

Jharkhand Polytechnic Mathematics

Sample Paper – 1

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 12 and 18 is:

- (A) 36
- (B) 6
- (C) 3
- (D) 2

Q2. The LCM (lowest common multiple) of 4 and 6 is:

- (A) 12
- (B) 24
- (C) 6
- (D) 2



Q3. The smallest prime number is:

- (A) 0
- (B) 1
- (C) 3
- (D) 2

Q4. Which one of the following is an irrational number?

- (A) 0.25
- (B) $\frac{4}{5}$
- (C) $\sqrt{2}$
- (D) 7

Q5. The place value of the digit 7 in the number 3725 is:

- (A) 700
- (B) 7
- (C) 70
- (D) 7000

Q6. If $x + 5 = 12$, then the value of x is:

- (A) 17
- (B) 7
- (C) 60
- (D) 5

Q7. The value of $(a + b)^2$ when $a = 2$ and $b = 3$ is:

- (A) 13
- (B) 10
- (C) 36



(D) 25

Q8. The factors of $x^2 - 9$ are:

(A) $(x - 9)(x + 1)$

(B) $(x - 3)(x - 3)$

(C) $(x - 3)(x + 3)$

(D) $(x + 9)(x - 1)$

Q9. If $2x = 10$, then x equals:

(A) 5

(B) 20

(C) 8

(D) 12

Q10. The roots of the quadratic equation $x^2 - 5x + 6 = 0$ are:

(A) 1, 6

(B) 2, 3

(C) -2, -3

(D) 5, 6

Q11. On simplifying, $3x + 2x$ equals:

(A) $6x$

(B) x

(C) $5x$

(D) $6x^2$

Q12. If $a = 3$, the value of $2a^2 - 1$ is:

(A) 35



(B) 11

(C) 5

(D) 17

Q13. The ratio 15 : 25 in its simplest form is:

(A) 3 : 5

(B) 5 : 3

(C) 15 : 25

(D) 1 : 2

Q14. The average of 10, 20 and 30 is:

(A) 30

(B) 20

(C) 60

(D) 15

Q15. If $a : b = 2 : 3$ and $b : c = 3 : 4$, then $a : c$ is:

(A) 3 : 4

(B) 2 : 3

(C) 4 : 2

(D) 1 : 2

Q16. The fourth proportional to 2, 4 and 6 is:

(A) 8

(B) 3

(C) 12

(D) 6

Q17. 25% of 200 is:



- (A) 50
- (B) 25
- (C) 75
- (D) 100

Q18. An article bought for Rs. 100 is sold for Rs. 120. The profit per cent is:

- (A) 10%
- (B) 20%
- (C) 12%
- (D) 25%

Q19. The decimal 0.5 expressed as a percentage is:

- (A) 5%
- (B) 0.5%
- (C) 50%
- (D) 500%

Q20. A shirt marked at Rs. 500 is sold at a discount of 10%. Its selling price is:

- (A) Rs. 550
- (B) Rs. 50
- (C) Rs. 490
- (D) Rs. 450

Q21. A number increased by 20% becomes 60. The original number is:

- (A) 48
- (B) 50
- (C) 72
- (D) 40



- Q22.** The simple interest on Rs. 1000 at 10% per annum for 2 years is:
- (A) Rs. 200
 - (B) Rs. 100
 - (C) Rs. 220
 - (D) Rs. 2000
- Q23.** The compound interest on Rs. 1000 at 10% per annum for 2 years (compounded annually) is:
- (A) Rs. 200
 - (B) Rs. 100
 - (C) Rs. 210
 - (D) Rs. 1210
- Q24.** At what rate per annum will Rs. 500 earn a simple interest of Rs. 100 in 2 years?
- (A) 5%
 - (B) 20%
 - (C) 4%
 - (D) 10%
- Q25.** If A can complete a piece of work in 10 days, the part of the work A does in one day is:
- (A) $\frac{1}{10}$
 - (B) 10
 - (C) $\frac{1}{5}$
 - (D) 5
- Q26.** A can do a work in 12 days and B can do the same work in 6 days. Working together, they finish it in:



- (A) 8 days
- (B) 4 days
- (C) 18 days
- (D) 2 days

Q27. A tap can fill a tank in 5 hours. The part of the tank it fills in one hour is:

- (A) 5
- (B) $\frac{1}{10}$
- (C) $\frac{2}{5}$
- (D) $\frac{1}{5}$

Q28. A car travels 150 km in 3 hours. Its average speed is:

- (A) 450 km/h
- (B) 45 km/h
- (C) 50 km/h
- (D) 153 km/h

Q29. A train 100 m long crosses a pole in 5 seconds. Its speed is:

- (A) 20 m/s
- (B) 500 m/s
- (C) 105 m/s
- (D) 50 m/s

Q30. The distance covered by a vehicle moving at 60 km/h in 30 minutes is:

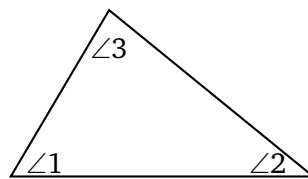
- (A) 60 km
- (B) 30 km
- (C) 120 km
- (D) 90 km



Q31. The speed of a boat in still water is 10 km/h and the speed of the stream is 2 km/h. The downstream speed of the boat is:

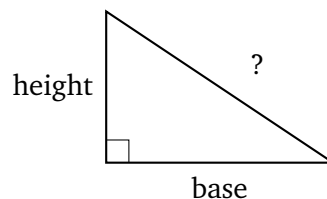
- (A) 8 km/h
- (B) 5 km/h
- (C) 20 km/h
- (D) 12 km/h

Q32. The sum of the three interior angles of the triangle shown is:



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

Q33. In the right-angled triangle shown, the side opposite the right angle is called the:



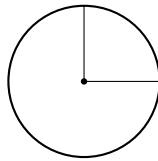
- (A) hypotenuse
- (B) base
- (C) altitude
- (D) median

Q34. Two angles are said to be supplementary if their sum is equal to:



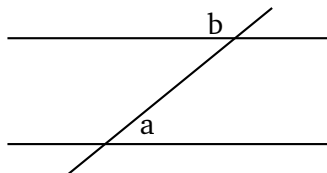
- (A) 90°
- (B) 180°
- (C) 360°
- (D) 270°

Q35. The total angle (in degrees) at the centre of the complete circle shown is:



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

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



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

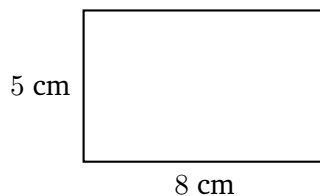
Q37. An angle whose measure is exactly 90° is called a:

- (A) right angle
- (B) acute angle



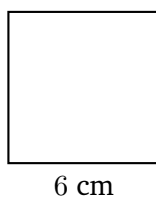
- (C) obtuse angle
- (D) straight angle

Q38. The area of the rectangle shown, of length 8 cm and breadth 5 cm, is:



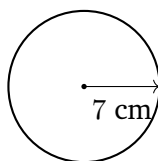
- (A) 26 cm^2
- (B) 40 cm^2
- (C) 13 cm^2
- (D) 80 cm^2

Q39. The perimeter of the square shown, of side 6 cm, is:



- (A) 36 cm
- (B) 12 cm
- (C) 24 cm
- (D) 6 cm

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



- (A) 44 cm^2

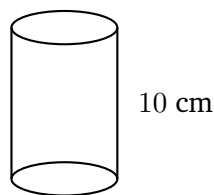


- (B) 22 cm^2
- (C) 49 cm^2
- (D) 154 cm^2

Q41. The volume of a cube of side 3 cm is:

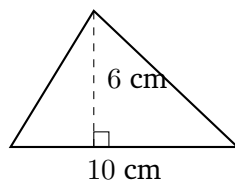
- (A) 27 cm^3
- (B) 9 cm^3
- (C) 18 cm^3
- (D) 54 cm^3

Q42. The volume of the cylinder shown, of radius 7 cm and height 10 cm $\left(\pi = \frac{22}{7}\right)$, is:



- (A) 220 cm^3
- (B) 1540 cm^3
- (C) 154 cm^3
- (D) 308 cm^3

Q43. The area of the triangle shown, with base 10 cm and height 6 cm, is:



- (A) 60 cm^2
- (B) 16 cm^2
- (C) 30 cm^2



(D) 15 cm^2

Q44. The value of $\sin 30^\circ$ is:

(A) 1

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

(C) 0

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

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

(A) 1

(B) 0

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

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

Q46. The value of $\tan 45^\circ$ is:

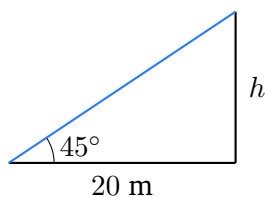
(A) 0

(B) 1

(C) $\sqrt{3}$

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

Q47. From a point 20 m from the base of a tower, the angle of elevation of its top is 45° , as shown. The height of the tower is:



(A) 40 m

(B) 10 m



- (C) 20 m
(D) $20\sqrt{3}$ m

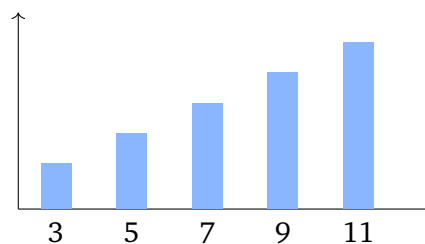
Q48. The mean (average) of the first five natural numbers 1, 2, 3, 4, 5 is:

- (A) 5
(B) 2.5
(C) 15
(D) 3

Q49. The probability of getting a head when a fair coin is tossed once is:

- (A) $\frac{1}{2}$
(B) 1
(C) 0
(D) $\frac{1}{4}$

Q50. The data values 3, 5, 7, 9, 11 are shown as bars below. The median of this data is:



- (A) 5
(B) 7
(C) 9
(D) 35



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 12 are 1, 2, 3, 4, 6, 12; factors of 18 are 1, 2, 3, 6, 9, 18.

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

Why other options are wrong:

- 36 is the LCM, not the HCF.
- 3 and 2 are common factors but not the highest.

Final Answer: $\text{HCF} = 6 \Rightarrow \boxed{\text{B}}$

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 4: 4, 8, 12, ...; multiples of 6: 6, 12, 18, ...

Step 2 — Find the smallest common one: The smallest common multiple is 12.

Why other options are wrong:

- 24 is a common multiple but not the smallest.
- 6 and 2 are not multiples of 4.

Final Answer: $\text{LCM} = 12 \Rightarrow \boxed{\text{A}}$

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



Q3.

Solution

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

Step 1 — Check the small numbers: 0 and 1 are not prime; 2 has only the factors 1 and 2.

Step 2 — Identify the smallest: The smallest prime number is 2 (it is also the only even prime).

Why other options are wrong:

- 0 and 1 are not prime numbers.
- 3 is prime but larger than 2.

Final Answer: The smallest prime is 2 $\Rightarrow$

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

Q4.

Solution

Concept — Rational and irrational numbers: A rational number can be written as a fraction of integers; an irrational number cannot, and its decimal neither ends nor repeats.

Step 1 — Test each option: $0.25 = \frac{1}{4}$ and $\frac{4}{5}$ are fractions; $7 = \frac{7}{1}$ is an integer.

Step 2 — Identify the irrational: $\sqrt{2} = 1.4142\dots$ never ends or repeats, so it is irrational.

Why other options are wrong:

- 0.25, $\frac{4}{5}$ and 7 are all rational numbers.

Final Answer: $\sqrt{2}$ is irrational $\Rightarrow$

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 3725, the digit 7 is in the hundreds place.

Step 2 — Multiply: Place value = $7 \times 100 = 700$.

Why other options are wrong:

- 7 is the face value, not the place value.
- 70 and 7000 use the wrong place.

Final Answer: Place value = 700 $\Rightarrow$ 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 — Subtract 5 from both sides: $x = 12 - 5$.

Step 2 — Compute: $x = 7$.

Why other options are wrong:

- 17 adds instead of subtracting.
- 60 multiplies the numbers.
- 5 is the number being moved, not x .

Final Answer: $x = 7 \Rightarrow$ B

Answer: (B) [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: $a + b = 2 + 3 = 5$.

Step 2 — Square the sum: $(5)^2 = 25$.

Why other options are wrong:

- $13 = a^2 + b^2$ forgets the $2ab$ term.
- 10 is $2ab$ only.
- 36 comes from squaring 6 wrongly.

Final Answer: $(a + b)^2 = 25 \Rightarrow \boxed{D}$

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

Q8.

Solution

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

Step 1 — Write 9 as a square: $x^2 - 9 = x^2 - 3^2$.

Step 2 — Apply the identity: $x^2 - 3^2 = (x - 3)(x + 3)$.

Why other options are wrong:

- $(x - 3)(x - 3) = x^2 - 6x + 9$, which is wrong.
- The other pairs do not multiply back to $x^2 - 9$.

Final Answer: $x^2 - 9 = (x - 3)(x + 3) \Rightarrow \boxed{C}$

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



Q9.

Solution**Concept — Simple equation:** Divide both sides by the coefficient of x .**Step 1 — Divide by 2:** $x = \frac{10}{2}$.**Step 2 — Compute:** $x = 5$.**Why other options are wrong:**

- 20 multiplies instead of dividing.
- 8 and 12 come from adding or subtracting.

Final Answer: $x = 5 \Rightarrow$ AAnswer: (A) [Go Back to Q9](#)

Q10.

Solution**Concept — Quadratic roots:** Factorise the quadratic so that the two factors multiply to +6 and add to -5.**Step 1 — Split the middle term:** $x^2 - 5x + 6 = (x - 2)(x - 3)$.**Step 2 — Set each factor to zero:** $x - 2 = 0$ or $x - 3 = 0$, giving $x = 2$ or $x = 3$.**Why other options are wrong:**

- 1, 6 and 5, 6 do not satisfy the equation.
- -2, -3 would need the equation $x^2 + 5x + 6$.

Final Answer: Roots are 2 and 3 $\Rightarrow$ BAnswer: (B) [Go Back to Q10](#)

Q11.

Solution

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

Step 1 — Add the coefficients: $3 + 2 = 5$.

Step 2 — Attach the variable: $3x + 2x = 5x$.

Why other options are wrong:

- $6x$ multiplies the coefficients.
- x subtracts them.
- $6x^2$ wrongly multiplies the variables too.

Final Answer: $3x + 2x = 5x \Rightarrow$

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

Q12.

Solution

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

Step 1 — Square first: $a^2 = 3^2 = 9$.

Step 2 — Multiply by 2: $2 \times 9 = 18$.

Step 3 — Subtract 1: $18 - 1 = 17$.

Why other options are wrong:

- 35 uses $(2a)^2$.
- 11 uses $2a - 1$ wrongly... it forgets to square.
- 5 uses $2a - 1$ directly.

Final Answer: $2a^2 - 1 = 17 \Rightarrow$

Answer: (D) [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 15 and 25 is 5.**Step 2 — Divide both terms:** $\frac{15}{5} : \frac{25}{5} = 3 : 5$.**Why other options are wrong:**

- 5 : 3 reverses the ratio.
- 15 : 25 is not in simplest form.
- 1 : 2 is incorrect.

Final Answer: $15 : 25 = 3 : 5 \Rightarrow$ AAnswer: (A) [Go Back to Q13](#)

Q14.

Solution**Concept — Average:** $\text{Average} = \frac{\text{sum of values}}{\text{number of values}}$.**Step 1 — Add the values:** $10 + 20 + 30 = 60$.**Step 2 — Divide by the count:** $\frac{60}{3} = 20$.**Why other options are wrong:**

- 60 is the sum, not the average.
- 30 is the largest value.
- 15 uses a wrong divisor.

Final Answer: $\text{Average} = 20 \Rightarrow$ BAnswer: (B) [Go Back to Q14](#)

Q15.

Solution

Concept — Combining ratios: Make the common term b equal in both ratios, then read $a : c$.

Step 1 — Note the ratios: $a : b = 2 : 3$ and $b : c = 3 : 4$. The value of b is already 3 in both.

Step 2 — Write $a : b : c$: $a : b : c = 2 : 3 : 4$.

Step 3 — Pick $a : c$: $a : c = 2 : 4 = 1 : 2$.

Why other options are wrong:

- $3 : 4$ and $2 : 3$ are the given ratios, not $a : c$.
- $4 : 2$ reverses the answer.

Final Answer: $a : c = 1 : 2 \Rightarrow$ D

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

Q16.

Solution

Concept — Fourth proportional: If $a : b = c : x$, then $x = \frac{b \times c}{a}$.

Step 1 — Set up the proportion: $2 : 4 = 6 : x$.

Step 2 — Cross multiply: $2x = 4 \times 6 = 24$.

Step 3 — Solve: $x = \frac{24}{2} = 12$.

Why other options are wrong:

- 8, 3 and 6 do not satisfy the proportion.

Final Answer: Fourth proportional = 12 $\Rightarrow$ C

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



Q17.

Solution

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

Step 1 — Write the fraction: $25\% = \frac{25}{100} = \frac{1}{4}$.

Step 2 — Multiply: $\frac{1}{4} \times 200 = 50$.

Why other options are wrong:

- 25 is the percentage value, not the result.
- 75 and 100 use wrong fractions.

Final Answer: 25% of $200 = 50 \Rightarrow \boxed{A}$

Answer: (A) [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: $\text{Profit} = 120 - 100 = 20$.

Step 2 — Apply the formula: $\text{Profit}\% = \frac{20}{100} \times 100 = 20\%$.

Why other options are wrong:

- 10% and 12% use wrong numbers.
- 25% would need a profit of 25.

Final Answer: $\text{Profit} = 20\% \Rightarrow \boxed{B}$

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



Q19.

Solution

Concept — Decimal to percentage: Multiply the decimal by 100 and add the % sign.

Step 1 — Multiply by 100: $0.5 \times 100 = 50$.

Step 2 — Add the sign: $0.5 = 50\%$.

Why other options are wrong:

- 5% and 0.5% move the decimal wrongly.
- 500% multiplies by 1000.

Final Answer: $0.5 = 50\% \Rightarrow \boxed{\text{C}}$

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: $10\% \text{ of } 500 = \frac{10}{100} \times 500 = 50$.

Step 2 — Subtract: Selling price = $500 - 50 = 450$.

Why other options are wrong:

- Rs. 550 adds the discount.
- Rs. 50 is the discount itself.
- Rs. 490 uses a wrong discount.

Final Answer: Selling price = Rs. 450 $\Rightarrow \boxed{\text{D}}$

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



Q21.

Solution

Concept — Reverse percentage: If a number increased by 20% becomes 60, then 120% of the number is 60.

Step 1 — Write the equation: $\frac{120}{100} \times x = 60$.

Step 2 — Solve for x : $x = \frac{60 \times 100}{120} = 50$.

Why other options are wrong:

- 48, 72 and 40 do not give 60 after a 20% rise.

Final Answer: The original number is 50 $\Rightarrow$ **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: $P = 1000, R = 10, T = 2$.

Step 2 — Substitute: $SI = \frac{1000 \times 10 \times 2}{100}$.

Step 3 — Compute: $SI = \frac{20000}{100} = 200$.

Why other options are wrong:

- Rs. 100 uses $T = 1$.
- Rs. 220 is the compound interest.
- Rs. 2000 omits the 100.

Final Answer: $SI = \text{Rs. } 200 \Rightarrow$ **A**

Answer: (A) [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: $A = 1000 \left(1 + \frac{10}{100}\right)^2 = 1000 \times (1.1)^2$.

Step 2 — Compute the power: $(1.1)^2 = 1.21$, so $A = 1000 \times 1.21 = 1210$.

Step 3 — Subtract the principal: CI = $1210 - 1000 = 210$.

Why other options are wrong:

- Rs. 200 is the simple interest.
- Rs. 1210 is the total amount, not the interest.

Final Answer: CI = Rs. 210 $\Rightarrow$ **C**

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

Q24.

Solution

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

Step 1 — List the data: SI = 100, $P = 500$, $T = 2$.

Step 2 — Substitute: $R = \frac{100 \times 100}{500 \times 2}$.

Step 3 — Compute: $R = \frac{10000}{1000} = 10\%$.

Why other options are wrong:

- 5%, 20% and 4% do not give Rs. 100 interest.

Final Answer: Rate = 10% $\Rightarrow$ **D**

Answer: (D) [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 $n = 10$: One day's work = $\frac{1}{10}$.

Step 2 — Confirm: In 10 days, $10 \times \frac{1}{10} = 1$ whole work.

Why other options are wrong:

- 10 and 5 are not fractions of work.
- $\frac{1}{5}$ would mean finishing in 5 days.

Final Answer: One day's work = $\frac{1}{10} \Rightarrow \boxed{A}$

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 $\frac{1}{12}$, B does $\frac{1}{6}$.

Step 2 — Add them: $\frac{1}{12} + \frac{1}{6} = \frac{1}{12} + \frac{2}{12} = \frac{3}{12} = \frac{1}{4}$.

Step 3 — Take the reciprocal: Time together = 4 days.

Why other options are wrong:

- 8 and 18 come from wrong addition.
- 2 days is too fast.

Final Answer: They finish in 4 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 $n = 5$: One hour's filling = $\frac{1}{5}$.

Step 2 — Confirm: In 5 hours, $5 \times \frac{1}{5} = 1$ full tank.

Why other options are wrong:

- 5 is the number of hours, not the part.
- $\frac{1}{10}$ and $\frac{2}{5}$ are wrong fractions.

Final Answer: One hour's work = $\frac{1}{5} \Rightarrow \boxed{\text{D}}$

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

Q28.

Solution

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

Step 1 — List the data: distance = 150 km, time = 3 h.

Step 2 — Divide: $\text{Speed} = \frac{150}{3} = 50 \text{ km/h}$.

Why other options are wrong:

- 450 multiplies instead of dividing.
- 45 and 153 come from wrong operations.

Final Answer: Speed = 50 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 = 100 m, time = 5 s.

Step 2 — Divide: $\text{Speed} = \frac{100}{5} = 20 \text{ m/s}$.

Why other options are wrong:

- 500 multiplies the values.
- 105 adds them.
- 50 uses a wrong divisor.

Final Answer: Speed = 20 m/s $\Rightarrow$ **A**

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

Q30.

Solution

Concept — Distance: Distance = speed $\times$ time, with time in hours.

Step 1 — Convert the time: 30 minutes = $\frac{30}{60} = 0.5$ hour.

Step 2 — Multiply: Distance = $60 \times 0.5 = 30 \text{ km}$.

Why other options are wrong:

- 60 ignores the half hour.
- 120 and 90 use wrong times.

Final Answer: Distance = 30 km $\Rightarrow$ **B**

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



Q31.

Solution

Concept — Downstream speed: Going downstream, the stream helps the boat, so downstream speed = boat speed + stream speed.

Step 1 — Add the speeds: $10 + 2 = 12$ km/h.

Step 2 — State the result: Downstream speed = 12 km/h.

Why other options are wrong:

- 8 km/h is the upstream speed ($10 - 2$).
- 20 multiplies and 5 is unrelated.

Final Answer: Downstream speed = 12 km/h $\Rightarrow$ D

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

Q32.

Solution

Concept — Angle sum of a triangle: The three interior angles of any triangle always add up to 180° .

Step 1 — State the property: $\angle 1 + \angle 2 + \angle 3 = 180^\circ$.

Step 2 — Confirm: This holds for every triangle, whatever its shape.

Why other options are wrong:

- 90° is a single right angle.
- 360° is the angle sum of a quadrilateral.

Final Answer: Angle sum = $180^\circ \Rightarrow$ C

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



Q33.

Solution

Concept — Right-angled triangle: The side directly opposite the right angle is the longest side, called the hypotenuse.

Step 1 — Locate the right angle: The small square marks the 90° corner.

Step 2 — Name the opposite side: The slanting side opposite it is the hypotenuse.

Why other options are wrong:

- Base and height are the two sides forming the right angle.
- Altitude and median are lines drawn inside a triangle.

Final Answer: The opposite side is the hypotenuse $\Rightarrow$ A

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

Q34.

Solution

Concept — Supplementary angles: Two angles are supplementary when their measures add up to 180° .

Step 1 — Recall the definition: Sum = 180° .

Step 2 — Compare with complementary: Complementary angles add to 90° , which is different.

Why other options are wrong:

- 90° is for complementary angles.
- 360° and 270° are not the definition.

Final Answer: Supplementary angles add to $180^\circ \Rightarrow$ B

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



Q35.

Solution

Concept — Angle at the centre of a circle: One complete turn around the centre of a circle measures 360° .

Step 1 — Recall the full turn: A complete revolution = 360° .

Step 2 — Confirm: Half a turn is 180° and a quarter is 90° .

Why other options are wrong:

- 90° , 180° and 270° are only part of a full turn.

Final Answer: The complete circle is $360^\circ \Rightarrow \boxed{D}$

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

Q36.

Solution

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

Step 1 — Identify the pair: Angles a and b are in the same position at the two intersections, so they are corresponding angles.

Step 2 — State the relation: Corresponding angles are equal.

Why other options are wrong:

- Supplementary and complementary describe sums of 180° and 90° .
- The angles are not zero.

Final Answer: Corresponding angles are equal $\Rightarrow \boxed{C}$

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



Q37.

Solution

Concept — Types of angles: An angle of exactly 90° is a right angle; less than 90° is acute and more than 90° (but less than 180°) is obtuse.

Step 1 — Match the measure: 90° corresponds to a right angle.

Step 2 — Confirm: A right angle looks like the corner of a square.

Why other options are wrong:

- Acute is less than 90° and obtuse is more.
- A straight angle is 180° .

Final Answer: A 90° angle is a right angle $\Rightarrow$ **A**

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

Q38.

Solution

Concept — Area of a rectangle: Area = length $\times$ breadth.

Step 1 — List the data: length = 8 cm, breadth = 5 cm.

Step 2 — Multiply: Area = $8 \times 5 = 40 \text{ cm}^2$.

Why other options are wrong:

- 26 is the perimeter ($2(8 + 5)$).
- 13 is the half-perimeter.
- 80 doubles the area.

Final Answer: Area = $40 \text{ cm}^2 \Rightarrow$ **B**

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



Q39.

Solution**Concept — Perimeter of a square:** $\text{Perimeter} = 4 \times \text{side}$.**Step 1 — List the side:** $\text{side} = 6 \text{ cm}$.**Step 2 — Multiply:** $\text{Perimeter} = 4 \times 6 = 24 \text{ cm}$.**Why other options are wrong:**

- 36 is the area (6^2).
- 12 uses only two sides.
- 6 is one side.

Final Answer: $\text{Perimeter} = 24 \text{ cm} \Rightarrow \boxed{\text{C}}$ **Answer: (C)** [Go Back to Q39](#)

Q40.

Solution**Concept — Area of a circle:** $\text{Area} = \pi r^2$.**Step 1 — Square the radius:** $r^2 = 7^2 = 49$.**Step 2 — Multiply by π :** $\text{Area} = \frac{22}{7} \times 49 = 22 \times 7 = 154 \text{ cm}^2$.**Why other options are wrong:**

- 44 is the circumference ($2\pi r$).
- 49 is only r^2 .
- 22 is incomplete.

Final Answer: $\text{Area} = 154 \text{ cm}^2 \Rightarrow \boxed{\text{D}}$ **Answer: (D)** [Go Back to Q40](#)

Q41.

Solution**Concept — Volume of a cube:** $\text{Volume} = \text{side}^3$.**Step 1 — List the side:** $\text{side} = 3 \text{ cm}$.**Step 2 — Cube it:** $\text{Volume} = 3 \times 3 \times 3 = 27 \text{ cm}^3$.**Why other options are wrong:**

- 9 is side^2 (the area of a face).
- 18 and 54 use wrong operations.

Final Answer: $\text{Volume} = 27 \text{ cm}^3 \Rightarrow \boxed{\text{A}}$ **Answer: (A)** [Go Back to Q41](#)

Q42.

Solution**Concept — Volume of a cylinder:** $\text{Volume} = \pi r^2 h$.**Step 1 — Square the radius:** $r^2 = 7^2 = 49$.**Step 2 — Multiply by π :** $\frac{22}{7} \times 49 = 154$.**Step 3 — Multiply by the height:** $154 \times 10 = 1540 \text{ cm}^3$.**Why other options are wrong:**

- 154 forgets to multiply by the height.
- 220 and 308 use wrong values.

Final Answer: $\text{Volume} = 1540 \text{ cm}^3 \Rightarrow \boxed{\text{B}}$ **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 = 10 cm, height = 6 cm.

Step 2 — Substitute: $\text{Area} = \frac{1}{2} \times 10 \times 6$.

Step 3 — Compute: $\frac{1}{2} \times 60 = 30 \text{ cm}^2$.

Why other options are wrong:

- 60 forgets the factor $\frac{1}{2}$.
- 16 adds base and height.
- 15 halves the wrong value.

Final Answer: $\text{Area} = 30 \text{ cm}^2 \Rightarrow \boxed{\text{C}}$

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

Q44.

Solution

Concept — Standard trigonometric values: The value of $\sin 30^\circ$ is one of the standard ratios.

Step 1 — Recall the value: $\sin 30^\circ = \frac{1}{2}$.

Step 2 — Confirm: It comes from a 30° – 60° – 90° triangle.

Why other options are wrong:

- $\frac{\sqrt{3}}{2}$ is $\sin 60^\circ$.
- 1 is $\sin 90^\circ$ and 0 is $\sin 0^\circ$.

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

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



Q45.

Solution

Concept — Standard trigonometric values: The value of $\cos 0^\circ$ is a standard ratio.

Step 1 — Recall the value: $\cos 0^\circ = 1$.

Step 2 — Confirm: The cosine is largest at 0° and falls to 0 at 90° .

Why other options are wrong:

- 0 is $\cos 90^\circ$.
- $\frac{1}{2}$ is $\cos 60^\circ$ and $\frac{\sqrt{3}}{2}$ is $\cos 30^\circ$.

Final Answer: $\cos 0^\circ = 1 \Rightarrow \boxed{\text{A}}$

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

Q46.

Solution

Concept — Standard trigonometric values: The value of $\tan 45^\circ$ is a standard ratio.

Step 1 — Recall the value: $\tan 45^\circ = 1$.

Step 2 — Confirm: Since $\tan \theta = \frac{\sin \theta}{\cos \theta}$ and $\sin 45^\circ = \cos 45^\circ$, the ratio is 1.

Why other options are wrong:

- 0 is $\tan 0^\circ$.
- $\sqrt{3}$ is $\tan 60^\circ$ and $\frac{1}{2}$ is not a standard tangent value.

Final Answer: $\tan 45^\circ = 1 \Rightarrow \boxed{\text{B}}$

Answer: (B) [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: $\tan 45^\circ = \frac{h}{20}.$

Step 2 — Use $\tan 45^\circ = 1$: $1 = \frac{h}{20}.$

Step 3 — Solve for h : $h = 20$ m.

Why other options are wrong:

- 40 doubles the distance.
- 10 halves it.
- $20\sqrt{3}$ would use a 60° angle.

Final Answer: Height = 20 m $\Rightarrow$

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

Q48.

Solution

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

Step 1 — Add the numbers: $1 + 2 + 3 + 4 + 5 = 15.$

Step 2 — Divide by the count: $\frac{15}{5} = 3.$

Why other options are wrong:

- 5 is the largest value.
- 15 is the sum, not the mean.
- 2.5 uses a wrong divisor.

Final Answer: Mean = 3 $\Rightarrow$

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



Q49.

Solution

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

Step 1 — Count the outcomes: A coin has 2 outcomes (head, tail); a head is 1 favourable outcome.

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

Why other options are wrong:

- 1 would mean a head is certain.
- 0 would mean it is impossible.
- $\frac{1}{4}$ uses a wrong total.

Final Answer: Probability of a head = $\frac{1}{2} \Rightarrow \boxed{\text{A}}$

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

Q50.

Solution

Concept — Median: The median is the middle value when the data is arranged in order. For an odd number of values, it is the exact middle one.

Step 1 — Arrange in order: 3, 5, 7, 9, 11 (already increasing).

Step 2 — Find the middle: There are 5 values, so the 3rd value is the median, which is 7.

Why other options are wrong:

- 5 and 9 are not in the middle position.
- 35 is the sum of all the values.

Final Answer: Median = 7 $\Rightarrow \boxed{\text{B}}$

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



Answer Key

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

