

Jharkhand Polytechnic Mathematics

Sample Paper – 2

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 16 and 24 is:

- (A) 48
- (B) 8
- (C) 4
- (D) 2

Q2. The LCM (lowest common multiple) of 6 and 8 is:

- (A) 2
- (B) 48
- (C) 12
- (D) 24



Q3. The smallest composite number is:

- (A) 4
- (B) 1
- (C) 2
- (D) 3

Q4. Which one of the following is a rational number?

- (A) $\sqrt{2}$
- (B) $\sqrt{5}$
- (C) $\sqrt{16}$
- (D) $\sqrt{7}$

Q5. The successor of 999 is:

- (A) 1000
- (B) 998
- (C) 99
- (D) 9990

Q6. If $x - 7 = 3$, then the value of x is:

- (A) 4
- (B) 21
- (C) -4
- (D) 10

Q7. The value of $(a - b)^2$ when $a = 5$ and $b = 2$ is:

- (A) 49
- (B) 9
- (C) 21



(D) 3

Q8. The factors of $x^2 - 25$ are:

(A) $(x - 5)(x + 5)$

(B) $(x - 5)(x - 5)$

(C) $(x + 5)(x + 5)$

(D) $(x - 25)(x + 1)$

Q9. If $3x = 18$, then x equals:

(A) 54

(B) 15

(C) 6

(D) 21

Q10. The roots of the quadratic equation $x^2 - 7x + 12 = 0$ are:

(A) 2, 6

(B) 3, 4

(C) -3, -4

(D) 1, 12

Q11. On simplifying, $5y - 2y$ equals:

(A) $7y$

(B) $10y$

(C) y

(D) $3y$

Q12. If $a = 2$, the value of $3a^2 + 2$ is:

(A) 14



- (B) 8
- (C) 38
- (D) 20

Q13. The ratio 18 : 24 in its simplest form is:

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

Q14. The average of 4, 8 and 12 is:

- (A) 24
- (B) 12
- (C) 6
- (D) 8

Q15. The mean proportional between 4 and 9 is:

- (A) 36
- (B) 6
- (C) 6.5
- (D) 13

Q16. If $3 : 5 = 9 : x$, then the value of x is:

- (A) 15
- (B) 11
- (C) 27
- (D) 45

Q17. 40% of 150 is:



- (A) 40
- (B) 90
- (C) 60
- (D) 600

Q18. An article bought for Rs. 200 is sold for Rs. 250. The profit per cent is:

- (A) 50%
- (B) 20%
- (C) 12.5%
- (D) 25%

Q19. The fraction $\frac{3}{4}$ expressed as a percentage is:

- (A) 34%
- (B) 75%
- (C) 7.5%
- (D) 43%

Q20. An item marked at Rs. 800 is sold at a discount of 25%. Its selling price is:

- (A) Rs. 600
- (B) Rs. 200
- (C) Rs. 775
- (D) Rs. 1000

Q21. If 10% of a number is 7, then the number is:

- (A) 0.7
- (B) 7
- (C) 70
- (D) 700



- Q22.** The simple interest on Rs. 2000 at 5% per annum for 3 years is:
- (A) Rs. 100
 - (B) Rs. 300
 - (C) Rs. 600
 - (D) Rs. 30000
- Q23.** The compound interest on Rs. 2000 at 10% per annum for 2 years (compounded annually) is:
- (A) Rs. 400
 - (B) Rs. 200
 - (C) Rs. 2420
 - (D) Rs. 420
- Q24.** What sum of money will earn a simple interest of Rs. 150 at 5% per annum in 2 years?
- (A) Rs. 1500
 - (B) Rs. 750
 - (C) Rs. 3000
 - (D) Rs. 300
- Q25.** If A can complete a piece of work in 8 days, the part of the work A does in one day is:
- (A) 8
 - (B) $\frac{1}{4}$
 - (C) $\frac{1}{8}$
 - (D) 4
- Q26.** A can do a work in 10 days and B can do the same work in 15 days. Working together, they finish it in:



- (A) 25 days
- (B) 12.5 days
- (C) 5 days
- (D) 6 days

Q27. A tap can fill a tank in 4 hours. The part of the tank it fills in one hour is:

- (A) 4
- (B) $\frac{1}{4}$
- (C) $\frac{1}{2}$
- (D) $\frac{1}{8}$

Q28. A car travels 240 km in 4 hours. Its average speed is:

- (A) 60 km/h
- (B) 244 km/h
- (C) 40 km/h
- (D) 960 km/h

Q29. A train 150 m long crosses a pole in 10 seconds. Its speed is:

- (A) 1500 m/s
- (B) 160 m/s
- (C) 10 m/s
- (D) 15 m/s

Q30. The distance covered by a vehicle moving at 50 km/h in 2 hours is:

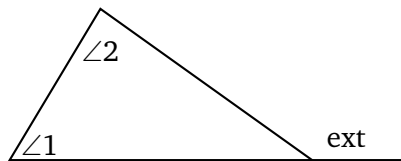
- (A) 25 km
- (B) 52 km
- (C) 100 km
- (D) 200 km



Q31. The speed of a boat in still water is 12 km/h and the speed of the stream is 3 km/h. The upstream speed of the boat is:

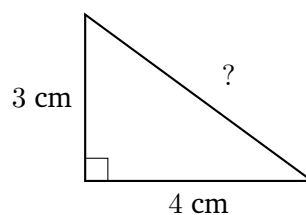
- (A) 15 km/h
- (B) 9 km/h
- (C) 36 km/h
- (D) 4 km/h

Q32. In the triangle shown, the marked exterior angle is equal to:



- (A) the sum of the two opposite interior angles
- (B) the difference of the two opposite interior angles
- (C) the adjacent interior angle
- (D) 90°

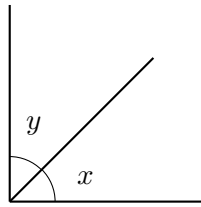
Q33. In the right-angled triangle shown, with legs 3 cm and 4 cm, the length of the hypotenuse is:



- (A) 7 cm
- (B) 12 cm
- (C) 25 cm
- (D) 5 cm

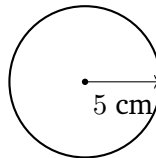
Q34. Two angles are said to be complementary if their sum is equal to the angle shown between the two perpendicular rays:





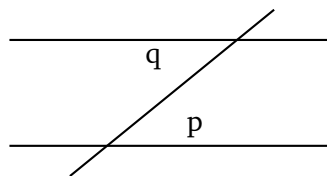
- (A) 180°
- (B) 360°
- (C) 90°
- (D) 270°

Q35. The diameter of the circle shown, whose radius is 5 cm, is:



- (A) 2.5 cm
- (B) 10 cm
- (C) 25 cm
- (D) 15 cm

Q36. In the figure, two parallel lines are cut by a transversal. A pair of alternate interior angles so formed are always:



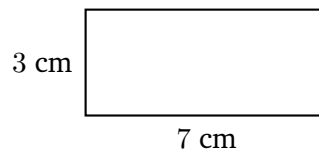
- (A) equal
- (B) supplementary
- (C) complementary
- (D) unequal



Q37. The sum of the four interior angles of a quadrilateral is:

- (A) 180°
- (B) 270°
- (C) 540°
- (D) 360°

Q38. The perimeter of the rectangle shown, of length 7 cm and breadth 3 cm, is:

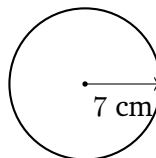


- (A) 21 cm
- (B) 10 cm
- (C) 20 cm
- (D) 40 cm

Q39. The area of a square of side 9 cm is:

- (A) 81 cm^2
- (B) 36 cm^2
- (C) 18 cm^2
- (D) 72 cm^2

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

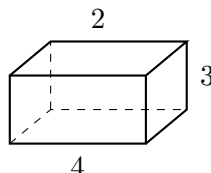


- (A) 154 cm



- (B) 44 cm
- (C) 22 cm
- (D) 88 cm

Q41. The volume of the cuboid shown, of length 4 cm, breadth 3 cm and height 2 cm, is:

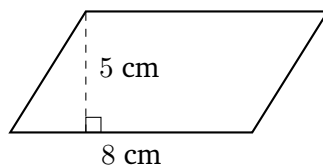


- (A) 9 cm^3
- (B) 26 cm^3
- (C) 48 cm^3
- (D) 24 cm^3

Q42. The volume of a sphere of radius r is given by:

- (A) $\pi r^2 h$
- (B) $4\pi r^2$
- (C) $\frac{4}{3}\pi r^3$
- (D) $\frac{1}{3}\pi r^2 h$

Q43. The area of the parallelogram shown, with base 8 cm and height 5 cm, is:



- (A) 13 cm^2
- (B) 40 cm^2



(C) 20 cm^2

(D) 26 cm^2

Q44. The value of $\cos 60^\circ$ is:

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

(B) $\frac{\sqrt{3}}{2}$

(C) 1

(D) 0

Q45. The value of $\sin 90^\circ$ is:

(A) 0

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

(C) 1

(D) $\frac{\sqrt{3}}{2}$

Q46. The value of $\sin^2 30^\circ + \cos^2 30^\circ$ is:

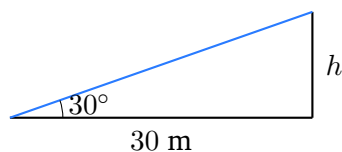
(A) 0

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

(C) 2

(D) 1

Q47. From a point 30 m from the base of a tower, the angle of elevation of its top is 30° , as shown. The height of the tower is:



(A) $30\sqrt{3} \text{ m}$

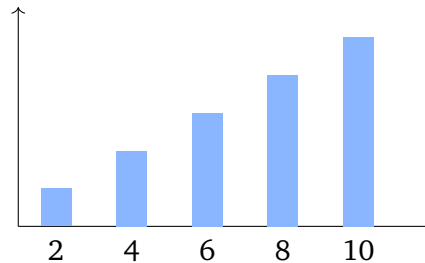
(B) $10\sqrt{3} \text{ m}$



(C) 15 m

(D) 10 m

Q48. The data values 2, 4, 6, 8, 10 are shown as bars below. The mean of this data is:



(A) 6

(B) 30

(C) 5

(D) 10

Q49. The mode of the data 2, 3, 3, 5, 7 is:

(A) 2

(B) 5

(C) 3

(D) 7

Q50. The probability of getting an even number when a fair die is rolled once is:

(A) $\frac{1}{3}$

(B) $\frac{1}{6}$

(C) $\frac{2}{3}$

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



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 16 are 1, 2, 4, 8, 16; factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24.

Step 2 — Pick the greatest common one: The common factors are 1, 2, 4, 8; the greatest is 8.

Why other options are wrong:

- 48 is the LCM, not the HCF.
- 4 and 2 are common factors but not the highest.

Final Answer: $\text{HCF} = 8 \Rightarrow \boxed{\text{B}}$

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 6: 6, 12, 18, 24, ...; multiples of 8: 8, 16, 24, ...

Step 2 — Find the smallest common one: The smallest common multiple is 24.

Why other options are wrong:

- 2 is the HCF, not the LCM.
- 48 is a common multiple but not the smallest.
- 12 is not a multiple of 8.

Final Answer: $\text{LCM} = 24 \Rightarrow \boxed{\text{D}}$

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



Q3.

Solution

Concept — Composite numbers: A composite number has more than two factors (it is divisible by a number other than 1 and itself).

Step 1 — Check the small numbers: 1 has one factor; 2 and 3 are prime (two factors each).

Step 2 — Identify the smallest composite: 4 has factors 1, 2, 4, so it is the smallest composite number.

Why other options are wrong:

- 1 is neither prime nor composite.
- 2 and 3 are prime numbers.

Final Answer: The smallest composite number is 4 $\Rightarrow$ **A**

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 option: $\sqrt{2}$, $\sqrt{5}$ and $\sqrt{7}$ are not perfect squares, so they are irrational.

Step 2 — Identify the rational one: $\sqrt{16} = 4$, which is a whole number, hence rational.

Why other options are wrong:

- $\sqrt{2}$, $\sqrt{5}$ and $\sqrt{7}$ have non-terminating, non-repeating decimals.

Final Answer: $\sqrt{16} = 4$ is rational $\Rightarrow$ **C**

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



Q5.

Solution

Concept — Successor: The successor of a number is the number that comes immediately after it, found by adding 1.

Step 1 — Add 1: $999 + 1 = 1000$.

Step 2 — State the successor: The successor of 999 is 1000.

Why other options are wrong:

- 998 is the predecessor (one less).
- 99 and 9990 are not obtained by adding 1.

Final Answer: Successor = 1000 $\Rightarrow$ A

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

Q6.

Solution

Concept — Linear equation: To solve for x , move the known number to the other side and change its sign.

Step 1 — Add 7 to both sides: $x = 3 + 7$.

Step 2 — Compute: $x = 10$.

Why other options are wrong:

- 4 subtracts instead of adding.
- 21 multiplies the numbers.
- -4 uses the wrong sign.

Final Answer: $x = 10 \Rightarrow$ D

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



Q7.

Solution

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

Step 1 — Subtract first: $a - b = 5 - 2 = 3$.

Step 2 — Square the difference: $(3)^2 = 9$.

Why other options are wrong:

- 49 is $(a + b)^2$.
- 21 comes from $a^2 - b^2$ wrongly.
- 3 is the difference, not its square.

Final Answer: $(a - b)^2 = 9 \Rightarrow \boxed{\text{B}}$

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

Q8.

Solution

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

Step 1 — Write 25 as a square: $x^2 - 25 = x^2 - 5^2$.

Step 2 — Apply the identity: $x^2 - 5^2 = (x - 5)(x + 5)$.

Why other options are wrong:

- $(x - 5)(x - 5) = x^2 - 10x + 25$, which is wrong.
- $(x + 5)(x + 5) = x^2 + 10x + 25$, also wrong.
- $(x - 25)(x + 1)$ does not multiply back to $x^2 - 25$.

Final Answer: $x^2 - 25 = (x - 5)(x + 5) \Rightarrow \boxed{\text{A}}$

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



Q9.

Solution**Concept — Simple equation:** Divide both sides by the coefficient of x .**Step 1 — Divide by 3:** $x = \frac{18}{3}$.**Step 2 — Compute:** $x = 6$.**Why other options are wrong:**

- 54 multiplies instead of dividing.
- 15 and 21 come from adding or subtracting.

Final Answer: $x = 6 \Rightarrow$ CAnswer: (C) [Go Back to Q9](#)

Q10.

Solution**Concept — Quadratic roots:** Factorise the quadratic so that the two factors multiply to +12 and add to -7.**Step 1 — Split the middle term:** $x^2 - 7x + 12 = (x - 3)(x - 4)$.**Step 2 — Set each factor to zero:** $x - 3 = 0$ or $x - 4 = 0$, giving $x = 3$ or $x = 4$.**Why other options are wrong:**

- 2, 6 and 1, 12 do not satisfy the equation.
- -3, -4 would need the equation $x^2 + 7x + 12$.

Final Answer: Roots are 3 and 4 $\Rightarrow$ BAnswer: (B) [Go Back to Q10](#)

Q11.

Solution

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

Step 1 — Subtract the coefficients: $5 - 2 = 3$.

Step 2 — Attach the variable: $5y - 2y = 3y$.

Why other options are wrong:

- $7y$ adds the coefficients.
- $10y$ multiplies them.
- y uses a wrong subtraction.

Final Answer: $5y - 2y = 3y \Rightarrow$ 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 — Square first: $a^2 = 2^2 = 4$.

Step 2 — Multiply by 3: $3 \times 4 = 12$.

Step 3 — Add 2: $12 + 2 = 14$.

Why other options are wrong:

- 8 uses $3a + 2$ without squaring.
- 38 uses $(3a)^2 + 2$.
- 20 comes from a wrong order of operations.

Final Answer: $3a^2 + 2 = 14 \Rightarrow$ A

Answer: (A) [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 18 and 24 is 6.**Step 2 — Divide both terms:** $\frac{18}{6} : \frac{24}{6} = 3 : 4$.**Why other options are wrong:**

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

Final Answer: $18 : 24 = 3 : 4 \Rightarrow$ CAnswer: (C) [Go Back to Q13](#)

Q14.

Solution**Concept — Average:** $\text{Average} = \frac{\text{sum of values}}{\text{number of values}}$.**Step 1 — Add the values:** $4 + 8 + 12 = 24$.**Step 2 — Divide by the count:** $\frac{24}{3} = 8$.**Why other options are wrong:**

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

Final Answer: $\text{Average} = 8 \Rightarrow$ DAnswer: (D) [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 two numbers: $4 \times 9 = 36$.

Step 2 — Take the square root: $\sqrt{36} = 6$.

Why other options are wrong:

- 36 is the product, not its square root.
- 6.5 and 13 do not satisfy $4 : x = x : 9$.

Final Answer: Mean proportional = 6 $\Rightarrow$ **B**

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

Q16.

Solution

Concept — Proportion: In $a : b = c : d$, the product of the means equals the product of the extremes, so $a \times d = b \times c$.

Step 1 — Set up the cross product: $3 \times x = 5 \times 9$.

Step 2 — Compute the right side: $3x = 45$.

Step 3 — Solve for x : $x = \frac{45}{3} = 15$.

Why other options are wrong:

- 11, 27 and 45 do not satisfy the proportion.

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

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



Q17.

Solution

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

Step 1 — Write the fraction: $40\% = \frac{40}{100} = \frac{2}{5}$.

Step 2 — Multiply: $\frac{2}{5} \times 150 = \frac{300}{5} = 60$.

Why other options are wrong:

- 40 is the percentage value, not the result.
- 90 and 600 use wrong fractions.

Final Answer: 40% of $150 = 60 \Rightarrow \boxed{\text{C}}$

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

Q18.

Solution

Concept — Profit per cent: $\text{Profit}\% = \frac{\text{Profit}}{\text{Cost price}} \times 100$.

Step 1 — Find the profit: $\text{Profit} = 250 - 200 = 50$.

Step 2 — Apply the formula: $\text{Profit}\% = \frac{50}{200} \times 100 = 25\%$.

Why other options are wrong:

- 50% divides by a wrong base.
- 20% and 12.5% use wrong numbers.

Final Answer: $\text{Profit} = 25\% \Rightarrow \boxed{\text{D}}$

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



Q19.

Solution

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

Step 1 — Multiply by 100: $\frac{3}{4} \times 100 = \frac{300}{4} = 75$.

Step 2 — Add the sign: $\frac{3}{4} = 75\%$.

Why other options are wrong:

- 34% just writes the digits.
- 7.5% and 43% use wrong arithmetic.

Final Answer: $\frac{3}{4} = 75\% \Rightarrow \boxed{\text{B}}$

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

Q20.

Solution

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

Step 1 — Find the discount: 25% of 800 = $\frac{25}{100} \times 800 = 200$.

Step 2 — Subtract: Selling price = 800 – 200 = 600.

Why other options are wrong:

- Rs. 200 is the discount itself.
- Rs. 775 uses a wrong discount.
- Rs. 1000 adds the discount.

Final Answer: Selling price = Rs. 600 $\Rightarrow \boxed{\text{A}}$

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



Q21.

Solution

Concept — Reverse percentage: If 10% of a number is 7, then the whole number is 7 divided by the fraction $\frac{10}{100}$.

Step 1 — Write the equation: $\frac{10}{100} \times x = 7$.

Step 2 — Solve for x : $x = \frac{7 \times 100}{10} = 70$.

Why other options are wrong:

- 0.7 and 7 are too small.
- 700 would make 10% equal to 70.

Final Answer: The number is 70 $\Rightarrow$ **C**

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

Q22.

Solution

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

Step 1 — List the data: $P = 2000, R = 5, T = 3$.

Step 2 — Substitute: $SI = \frac{2000 \times 5 \times 3}{100}$.

Step 3 — Compute: $SI = \frac{30000}{100} = 300$.

Why other options are wrong:

- Rs. 100 uses $T = 1$ and wrong rate.
- Rs. 600 doubles the result.
- Rs. 30000 omits the 100.

Final Answer: $SI = \text{Rs. } 300 \Rightarrow$ **B**

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



Q23.

Solution

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

Step 1 — Find the amount: $A = 2000 \left(1 + \frac{10}{100}\right)^2 = 2000 \times (1.1)^2$.

Step 2 — Compute the power: $(1.1)^2 = 1.21$, so $A = 2000 \times 1.21 = 2420$.

Step 3 — Subtract the principal: CI = $2420 - 2000 = 420$.

Why other options are wrong:

- Rs. 400 is the simple interest.
- Rs. 200 uses one year only.
- Rs. 2420 is the total amount, not the interest.

Final Answer: CI = Rs. 420 $\Rightarrow$ **D**

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

Q24.

Solution

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

Step 1 — List the data: SI = 150, $R = 5$, $T = 2$.

Step 2 — Substitute: $P = \frac{150 \times 100}{5 \times 2}$.

Step 3 — Compute: $P = \frac{15000}{10} = 1500$.

Why other options are wrong:

- Rs. 750, Rs. 3000 and Rs. 300 do not give Rs. 150 interest.

Final Answer: Principal = Rs. 1500 $\Rightarrow$ **A**

Answer: (A) [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 $n = 8$: One day's work = $\frac{1}{8}$.

Step 2 — Confirm: In 8 days, $8 \times \frac{1}{8} = 1$ whole work.

Why other options are wrong:

- 8 and 4 are not fractions of work.
- $\frac{1}{4}$ would mean finishing in 4 days.

Final Answer: One day's work = $\frac{1}{8} \Rightarrow \boxed{\text{C}}$

Answer: (C) [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 $\frac{1}{15}$.

Step 2 — Add them: $\frac{1}{10} + \frac{1}{15} = \frac{3}{30} + \frac{2}{30} = \frac{5}{30} = \frac{1}{6}$.

Step 3 — Take the reciprocal: Time together = 6 days.

Why other options are wrong:

- 25 adds the days directly.
- 12.5 averages the days.
- 5 days is too fast.

Final Answer: They finish in 6 days $\Rightarrow \boxed{\text{D}}$

Answer: (D) [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 $n = 4$: One hour's filling = $\frac{1}{4}$.

Step 2 — Confirm: In 4 hours, $4 \times \frac{1}{4} = 1$ full tank.

Why other options are wrong:

- 4 is the number of hours, not the part.
- $\frac{1}{2}$ and $\frac{1}{8}$ are wrong fractions.

Final Answer: One hour's work = $\frac{1}{4} \Rightarrow \boxed{\text{B}}$

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

Q28.

Solution

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

Step 1 — List the data: Distance = 240 km, time = 4 h.

Step 2 — Divide: $\text{Speed} = \frac{240}{4} = 60 \text{ km/h}$.

Why other options are wrong:

- 244 adds instead of dividing.
- 40 uses a wrong divisor.
- 960 multiplies the numbers.

Final Answer: Speed = 60 km/h $\Rightarrow \boxed{\text{A}}$

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



Q29.

Solution

Concept — Train crossing a pole: A pole has no length, so the train covers its own length in the given time; $\text{speed} = \frac{\text{length}}{\text{time}}$.

Step 1 — List the data: Length = 150 m, time = 10 s.

Step 2 — Divide: $\text{Speed} = \frac{150}{10} = 15 \text{ m/s}$.

Why other options are wrong:

- 1500 multiplies instead of dividing.
- 160 adds the numbers.
- 10 is the time, not the speed.

Final Answer: Speed = 15 m/s $\Rightarrow$ D

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

Q30.

Solution

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

Step 1 — List the data: Speed = 50 km/h, time = 2 h.

Step 2 — Multiply: Distance = $50 \times 2 = 100 \text{ km}$.

Why other options are wrong:

- 25 divides instead of multiplying.
- 52 adds the numbers.
- 200 uses a wrong time.

Final Answer: Distance = 100 km $\Rightarrow$ C

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



Q31.

Solution

Concept — Upstream speed: Upstream speed = speed of boat in still water – speed of stream.

Step 1 — List the data: Boat = 12 km/h, stream = 3 km/h.

Step 2 — Subtract: Upstream speed = $12 - 3 = 9$ km/h.

Why other options are wrong:

- 15 is the downstream speed.
- 36 multiplies the speeds.
- 4 divides them.

Final Answer: Upstream speed = 9 km/h $\Rightarrow$ **B**

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

Q32.

Solution

Concept — Exterior angle of a triangle: An exterior angle of a triangle equals the sum of the two interior angles opposite to it (not adjacent to it).

Step 1 — Identify the opposite angles: For the marked exterior angle at B , the two opposite interior angles are $\angle 1$ and $\angle 2$.

Step 2 — State the relation: Exterior angle = $\angle 1 + \angle 2$.

Why other options are wrong:

- It is not the difference of the two angles.
- It is supplementary to the adjacent interior angle, not equal to it.
- It need not be 90° .

Final Answer: It equals the sum of the two opposite interior angles $\Rightarrow$ **A**

Answer: (A) [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: $3^2 + 4^2 = 9 + 16 = 25$.

Step 2 — Take the square root: Hypotenuse $= \sqrt{25} = 5$ cm.

Why other options are wrong:

- 7 adds the legs.
- 12 multiplies the legs.
- 25 is the square, not its root.

Final Answer: Hypotenuse $= 5$ cm $\Rightarrow$ D

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

Q34.

Solution

Concept — Complementary angles: Two angles are complementary if their measures add up to 90° .

Step 1 — Read the figure: The two rays together make a right angle, so $x + y = 90^\circ$.

Step 2 — State the rule: Complementary angles sum to 90° .

Why other options are wrong:

- 180° is for supplementary angles.
- 360° is a complete angle.
- 270° is a reflex angle.

Final Answer: Complementary angles sum to $90^\circ \Rightarrow$ C

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



Q35.

Solution

Concept — Diameter: The diameter of a circle is twice its radius, i.e. $d = 2r$.

Step 1 — List the data: Radius $r = 5$ cm.

Step 2 — Multiply by 2: $d = 2 \times 5 = 10$ cm.

Why other options are wrong:

- 2.5 halves the radius.
- 25 squares the radius.
- 15 uses a wrong multiplier.

Final Answer: Diameter = 10 cm $\Rightarrow$ **B**

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

Q36.

Solution

Concept — Alternate interior angles: When two parallel lines are cut by a transversal, the alternate interior angles are equal.

Step 1 — Identify the pair: Angles p and q lie on opposite sides of the transversal, between the parallels.

Step 2 — State the rule: For parallel lines, such alternate interior angles are equal.

Why other options are wrong:

- Supplementary describes co-interior angles.
- Complementary and unequal do not apply here.

Final Answer: Alternate interior angles are equal $\Rightarrow$ **A**

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



Q37.

Solution

Concept — Angle sum of a quadrilateral: The interior angles of any quadrilateral add up to 360° (a quadrilateral can be split into two triangles, each 180°).

Step 1 — Split into triangles: A quadrilateral is made of 2 triangles.

Step 2 — Add the angle sums: $2 \times 180^\circ = 360^\circ$.

Why other options are wrong:

- 180° is for a triangle.
- 540° is for a pentagon.
- 270° is not a polygon angle sum.

Final Answer: Angle sum = $360^\circ \Rightarrow$ D

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

Q38.

Solution

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

Step 1 — Add length and breadth: $7 + 3 = 10$.

Step 2 — Multiply by 2: Perimeter = $2 \times 10 = 20$ cm.

Why other options are wrong:

- 21 multiplies length and breadth (that is area).
- 10 forgets to double the sum.
- 40 doubles the answer.

Final Answer: Perimeter = 20 cm $\Rightarrow$ C

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



Q39.

Solution**Concept — Area of a square:** $\text{Area} = \text{side} \times \text{side} = \text{side}^2$.**Step 1 — Square the side:** $9^2 = 9 \times 9$.**Step 2 — Compute:** $\text{Area} = 81 \text{ cm}^2$.**Why other options are wrong:**

- 36 is 4×9 (a perimeter idea).
- 18 doubles the side.
- 72 uses a wrong multiplier.

Final Answer: $\text{Area} = 81 \text{ cm}^2 \Rightarrow \boxed{\text{A}}$ **Answer: (A)** [Go Back to Q39](#)

Q40.

Solution**Concept — Circumference of a circle:** $\text{Circumference} = 2\pi r$.**Step 1 — Substitute the values:** $C = 2 \times \frac{22}{7} \times 7$.**Step 2 — Cancel the 7:** $C = 2 \times 22 = 44 \text{ cm}$.**Why other options are wrong:**

- 154 is the area πr^2 .
- 22 forgets the factor of 2.
- 88 doubles the answer.

Final Answer: $\text{Circumference} = 44 \text{ cm} \Rightarrow \boxed{\text{B}}$ **Answer: (B)** [Go Back to Q40](#)

Q41.

Solution

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

Step 1 — Multiply length and breadth: $4 \times 3 = 12$.

Step 2 — Multiply by the height: $12 \times 2 = 24 \text{ cm}^3$.

Why other options are wrong:

- 9 adds the dimensions.
- 26 comes from a wrong sum.
- 48 doubles the answer.

Final Answer: Volume = $24 \text{ cm}^3 \Rightarrow \boxed{\text{D}}$

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

Q42.

Solution

Concept — Volume of a sphere: The standard formula for the volume of a sphere of radius r is $\frac{4}{3}\pi r^3$.

Step 1 — Recall the formulas: $\pi r^2 h$ is a cylinder; $\frac{1}{3}\pi r^2 h$ is a cone; $4\pi r^2$ is the surface area of a sphere.

Step 2 — Pick the sphere volume: The volume of a sphere is $\frac{4}{3}\pi r^3$.

Why other options are wrong:

- $\pi r^2 h$ is the volume of a cylinder.
- $4\pi r^2$ is the surface area of a sphere.
- $\frac{1}{3}\pi r^2 h$ is the volume of a cone.

Final Answer: Volume of a sphere = $\frac{4}{3}\pi r^3 \Rightarrow \boxed{\text{C}}$

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



Q43.

Solution**Concept — Area of a parallelogram:** $\text{Area} = \text{base} \times \text{height}$.**Step 1 — List the values:** Base = 8 cm, height = 5 cm.**Step 2 — Multiply:** $\text{Area} = 8 \times 5 = 40 \text{ cm}^2$.**Why other options are wrong:**

- 13 adds the base and height.
- 20 takes half the product (that is a triangle).
- 26 comes from a wrong calculation.

Final Answer: $\text{Area} = 40 \text{ cm}^2 \Rightarrow \boxed{\text{B}}$ **Answer: (B)** [Go Back to Q43](#)

Q44.

Solution**Concept — Standard trigonometric values:** The value of $\cos 60^\circ$ is a standard ratio.**Step 1 — Recall the value:** $\cos 60^\circ = \frac{1}{2}$.**Step 2 — Confirm:** In a 30° – 60° – 90° triangle, the side adjacent to 60° is half the hypotenuse.**Why other options are wrong:**

- $\frac{\sqrt{3}}{2}$ is $\cos 30^\circ$.
- 1 is $\cos 0^\circ$.
- 0 is $\cos 90^\circ$.

Final Answer: $\cos 60^\circ = \frac{1}{2} \Rightarrow \boxed{\text{A}}$ **Answer: (A)** [Go Back to Q44](#)

Q45.

Solution

Concept — Standard trigonometric values: The value of $\sin 90^\circ$ is a standard ratio.

Step 1 — Recall the value: $\sin 90^\circ = 1$.

Step 2 — Confirm: As the angle grows from 0° to 90° , $\sin \theta$ increases from 0 to its maximum value 1.

Why other options are wrong:

- 0 is $\sin 0^\circ$.
- $\frac{1}{2}$ is $\sin 30^\circ$.
- $\frac{\sqrt{3}}{2}$ is $\sin 60^\circ$.

Final Answer: $\sin 90^\circ = 1 \Rightarrow \boxed{\text{C}}$

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: $\sin 30^\circ = \frac{1}{2}$, $\cos 30^\circ = \frac{\sqrt{3}}{2}$.

Step 2 — Square and add: $\left(\frac{1}{2}\right)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{1}{4} + \frac{3}{4} = 1$.

Why other options are wrong:

- 0, $\frac{1}{2}$ and 2 contradict the identity.

Final Answer: $\sin^2 30^\circ + \cos^2 30^\circ = 1 \Rightarrow \boxed{\text{D}}$

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



Q47.

Solution

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

Step 1 — Write the relation: $\tan 30^\circ = \frac{h}{30}.$

Step 2 — Use $\tan 30^\circ = \frac{1}{\sqrt{3}}; \frac{1}{\sqrt{3}} = \frac{h}{30}.$

Step 3 — Solve for h : $h = \frac{30}{\sqrt{3}} = \frac{30}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{30\sqrt{3}}{3} = 10\sqrt{3} \text{ m}.$

Why other options are wrong:

- $30\sqrt{3}$ multiplies instead of dividing.
- 15 and 10 ignore the $\sqrt{3}$ factor.

Final Answer: Height = $10\sqrt{3} \text{ m} \Rightarrow \boxed{\text{B}}$

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

Q48.

Solution

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

Step 1 — Add the numbers: $2 + 4 + 6 + 8 + 10 = 30.$

Step 2 — Divide by the count: $\frac{30}{5} = 6.$

Why other options are wrong:

- 30 is the sum, not the mean.
- 5 is the number of values.
- 10 is the largest value.

Final Answer: Mean = 6 $\Rightarrow \boxed{\text{A}}$

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: In 2, 3, 3, 5, 7, the value 3 appears twice; every other value appears once.

Step 2 — Identify the mode: The most frequent value is 3.

Why other options are wrong:

- 2, 5 and 7 each appear only once.

Final Answer: Mode = 3 $\Rightarrow$ C

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

Q50.

Solution

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

Step 1 — Count the outcomes: A die has 6 outcomes; the even numbers are 2, 4, 6, so there are 3 favourable outcomes.

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

Why other options are wrong:

- $\frac{1}{3}$ counts only two favourable outcomes.
- $\frac{1}{6}$ counts one outcome.
- $\frac{2}{3}$ uses a wrong count.

Final Answer: Probability of an even number = $\frac{1}{2} \Rightarrow$ D

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

