Answer: (A) [Go Back to Q30](#)



Q31.

Solution

Concept — Upstream speed: Going upstream, the stream opposes the boat, so upstream speed = boat speed – stream speed.

Step 1 — Subtract the speeds: $16 - 5 = 11$ km/h.

Step 2 — State the result: Upstream speed = 11 km/h.

Why other options are wrong:

- 21 km/h is the downstream speed ($16 + 5$).
- 80 multiplies and 16 ignores the stream.

Final Answer: Upstream speed = 11 km/h $\Rightarrow$ **D**

Answer: (D) [Go Back to Q31](#)

Q32.

Solution

Concept — Exterior angle: An exterior angle of a triangle and its adjacent interior angle form a linear pair, so they add to 180° .

Step 1 — Note the interior angle: Each interior angle of an equilateral triangle is 60° .

Step 2 — Find the exterior angle: Exterior angle = $180^\circ - 60^\circ = 120^\circ$.

Why other options are wrong:

- 60° is the interior angle.
- 90° and 360° do not match the linear pair.

Final Answer: Exterior angle = $120^\circ \Rightarrow$ **C**

Answer: (C) [Go Back to Q32](#)



Q33.

Solution

Concept — Pythagoras theorem: In a right triangle, $(\text{hypotenuse})^2 = (\text{leg}_1)^2 + (\text{leg}_2)^2$.

Step 1 — Square the legs: $9^2 + 12^2 = 81 + 144 = 225$.

Step 2 — Take the square root: Hypotenuse = $\sqrt{225} = 15$.

Why other options are wrong:

- 21 just adds 9 and 12.
- 225 is the square of the hypotenuse, not the length.
- 13 is the answer for legs 5 and 12.

Final Answer: Hypotenuse = 15 $\Rightarrow$ **A**

Answer: (A) [Go Back to Q33](#)

Q34.

Solution

Concept — Vertically opposite angles: When two straight lines intersect, the angles opposite each other at the point of crossing are equal.

Step 1 — Note the given angle: One angle is 50° .

Step 2 — State the equal angle: The vertically opposite angle is also 50° .

Why other options are wrong:

- 130° is the adjacent (supplementary) angle.
- 40° is the complement and 90° is unrelated.

Final Answer: The vertically opposite angle = $50^\circ \Rightarrow$ **B**

Answer: (B) [Go Back to Q34](#)



Q35.

Solution

Concept — Radius and diameter: The radius of a circle is half its diameter, so
 $\text{radius} = \frac{\text{diameter}}{2}$.

Step 1 — Note the diameter: Diameter = 20 cm.

Step 2 — Halve it: Radius = $\frac{20}{2} = 10$ cm.

Why other options are wrong:

- 40 cm doubles the diameter.
- 5 cm quarters it and 20 cm is the diameter itself.

Final Answer: Radius = 10 cm $\Rightarrow$ D

Answer: (D) [Go Back to Q35](#)

Q36.

Solution

Concept — Corresponding angles: When a transversal cuts two parallel lines, each pair of corresponding angles is equal.

Step 1 — Identify the pair: The 65° angle and x are in the same position at the two intersections, so they are corresponding angles.

Step 2 — State the relation: Corresponding angles are equal, so $x = 65^\circ$.

Why other options are wrong:

- 115° is the supplement of 65° .
- 25° and 35° are unrelated.

Final Answer: $x = 65^\circ \Rightarrow$ A

Answer: (A) [Go Back to Q36](#)



Q37.

Solution

Concept — Interior angle of a regular polygon: A regular polygon with all interior angles equal to 90° is a square, which has 4 sides.

Step 1 — Recall the square: Each angle of a square is 90° .

Step 2 — Count the sides: A square has 4 equal sides.

Why other options are wrong:

- A regular polygon with 3 sides (equilateral triangle) has 60° angles.
- Polygons with 5 or 6 sides have larger interior angles.

Final Answer: Number of sides = 4 $\Rightarrow$ **C**

Answer: (C) [Go Back to Q37](#)

Q38.

Solution

Concept — Perimeter of a rectangle: Perimeter = $2(\text{length} + \text{breadth})$.

Step 1 — Add length and breadth: $15 + 5 = 20$.

Step 2 — Multiply by 2: Perimeter = $2 \times 20 = 40$ cm.

Why other options are wrong:

- 75 is the area (15×5).
- 20 is the half-perimeter.
- 35 uses wrong addition.

Final Answer: Perimeter = 40 cm $\Rightarrow$ **B**

Answer: (B) [Go Back to Q38](#)



Q39.

Solution**Concept — Area of a square:** $\text{Area} = \text{side} \times \text{side} = \text{side}^2$.**Step 1 — List the side:** $\text{side} = 12 \text{ cm}$.**Step 2 — Square it:** $\text{Area} = 12 \times 12 = 144 \text{ cm}^2$.**Why other options are wrong:**

- 48 is the perimeter (4×12).
- 24 is twice the side.
- 124 is a miscalculation.

Final Answer: $\text{Area} = 144 \text{ cm}^2 \Rightarrow \boxed{\text{A}}$ **Answer: (A)** [Go Back to Q39](#)

Q40.

Solution**Concept — Circumference of a circle:** $\text{Circumference} = 2\pi r$.**Step 1 — Substitute the values:** $2 \times \frac{22}{7} \times 10.5$.**Step 2 — Simplify:** $10.5 = \frac{21}{2}$, so $2 \times \frac{22}{7} \times \frac{21}{2} = \frac{22}{7} \times 21$.**Step 3 — Compute:** $\frac{22}{7} \times 21 = 22 \times 3 = 66 \text{ cm}$.**Why other options are wrong:**

- 33 uses πr instead of $2\pi r$.
- 346.5 is the area (πr^2).
- 21 is the diameter.

Final Answer: $\text{Circumference} = 66 \text{ cm} \Rightarrow \boxed{\text{D}}$ **Answer: (D)** [Go Back to Q40](#)

Q41.

Solution

Concept — Volume of a cuboid: $\text{Volume} = \text{length} \times \text{breadth} \times \text{height}$.

Step 1 — List the dimensions: 6 cm, 5 cm and 4 cm.

Step 2 — Multiply two of them: $6 \times 5 = 30$.

Step 3 — Multiply by the third: $30 \times 4 = 120 \text{ cm}^3$.

Why other options are wrong:

- 15 adds the dimensions.
- 60 uses only two of them.
- 240 doubles the volume.

Final Answer: $\text{Volume} = 120 \text{ cm}^3 \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q41](#)

Q42.

Solution

Concept — Volume of a cube: $\text{Volume} = \text{side}^3$.

Step 1 — List the side: side = 2 cm.

Step 2 — Cube it: $\text{Volume} = 2 \times 2 \times 2 = 8 \text{ cm}^3$.

Why other options are wrong:

- 6 adds the side three times.
- 4 is side^2 (a face area) and 12 is a miscalculation.

Final Answer: $\text{Volume} = 8 \text{ cm}^3 \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q42](#)



Q43.

Solution

Concept — Area of a triangle: $\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$.

Step 1 — List the data: base = 22 cm, height = 5 cm.

Step 2 — Substitute: $\text{Area} = \frac{1}{2} \times 22 \times 5$.

Step 3 — Compute: $\frac{1}{2} \times 110 = 55 \text{ cm}^2$.

Why other options are wrong:

- 110 forgets the factor $\frac{1}{2}$.
- 27 rounds wrongly and 60 uses wrong numbers.

Final Answer: $\text{Area} = 55 \text{ cm}^2 \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q43](#)

Q44.

Solution

Concept — Standard trigonometric values: $\cot \theta = \frac{\cos \theta}{\sin \theta}$, and $\cot 45^\circ$ is a standard ratio.

Step 1 — Use the values at 45° : $\sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}}$.

Step 2 — Form the ratio: $\cot 45^\circ = \frac{\cos 45^\circ}{\sin 45^\circ} = 1$.

Why other options are wrong:

- 0 is $\cot 90^\circ$.
- $\sqrt{3}$ is $\cot 30^\circ$ and $\frac{1}{\sqrt{3}}$ is $\cot 60^\circ$.

Final Answer: $\cot 45^\circ = 1 \Rightarrow \boxed{\text{A}}$

Answer: (A) [Go Back to Q44](#)



Q45.

Solution

Concept — Standard trigonometric values: $\sec \theta = \frac{1}{\cos \theta}$.

Step 1 — Use $\cos 0^\circ = 1$: $\sec 0^\circ = \frac{1}{\cos 0^\circ} = \frac{1}{1}$.

Step 2 — Simplify: $\sec 0^\circ = 1$.

Why other options are wrong:

- 2 is $\sec 60^\circ$.
- 0 and $\frac{1}{2}$ are not values of the secant.

Final Answer: $\sec 0^\circ = 1 \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q45](#)

Q46.

Solution

Concept — Pythagorean identity: For any angle θ , $\sin^2 \theta + \cos^2 \theta = 1$.

Step 1 — Substitute the values: $\sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}}$, so each square is $\frac{1}{2}$.

Step 2 — Add them: $\frac{1}{2} + \frac{1}{2} = 1$.

Why other options are wrong:

- $\frac{1}{2}$ is only one of the two squares.
- 0 and 2 do not match the identity.

Final Answer: $\sin^2 45^\circ + \cos^2 45^\circ = 1 \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q46](#)



Q47.

Solution

Concept — Height and distance: $\tan(\text{angle of elevation}) = \frac{\text{height}}{\text{base distance}}$.

Step 1 — Write the ratio: $\tan \theta = \frac{30}{30\sqrt{3}}$.

Step 2 — Simplify: $\tan \theta = \frac{1}{\sqrt{3}}$.

Step 3 — Identify the angle: Since $\tan 30^\circ = \frac{1}{\sqrt{3}}$, we get $\theta = 30^\circ$.

Why other options are wrong:

- 60° gives $\tan = \sqrt{3}$ and 45° gives $\tan = 1$.
- 90° would need a vertical line of sight.

Final Answer: Angle of elevation = $30^\circ \Rightarrow$ D

Answer: (D) [Go Back to Q47](#)

Q48.

Solution

Concept — Mean: $\text{Mean} = \frac{\text{sum of observations}}{\text{number of observations}}$.

Step 1 — Add the numbers: $5 + 10 + 15 + 20 + 25 = 75$.

Step 2 — Divide by the count: $\frac{75}{5} = 15$.

Why other options are wrong:

- 75 is the sum, not the mean.
- 25 is the largest value.
- 12.5 uses a wrong divisor.

Final Answer: Mean = 15 $\Rightarrow$ A

Answer: (A) [Go Back to Q48](#)



Q49.

Solution

Concept — Mode: The mode is the value that occurs most often in the data.

Step 1 — Count the occurrences: 4 appears three times; 6 and 9 appear once each.

Step 2 — Pick the most frequent: The value 4 occurs most often.

Why other options are wrong:

- 6 and 9 each appear only once.
- 5 does not appear in the data at all.

Final Answer: Mode = 4 $\Rightarrow$ **C**

Answer: (C) [Go Back to Q49](#)

Q50.

Solution

Concept — Probability: Probability = $\frac{\text{favourable outcomes}}{\text{total outcomes}}$.

Step 1 — List the outcomes: A die has 6 outcomes 1, 2, 3, 4, 5, 6; numbers less than 3 are 1 and 2, so 2 favourable outcomes.

Step 2 — Form the ratio: Probability = $\frac{2}{6} = \frac{1}{3}$.

Why other options are wrong:

- $\frac{1}{2}$ counts three numbers.
- $\frac{1}{6}$ counts only one number and $\frac{2}{3}$ counts four.

Final Answer: Probability = $\frac{1}{3} \Rightarrow$ **B**

Answer: (B) [Go Back to Q50](#)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	D	3	A	4	C	5	B
6	A	7	D	8	B	9	C	10	A
11	D	12	C	13	B	14	A	15	C
16	D	17	B	18	A	19	C	20	D
21	B	22	A	23	D	24	C	25	A
26	B	27	D	28	C	29	B	30	A
31	D	32	C	33	A	34	B	35	D
36	A	37	C	38	B	39	A	40	D
41	C	42	B	43	D	44	A	45	C
46	B	47	D	48	A	49	C	50	B

