

Jharkhand Polytechnic Mathematics

Sample Paper – 5

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 18 and 27 is:

- (A) 54
- (B) 3
- (C) 9
- (D) 6

Q2. The LCM (lowest common multiple) of 5 and 7 is:

- (A) 35
- (B) 12
- (C) 5
- (D) 70



Q3. The only even prime number is:

- (A) 4
- (B) 1
- (C) 6
- (D) 2

Q4. Which of the following numbers is irrational?

- (A) 0.6
- (B) $\sqrt{5}$
- (C) $\frac{4}{9}$
- (D) 9

Q5. The predecessor of 500 is:

- (A) 499
- (B) 501
- (C) 500
- (D) 490

Q6. If $2x + 4 = 16$, then the value of x is:

- (A) 10
- (B) 6
- (C) 8
- (D) 12

Q7. The value of $(a - b)^2$ when $a = 8$ and $b = 3$ is:

- (A) 121
- (B) 55
- (C) 11



(D) 25

Q8. The factors of $x^2 - 36$ are:

(A) $(x - 6)(x - 6)$

(B) $(x - 4)(x + 9)$

(C) $(x - 6)(x + 6)$

(D) $(x - 36)(x + 1)$

Q9. If $7x = 49$, then x equals:

(A) 7

(B) 42

(C) 56

(D) 6

Q10. The roots of the quadratic equation $x^2 - 9x + 20 = 0$ are:

(A) 2, 10

(B) 4, 5

(C) -4, -5

(D) 1, 20

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

(A) $6a^2$

(B) $6a$

(C) $13a$

(D) $7a$

Q12. If $a = 5$, the value of $a^2 - 1$ is:

(A) 9



(B) 26

(C) 24

(D) 11

Q13. The ratio 16 : 20 in its simplest form is:

(A) 5 : 4

(B) 4 : 5

(C) 8 : 10

(D) 3 : 5

Q14. The average of 11, 22 and 33 is:

(A) 22

(B) 66

(C) 33

(D) 11

Q15. The fourth proportional to 5, 10 and 15 is:

(A) 20

(B) 25

(C) 7.5

(D) 30

Q16. If $2 : 3 = x : 12$, then the value of x is:

(A) 18

(B) 6

(C) 8

(D) 9

Q17. 75% of 80 is:



- (A) 75
- (B) 60
- (C) 56
- (D) 64

Q18. An article bought for Rs. 400 is sold for Rs. 480. The profit per cent is:

- (A) 20%
- (B) 80%
- (C) 25%
- (D) 16%

Q19. The fraction $\frac{9}{20}$ expressed as a percentage is:

- (A) 9%
- (B) 20%
- (C) 45%
- (D) 90%

Q20. An item marked at Rs. 1000 is sold at a discount of 15%. Its selling price is:

- (A) Rs. 1150
- (B) Rs. 150
- (C) Rs. 985
- (D) Rs. 850

Q21. If 20% of a number is 50, then the number is:

- (A) 10
- (B) 250
- (C) 100
- (D) 1000



- Q22.** The simple interest on Rs. 3000 at 5% per annum for 4 years is:
- (A) Rs. 600
 - (B) Rs. 150
 - (C) Rs. 1200
 - (D) Rs. 660
- Q23.** The compound interest on Rs. 1000 at 20% per annum for 2 years (compounded annually) is:
- (A) Rs. 400
 - (B) Rs. 200
 - (C) Rs. 440
 - (D) Rs. 1440
- Q24.** What sum of money will earn a simple interest of Rs. 200 at 10% per annum in 2 years?
- (A) Rs. 2000
 - (B) Rs. 500
 - (C) Rs. 4000
 - (D) Rs. 1000
- Q25.** If A can complete a piece of work in 15 days, the part of the work A does in one day is:
- (A) 15
 - (B) $\frac{1}{15}$
 - (C) $\frac{1}{30}$
 - (D) 5
- Q26.** A can do a work in 9 days and B can do the same work in 18 days. Working together, they finish it in:



- (A) 6 days
- (B) 27 days
- (C) 3 days
- (D) 13.5 days

Q27. A tap can fill a tank in 12 hours. The part of the tank it fills in one hour is:

- (A) 12
- (B) $\frac{1}{6}$
- (C) $\frac{1}{24}$
- (D) $\frac{1}{12}$

Q28. A car travels 200 km in 5 hours. Its average speed is:

- (A) 1000 km/h
- (B) 205 km/h
- (C) 40 km/h
- (D) 45 km/h

Q29. A train 250 m long crosses a pole in 10 seconds. Its speed is:

- (A) 2500 m/s
- (B) 25 m/s
- (C) 260 m/s
- (D) 50 m/s

Q30. The distance covered by a vehicle moving at 100 km/h in 1.5 hours is:

- (A) 150 km
- (B) 100 km
- (C) 67 km



(D) 200 km

Q31. The speed of a boat in still water is 20 km/h and the speed of the stream is 4 km/h. The downstream speed of the boat is:

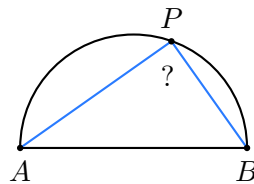
(A) 16 km/h

(B) 5 km/h

(C) 24 km/h

(D) 80 km/h

Q32. In the figure, AB is the diameter of the circle and P is a point on the circle. The angle $\angle APB$ (the angle in a semicircle) is:



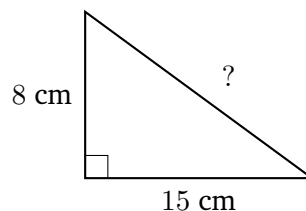
(A) 45°

(B) 180°

(C) 60°

(D) 90°

Q33. In the right-angled triangle shown, the legs measure 8 cm and 15 cm. The length of the hypotenuse is:



(A) 23 cm

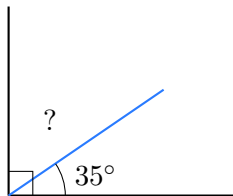
(B) 17 cm

(C) 13 cm



(D) 289 cm

Q34. In the figure, a ray divides the right angle into two parts. If one part is 35° , the other (its complement) is:



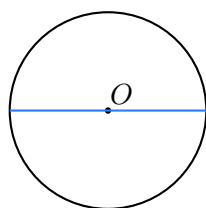
(A) 55°

(B) 145°

(C) 65°

(D) 35°

Q35. In the circle shown with centre O , a chord that passes through the centre is called the:



chord through O

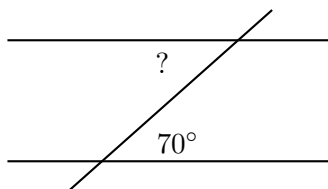
(A) radius

(B) tangent

(C) diameter

(D) arc

Q36. In the figure, two parallel lines are cut by a transversal. If one of the co-interior (same-side interior) angles is 70° , the other is:

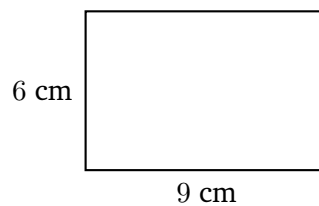


- (A) 70°
- (B) 90°
- (C) 20°
- (D) 110°

Q37. The sum of the interior angles of a hexagon (a six-sided polygon) is:

- (A) 540°
- (B) 720°
- (C) 360°
- (D) 1080°

Q38. The area of the rectangle shown, of length 9 cm and breadth 6 cm, is:



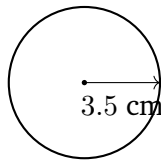
- (A) 54 cm^2
- (B) 30 cm^2
- (C) 15 cm^2
- (D) 108 cm^2

Q39. The perimeter of a square of side 8 cm is:

- (A) 64 cm
- (B) 16 cm
- (C) 32 cm
- (D) 8 cm

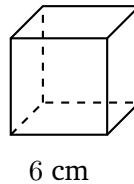
Q40. The area of a circle of radius 3.5 cm $\left(\text{take } \pi = \frac{22}{7}\right)$ is:





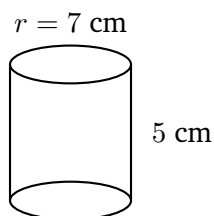
- (A) 22 cm^2
- (B) 38.5 cm^2
- (C) 11 cm^2
- (D) 12.25 cm^2

Q41. The volume of the cube shown, of side 6 cm, is:



- (A) 36 cm^3
- (B) 18 cm^3
- (C) 72 cm^3
- (D) 216 cm^3

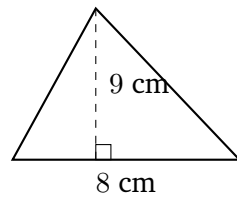
Q42. The volume of the cylinder shown, of radius 7 cm and height 5 cm $\left(\pi = \frac{22}{7}\right)$, is:



- (A) 770 cm^3
- (B) 154 cm^3
- (C) 220 cm^3
- (D) 1540 cm^3



Q43. The area of the triangle shown, with base 8 cm and height 9 cm, is:



- (A) 72 cm^2
- (B) 17 cm^2
- (C) 36 cm^2
- (D) 18 cm^2

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

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

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

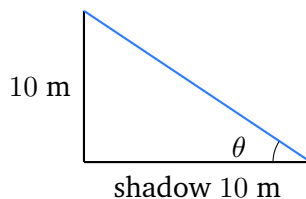
- (A) 1
- (B) 0
- (C) $\frac{1}{2}$
- (D) $\frac{\sqrt{3}}{2}$

Q46. The value of $\tan 60^\circ$ is:

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



Q47. A vertical pole 10 m high casts a shadow 10 m long on the ground, as shown. The angle of elevation of the sun is:

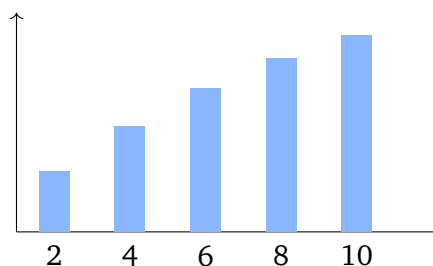


- (A) 30°
- (B) 60°
- (C) 45°
- (D) 90°

Q48. The mean (average) of the numbers 4, 8, 12, 16, 20 is:

- (A) 10
- (B) 12
- (C) 60
- (D) 16

Q49. The data values 2, 4, 6, 8, 10 are shown as bars below. The median of this data is:



- (A) 4
- (B) 8
- (C) 5
- (D) 6



Q50. The probability of drawing a red card from a well-shuffled standard deck of 52 playing cards is:

- (A) $\frac{1}{2}$
- (B) $\frac{1}{4}$
- (C) $\frac{1}{13}$
- (D) $\frac{1}{26}$



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 18 are 1, 2, 3, 6, 9, 18; factors of 27 are 1, 3, 9, 27.

Step 2 — Pick the greatest common one: The common factors are 1, 3, 9; the greatest is 9.

Why other options are wrong:

- 54 is the LCM, not the HCF.
- 3 is a common factor but not the highest.
- 6 does not divide 27 exactly.

Final Answer: $\text{HCF} = 9 \Rightarrow \boxed{\text{C}}$

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 — Note the numbers are co-prime: 5 and 7 are both prime and share no common factor other than 1.

Step 2 — Multiply them: For co-prime numbers the LCM is their product, $5 \times 7 = 35$.

Why other options are wrong:

- 12 is the sum, not the LCM.
- 5 is not a multiple of 7.
- 70 is a common multiple but not the smallest.

Final Answer: $\text{LCM} = 35 \Rightarrow \boxed{\text{A}}$

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



Q3.

Solution

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

Step 1 — Check evenness: An even number is divisible by 2. For an even number to be prime, its only factors must be 1 and itself, so it must equal 2.

Step 2 — Confirm: 2 has factors 1 and 2 only, so it is prime and even. Every other even number has 2 as an extra factor.

Why other options are wrong:

- 4 and 6 are even but composite.
- 1 is neither prime nor composite.

Final Answer: The only even prime is 2 $\Rightarrow$ D

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: $0.6 = \frac{3}{5}$ and $\frac{4}{9}$ are fractions; $9 = \frac{9}{1}$ is an integer.

Step 2 — Identify the irrational: $\sqrt{5} = 2.2360\dots$ never ends or repeats, so it is irrational.

Why other options are wrong:

- 0.6 , $\frac{4}{9}$ and 9 are all rational numbers.

Final Answer: $\sqrt{5}$ is irrational $\Rightarrow$ B

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



Q5.

Solution

Concept — Predecessor: The predecessor of a whole number is the number that comes just before it, found by subtracting 1.

Step 1 — Subtract one: $500 - 1 = 499$.

Step 2 — State the result: The predecessor of 500 is 499.

Why other options are wrong:

- 501 is the successor (the number after).
- 500 is the number itself.
- 490 is ten less, not one less.

Final Answer: Predecessor = 499 $\Rightarrow$ A

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

Q6.

Solution

Concept — Linear equation: Isolate x by first removing the constant term, then dividing by the coefficient.

Step 1 — Subtract 4 from both sides: $2x = 16 - 4 = 12$.

Step 2 — Divide by 2: $x = \frac{12}{2} = 6$.

Why other options are wrong:

- 10 subtracts but forgets to divide.
- 8 and 12 use wrong operations.

Final Answer: $x = 6 \Rightarrow$ 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: $a - b = 8 - 3 = 5$.

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

Why other options are wrong:

- 121 comes from $(8 + 3)^2$.
- 55 and 11 use wrong operations.

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 36 as a square: $x^2 - 36 = x^2 - 6^2$.

Step 2 — Apply the identity: $x^2 - 6^2 = (x - 6)(x + 6)$.

Why other options are wrong:

- $(x - 6)(x - 6) = x^2 - 12x + 36$, which is wrong.
- The other pairs do not multiply back to $x^2 - 36$.

Final Answer: $x^2 - 36 = (x - 6)(x + 6) \Rightarrow \boxed{C}$

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



Q9.

Solution**Concept — Simple equation:** Divide both sides by the coefficient of x .**Step 1 — Divide by 7:** $x = \frac{49}{7}$.**Step 2 — Compute:** $x = 7$.**Why other options are wrong:**

- 42 subtracts instead of dividing.
- 56 adds the numbers.
- 6 is a wrong quotient.

Final Answer: $x = 7 \Rightarrow$ AAnswer: (A) [Go Back to Q9](#)

Q10.

Solution**Concept — Quadratic roots:** Factorise so that the two factors multiply to $+20$ and add to -9 .**Step 1 — Split the middle term:** $x^2 - 9x + 20 = (x - 4)(x - 5)$.**Step 2 — Set each factor to zero:** $x - 4 = 0$ or $x - 5 = 0$, giving $x = 4$ or $x = 5$.**Why other options are wrong:**

- 2, 10 and 1, 20 do not add to 9.
- $-4, -5$ would need the equation $x^2 + 9x + 20$.

Final Answer: Roots are 4 and 5 $\Rightarrow$ BAnswer: (B) [Go Back to Q10](#)

Q11.

Solution

Concept — Like terms: Terms with the same variable can be added by adding their coefficients. A lone a has coefficient 1.

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

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

Why other options are wrong:

- $6a^2$ wrongly multiplies the variables.
- $6a$ ignores the second term.
- $13a$ wrongly adds 6 and 7.

Final Answer: $6a + a = 7a \Rightarrow$ 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: $a^2 = 5^2 = 25$.

Step 2 — Subtract 1: $25 - 1 = 24$.

Why other options are wrong:

- 9 uses $a = \sqrt{10}$ wrongly.
- 26 adds 1 instead of subtracting.
- 11 uses $2a + 1$.

Final Answer: $a^2 - 1 = 24 \Rightarrow$ 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 16 and 20 is 4.**Step 2 — Divide both terms:** $\frac{16}{4} : \frac{20}{4} = 4 : 5$.**Why other options are wrong:**

- 5 : 4 reverses the ratio.
- 8 : 10 is not in simplest form.
- 3 : 5 is incorrect.

Final Answer: $16 : 20 = 4 : 5 \Rightarrow$ BAnswer: (B) [Go Back to Q13](#)

Q14.

Solution**Concept — Average:** $\text{Average} = \frac{\text{sum of values}}{\text{number of values}}$.**Step 1 — Add the values:** $11 + 22 + 33 = 66$.**Step 2 — Divide by the count:** $\frac{66}{3} = 22$.**Why other options are wrong:**

- 66 is the sum, not the average.
- 33 is the largest value.
- 11 is the smallest value.

Final Answer: $\text{Average} = 22 \Rightarrow$ AAnswer: (A) [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: $5 : 10 = 15 : x$.

Step 2 — Cross multiply: $5x = 10 \times 15 = 150$.

Step 3 — Solve: $x = \frac{150}{5} = 30$.

Why other options are wrong:

- 20, 25 and 7.5 do not satisfy the proportion.

Final Answer: Fourth proportional = 30 $\Rightarrow$ D

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

Q16.

Solution

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

Step 1 — Write the equation: $2 : 3 = x : 12$ gives $2 \times 12 = 3 \times x$.

Step 2 — Simplify: $24 = 3x$.

Step 3 — Solve: $x = \frac{24}{3} = 8$.

Why other options are wrong:

- 18, 6 and 9 do not satisfy the cross-multiplication.

Final Answer: $x = 8 \Rightarrow$ 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: $75\% = \frac{75}{100} = \frac{3}{4}$.

Step 2 — Multiply: $\frac{3}{4} \times 80 = \frac{240}{4} = 60$.

Why other options are wrong:

- 75 is the percentage value, not the result.
- 56 and 64 use wrong fractions.

Final Answer: 75% of $80 = 60 \Rightarrow \boxed{\text{B}}$

Answer: (B) [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: $\text{Profit} = 480 - 400 = 80$.

Step 2 — Apply the formula: $\text{Profit}\% = \frac{80}{400} \times 100 = 20\%$.

Why other options are wrong:

- 80% forgets to divide by the cost price.
- 25% uses the selling price as the base.
- 16% uses a wrong base.

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

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



Q19.

Solution

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

Step 1 — Multiply by 100: $\frac{9}{20} \times 100 = \frac{900}{20} = 45$.

Step 2 — Add the sign: $\frac{9}{20} = 45\%$.

Why other options are wrong:

- 9% and 20% just copy the numbers.
- 90% multiplies by 200.

Final Answer: $\frac{9}{20} = 45\% \Rightarrow \boxed{\text{C}}$

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: 15% of 1000 = $\frac{15}{100} \times 1000 = 150$.

Step 2 — Subtract: Selling price = 1000 – 150 = 850.

Why other options are wrong:

- Rs. 1150 adds the discount.
- Rs. 150 is the discount itself.
- Rs. 985 uses a wrong discount.

Final Answer: Selling price = Rs. 850 $\Rightarrow \boxed{\text{D}}$

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



Q21.

Solution

Concept — Reverse percentage: If 20% of a number is 50, then $\frac{20}{100}$ of the number equals 50.

Step 1 — Write the equation: $\frac{20}{100} \times x = 50$.

Step 2 — Solve for x : $x = \frac{50 \times 100}{20} = \frac{5000}{20} = 250$.

Why other options are wrong:

- 10 is 20% of 50.
- 100 and 1000 do not give 50 as their 20%.

Final Answer: The number is 250 $\Rightarrow$ **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: $P = 3000$, $R = 5$, $T = 4$.

Step 2 — Substitute: $SI = \frac{3000 \times 5 \times 4}{100}$.

Step 3 — Compute: $SI = \frac{60000}{100} = 600$.

Why other options are wrong:

- Rs. 150 uses $T = 1$.
- Rs. 1200 doubles the interest.
- Rs. 660 uses a wrong rate.

Final Answer: $SI = \text{Rs. } 600 \Rightarrow$ **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: $A = 1000 \left(1 + \frac{20}{100}\right)^2 = 1000 \times (1.2)^2$.

Step 2 — Compute the power: $(1.2)^2 = 1.44$, so $A = 1000 \times 1.44 = 1440$.

Step 3 — Subtract the principal: CI = $1440 - 1000 = 440$.

Why other options are wrong:

- Rs. 400 is the simple interest.
- Rs. 200 uses $T = 1$.
- Rs. 1440 is the total amount, not the interest.

Final Answer: CI = Rs. 440 $\Rightarrow$ **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 = 200, $R = 10$, $T = 2$.

Step 2 — Substitute: $P = \frac{200 \times 100}{10 \times 2}$.

Step 3 — Compute: $P = \frac{20000}{20} = 1000$.

Why other options are wrong:

- Rs. 2000, Rs. 500 and Rs. 4000 do not give Rs. 200 interest under the given terms.

Final Answer: Principal = Rs. 1000 $\Rightarrow$ **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 $n = 15$: One day's work = $\frac{1}{15}$.

Step 2 — Confirm: In 15 days, $15 \times \frac{1}{15} = 1$ whole work.

Why other options are wrong:

- 15 and 5 are not fractions of work.
- $\frac{1}{30}$ would mean finishing in 30 days.

Final Answer: One day's work = $\frac{1}{15} \Rightarrow \boxed{\text{B}}$

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 $\frac{1}{9}$, B does $\frac{1}{18}$.

Step 2 — Add them: $\frac{1}{9} + \frac{1}{18} = \frac{2}{18} + \frac{1}{18} = \frac{3}{18} = \frac{1}{6}$.

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

Why other options are wrong:

- 27 days adds the days directly.
- 3 days is too fast.
- 13.5 days averages the days wrongly.

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

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 $n = 12$: One hour's filling = $\frac{1}{12}$.

Step 2 — Confirm: In 12 hours, $12 \times \frac{1}{12} = 1$ full tank.

Why other options are wrong:

- 12 is the number of hours, not the part.
- $\frac{1}{6}$ and $\frac{1}{24}$ are wrong fractions.

Final Answer: One hour's work = $\frac{1}{12} \Rightarrow \boxed{\text{D}}$

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

Q28.

Solution

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

Step 1 — List the data: distance = 200 km, time = 5 h.

Step 2 — Divide: $\text{Speed} = \frac{200}{5} = 40 \text{ km/h}$.

Why other options are wrong:

- 1000 multiplies instead of dividing.
- 205 adds the values.
- 45 uses a wrong divisor.

Final Answer: $\text{Speed} = 40 \text{ km/h} \Rightarrow \boxed{\text{C}}$

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 = 250 m, time = 10 s.

Step 2 — Divide: $\text{Speed} = \frac{250}{10} = 25 \text{ m/s}$.

Why other options are wrong:

- 2500 multiplies the values.
- 260 adds them.
- 50 uses a wrong divisor.

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

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

Q30.

Solution

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

Step 1 — Note the data: speed = 100 km/h, time = 1.5 h.

Step 2 — Multiply: Distance = $100 \times 1.5 = 150 \text{ km}$.

Why other options are wrong:

- 100 ignores the half hour.
- 67 divides instead of multiplying.
- 200 uses a wrong time.

Final Answer: Distance = 150 km $\Rightarrow$ **A**

Answer: (A) [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: $20 + 4 = 24$ km/h.

Step 2 — State the result: Downstream speed = 24 km/h.

Why other options are wrong:

- 16 km/h is the upstream speed ($20 - 4$).
- 5 is unrelated and 80 multiplies the speeds.

Final Answer: Downstream speed = 24 km/h $\Rightarrow$ C

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

Q32.

Solution

Concept — Angle in a semicircle: The angle subtended at any point on a circle by a diameter is always a right angle.

Step 1 — Identify the diameter: AB is the diameter and P lies on the circle.

Step 2 — Apply the theorem: $\angle APB = 90^\circ$.

Why other options are wrong:

- 45° and 60° are not guaranteed by the theorem.
- 180° is the straight angle AOB at the centre.

Final Answer: The angle in a semicircle = $90^\circ \Rightarrow$ D

Answer: (D) [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: $8^2 = 64$ and $15^2 = 225$.

Step 2 — Add them: $64 + 225 = 289$.

Step 3 — Take the square root: Hypotenuse = $\sqrt{289} = 17$ cm.

Why other options are wrong:

- 23 adds the legs ($8 + 15$).
- 13 is too small.
- 289 is the square, not the root.

Final Answer: Hypotenuse = 17 cm $\Rightarrow$ **B**

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

Q34.

Solution

Concept — Complementary angles: Two angles that together form a right angle are complementary, so their sum is 90° .

Step 1 — Write the relation: $35^\circ + ? = 90^\circ$.

Step 2 — Subtract: $? = 90^\circ - 35^\circ = 55^\circ$.

Why other options are wrong:

- 145° uses 180° instead of 90° .
- 65° subtracts from 100° .
- 35° just repeats the given angle.

Final Answer: The complement is $55^\circ \Rightarrow$ **A**

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



Q35.

Solution

Concept — Parts of a circle: A chord is a line joining two points on the circle; the chord that passes through the centre is the longest chord and is called the diameter.

Step 1 — Note the centre: The chord shown passes through the centre O .

Step 2 — Name it: Such a chord is the diameter, equal to twice the radius.

Why other options are wrong:

- A radius joins the centre to one point on the circle only.
- A tangent touches the circle at one point.
- An arc is a curved part of the circle.

Final Answer: A chord through the centre is the diameter $\Rightarrow$ C

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

Q36.

Solution

Concept — Co-interior angles: When a transversal cuts two parallel lines, each pair of co-interior (same-side interior) angles adds up to 180° .

Step 1 — Write the relation: $70^\circ + ? = 180^\circ$.

Step 2 — Subtract: $? = 180^\circ - 70^\circ = 110^\circ$.

Why other options are wrong:

- 70° would make them equal, which holds for alternate angles, not co-interior.
- 90° and 20° do not sum to 180° with 70° .

Final Answer: The other co-interior angle $= 110^\circ \Rightarrow$ D

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



Q37.

Solution

Concept — Angle sum of a polygon: The interior angles of an n -sided polygon add up to $(n - 2) \times 180^\circ$.

Step 1 — Use $n = 6$: Sum = $(6 - 2) \times 180^\circ$.

Step 2 — Compute: $4 \times 180^\circ = 720^\circ$.

Why other options are wrong:

- 540° is for a pentagon ($n = 5$).
- 360° is for a quadrilateral.
- 1080° is for an octagon ($n = 8$).

Final Answer: Sum = $720^\circ \Rightarrow$ **B**

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

Q38.

Solution

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

Step 1 — List the data: length = 9 cm, breadth = 6 cm.

Step 2 — Multiply: Area = $9 \times 6 = 54 \text{ cm}^2$.

Why other options are wrong:

- 30 is the perimeter ($2(9 + 6)$).
- 15 is the sum of the sides.
- 108 doubles the area.

Final Answer: Area = $54 \text{ cm}^2 \Rightarrow$ **A**

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



Q39.

Solution**Concept — Perimeter of a square:** $\text{Perimeter} = 4 \times \text{side}$.**Step 1 — List the side:** $\text{side} = 8 \text{ cm}$.**Step 2 — Multiply:** $\text{Perimeter} = 4 \times 8 = 32 \text{ cm}$.**Why other options are wrong:**

- 64 is the area (8^2).
- 16 uses only two sides.
- 8 is one side.

Final Answer: $\text{Perimeter} = 32 \text{ cm} \Rightarrow \boxed{\text{C}}$ **Answer: (C)** [Go Back to Q39](#)

Q40.

Solution**Concept — Area of a circle:** $\text{Area} = \pi r^2$.**Step 1 — Square the radius:** $r^2 = (3.5)^2 = 12.25$.**Step 2 — Multiply by π :** $\text{Area} = \frac{22}{7} \times 12.25 = \frac{22 \times 12.25}{7} = \frac{269.5}{7} = 38.5 \text{ cm}^2$.**Why other options are wrong:**

- 22 is the circumference ($2\pi r$).
- 11 is half the circumference.
- 12.25 is only r^2 .

Final Answer: $\text{Area} = 38.5 \text{ cm}^2 \Rightarrow \boxed{\text{B}}$ **Answer: (B)** [Go Back to Q40](#)

Q41.

Solution**Concept — Volume of a cube:** $\text{Volume} = \text{side}^3$.**Step 1 — List the side:** $\text{side} = 6 \text{ cm}$.**Step 2 — Cube it:** $\text{Volume} = 6 \times 6 \times 6 = 216 \text{ cm}^3$.**Why other options are wrong:**

- 36 is side^2 (the area of a face).
- 18 is 3×6 .
- 72 doubles a face area.

Final Answer: $\text{Volume} = 216 \text{ cm}^3 \Rightarrow \boxed{\text{D}}$ **Answer: (D)** [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:** $154 \times 5 = 770 \text{ cm}^3$.**Why other options are wrong:**

- 154 forgets to multiply by the height.
- 220 uses a wrong value.
- 1540 uses a height of 10 cm.

Final Answer: $\text{Volume} = 770 \text{ cm}^3 \Rightarrow \boxed{\text{A}}$ **Answer: (A)** [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 = 8 cm, height = 9 cm.

Step 2 — Substitute: $\text{Area} = \frac{1}{2} \times 8 \times 9$.

Step 3 — Compute: $\frac{1}{2} \times 72 = 36 \text{ cm}^2$.

Why other options are wrong:

- 72 forgets the factor $\frac{1}{2}$.
- 17 adds base and height.
- 18 halves the wrong value.

Final Answer: $\text{Area} = 36 \text{ cm}^2 \Rightarrow \boxed{\text{C}}$

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

Q44.

Solution

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

Step 1 — Recall the value: $\cos 30^\circ = \frac{\sqrt{3}}{2}$.

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

Why other options are wrong:

- $\frac{1}{2}$ is $\cos 60^\circ$.
- 1 is $\cos 0^\circ$ and $\frac{1}{\sqrt{2}}$ is $\cos 45^\circ$.

Final Answer: $\cos 30^\circ = \frac{\sqrt{3}}{2} \Rightarrow \boxed{\text{D}}$

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



Q45.

Solution

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

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

Step 2 — Confirm: The sine starts at 0 for 0° and rises to 1 at 90° .

Why other options are wrong:

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

Final Answer: $\sin 0^\circ = 0 \Rightarrow \boxed{\text{B}}$

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

Q46.

Solution

Concept — Standard trigonometric values: The value of $\tan 60^\circ$ is a standard ratio.

Step 1 — Recall the value: $\tan 60^\circ = \sqrt{3}$.

Step 2 — Confirm: $\tan 60^\circ = \frac{\sin 60^\circ}{\cos 60^\circ} = \frac{\sqrt{3}/2}{1/2} = \sqrt{3}$.

Why other options are wrong:

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

Final Answer: $\tan 60^\circ = \sqrt{3} \Rightarrow \boxed{\text{A}}$

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



Q47.

Solution

Concept — Angle of elevation: For a pole and its shadow,
 $\tan(\text{angle of elevation}) = \frac{\text{height of pole}}{\text{length of shadow}}.$

Step 1 — Write the ratio: $\tan \theta = \frac{10}{10} = 1.$

Step 2 — Find the angle: Since $\tan 45^\circ = 1$, we get $\theta = 45^\circ.$

Why other options are wrong:

- 30° would need the shadow longer than the pole.
- 60° would need the shadow shorter than the pole.
- 90° would mean no shadow at all.

Final Answer: Angle of elevation = $45^\circ \Rightarrow$

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

Q48.

Solution

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

Step 1 — Add the numbers: $4 + 8 + 12 + 16 + 20 = 60.$

Step 2 — Divide by the count: $\frac{60}{5} = 12.$

Why other options are wrong:

- 10 uses a wrong sum.
- 60 is the sum, not the mean.
- 16 is one of the values, not the mean.

Final Answer: Mean = 12 $\Rightarrow$

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: 2, 4, 6, 8, 10 (already increasing).

Step 2 — Find the middle: There are 5 values, so the 3rd value is the median, which is 6.

Why other options are wrong:

- 4 and 8 are not in the middle position.
- 5 is the average, not the median, of this data.

Final Answer: Median = 6 $\Rightarrow$ D

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

Q50.

Solution

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

Step 1 — Count the cards: A standard deck has 52 cards, of which 26 are red (hearts and diamonds).

Step 2 — Form the ratio: Probability = $\frac{26}{52} = \frac{1}{2}$.

Why other options are wrong:

- $\frac{1}{4}$ would be one suit out of four.
- $\frac{1}{13}$ is for one rank and $\frac{1}{26}$ for one particular card.

Final Answer: Probability of a red card = $\frac{1}{2} \Rightarrow$ A

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



Answer Key

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

