

Jharkhand Polytechnic Mathematics

Sample Paper – 7

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 15 and 25 is:

- (A) 75
- (B) 3
- (C) 5
- (D) 1

Q2. The LCM (lowest common multiple) of 7 and 14 is:

- (A) 14
- (B) 7
- (C) 98
- (D) 21



Q3. The smallest odd prime number is:

- (A) 1
- (B) 2
- (C) 9
- (D) 3

Q4. Identify the irrational number from the options below:

- (A) $\sqrt{4}$
- (B) $\sqrt{7}$
- (C) 0.7
- (D) $\frac{7}{9}$

Q5. The place value of the digit 6 in the number 6300 is:

- (A) 6000
- (B) 600
- (C) 60
- (D) 6

Q6. If $3x + 6 = 24$, then the value of x is:

- (A) 10
- (B) 8
- (C) 6
- (D) 30

Q7. The value of $(a - b)^2$ when $a = 9$ and $b = 5$ is:

- (A) 196
- (B) 16
- (C) 4



(D) 56

Q8. The factors of $x^2 - 64$ are:

(A) $(x - 8)(x - 8)$

(B) $(x - 64)(x + 1)$

(C) $(x + 8)(x + 8)$

(D) $(x - 8)(x + 8)$

Q9. If $9x = 81$, then x equals:

(A) 9

(B) 72

(C) 90

(D) 8

Q10. The roots of the quadratic equation $x^2 - 11x + 30 = 0$ are:

(A) 2, 15

(B) 5, 6

(C) -5, -6

(D) 3, 10

Q11. On simplifying, $4a + 5a$ equals:

(A) $20a$

(B) $9a^2$

(C) $9a$

(D) a

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

(A) 98



(B) 23

(C) 8

(D) 18

Q13. The ratio 35 : 49 in its simplest form is:

(A) 5 : 7

(B) 7 : 5

(C) 35 : 49

(D) 5 : 9

Q14. The average of 9, 18, 27, 36 and 45 is:

(A) 135

(B) 27

(C) 45

(D) 25

Q15. The fourth proportional to 4, 8 and 12 is:

(A) 6

(B) 16

(C) 24

(D) 18

Q16. If $3 : 4 = 15 : x$, then the value of x is:

(A) 11

(B) 12

(C) 16

(D) 20

Q17. 80% of 50 is:



- (A) 50
- (B) 40
- (C) 30
- (D) 45

Q18. An article bought for Rs. 800 is sold for Rs. 1000. The profit per cent is:

- (A) 25%
- (B) 20%
- (C) 12.5%
- (D) 30%

Q19. The fraction $\frac{13}{20}$ expressed as a percentage is:

- (A) 13%
- (B) 26%
- (C) 60%
- (D) 65%

Q20. A jacket marked at Rs. 2000 is sold at a discount of 10%. Its selling price is:

- (A) Rs. 2200
- (B) Rs. 200
- (C) Rs. 1800
- (D) Rs. 1900

Q21. If 15% of a number is 45, then the number is:

- (A) 45
- (B) 300
- (C) 600
- (D) 30



- Q22.** The simple interest on Rs. 4000 at 5% per annum for 2 years is:
- (A) Rs. 400
 - (B) Rs. 200
 - (C) Rs. 420
 - (D) Rs. 800
- Q23.** The compound interest on Rs. 8000 at 10% per annum for 2 years (compounded annually) is:
- (A) Rs. 1600
 - (B) Rs. 800
 - (C) Rs. 1680
 - (D) Rs. 9680
- Q24.** In how many years will Rs. 1500 earn a simple interest of Rs. 240 at 4% per annum?
- (A) 2 years
 - (B) 3 years
 - (C) 5 years
 - (D) 4 years
- Q25.** If A can complete a piece of work in 4 days, the part of the work A does in one day is:
- (A) 4
 - (B) $\frac{1}{4}$
 - (C) $\frac{1}{2}$
 - (D) $\frac{1}{8}$
- Q26.** A can do a work in 12 days and B can do the same work in 24 days. Working together, they finish it in:



- (A) 8 days
- (B) 36 days
- (C) 6 days
- (D) 16 days

Q27. A tap can fill a tank in 9 hours. The part of the tank it fills in one hour is:

- (A) 9
- (B) $\frac{1}{3}$
- (C) $\frac{1}{9}$
- (D) $\frac{1}{18}$

Q28. A car travels 320 km in 4 hours. Its average speed is:

- (A) 1280 km/h
- (B) 84 km/h
- (C) 76 km/h
- (D) 80 km/h

Q29. A train 270 m long crosses a pole in 9 seconds. Its speed is:

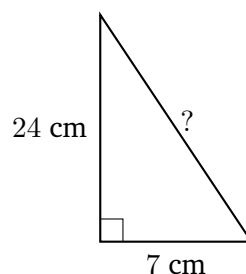
- (A) 27 m/s
- (B) 30 m/s
- (C) 24 m/s
- (D) 15 m/s

Q30. The distance covered by a vehicle moving at 90 km/h in 2 hours is:

- (A) 180 km
- (B) 45 km
- (C) 90 km
- (D) 270 km



- Q31.** The speed of a boat in still water is 22 km/h and the speed of the stream is 3 km/h. The downstream speed of the boat is:
- (A) 19 km/h
(B) 66 km/h
(C) 25 km/h
(D) 22 km/h
- Q32.** The sum of all the exterior angles of any polygon (one at each vertex) is:
- (A) 90°
(B) 180°
(C) 540°
(D) 360°
- Q33.** In the right-angled triangle shown, the legs are 7 cm and 24 cm. The length of the hypotenuse is:

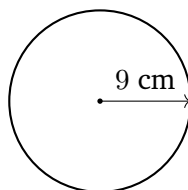


- (A) 25 cm
(B) 24 cm
(C) 31 cm
(D) 17 cm
- Q34.** Two angles are supplementary. If one of them is 120° , the other angle is:
- (A) 30°
(B) 60°



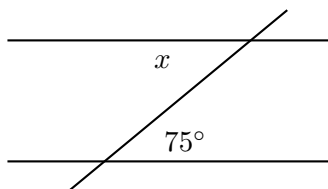
- (C) 80°
(D) 240°

Q35. The diameter of the circle shown, whose radius is 9 cm, is:



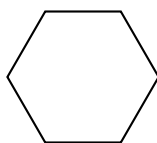
- (A) 4.5 cm
(B) 81 cm
(C) 18 cm
(D) 9 cm

Q36. In the figure, two parallel lines are cut by a transversal. The marked angle x and the angle 75° are alternate interior angles, so x equals:



- (A) 15°
(B) 105°
(C) 25°
(D) 75°

Q37. Each interior angle of the regular hexagon shown is:

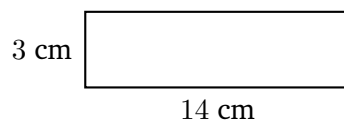


- (A) 120°



- (B) 60°
- (C) 90°
- (D) 108°

Q38. The area of the rectangle shown, of length 14 cm and breadth 3 cm, is:



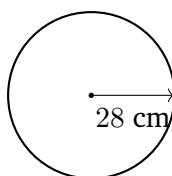
- (A) 34 cm^2
- (B) 42 cm^2
- (C) 17 cm^2
- (D) 84 cm^2

Q39. The perimeter of the square shown, of side 13 cm, is:



- (A) 169 cm
- (B) 26 cm
- (C) 52 cm
- (D) 13 cm

Q40. The area of a circle of radius 28 cm (take $\pi = \frac{22}{7}$) is:



- (A) 176 cm^2

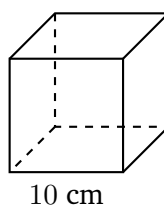


- (B) 88 cm^2
- (C) 784 cm^2
- (D) 2464 cm^2

Q41. The volume of a cuboid of length 7 cm, breadth 2 cm and height 2 cm is:

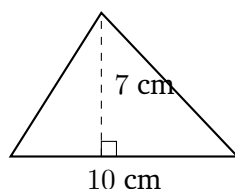
- (A) 28 cm^3
- (B) 11 cm^3
- (C) 14 cm^3
- (D) 56 cm^3

Q42. The volume of the cube shown, of side 10 cm, is:



- (A) 100 cm^3
- (B) 1000 cm^3
- (C) 300 cm^3
- (D) 30 cm^3

Q43. The area of the triangle shown, with base 10 cm and height 7 cm, is:



- (A) 70 cm^2
- (B) 17 cm^2
- (C) 35 cm^2
- (D) 24 cm^2



Q44. The value of $\operatorname{cosec} 90^\circ$ is:

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

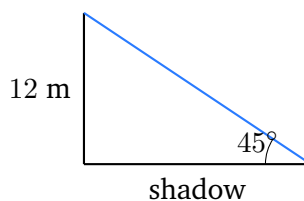
Q45. The value of $\sec 60^\circ$ is:

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

Q46. The value of $\sin^2 60^\circ + \cos^2 60^\circ$ is:

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

Q47. When the angle of elevation of the sun is 45° , the shadow of a vertical pole 12 m high, as shown, has length:



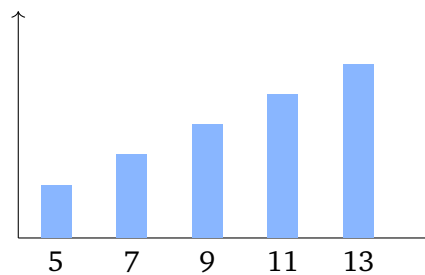
- (A) 24 m
- (B) 6 m
- (C) 12 m
- (D) $12\sqrt{3}$ m



Q48. The mean (average) of the numbers 6, 12, 18, 24, 30 is:

- (A) 18
- (B) 90
- (C) 30
- (D) 15

Q49. The data values 5, 7, 9, 11, 13 are shown as bars below. The median of this data is:



- (A) 7
- (B) 9
- (C) 11
- (D) 45

Q50. A fair die is rolled once. The probability of getting a prime number (that is 2, 3 or 5) is:

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



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

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

Step 1 — Write the factors: Factors of 15 are 1, 3, 5, 15; factors of 25 are 1, 5, 25.

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

Why other options are wrong:

- 75 is the LCM, not the HCF.
- 3 divides 15 but not 25.
- 1 is common but not the highest.

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

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 7: 7, 14, 21, ...; multiples of 14: 14, 28, ...

Step 2 — Find the smallest common one: Since 14 is itself a multiple of 7, the LCM is 14.

Why other options are wrong:

- 7 is a factor, not the LCM.
- 98 and 21 are common multiples but not the smallest.

Final Answer: $\text{LCM} = 14 \Rightarrow \boxed{\text{A}}$

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



Q3.

Solution

Concept — Odd prime numbers: A prime number has exactly two factors. An odd prime is a prime that is not even.

Step 1 — Check the small numbers: 1 is not prime; 2 is prime but even; 3 is prime and odd.

Step 2 — Identify the smallest: The smallest odd prime number is 3.

Why other options are wrong:

- 1 is not a prime number.
- 2 is prime but it is even, not odd.
- $9 = 3 \times 3$ is not prime.

Final Answer: The smallest odd prime is 3 $\Rightarrow$ **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: $\sqrt{4} = 2$ is an integer; $0.7 = \frac{7}{10}$ and $\frac{7}{9}$ are fractions.

Step 2 — Identify the irrational: $\sqrt{7} = 2.6457 \dots$ never ends or repeats, so it is irrational.

Why other options are wrong:

- $\sqrt{4}$, 0.7 and $\frac{7}{9}$ are all rational numbers.

Final Answer: $\sqrt{7}$ is irrational $\Rightarrow$ **B**

Answer: (B) [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 6300, the digit 6 is in the thousands place.

Step 2 — Multiply: Place value = $6 \times 1000 = 6000$.

Why other options are wrong:

- 600 uses the hundreds place.
- 60 uses the tens place.
- 6 is the face value, not the place value.

Final Answer: Place value = 6000 $\Rightarrow$ **A**

Answer: (A) [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 — Subtract 6 from both sides: $3x = 24 - 6 = 18$.

Step 2 — Divide by 3: $x = \frac{18}{3} = 6$.

Why other options are wrong:

- 10 and 8 come from wrong arithmetic.
- 30 adds instead of subtracting before dividing.

Final Answer: $x = 6 \Rightarrow$ **C**

Answer: (C) [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: $a - b = 9 - 5 = 4$.

Step 2 — Square the difference: $(4)^2 = 16$.

Why other options are wrong:

- $196 = (a + b)^2$ uses the sum.
- 4 is the difference, not its square.
- 56 is $2ab$ only.

Final Answer: $(a - b)^2 = 16 \Rightarrow \boxed{\text{B}}$

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

Q8.

Solution

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

Step 1 — Write 64 as a square: $x^2 - 64 = x^2 - 8^2$.

Step 2 — Apply the identity: $x^2 - 8^2 = (x - 8)(x + 8)$.

Why other options are wrong:

- $(x - 8)(x - 8) = x^2 - 16x + 64$, which is wrong.
- $(x + 8)(x + 8) = x^2 + 16x + 64$, which is wrong.
- $(x - 64)(x + 1)$ does not multiply back to $x^2 - 64$.

Final Answer: $x^2 - 64 = (x - 8)(x + 8) \Rightarrow \boxed{\text{D}}$

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



Q9.

Solution**Concept — Simple equation:** Divide both sides by the coefficient of x .**Step 1 — Divide by 9:** $x = \frac{81}{9}$.**Step 2 — Compute:** $x = 9$.**Why other options are wrong:**

- 72 subtracts instead of dividing.
- 90 adds instead of dividing.
- 8 is a wrong quotient.

Final Answer: $x = 9 \Rightarrow$ AAnswer: (A) [Go Back to Q9](#)

Q10.

Solution**Concept — Quadratic roots:** Factorise the quadratic so that the two factors multiply to +30 and add to -11.**Step 1 — Split the middle term:** $x^2 - 11x + 30 = (x - 5)(x - 6)$.**Step 2 — Set each factor to zero:** $x - 5 = 0$ or $x - 6 = 0$, giving $x = 5$ or $x = 6$.**Why other options are wrong:**

- 2, 15 and 3, 10 multiply to 30 but do not add to 11.
- -5, -6 would need the equation $x^2 + 11x + 30$.

Final Answer: Roots are 5 and 6 $\Rightarrow$ 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: $4 + 5 = 9$.

Step 2 — Attach the variable: $4a + 5a = 9a$.

Why other options are wrong:

- $20a$ multiplies the coefficients.
- $9a^2$ wrongly multiplies the variables too.
- a subtracts them.

Final Answer: $4a + 5a = 9a \Rightarrow$ C

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

Q12.

Solution

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

Step 1 — Square first: $a^2 = 2^2 = 4$.

Step 2 — Multiply by 5: $5 \times 4 = 20$.

Step 3 — Subtract 2: $20 - 2 = 18$.

Why other options are wrong:

- 98 uses $(5a)^2$.
- 8 uses $5a - 2$ without squaring.
- 23 comes from a wrong product.

Final Answer: $5a^2 - 2 = 18 \Rightarrow$ D

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 35 and 49 is 7.**Step 2 — Divide both terms:** $\frac{35}{7} : \frac{49}{7} = 5 : 7$.**Why other options are wrong:**

- 7 : 5 reverses the ratio.
- 35 : 49 is not in simplest form.
- 5 : 9 uses a wrong divisor.

Final Answer: $35 : 49 = 5 : 7 \Rightarrow \boxed{A}$ **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:** $9 + 18 + 27 + 36 + 45 = 135$.**Step 2 — Divide by the count:** $\frac{135}{5} = 27$.**Why other options are wrong:**

- 135 is the sum, not the average.
- 45 is the largest value.
- 25 uses a wrong divisor.

Final Answer: $\text{Average} = 27 \Rightarrow \boxed{B}$ **Answer: (B)** [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: $4 : 8 = 12 : x$.

Step 2 — Cross multiply: $4x = 8 \times 12 = 96$.

Step 3 — Solve: $x = \frac{96}{4} = 24$.

Why other options are wrong:

- 6, 16 and 18 do not satisfy the proportion.

Final Answer: Fourth proportional = 24 $\Rightarrow$ C

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

Q16.

Solution

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

Step 1 — Write the equation: $3 : 4 = 15 : x$ gives $3x = 4 \times 15$.

Step 2 — Multiply: $3x = 60$.

Step 3 — Solve: $x = \frac{60}{3} = 20$.

Why other options are wrong:

- 11, 12 and 16 do not keep the ratio 3 : 4.

Final Answer: $x = 20 \Rightarrow$ D

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



Q17.

Solution

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

Step 1 — Write the fraction: $80\% = \frac{80}{100} = \frac{4}{5}$.

Step 2 — Multiply: $\frac{4}{5} \times 50 = \frac{200}{5} = 40$.

Why other options are wrong:

- 50 is the whole number, not 80% of it.
- 30 and 45 use wrong fractions.

Final Answer: 80% of 50 = 40 $\Rightarrow$ **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: Profit = 1000 – 800 = 200.

Step 2 — Apply the formula: $\text{Profit}\% = \frac{200}{800} \times 100$.

Step 3 — Compute: $\frac{200}{800} = \frac{1}{4}$, and $\frac{1}{4} \times 100 = 25\%$.

Why other options are wrong:

- 20% wrongly divides by the selling price.
- 12.5% and 30% use wrong numbers.

Final Answer: Profit = 25% $\Rightarrow$ **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: $\frac{13}{20} \times 100 = \frac{1300}{20}$.

Step 2 — Compute: $\frac{1300}{20} = 65$, so $\frac{13}{20} = 65\%$.

Why other options are wrong:

- 13% ignores the denominator.
- 26% and 60% use wrong arithmetic.

Final Answer: $\frac{13}{20} = 65\% \Rightarrow \boxed{D}$

Answer: (D) [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% of 2000 = $\frac{10}{100} \times 2000 = 200$.

Step 2 — Subtract: Selling price = 2000 – 200 = 1800.

Why other options are wrong:

- Rs. 2200 adds the discount.
- Rs. 200 is the discount itself.
- Rs. 1900 uses a wrong discount.

Final Answer: Selling price = Rs. 1800 $\Rightarrow \boxed{C}$

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



Q21.

Solution

Concept — Reverse percentage: If 15% of a number is 45, write the relation and solve for the number.

Step 1 — Write the equation: $\frac{15}{100} \times x = 45$.

Step 2 — Solve for x : $x = \frac{45 \times 100}{15} = \frac{4500}{15} = 300$.

Why other options are wrong:

- 45 is the given part, not the whole.
- 600 and 30 do not give 45 as 15%.

Final Answer: The number is 300 $\Rightarrow$ **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: $P = 4000$, $R = 5$, $T = 2$.

Step 2 — Substitute: $SI = \frac{4000 \times 5 \times 2}{100}$.

Step 3 — Compute: $SI = \frac{40000}{100} = 400$.

Why other options are wrong:

- Rs. 200 uses $T = 1$.
- Rs. 420 is the compound interest.
- Rs. 800 omits the 100.

Final Answer: $SI = \text{Rs. } 400 \Rightarrow$ **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: $A = 8000 \left(1 + \frac{10}{100}\right)^2 = 8000 \times (1.1)^2$.

Step 2 — Compute the power: $(1.1)^2 = 1.21$, so $A = 8000 \times 1.21 = 9680$.

Step 3 — Subtract the principal: CI = $9680 - 8000 = 1680$.

Why other options are wrong:

- Rs. 1600 is the simple interest.
- Rs. 800 uses one year only.
- Rs. 9680 is the total amount, not the interest.

Final Answer: CI = Rs. 1680 $\Rightarrow$

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

Q24.

Solution

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

Step 1 — List the data: SI = 240, $P = 1500$, $R = 4$.

Step 2 — Substitute: $T = \frac{240 \times 100}{1500 \times 4}$.

Step 3 — Compute: $T = \frac{24000}{6000} = 4$ years.

Why other options are wrong:

- 2, 3 and 5 years do not give Rs. 240 interest.

Final Answer: Time = 4 years $\Rightarrow$

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 $n = 4$: One day's work = $\frac{1}{4}$.

Step 2 — Confirm: In 4 days, $4 \times \frac{1}{4} = 1$ whole work.

Why other options are wrong:

- 4 is the number of days, not a fraction.
- $\frac{1}{2}$ would mean finishing in 2 days.
- $\frac{1}{8}$ would mean finishing in 8 days.

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

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 $\frac{1}{12}$, B does $\frac{1}{24}$.

Step 2 — Add them: $\frac{1}{12} + \frac{1}{24} = \frac{2}{24} + \frac{1}{24} = \frac{3}{24} = \frac{1}{8}$.

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

Why other options are wrong:

- 36 and 16 come from wrong addition.
- 6 days is too fast for these rates.

Final Answer: They finish in 8 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 $n = 9$: One hour's filling = $\frac{1}{9}$.

Step 2 — Confirm: In 9 hours, $9 \times \frac{1}{9} = 1$ full tank.

Why other options are wrong:

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

Final Answer: One hour's work = $\frac{1}{9} \Rightarrow \boxed{\text{C}}$

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

Q28.

Solution

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

Step 1 — List the data: distance = 320 km, time = 4 h.

Step 2 — Divide: $\text{Speed} = \frac{320}{4} = 80 \text{ km/h}$.

Why other options are wrong:

- 1280 multiplies instead of dividing.
- 84 and 76 come from wrong division.

Final Answer: Speed = 80 km/h $\Rightarrow \boxed{\text{D}}$

Answer: (D) [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 = 270 m, time = 9 s.

Step 2 — Divide: $\text{Speed} = \frac{270}{9} = 30 \text{ m/s}$.

Why other options are wrong:

- 27, 24 and 15 come from wrong division.

Final Answer: Speed = 30 m/s $\Rightarrow$ **B**

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

Q30.

Solution

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

Step 1 — List the data: speed = 90 km/h, time = 2 h.

Step 2 — Multiply: Distance = $90 \times 2 = 180 \text{ km}$.

Why other options are wrong:

- 45 divides instead of multiplying.
- 90 ignores the time.
- 270 uses a wrong time.

Final Answer: Distance = 180 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: $22 + 3 = 25$ km/h.

Step 2 — State the result: Downstream speed = 25 km/h.

Why other options are wrong:

- 19 km/h is the upstream speed ($22 - 3$).
- 66 multiplies the speeds.
- 22 ignores the stream.

Final Answer: Downstream speed = 25 km/h $\Rightarrow$ C

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

Q32.

Solution

Concept — Exterior angles of a polygon: For any convex polygon, the sum of the exterior angles, taking one at each vertex, is always 360° .

Step 1 — State the property: This holds no matter how many sides the polygon has.

Step 2 — Confirm: A triangle, a square and a pentagon all have exterior angles adding to 360° .

Why other options are wrong:

- 90° and 180° are too small.
- 540° is the interior angle sum of a pentagon.

Final Answer: Exterior angle sum = $360^\circ \Rightarrow$ 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: $7^2 = 49$ and $24^2 = 576$.

Step 2 — Add them: $49 + 576 = 625$.

Step 3 — Take the square root: Hypotenuse = $\sqrt{625} = 25$ cm.

Why other options are wrong:

- 24 and 17 are smaller than a leg or wrong.
- 31 comes from adding the legs ($7 + 24$).

Final Answer: Hypotenuse = 25 cm $\Rightarrow$ **A**

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

Q34.

Solution

Concept — Supplementary angles: Two supplementary angles add up to 180° .

Step 1 — Write the equation: Other angle = $180^\circ - 120^\circ$.

Step 2 — Subtract: Other angle = 60° .

Why other options are wrong:

- 30° would suit a complementary pair from 150° .
- 80° does not add to 180° with 120° .
- 240° is larger than a straight angle.

Final Answer: The other angle = $60^\circ \Rightarrow$ **B**

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



Q35.

Solution

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

Step 1 — List the radius: $r = 9$ cm.

Step 2 — Double it: $d = 2 \times 9 = 18$ cm.

Why other options are wrong:

- 4.5 halves the radius instead of doubling.
- 81 is r^2 .
- 9 is the radius itself.

Final Answer: Diameter = 18 cm $\Rightarrow$ **C**

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

Q36.

Solution

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

Step 1 — Identify the pair: The angle x and the 75° angle lie on opposite sides of the transversal, between the two parallel lines.

Step 2 — Apply the rule: Being alternate interior angles, $x = 75^\circ$.

Why other options are wrong:

- 105° would be the co-interior (supplementary) angle.
- 15° and 25° are not related to 75° here.

Final Answer: $x = 75^\circ \Rightarrow$ **D**

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



Q37.

Solution

Concept — Interior angle of a regular polygon: Each interior angle = $\frac{(n-2) \times 180^\circ}{n}$, where n is the number of sides.

Step 1 — Use $n = 6$: Each angle = $\frac{(6-2) \times 180^\circ}{6} = \frac{4 \times 180^\circ}{6}$.

Step 2 — Compute: $\frac{720^\circ}{6} = 120^\circ$.

Why other options are wrong:

- 60° is each angle of an equilateral triangle.
- 90° is for a square.
- 108° is for a regular pentagon.

Final Answer: Each interior angle = $120^\circ \Rightarrow \boxed{\text{A}}$

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

Q38.

Solution

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

Step 1 — List the data: length = 14 cm, breadth = 3 cm.

Step 2 — Multiply: Area = $14 \times 3 = 42 \text{ cm}^2$.

Why other options are wrong:

- 34 is the perimeter ($2(14 + 3)$).
- 17 is the half-perimeter.
- 84 doubles the area.

Final Answer: Area = $42 \text{ cm}^2 \Rightarrow \boxed{\text{B}}$

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



Q39.

Solution**Concept — Perimeter of a square:** $\text{Perimeter} = 4 \times \text{side}$.**Step 1 — List the side:** $\text{side} = 13 \text{ cm}$.**Step 2 — Multiply:** $\text{Perimeter} = 4 \times 13 = 52 \text{ cm}$.**Why other options are wrong:**

- 169 is the area (13^2).
- 26 uses only two sides.
- 13 is one side.

Final Answer: $\text{Perimeter} = 52 \text{ cm} \Rightarrow \boxed{\text{C}}$ **Answer: (C)** [Go Back to Q39](#)

Q40.

Solution**Concept — Area of a circle:** $\text{Area} = \pi r^2$.**Step 1 — Square the radius:** $r^2 = 28^2 = 784$.**Step 2 — Multiply by π :** $\text{Area} = \frac{22}{7} \times 784$.**Step 3 — Compute:** $\frac{784}{7} = 112$, and $22 \times 112 = 2464 \text{ cm}^2$.**Why other options are wrong:**

- 176 is the circumference ($2\pi r$).
- 784 is only r^2 .
- 88 is incomplete.

Final Answer: $\text{Area} = 2464 \text{ cm}^2 \Rightarrow \boxed{\text{D}}$ **Answer: (D)** [Go Back to Q40](#)

Q41.

Solution**Concept — Volume of a cuboid:** $\text{Volume} = \text{length} \times \text{breadth} \times \text{height}$.**Step 1 — List the data:** length = 7 cm, breadth = 2 cm, height = 2 cm.**Step 2 — Multiply:** $\text{Volume} = 7 \times 2 \times 2 = 28 \text{ cm}^3$.**Why other options are wrong:**

- 11 adds the dimensions ($7 + 2 + 2$).
- 14 uses only two dimensions.
- 56 doubles the answer.

Final Answer: $\text{Volume} = 28 \text{ cm}^3 \Rightarrow \boxed{\text{A}}$ **Answer: (A)** [Go Back to Q41](#)

Q42.

Solution**Concept — Volume of a cube:** $\text{Volume} = \text{side}^3$.**Step 1 — List the side:** side = 10 cm.**Step 2 — Cube it:** $\text{Volume} = 10 \times 10 \times 10 = 1000 \text{ cm}^3$.**Why other options are wrong:**

- 100 is side^2 (the area of a face).
- 300 multiplies by 3 instead of cubing.
- 30 multiplies side by 3.

Final Answer: $\text{Volume} = 1000 \text{ cm}^3 \Rightarrow \boxed{\text{B}}$ **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 = 7 cm.

Step 2 — Substitute: $\text{Area} = \frac{1}{2} \times 10 \times 7$.

Step 3 — Compute: $\frac{1}{2} \times 70 = 35 \text{ cm}^2$.

Why other options are wrong:

- 70 forgets the factor $\frac{1}{2}$.
- 17 adds base and height.
- 24 uses wrong numbers.

Final Answer: $\text{Area} = 35 \text{ cm}^2 \Rightarrow \boxed{\text{C}}$

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

Q44.

Solution

Concept — Reciprocal ratios: $\operatorname{cosec} \theta = \frac{1}{\sin \theta}$.

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

Step 2 — Take the reciprocal: $\operatorname{cosec} 90^\circ = \frac{1}{1} = 1$.

Why other options are wrong:

- 0 would need $\sin 90^\circ$ to be infinite.
- 2 is $\operatorname{cosec} 30^\circ$.
- $\frac{1}{2}$ is $\sin 30^\circ$, not this value.

Final Answer: $\operatorname{cosec} 90^\circ = 1 \Rightarrow \boxed{\text{D}}$

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



Q45.

Solution

Concept — Reciprocal ratios: $\sec \theta = \frac{1}{\cos \theta}$.

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

Step 2 — Take the reciprocal: $\sec 60^\circ = \frac{1}{1/2} = 2$.

Why other options are wrong:

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

Final Answer: $\sec 60^\circ = 2 \Rightarrow \boxed{\text{A}}$

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

Q46.

Solution

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

Step 1 — Recall the values: $\sin 60^\circ = \frac{\sqrt{3}}{2}$ and $\cos 60^\circ = \frac{1}{2}$.

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

Why other options are wrong:

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

Final Answer: $\sin^2 60^\circ + \cos^2 60^\circ = 1 \Rightarrow \boxed{\text{B}}$

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



Q47.

Solution

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

Step 1 — Write the relation: $\tan 45^\circ = \frac{12}{\text{shadow}}.$

Step 2 — Use $\tan 45^\circ = 1$: $1 = \frac{12}{\text{shadow}}.$

Step 3 — Solve: Shadow = 12 m.

Why other options are wrong:

- 24 doubles the height.
- 6 halves it.
- $12\sqrt{3}$ would use a 30° elevation.

Final Answer: Shadow length = 12 m $\Rightarrow$ C

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: $6 + 12 + 18 + 24 + 30 = 90.$

Step 2 — Divide by the count: $\frac{90}{5} = 18.$

Why other options are wrong:

- 90 is the sum, not the mean.
- 30 is the largest value.
- 15 uses a wrong divisor.

Final Answer: Mean = 18 $\Rightarrow$ A

Answer: (A) [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: 5, 7, 9, 11, 13 (already increasing).

Step 2 — Find the middle: There are 5 values, so the 3rd value is the median, which is 9.

Why other options are wrong:

- 7 and 11 are not in the middle position.
- 45 is the sum of all the values.

Final Answer: Median = 9 $\Rightarrow$ **B**

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

Q50.

Solution

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

Step 1 — Count the outcomes: A die has 6 faces (1 to 6). The prime numbers are 2, 3, 5, so there are 3 favourable outcomes.

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

Why other options are wrong:

- $\frac{1}{3}$ counts only 2 primes.
- $\frac{1}{6}$ counts only 1 outcome.
- $\frac{2}{3}$ counts 4 outcomes.

Final Answer: Probability = $\frac{1}{2} \Rightarrow$ **D**

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

