

Jharkhand Polytechnic Mathematics

Sample Paper – 9

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 45 and 60 is:

- (A) 180
- (B) 5
- (C) 15
- (D) 9

Q2. The LCM (lowest common multiple) of 8 and 10 is:

- (A) 40
- (B) 80
- (C) 2
- (D) 20



Q3. The smallest three-digit number is:

- (A) 99
- (B) 999
- (C) 100
- (D) 10

Q4. Out of the following, which number is irrational?

- (A) $\sqrt{11}$
- (B) $\sqrt{16}$
- (C) 0.5
- (D) $\frac{3}{4}$

Q5. The place value of the digit 3 in the number 3000 is:

- (A) 3
- (B) 30
- (C) 300
- (D) 3000

Q6. If $7x - 4 = 24$, then the value of x is:

- (A) 28
- (B) 4
- (C) 2
- (D) 20

Q7. The value of $(a - b)^2$ when $a = 6$ and $b = 1$ is:

- (A) 25
- (B) 35
- (C) 7



(D) 37

Q8. The factors of $x^2 - 121$ are:

(A) $(x - 11)(x - 11)$

(B) $(x + 11)(x + 11)$

(C) $(x - 11)(x + 11)$

(D) $(x - 121)(x + 1)$

Q9. If $12x = 60$, then x equals:

(A) 720

(B) 5

(C) 48

(D) 72

Q10. The roots of the quadratic equation $x^2 - 13x + 40 = 0$ are:

(A) 4, 10

(B) 2, 20

(C) -5, -8

(D) 5, 8

Q11. On simplifying, $7a + 6a$ equals:

(A) $13a$

(B) $42a$

(C) a

(D) $13a^2$

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

(A) 11



- (B) 12
- (C) 15
- (D) 9

Q13. The ratio 24 : 32 in its simplest form is:

- (A) 3 : 4
- (B) 4 : 3
- (C) 6 : 8
- (D) 2 : 3

Q14. The average of 20, 40 and 60 is:

- (A) 120
- (B) 60
- (C) 40
- (D) 30

Q15. The fourth proportional to 6, 12 and 18 is:

- (A) 24
- (B) 36
- (C) 9
- (D) 12

Q16. If $7 : 9 = 14 : x$, then the value of x is:

- (A) 16
- (B) 21
- (C) 18
- (D) 12

Q17. 12% of 50 is:



- (A) 6
- (B) 12
- (C) 600
- (D) 5

Q18. An article bought for Rs. 1200 is sold for Rs. 1500. The profit per cent is:

- (A) 20%
- (B) 25%
- (C) 30%
- (D) 15%

Q19. The fraction $\frac{19}{20}$ expressed as a percentage is:

- (A) 95%
- (B) 90%
- (C) 19%
- (D) 85%

Q20. A jacket marked at Rs. 3000 is sold at a discount of 10%. Its selling price is:

- (A) Rs. 3300
- (B) Rs. 300
- (C) Rs. 2900
- (D) Rs. 2700

Q21. If 25% of a number is 90, then the number is:

- (A) 360
- (B) 90
- (C) 22.5
- (D) 270



- Q22.** The simple interest on Rs. 6000 at 5% per annum for 3 years is:
- (A) Rs. 1500
 - (B) Rs. 300
 - (C) Rs. 90000
 - (D) Rs. 900
- Q23.** The compound interest on Rs. 1000 at 10% per annum for 3 years (compounded annually) is:
- (A) Rs. 300
 - (B) Rs. 1331
 - (C) Rs. 331
 - (D) Rs. 310
- Q24.** At what principal will a simple interest of Rs. 250 be earned at 5% per annum in 2 years?
- (A) Rs. 2500
 - (B) Rs. 5000
 - (C) Rs. 1250
 - (D) Rs. 2000
- Q25.** If A can complete a piece of work in 9 days, the part of the work A does in one day is:
- (A) 9
 - (B) $\frac{1}{9}$
 - (C) $\frac{1}{3}$
 - (D) $\frac{1}{18}$
- Q26.** A can do a work in 6 days and B can do the same work in 3 days. Working together, they finish it in:



- (A) 2 days
- (B) 4 days
- (C) 9 days
- (D) 3 days

Q27. A tap can fill a tank in 20 hours. The part of the tank it fills in one hour is:

- (A) 20
- (B) $\frac{1}{10}$
- (C) $\frac{1}{40}$
- (D) $\frac{1}{20}$

Q28. A car travels 480 km in 8 hours. Its average speed is:

- (A) 480 km/h
- (B) 60 km/h
- (C) 50 km/h
- (D) 472 km/h

Q29. A train 400 m long crosses a pole in 16 seconds. Its speed is:

- (A) 416 m/s
- (B) 40 m/s
- (C) 25 m/s
- (D) 50 m/s

Q30. The distance covered by a vehicle moving at 120 km/h in 2 hours is:

- (A) 240 km
- (B) 120 km
- (C) 60 km



(D) 122 km

Q31. The speed of a boat in still water is 30 km/h and the speed of the stream is 6 km/h. The downstream speed of the boat is:

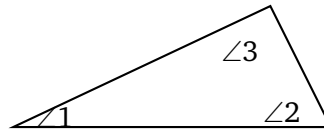
(A) 24 km/h

(B) 30 km/h

(C) 5 km/h

(D) 36 km/h

Q32. In an obtuse-angled triangle like the one shown, one of the interior angles is:



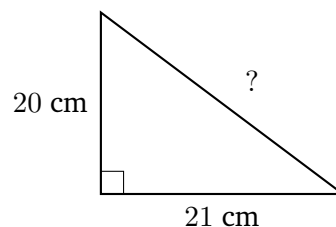
(A) greater than 90°

(B) equal to 90°

(C) less than 90°

(D) equal to 180°

Q33. In the right-angled triangle shown, the legs measure 20 cm and 21 cm. The length of the hypotenuse is:



(A) 41 cm

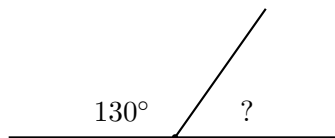
(B) 20 cm

(C) 21 cm



(D) 29 cm

Q34. In the figure, a ray stands on a straight line forming a linear pair. If one angle is 130° , the other angle is:



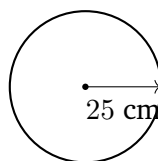
(A) 50°

(B) 130°

(C) 60°

(D) 230°

Q35. A circle has a radius of 25 cm, as shown. Its diameter is:



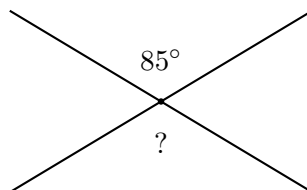
(A) 25 cm

(B) 12.5 cm

(C) 50 cm

(D) 75 cm

Q36. Two straight lines intersect as shown. If one angle is 85° , the vertically opposite angle is:



(A) 95°

(B) 5°



(C) 180°

(D) 85°

Q37. A regular polygon has each exterior angle equal to 60° . The number of sides of the polygon is:

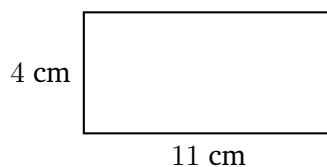
(A) 5

(B) 6

(C) 60

(D) 3

Q38. The area of the rectangle shown, of length 11 cm and breadth 4 cm, is:



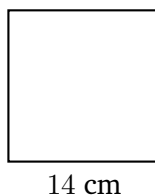
(A) 15 cm^2

(B) 30 cm^2

(C) 22 cm^2

(D) 44 cm^2

Q39. The perimeter of the square shown, of side 14 cm, is:



(A) 196 cm

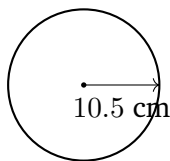
(B) 56 cm

(C) 28 cm

(D) 14 cm



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

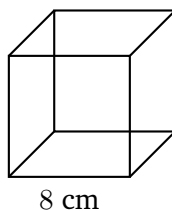


- (A) 66 cm^2
- (B) 33 cm^2
- (C) 110.25 cm^2
- (D) 346.5 cm^2

Q41. The volume of a cuboid of length 8 cm, breadth 3 cm and height 2 cm is:

- (A) 13 cm^3
- (B) 48 cm^3
- (C) 26 cm^3
- (D) 24 cm^3

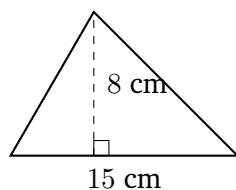
Q42. The volume of the cube shown, of side 8 cm, is:



- (A) 24 cm^3
- (B) 64 cm^3
- (C) 128 cm^3
- (D) 512 cm^3

Q43. The area of the triangle shown, with base 15 cm and height 8 cm, is:





(A) 120 cm^2

(B) 60 cm^2

(C) 23 cm^2

(D) 30 cm^2

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

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

(B) 1

(C) $\sqrt{3}$

(D) 2

Q45. The value of $2 \cos 60^\circ$ is:

(A) 2

(B) $\sqrt{3}$

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

(D) 1

Q46. The value of $\sin^2 90^\circ + \cos^2 90^\circ$ is:

(A) 0

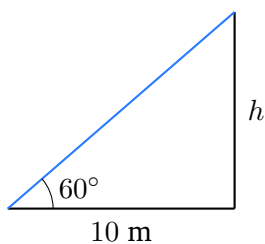
(B) 1

(C) 2

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

Q47. From a point 10 m from the base of a tower, the angle of elevation of its top is 60° , as shown. The height of the tower is:





- (A) 10 m
- (B) 20 m
- (C) $10\sqrt{3}$ m
- (D) $\frac{10}{\sqrt{3}}$ m

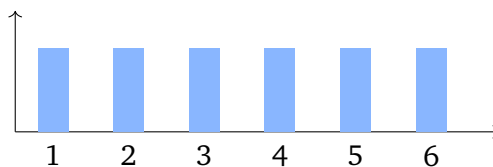
Q48. The mean (average) of the numbers 8, 16, 24, 32, 40 is:

- (A) 120
- (B) 24
- (C) 20
- (D) 30

Q49. The median of the data 6, 9, 12, 15, 18 is:

- (A) 9
- (B) 15
- (C) 12
- (D) 60

Q50. A fair die is rolled once. The faces 1 to 6 are shown below. The probability of getting an odd number is:



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



- (B) $\frac{1}{2}$
(C) $\frac{1}{6}$
(D) 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 45 are 1, 3, 5, 9, 15, 45; factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60.

Step 2 — Pick the greatest common one: The common factors are 1, 3, 5, 15; the greatest is 15.

Why other options are wrong:

- 180 is the LCM, not the HCF.
- 5 and 9 are common or single factors but not the highest common one.

Final Answer: $\text{HCF} = 15 \Rightarrow \boxed{\text{C}}$

Answer: (C) [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 8: 8, 16, 24, 32, 40, ...; multiples of 10: 10, 20, 30, 40, ...

Step 2 — Find the smallest common one: The smallest common multiple is 40.

Why other options are wrong:

- 80 is a common multiple but not the smallest.
- 2 is the HCF and 20 is not a multiple of 8.

Final Answer: $\text{LCM} = 40 \Rightarrow \boxed{\text{A}}$

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



Q3.

Solution

Concept — Three-digit numbers: A three-digit number must have exactly three digits, so the smallest one is the first number after the largest two-digit number.

Step 1 — Largest two-digit number: The largest two-digit number is 99.

Step 2 — Add one: The next number is $99 + 1 = 100$, which is the smallest three-digit number.

Why other options are wrong:

- 99 has only two digits.
- 999 is the largest three-digit number.
- 10 is a two-digit number.

Final Answer: Smallest three-digit number = 100 $\Rightarrow$ C

Answer: (C) [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: $\sqrt{16} = 4$ is a whole number; $0.5 = \frac{1}{2}$ and $\frac{3}{4}$ are fractions.

Step 2 — Identify the irrational: $\sqrt{11} = 3.3166\dots$ never ends or repeats, so it is irrational.

Why other options are wrong:

- $\sqrt{16}$, 0.5 and $\frac{3}{4}$ are all rational numbers.

Final Answer: $\sqrt{11}$ is irrational $\Rightarrow$ A

Answer: (A) [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 3000, the digit 3 is in the thousands place.

Step 2 — Multiply: Place value = $3 \times 1000 = 3000$.

Why other options are wrong:

- 3 is the face value, not the place value.
- 30 and 300 use the wrong place.

Final Answer: Place value = 3000 $\Rightarrow$ D

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

Q6.

Solution

Concept — Linear equation: Move the constant to the other side, then divide by the coefficient of x .

Step 1 — Add 4 to both sides: $7x = 24 + 4 = 28$.

Step 2 — Divide by 7: $x = \frac{28}{7} = 4$.

Why other options are wrong:

- 28 is the value of $7x$, not of x .
- 2 and 20 come from wrong arithmetic.

Final Answer: $x = 4 \Rightarrow$ B

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



Q7.

Solution

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

Step 1 — Subtract first: $a - b = 6 - 1 = 5$.

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

Why other options are wrong:

- $37 = a^2 + b^2$ ignores the $-2ab$ correction.
- 35 and 7 come from wrong computation.

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

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

Q8.

Solution

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

Step 1 — Write 121 as a square: $x^2 - 121 = x^2 - 11^2$.

Step 2 — Apply the identity: $x^2 - 11^2 = (x - 11)(x + 11)$.

Why other options are wrong:

- $(x - 11)(x - 11) = x^2 - 22x + 121$, which is wrong.
- $(x + 11)(x + 11)$ and $(x - 121)(x + 1)$ do not multiply back to $x^2 - 121$.

Final Answer: $x^2 - 121 = (x - 11)(x + 11) \Rightarrow \boxed{C}$

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



Q9.

Solution

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

Step 1 — Divide by 12: $x = \frac{60}{12}$.

Step 2 — Compute: $x = 5$.

Why other options are wrong:

- 720 multiplies instead of dividing.
- 48 and 72 come from subtracting or adding.

Final Answer: $x = 5 \Rightarrow$ **B**

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

Q10.

Solution

Concept — Quadratic roots: Factorise so the two numbers multiply to +40 and add to -13.

Step 1 — Split the middle term: $x^2 - 13x + 40 = (x - 5)(x - 8)$.

Step 2 — Set each factor to zero: $x - 5 = 0$ or $x - 8 = 0$, giving $x = 5$ or $x = 8$.

Why other options are wrong:

- 4, 10 and 2, 20 multiply to 40 but do not add to 13.
- -5, -8 would need the equation $x^2 + 13x + 40$.

Final Answer: Roots are 5 and 8 $\Rightarrow$ **D**

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



Q11.

Solution

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

Step 1 — Add the coefficients: $7 + 6 = 13$.

Step 2 — Attach the variable: $7a + 6a = 13a$.

Why other options are wrong:

- $42a$ multiplies the coefficients.
- a subtracts them and $13a^2$ wrongly changes the power.

Final Answer: $7a + 6a = 13a \Rightarrow$ A

Answer: (A) [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 — Find $2a$: $2 \times 3 = 6$.

Step 3 — Add: $9 + 6 = 15$.

Why other options are wrong:

- 9 uses a^2 only.
- 11 and 12 come from wrong steps.

Final Answer: $a^2 + 2a = 15 \Rightarrow$ 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 24 and 32 is 8.**Step 2 — Divide both terms:** $\frac{24}{8} : \frac{32}{8} = 3 : 4$.**Why other options are wrong:**

- 4 : 3 reverses the ratio.
- 6 : 8 is not in simplest form and 2 : 3 is incorrect.

Final Answer: $24 : 32 = 3 : 4 \Rightarrow \boxed{A}$ **Answer: (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:** $20 + 40 + 60 = 120$.**Step 2 — Divide by the count:** $\frac{120}{3} = 40$.**Why other options are wrong:**

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

Final Answer: $\text{Average} = 40 \Rightarrow \boxed{C}$ **Answer: (C)** [Go Back to Q14](#)

Q15.

Solution**Concept — Fourth proportional:** If $a : b = c : x$, then $x = \frac{b \times c}{a}$.**Step 1 — Set up the proportion:** $6 : 12 = 18 : x$.**Step 2 — Cross multiply:** $6x = 12 \times 18 = 216$.

Step 3 — Solve: $x = \frac{216}{6} = 36$.

Why other options are wrong:

- 24, 9 and 12 do not satisfy the proportion.

Final Answer: Fourth proportional = 36 $\Rightarrow$ **B**

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

Q16.

Solution

Concept — Equal ratios: If $7 : 9 = 14 : x$, cross multiply to find x .

Step 1 — Cross multiply: $7 \times x = 9 \times 14 = 126$.

Step 2 — Solve: $x = \frac{126}{7} = 18$.

Why other options are wrong:

- 16, 21 and 12 do not keep the ratio equal to $7 : 9$.

Final Answer: $x = 18 \Rightarrow$ **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: $12\% = \frac{12}{100}$.

Step 2 — Multiply: $\frac{12}{100} \times 50 = \frac{600}{100} = 6$.

Why other options are wrong:

- 12 is the percentage value, not the result.
- 600 forgets to divide by 100 and 5 is incorrect.

Final Answer: 12% of 50 = 6 $\Rightarrow$ **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: $\text{Profit} = 1500 - 1200 = 300.$

Step 2 — Apply the formula: $\text{Profit}\% = \frac{300}{1200} \times 100 = 25\%.$

Why other options are wrong:

- 20% and 15% use wrong numbers.
- 30% would need a profit of 360.

Final Answer: Profit = 25% $\Rightarrow$ **B**

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

Q19.

Solution

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

Step 1 — Multiply by 100: $\frac{19}{20} \times 100 = \frac{1900}{20}.$

Step 2 — Compute: $\frac{1900}{20} = 95$, so $\frac{19}{20} = 95\%.$

Why other options are wrong:

- 90% and 85% come from wrong division.
- 19% ignores the denominator 20.

Final Answer: $\frac{19}{20} = 95\% \Rightarrow$ **A**

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



Q20.

Solution

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

Step 1 — Find the discount: $10\% \text{ of } 3000 = \frac{10}{100} \times 3000 = 300.$

Step 2 — Subtract: Selling price = $3000 - 300 = 2700.$

Why other options are wrong:

- Rs. 3300 adds the discount.
- Rs. 300 is the discount itself and Rs. 2900 uses a wrong discount.

Final Answer: Selling price = Rs. 2700 $\Rightarrow$ **D**

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

Q21.

Solution

Concept — Reverse percentage: If 25% of a number is 90, then $\frac{25}{100}$ of the number equals 90.

Step 1 — Write the equation: $\frac{25}{100} \times x = 90.$

Step 2 — Solve for x : $x = \frac{90 \times 100}{25} = \frac{9000}{25} = 360.$

Why other options are wrong:

- 90 is the given part, not the whole.
- 22.5 and 270 do not give 90 as 25%.

Final Answer: The number is 360 $\Rightarrow$ **A**

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



Q22.

Solution

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

Step 1 — List the data: $P = 6000, R = 5, T = 3$.

Step 2 — Substitute: $SI = \frac{6000 \times 5 \times 3}{100}$.

Step 3 — Compute: $SI = \frac{90000}{100} = 900$.

Why other options are wrong:

- Rs. 1500 and Rs. 300 use wrong values.
- Rs. 90000 omits the division by 100.

Final Answer: $SI = \text{Rs. } 900 \Rightarrow \boxed{\text{D}}$

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

Q23.

Solution

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

Step 1 — Find the amount: $A = 1000 \left(1 + \frac{10}{100}\right)^3 = 1000 \times (1.1)^3$.

Step 2 — Compute the power: $(1.1)^3 = 1.331$, so $A = 1000 \times 1.331 = 1331$.

Step 3 — Subtract the principal: $CI = 1331 - 1000 = 331$.

Why other options are wrong:

- Rs. 300 is the simple interest for 3 years.
- Rs. 1331 is the total amount and Rs. 310 uses only 2 years.

Final Answer: $CI = \text{Rs. } 331 \Rightarrow \boxed{\text{C}}$

Answer: (C) [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: $SI = 250$, $R = 5$, $T = 2$.

Step 2 — Substitute: $P = \frac{250 \times 100}{5 \times 2}$.

Step 3 — Compute: $P = \frac{25000}{10} = 2500$.

Why other options are wrong:

- Rs. 5000, Rs. 1250 and Rs. 2000 do not give Rs. 250 interest.

Final Answer: Principal = Rs. 2500 $\Rightarrow$ **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 $n = 9$: One day's work = $\frac{1}{9}$.

Step 2 — Confirm: In 9 days, $9 \times \frac{1}{9} = 1$ whole work.

Why other options are wrong:

- 9 is the number of days, not the part.
- $\frac{1}{3}$ and $\frac{1}{18}$ are wrong fractions.

Final Answer: One day's work = $\frac{1}{9} \Rightarrow$ **B**

Answer: (B) [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 $\frac{1}{6}$, B does $\frac{1}{3}$.

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

Step 3 — Take the reciprocal: Time together = 2 days.

Why other options are wrong:

- 4 and 9 days come from wrong addition.
- 3 days ignores A's contribution.

Final Answer: They finish in 2 days $\Rightarrow$ A

Answer: (A) [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 $n = 20$: One hour's filling = $\frac{1}{20}$.

Step 2 — Confirm: In 20 hours, $20 \times \frac{1}{20} = 1$ full tank.

Why other options are wrong:

- 20 is the number of hours, not the part.
- $\frac{1}{10}$ and $\frac{1}{40}$ are wrong fractions.

Final Answer: One hour's work = $\frac{1}{20} \Rightarrow$ D

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



Q28.

Solution

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

Step 1 — List the data: Distance = 480 km, time = 8 h.

Step 2 — Divide: $\text{Speed} = \frac{480}{8} = 60 \text{ km/h}$.

Why other options are wrong:

- 480 km/h ignores the time.
- 50 km/h and 472 km/h come from wrong arithmetic.

Final Answer: Speed = 60 km/h $\Rightarrow$ **B**

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

Q29.

Solution

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

Step 1 — List the data: Length = 400 m, time = 16 s.

Step 2 — Divide: $\text{Speed} = \frac{400}{16} = 25 \text{ m/s}$.

Why other options are wrong:

- 416 adds length and time.
- 40 and 50 come from wrong division.

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

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



Q30.

Solution**Concept — Distance:** Distance = speed $\times$ time.**Step 1 — List the data:** Speed = 120 km/h, time = 2 h.**Step 2 — Multiply:** Distance = $120 \times 2 = 240$ km.**Why other options are wrong:**

- 120 km uses only 1 hour.
- 60 km divides instead and 122 km adds.

Final Answer: Distance = 240 km $\Rightarrow$ **A****Answer: (A)** [Go Back to Q30](#)

Q31.

Solution**Concept — Downstream speed:** Downstream speed = speed of boat in still water + speed of stream.**Step 1 — List the data:** Boat = 30 km/h, stream = 6 km/h.**Step 2 — Add:** Downstream speed = $30 + 6 = 36$ km/h.**Why other options are wrong:**

- 24 km/h is the upstream speed.
- 30 km/h ignores the stream and 5 km/h is unrelated.

Final Answer: Downstream speed = 36 km/h $\Rightarrow$ **D****Answer: (D)** [Go Back to Q31](#)

Q32.

Solution

Concept — Obtuse-angled triangle: A triangle is obtuse-angled when exactly one of its interior angles is greater than 90° (the other two are acute).

Step 1 — Recall the definition: An obtuse angle measures more than 90° but less than 180° .

Step 2 — Apply to the figure: The widest angle of the shown triangle is the obtuse one, so one angle is greater than 90° .

Why other options are wrong:

- Equal to 90° describes a right triangle.
- All angles less than 90° describes an acute triangle, and no single triangle angle is 180° .

Final Answer: One angle is greater than $90^\circ \Rightarrow \boxed{A}$

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: $20^2 = 400$ and $21^2 = 441$.

Step 2 — Add them: $400 + 441 = 841$.

Step 3 — Take the square root: $\text{Hypotenuse} = \sqrt{841} = 29 \text{ cm}$.

Why other options are wrong:

- 41 adds the legs instead of using their squares.
- 20 and 21 are the legs, not the hypotenuse.

Final Answer: $\text{Hypotenuse} = 29 \text{ cm} \Rightarrow \boxed{D}$

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



Q34.

Solution

Concept — Linear pair: The two angles of a linear pair lie on a straight line, so they add up to 180° .

Step 1 — Write the equation: $130^\circ + ? = 180^\circ$.

Step 2 — Solve: $? = 180^\circ - 130^\circ = 50^\circ$.

Why other options are wrong:

- 130° repeats the given angle.
- 60° uses a wrong subtraction and 230° exceeds 180° .

Final Answer: The other angle $= 50^\circ \Rightarrow$ A

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

Q35.

Solution

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

Step 1 — List the data: Radius $r = 25$ cm.

Step 2 — Multiply by 2: $d = 2 \times 25 = 50$ cm.

Why other options are wrong:

- 25 cm is the radius itself.
- 12.5 cm halves the radius and 75 cm triples it.

Final Answer: Diameter $= 50$ cm $\Rightarrow$ C

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



Q36.

Solution

Concept — Vertically opposite angles: When two straight lines intersect, the angles opposite each other are always equal.

Step 1 — Identify the pair: The given angle and the angle directly across it are vertically opposite.

Step 2 — Apply the rule: The vertically opposite angle equals the given 85° .

Why other options are wrong:

- 95° and 5° treat the angles as supplementary or complementary.
- 180° is the angle on a straight line.

Final Answer: The vertically opposite angle $= 85^\circ \Rightarrow \boxed{D}$

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

Q37.

Solution

Concept — Exterior angle of a regular polygon: For a regular polygon, number of sides $= \frac{360^\circ}{\text{each exterior angle}}$.

Step 1 — Write the relation: Number of sides $= \frac{360^\circ}{60^\circ}$.

Step 2 — Compute: $\frac{360}{60} = 6$ sides.

Why other options are wrong:

- 5 and 3 give exterior angles of 72° and 120° .
- 60 is the angle value, not the number of sides.

Final Answer: The polygon has 6 sides $\Rightarrow \boxed{B}$

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



Q38.

Solution**Concept — Area of a rectangle:** $\text{Area} = \text{length} \times \text{breadth}$.**Step 1 — List the data:** Length = 11 cm, breadth = 4 cm.**Step 2 — Multiply:** $\text{Area} = 11 \times 4 = 44 \text{ cm}^2$.**Why other options are wrong:**

- 15 cm^2 adds the sides.
- 30 cm^2 uses the perimeter idea and 22 cm^2 halves the answer.

Final Answer: $\text{Area} = 44 \text{ cm}^2 \Rightarrow \boxed{\text{D}}$ **Answer: (D)** [Go Back to Q38](#)

Q39.

Solution**Concept — Perimeter of a square:** $\text{Perimeter} = 4 \times \text{side}$.**Step 1 — List the data:** Side = 14 cm.**Step 2 — Multiply:** $\text{Perimeter} = 4 \times 14 = 56 \text{ cm}$.**Why other options are wrong:**

- 196 cm is the area (14^2), not the perimeter.
- 28 cm uses $2 \times$ side and 14 cm is just the side.

Final Answer: $\text{Perimeter} = 56 \text{ cm} \Rightarrow \boxed{\text{B}}$ **Answer: (B)** [Go Back to Q39](#)

Q40.

Solution**Concept — Area of a circle:** $\text{Area} = \pi r^2$, with $\pi = \frac{22}{7}$.**Step 1 — Square the radius:** $r^2 = (10.5)^2 = 110.25$.**Step 2 — Multiply by π :** $\text{Area} = \frac{22}{7} \times 110.25$.

Step 3 — Compute: $\frac{22}{7} \times 110.25 = 22 \times 15.75 = 346.5 \text{ cm}^2$.

Why other options are wrong:

- 66 cm^2 is the circumference value.
- 33 cm^2 and 110.25 cm^2 skip the π multiplication correctly.

Final Answer: Area = $346.5 \text{ cm}^2 \Rightarrow$ D

Answer: (D) [Go Back to Q40](#)

Q41.

Solution

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

Step 1 — List the data: Length = 8 cm, breadth = 3 cm, height = 2 cm.

Step 2 — Multiply: Volume = $8 \times 3 \times 2 = 48 \text{ cm}^3$.

Why other options are wrong:

- 13 cm^3 adds the dimensions.
- 26 cm^3 and 24 cm^3 use only two of the three dimensions.

Final Answer: Volume = $48 \text{ cm}^3 \Rightarrow$ B

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

Q42.

Solution

Concept — Volume of a cube: Volume = side³.

Step 1 — List the data: Side = 8 cm.

Step 2 — Cube it: Volume = $8 \times 8 \times 8 = 512 \text{ cm}^3$.

Why other options are wrong:

- 24 cm^3 uses $3 \times$ side.
- 64 cm^3 is 8^2 and 128 cm^3 is 2×64 .

Final Answer: Volume = $512 \text{ cm}^3 \Rightarrow$ D

Answer: (D) [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 = 15 cm, height = 8 cm.

Step 2 — Substitute: $\text{Area} = \frac{1}{2} \times 15 \times 8$.

Step 3 — Compute: $\frac{1}{2} \times 120 = 60 \text{ cm}^2$.

Why other options are wrong:

- 120 cm^2 forgets the factor $\frac{1}{2}$.
- 23 cm^2 adds the sides and 30 cm^2 uses wrong numbers.

Final Answer: $\text{Area} = 60 \text{ cm}^2 \Rightarrow \boxed{\text{B}}$

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

Q44.

Solution

Concept — Standard trigonometric values: $\cot 30^\circ$ is a standard ratio equal to $\frac{\cos 30^\circ}{\sin 30^\circ}$.

Step 1 — Use the values: $\cos 30^\circ = \frac{\sqrt{3}}{2}$ and $\sin 30^\circ = \frac{1}{2}$.

Step 2 — Divide: $\cot 30^\circ = \frac{\sqrt{3}/2}{1/2} = \sqrt{3}$.

Why other options are wrong:

- $\frac{1}{\sqrt{3}}$ is $\tan 30^\circ$.
- 1 is $\cot 45^\circ$ and 2 is not a standard cotangent value here.

Final Answer: $\cot 30^\circ = \sqrt{3} \Rightarrow \boxed{\text{C}}$

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



Q45.

Solution

Concept — Standard trigonometric values: $\cos 60^\circ = \frac{1}{2}$.

Step 1 — Recall the value: $\cos 60^\circ = \frac{1}{2}$.

Step 2 — Multiply by 2: $2 \cos 60^\circ = 2 \times \frac{1}{2} = 1$.

Why other options are wrong:

- 2 forgets to multiply by $\cos 60^\circ$.
- $\sqrt{3}$ uses a wrong value and $\frac{1}{2}$ is $\cos 60^\circ$ alone.

Final Answer: $2 \cos 60^\circ = 1 \Rightarrow \boxed{D}$

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

Q46.

Solution

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

Step 1 — Use the values at 90° : $\sin 90^\circ = 1$ and $\cos 90^\circ = 0$.

Step 2 — Substitute and compute: $\sin^2 90^\circ + \cos^2 90^\circ = 1^2 + 0^2 = 1$.

Why other options are wrong:

- 0 and 2 misuse the standard values.
- $\frac{1}{2}$ does not follow from the identity.

Final Answer: $\sin^2 90^\circ + \cos^2 90^\circ = 1 \Rightarrow \boxed{B}$

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: $\tan 60^\circ = \frac{h}{10}.$

Step 2 — Use $\tan 60^\circ = \sqrt{3}$: $\sqrt{3} = \frac{h}{10}.$

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

Why other options are wrong:

- 10 m would use $\tan 45^\circ$.
- 20 m and $\frac{10}{\sqrt{3}}$ m come from wrong ratios.

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

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: $8 + 16 + 24 + 32 + 40 = 120.$

Step 2 — Divide by the count: $\frac{120}{5} = 24.$

Why other options are wrong:

- 120 is the sum, not the mean.
- 20 and 30 use wrong divisors.

Final Answer: Mean = 24 $\Rightarrow \boxed{\text{B}}$

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



Q49.

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: 6, 9, 12, 15, 18 (already increasing).

Step 2 — Find the middle: There are 5 values, so the 3rd value is the median, which is 12.

Why other options are wrong:

- 9 and 15 are not in the middle position.
- 60 is the sum of all the values.

Final Answer: Median = 12 $\Rightarrow$ C

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

Q50.

Solution

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

Step 1 — Count the outcomes: A die has 6 outcomes; the odd numbers are 1, 3, 5, giving 3 favourable outcomes.

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

Why other options are wrong:

- $\frac{1}{3}$ and $\frac{1}{6}$ use a wrong count of favourable outcomes.
- 3 is the number of odd faces, not a probability.

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

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



Answer Key

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

