

Jharkhand Polytechnic Mathematics

Sample Paper – 3

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 20 and 30 is:

- (A) 5
- (B) 60
- (C) 10
- (D) 20

Q2. The LCM (lowest common multiple) of 9 and 12 is:

- (A) 36
- (B) 108
- (C) 3
- (D) 18



Q3. The smallest two-digit prime number is:

- (A) 13
- (B) 10
- (C) 12
- (D) 11

Q4. Among the numbers given below, the irrational one is:

- (A) 0.75
- (B) $\sqrt{3}$
- (C) $\sqrt{16}$
- (D) 7

Q5. The place value of the digit 5 in the number 4567 is:

- (A) 500
- (B) 5
- (C) 50
- (D) 5000

Q6. If $2x + 1 = 9$, then the value of x is:

- (A) 5
- (B) 8
- (C) 10
- (D) 4

Q7. The value of $(a + b)^2$ when $a = 3$ and $b = 4$ is:

- (A) 25
- (B) 49
- (C) 7



(D) 12

Q8. The factors of $x^2 - 16$ are:

(A) $(x - 8)(x + 2)$

(B) $(x - 4)(x - 4)$

(C) $(x - 4)(x + 4)$

(D) $(x + 8)(x - 2)$

Q9. If $5x = 35$, then x equals:

(A) 7

(B) 30

(C) 40

(D) 175

Q10. The roots of the quadratic equation $x^2 - 6x + 8 = 0$ are:

(A) 1, 8

(B) 2, 4

(C) $-2, -4$

(D) 6, 8

Q11. On simplifying, $7a - 3a$ equals:

(A) $21a$

(B) $10a$

(C) $3a$

(D) $4a$

Q12. If $a = 4$, the value of $a^2 + a$ is:

(A) 8



(B) 16

(C) 20

(D) 12

Q13. The ratio 24 : 36 in its simplest form is:

(A) 2 : 3

(B) 3 : 2

(C) 24 : 36

(D) 4 : 6

Q14. The average of 12, 18 and 24 is:

(A) 54

(B) 24

(C) 18

(D) 12

Q15. The fourth proportional to 3, 6 and 9 is:

(A) 12

(B) 18

(C) 6

(D) 27

Q16. If Rs. 90 is divided between two persons in the ratio 2 : 1, the larger share is:

(A) Rs. 30

(B) Rs. 45

(C) Rs. 90

(D) Rs. 60



Q17. 15% of 200 is:

- (A) 30
- (B) 15
- (C) 45
- (D) 20

Q18. An article bought for Rs. 500 is sold for Rs. 400. The loss per cent is:

- (A) 10%
- (B) 20%
- (C) 25%
- (D) 80%

Q19. The fraction $\frac{1}{5}$ expressed as a percentage is:

- (A) 5%
- (B) 15%
- (C) 20%
- (D) 50%

Q20. A bag marked at Rs. 1200 is sold at a discount of 10%. Its selling price is:

- (A) Rs. 120
- (B) Rs. 1320
- (C) Rs. 1100
- (D) Rs. 1080

Q21. If 25% of a number is 40, then the number is:

- (A) 160
- (B) 100
- (C) 65



(D) 10

Q22. The simple interest on Rs. 1500 at 8% per annum for 2 years is:

- (A) Rs. 120
- (B) Rs. 300
- (C) Rs. 240
- (D) Rs. 2400

Q23. The compound interest on Rs. 5000 at 10% per annum for 2 years (compounded annually) is:

- (A) Rs. 1000
- (B) Rs. 1050
- (C) Rs. 500
- (D) Rs. 6050

Q24. In how many years will Rs. 800 earn a simple interest of Rs. 120 at 5% per annum?

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

Q25. If A can complete a piece of work in 6 days, the part of the work A does in one day is:

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



- Q26.** A can do a work in 20 days and B can do the same work in 20 days. Working together, they finish it in:
- (A) 40 days
 - (B) 20 days
 - (C) 10 days
 - (D) 5 days
- Q27.** A tap can fill a tank in 8 hours. The part of the tank it fills in one hour is:
- (A) 8
 - (B) $\frac{1}{8}$
 - (C) $\frac{1}{4}$
 - (D) $\frac{1}{16}$
- Q28.** A car travels 400 km in 8 hours. Its average speed is:
- (A) 3200 km/h
 - (B) 408 km/h
 - (C) 45 km/h
 - (D) 50 km/h
- Q29.** A train 200 m long crosses a pole in 8 seconds. Its speed is:
- (A) 25 m/s
 - (B) 1600 m/s
 - (C) 208 m/s
 - (D) 40 m/s
- Q30.** The distance covered by a vehicle moving at 40 km/h in 3 hours is:
- (A) 40 km
 - (B) 43 km

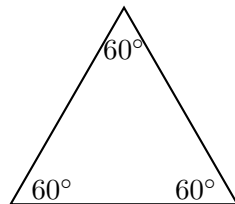


- (C) 120 km
- (D) 80 km

Q31. The speed of a boat in still water is 15 km/h and the speed of the stream is 5 km/h. The downstream speed of the boat is:

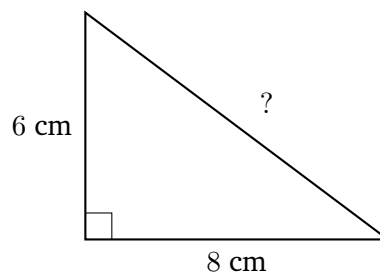
- (A) 10 km/h
- (B) 20 km/h
- (C) 75 km/h
- (D) 5 km/h

Q32. Each interior angle of the equilateral triangle shown measures:



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

Q33. In the right-angled triangle shown, the legs are 6 cm and 8 cm. The length of the hypotenuse is:



- (A) 10 cm
- (B) 14 cm



(C) 12 cm

(D) 7 cm

Q34. When two straight lines intersect, the vertically opposite angles so formed are always:

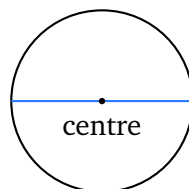
(A) supplementary

(B) equal

(C) complementary

(D) zero

Q35. In a circle, the longest chord is the:



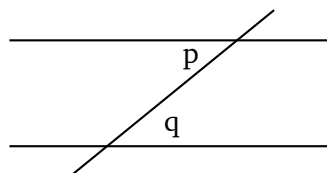
(A) radius

(B) tangent

(C) diameter

(D) arc

Q36. In the figure, two parallel lines are cut by a transversal. The pair of co-interior (allied) angles so formed are always:



(A) equal

(B) complementary

(C) zero



(D) supplementary

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

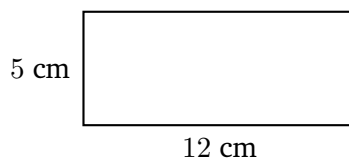
(A) 360°

(B) 540°

(C) 720°

(D) 180°

Q38. The area of the rectangle shown, of length 12 cm and breadth 5 cm, is:



(A) 60 cm^2

(B) 34 cm^2

(C) 17 cm^2

(D) 120 cm^2

Q39. The perimeter of the square shown, of side 11 cm, is:



(A) 121 cm

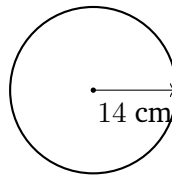
(B) 22 cm

(C) 44 cm

(D) 11 cm

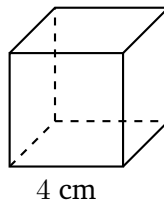
Q40. The area of a circle of radius 14 cm $\left(\text{take } \pi = \frac{22}{7}\right)$ is:





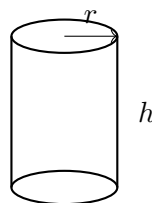
- (A) 88 cm^2
- (B) 196 cm^2
- (C) 308 cm^2
- (D) 616 cm^2

Q41. The volume of the cube shown, of side 4 cm, is:



- (A) 16 cm^3
- (B) 64 cm^3
- (C) 12 cm^3
- (D) 48 cm^3

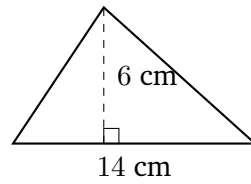
Q42. The curved surface area of the cylinder shown, of radius r and height h , is given by:



- (A) $2\pi rh$
- (B) $\pi r^2 h$
- (C) $2\pi r^2$
- (D) πr^2



Q43. The area of the triangle shown, with base 14 cm and height 6 cm, is:



- (A) 84 cm^2
- (B) 20 cm^2
- (C) 42 cm^2
- (D) 21 cm^2

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

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

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

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

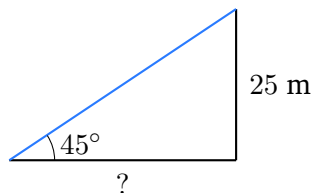
Q46. The value of $\sin 45^\circ$ is:

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



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

Q47. The angle of elevation of the top of a tower of height 25 m from a point on the ground is 45° , as shown. The distance of the point from the base of the tower is:



- (A) 50 m
- (B) 25 m
- (C) $25\sqrt{3}$ m
- (D) 12.5 m

Q48. The mean (average) of the numbers 10, 20, 30, 40 is:

- (A) 100
- (B) 40
- (C) 30
- (D) 25

Q49. The median of the data 4, 6, 8, 10 is:

- (A) 7
- (B) 6
- (C) 8
- (D) 28

Q50. The probability of getting a tail when a fair coin is tossed once is:

- (A) 1



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



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 20 are 1, 2, 4, 5, 10, 20; factors of 30 are 1, 2, 3, 5, 6, 10, 15, 30.

Step 2 — Pick the greatest common one: The common factors are 1, 2, 5, 10; the greatest is 10.

Why other options are wrong:

- 60 is the LCM, not the HCF.
- 5 is a common factor but not the highest.
- 20 does not divide 30.

Final Answer: $\text{HCF} = 10 \Rightarrow \boxed{\text{C}}$

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 9: 9, 18, 27, 36, ...; multiples of 12: 12, 24, 36, ...

Step 2 — Find the smallest common one: The smallest common multiple is 36.

Why other options are wrong:

- 108 is a common multiple but not the smallest.
- 3 is the HCF, and 18 is not a multiple of 12.

Final Answer: $\text{LCM} = 36 \Rightarrow \boxed{\text{A}}$

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



Q3.

Solution

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

Step 1 — Look at two-digit numbers from 10: 10 is divisible by 2 and 5, so it is not prime; 11 has only the factors 1 and 11.

Step 2 — Identify the smallest: The smallest two-digit prime is 11.

Why other options are wrong:

- 10 and 12 are composite (they have more than two factors).
- 13 is prime but larger than 11.

Final Answer: The smallest two-digit prime is 11 $\Rightarrow$ **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: $0.75 = \frac{3}{4}$ is a fraction; $\sqrt{16} = 4$ and $7 = \frac{7}{1}$ are integers.

Step 2 — Identify the irrational: $\sqrt{3} = 1.7320\dots$ never ends or repeats, so it is irrational.

Why other options are wrong:

- 0.75, $\sqrt{16}$ and 7 are all rational numbers.

Final Answer: $\sqrt{3}$ 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 4567, the digit 5 is in the hundreds place.

Step 2 — Multiply: Place value = $5 \times 100 = 500$.

Why other options are wrong:

- 5 is the face value, not the place value.
- 50 and 5000 use the wrong place.

Final Answer: Place value = 500 $\Rightarrow$ A

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

Q6.

Solution

Concept — Linear equation: Undo the operations on x one at a time to isolate it.

Step 1 — Subtract 1 from both sides: $2x = 9 - 1 = 8$.

Step 2 — Divide by 2: $x = \frac{8}{2} = 4$.

Why other options are wrong:

- 5 forgets to divide by 2 after subtracting.
- 8 stops at $2x$ without dividing.
- 10 adds instead of subtracting.

Final Answer: $x = 4 \Rightarrow$ D

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



Q7.

Solution

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

Step 1 — Add first: $a + b = 3 + 4 = 7$.

Step 2 — Square the sum: $(7)^2 = 49$.

Why other options are wrong:

- $25 = a^2 + b^2$ forgets the $2ab$ term.
- 7 is only the sum $a + b$.
- 12 comes from $2ab$ wrongly.

Final Answer: $(a + b)^2 = 49 \Rightarrow \boxed{\text{B}}$

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

Q8.

Solution

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

Step 1 — Write 16 as a square: $x^2 - 16 = x^2 - 4^2$.

Step 2 — Apply the identity: $x^2 - 4^2 = (x - 4)(x + 4)$.

Why other options are wrong:

- $(x - 4)(x - 4) = x^2 - 8x + 16$, which is wrong.
- The other pairs do not multiply back to $x^2 - 16$.

Final Answer: $x^2 - 16 = (x - 4)(x + 4) \Rightarrow \boxed{\text{C}}$

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



Q9.

Solution**Concept — Simple equation:** Divide both sides by the coefficient of x .**Step 1 — Divide by 5:** $x = \frac{35}{5}$.**Step 2 — Compute:** $x = 7$.**Why other options are wrong:**

- 30 subtracts instead of dividing.
- 40 adds the numbers.
- 175 multiplies them.

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

Q10.

Solution**Concept — Quadratic roots:** Factorise the quadratic so that the two factors multiply to $+8$ and add to -6 .**Step 1 — Split the middle term:** $x^2 - 6x + 8 = (x - 2)(x - 4)$.**Step 2 — Set each factor to zero:** $x - 2 = 0$ or $x - 4 = 0$, giving $x = 2$ or $x = 4$.**Why other options are wrong:**

- 1, 8 and 6, 8 do not satisfy the equation.
- $-2, -4$ would need the equation $x^2 + 6x + 8$.

Final Answer: Roots are 2 and 4 $\Rightarrow$ BAnswer: (B) [Go Back to Q10](#)

Q11.

Solution

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

Step 1 — Subtract the coefficients: $7 - 3 = 4$.

Step 2 — Attach the variable: $7a - 3a = 4a$.

Why other options are wrong:

- $21a$ multiplies the coefficients.
- $10a$ adds them.
- $3a$ uses the wrong difference.

Final Answer: $7a - 3a = 4a \Rightarrow$ 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: $a^2 = 4^2 = 16$.

Step 2 — Add a : $16 + 4 = 20$.

Why other options are wrong:

- 8 uses $a + a$ only.
- 16 forgets to add a .
- 12 uses a wrong operation.

Final Answer: $a^2 + a = 20 \Rightarrow$ 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 36 is 12.

Step 2 — Divide both terms: $\frac{24}{12} : \frac{36}{12} = 2 : 3$.

Why other options are wrong:

- 3 : 2 reverses the ratio.
- 24 : 36 and 4 : 6 are not in simplest form.

Final Answer: $24 : 36 = 2 : 3 \Rightarrow \boxed{A}$

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: $12 + 18 + 24 = 54$.

Step 2 — Divide by the count: $\frac{54}{3} = 18$.

Why other options are wrong:

- 54 is the sum, not the average.
- 24 is the largest value.
- 12 is the smallest value.

Final Answer: $\text{Average} = 18 \Rightarrow \boxed{C}$

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: $3 : 6 = 9 : x$.

Step 2 — Cross multiply: $3x = 6 \times 9 = 54$.

Step 3 — Solve: $x = \frac{54}{3} = 18$.

Why other options are wrong:

- 12, 6 and 27 do not satisfy the proportion.

Final Answer: Fourth proportional = 18 $\Rightarrow$ **B**

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

Q16.

Solution

Concept — Dividing a sum in a ratio: Add the ratio parts to get the total number of parts, then find the value of each part.

Step 1 — Total parts: $2 + 1 = 3$ parts.

Step 2 — Value of one part: $\frac{90}{3} = 30$.

Step 3 — Larger share: $2 \text{ parts} = 2 \times 30 = 60$.

Why other options are wrong:

- Rs. 30 is the smaller share (one part).
- Rs. 45 splits the money equally.
- Rs. 90 is the whole amount.

Final Answer: Larger share = Rs. 60 $\Rightarrow$ **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: $15\% = \frac{15}{100}$.

Step 2 — Multiply: $\frac{15}{100} \times 200 = 15 \times 2 = 30$.

Why other options are wrong:

- 15 is the percentage value, not the result.
- 45 and 20 use wrong calculations.

Final Answer: 15% of $200 = 30 \Rightarrow$ A

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

Q18.

Solution

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

Step 1 — Find the loss: $\text{Loss} = 500 - 400 = 100$.

Step 2 — Apply the formula: $\text{Loss}\% = \frac{100}{500} \times 100 = 20\%$.

Why other options are wrong:

- 10% and 25% use wrong numbers.
- 80% is the ratio of selling price to cost price, not the loss.

Final Answer: $\text{Loss} = 20\% \Rightarrow$ 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: $\frac{1}{5} \times 100 = 20$.

Step 2 — Add the sign: $\frac{1}{5} = 20\%$.

Why other options are wrong:

- 5% and 15% use wrong calculations.
- 50% would be the fraction $\frac{1}{2}$.

Final Answer: $\frac{1}{5} = 20\% \Rightarrow \boxed{\text{C}}$

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

Q20.

Solution

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

Step 1 — Find the discount: 10% of 1200 = $\frac{10}{100} \times 1200 = 120$.

Step 2 — Subtract: Selling price = 1200 – 120 = 1080.

Why other options are wrong:

- Rs. 120 is the discount itself.
- Rs. 1320 adds the discount.
- Rs. 1100 uses a wrong discount.

Final Answer: Selling price = Rs. 1080 $\Rightarrow \boxed{\text{D}}$

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



Q21.

Solution

Concept — Reverse percentage: If 25% of a number is 40, then $\frac{25}{100}$ of the number equals 40.

Step 1 — Write the equation: $\frac{25}{100} \times x = 40$.

Step 2 — Solve for x : $x = \frac{40 \times 100}{25} = \frac{4000}{25} = 160$.

Why other options are wrong:

- 100, 65 and 10 do not give 40 as their 25%.

Final Answer: The number is 160 $\Rightarrow$ **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: $P = 1500$, $R = 8$, $T = 2$.

Step 2 — Substitute: $SI = \frac{1500 \times 8 \times 2}{100}$.

Step 3 — Compute: $SI = \frac{24000}{100} = 240$.

Why other options are wrong:

- Rs. 120 uses $T = 1$.
- Rs. 300 uses a wrong rate.
- Rs. 2400 omits the 100.

Final Answer: $SI = \text{Rs. } 240 \Rightarrow$ **C**

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



Q23.

Solution

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

Step 1 — Find the amount: $A = 5000 \left(1 + \frac{10}{100}\right)^2 = 5000 \times (1.1)^2$.

Step 2 — Compute the power: $(1.1)^2 = 1.21$, so $A = 5000 \times 1.21 = 6050$.

Step 3 — Subtract the principal: $\text{CI} = 6050 - 5000 = 1050$.

Why other options are wrong:

- Rs. 1000 is the simple interest.
- Rs. 500 uses $T = 1$.
- Rs. 6050 is the total amount, not the interest.

Final Answer: $\text{CI} = \text{Rs. } 1050 \Rightarrow \boxed{\text{B}}$

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

Q24.

Solution

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

Step 1 — List the data: $\text{SI} = 120$, $P = 800$, $R = 5$.

Step 2 — Substitute: $T = \frac{120 \times 100}{800 \times 5}$.

Step 3 — Compute: $T = \frac{12000}{4000} = 3$ years.

Why other options are wrong:

- 1, 2 and 4 years do not give Rs. 120 interest.

Final Answer: $\text{Time} = 3$ years $\Rightarrow \boxed{\text{D}}$

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 $n = 6$: One day's work = $\frac{1}{6}$.

Step 2 — Confirm: In 6 days, $6 \times \frac{1}{6} = 1$ whole work.

Why other options are wrong:

- 6 and 3 are not fractions of work.
- $\frac{1}{3}$ would mean finishing in 3 days.

Final Answer: One day's work = $\frac{1}{6} \Rightarrow \boxed{A}$

Answer: (A) [Go Back to Q25](#)

Q26.

Solution

Concept — Combined work: Add the one-day works and take the reciprocal for the total time.

Step 1 — One day's work each: A does $\frac{1}{20}$, B does $\frac{1}{20}$.

Step 2 — Add them: $\frac{1}{20} + \frac{1}{20} = \frac{2}{20} = \frac{1}{10}$.

Step 3 — Take the reciprocal: Time together = 10 days.

Why other options are wrong:

- 40 and 20 days are longer than each person alone, which is impossible.
- 5 days is too fast.

Final Answer: They finish in 10 days $\Rightarrow \boxed{C}$

Answer: (C) [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 $n = 8$: One hour's filling = $\frac{1}{8}$.

Step 2 — Confirm: In 8 hours, $8 \times \frac{1}{8} = 1$ full tank.

Why other options are wrong:

- 8 is the number of hours, not the part.
- $\frac{1}{4}$ and $\frac{1}{16}$ are wrong fractions.

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

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

Q28.

Solution

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

Step 1 — List the data: distance = 400 km, time = 8 h.

Step 2 — Divide: $\text{Speed} = \frac{400}{8} = 50 \text{ km/h}$.

Why other options are wrong:

- 3200 multiplies instead of dividing.
- 408 adds the values.
- 45 comes from a wrong division.

Final Answer: Speed = 50 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 = 200 m, time = 8 s.

Step 2 — Divide: $\text{Speed} = \frac{200}{8} = 25 \text{ m/s}$.

Why other options are wrong:

- 1600 multiplies the values.
- 208 adds them.
- 40 uses a wrong divisor.

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

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

Q30.

Solution

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

Step 1 — List the data: speed = 40 km/h, time = 3 h.

Step 2 — Multiply: Distance = $40 \times 3 = 120 \text{ km}$.

Why other options are wrong:

- 40 ignores the time.
- 43 adds instead of multiplying.
- 80 uses a wrong time.

Final Answer: Distance = 120 km $\Rightarrow$ **C**

Answer: (C) [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: $15 + 5 = 20$ km/h.

Step 2 — State the result: Downstream speed = 20 km/h.

Why other options are wrong:

- 10 km/h is the upstream speed ($15 - 5$).
- 75 multiplies and 5 is the stream speed only.

Final Answer: Downstream speed = 20 km/h $\Rightarrow$ **B**

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

Q32.

Solution

Concept — Equilateral triangle: In an equilateral triangle all three sides are equal, so all three angles are equal.

Step 1 — Use the angle sum: The three angles add to 180° .

Step 2 — Divide equally: Each angle = $\frac{180^\circ}{3} = 60^\circ$.

Why other options are wrong:

- 90° is a right angle, found in a right triangle.
- 45° and 30° are smaller than the equal share.

Final Answer: Each angle = $60^\circ \Rightarrow$ **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: $6^2 + 8^2 = 36 + 64 = 100$.

Step 2 — Take the square root: Hypotenuse = $\sqrt{100} = 10$ cm.

Why other options are wrong:

- 14 adds the two legs.
- 12 and 7 do not satisfy the theorem.

Final Answer: Hypotenuse = 10 cm $\Rightarrow$ **A**

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

Q34.

Solution

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

Step 1 — Recall the property: Each pair of vertically opposite angles is equal in measure.

Step 2 — Confirm: They share the same vertex and lie on opposite sides of the intersection.

Why other options are wrong:

- Supplementary (180°) and complementary (90°) describe sums, not vertically opposite angles.
- The angles are not zero.

Final Answer: Vertically opposite angles are equal $\Rightarrow$ **B**

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



Q35.

Solution

Concept — Chords of a circle: A chord joins two points on a circle; the longest possible chord passes through the centre.

Step 1 — Identify the longest chord: A chord through the centre is the diameter.

Step 2 — Confirm: The diameter = $2 \times$ radius, which is longer than any other chord.

Why other options are wrong:

- The radius is only half the diameter.
- A tangent touches the circle at one point and is not a chord.
- An arc is a curved part of the circle, not a chord.

Final Answer: The longest chord is the diameter $\Rightarrow$ **C**

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

Q36.

Solution

Concept — Parallel lines and a transversal: When a transversal cuts two parallel lines, each pair of co-interior (allied) angles on the same side of the transversal adds up to 180° , that is, they are supplementary.

Step 1 — Identify the pair: Angles p and q lie between the parallel lines on the same side of the transversal, so they are co-interior angles.

Step 2 — State the relation: $p + q = 180^\circ$, so they are supplementary.

Why other options are wrong:

- Equal describes corresponding or alternate angles, not co-interior ones.
- Complementary means a sum of 90° .
- The angles are not zero.

Final Answer: Co-interior angles are supplementary $\Rightarrow$ **D**

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



Q37.

Solution

Concept — Angle sum of a polygon: For a polygon with n sides, the sum of the interior angles is $(n - 2) \times 180^\circ$.

Step 1 — Put $n = 5$: A pentagon has 5 sides.

Step 2 — Compute: Sum = $(5 - 2) \times 180^\circ = 3 \times 180^\circ = 540^\circ$.

Why other options are wrong:

- 360° is for a quadrilateral.
- 720° is for a hexagon.
- 180° is for a triangle.

Final Answer: Sum = $540^\circ \Rightarrow$ **B**

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

Q38.

Solution

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

Step 1 — List the data: length = 12 cm, breadth = 5 cm.

Step 2 — Multiply: Area = $12 \times 5 = 60 \text{ cm}^2$.

Why other options are wrong:

- 34 is the perimeter ($2(12 + 5)$).
- 17 is the half-perimeter.
- 120 doubles the area.

Final Answer: Area = $60 \text{ cm}^2 \Rightarrow$ **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:** $\text{side} = 11 \text{ cm}$.**Step 2 — Multiply:** $\text{Perimeter} = 4 \times 11 = 44 \text{ cm}$.**Why other options are wrong:**

- 121 is the area (11^2).
- 22 uses only two sides.
- 11 is one side.

Final Answer: $\text{Perimeter} = 44 \text{ cm} \Rightarrow \boxed{\text{C}}$ **Answer: (C)** [Go Back to Q39](#)

Q40.

Solution**Concept — Area of a circle:** $\text{Area} = \pi r^2$.**Step 1 — Square the radius:** $r^2 = 14^2 = 196$.**Step 2 — Multiply by π :** $\text{Area} = \frac{22}{7} \times 196 = 22 \times 28 = 616 \text{ cm}^2$.**Why other options are wrong:**

- 88 is the circumference ($2\pi r$).
- 196 is only r^2 .
- 308 is half the correct area.

Final Answer: $\text{Area} = 616 \text{ cm}^2 \Rightarrow \boxed{\text{D}}$ **Answer: (D)** [Go Back to Q40](#)

Q41.

Solution**Concept — Volume of a cube:** $\text{Volume} = \text{side}^3$.**Step 1 — List the side:** $\text{side} = 4 \text{ cm}$.**Step 2 — Cube it:** $\text{Volume} = 4 \times 4 \times 4 = 64 \text{ cm}^3$.**Why other options are wrong:**

- 16 is side^2 (the area of a face).
- 12 and 48 use wrong operations.

Final Answer: $\text{Volume} = 64 \text{ cm}^3 \Rightarrow \boxed{\text{B}}$ **Answer: (B)** [Go Back to Q41](#)

Q42.

Solution**Concept — Curved surface area of a cylinder:** If a cylinder is unrolled, its curved surface is a rectangle of width h and length equal to the base circumference $2\pi r$.**Step 1 — Length of the rectangle:** The base circumference $= 2\pi r$.**Step 2 — Multiply by the height:** Curved surface area $= 2\pi r \times h = 2\pi rh$.**Why other options are wrong:**

- $\pi r^2 h$ is the volume of the cylinder.
- $2\pi r^2$ is the area of the two circular ends.
- πr^2 is the area of one circular base.

Final Answer: Curved surface area $= 2\pi rh \Rightarrow \boxed{\text{A}}$ **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 = 14 cm, height = 6 cm.

Step 2 — Substitute: $\text{Area} = \frac{1}{2} \times 14 \times 6$.

Step 3 — Compute: $\frac{1}{2} \times 84 = 42 \text{ cm}^2$.

Why other options are wrong:

- 84 forgets the factor $\frac{1}{2}$.
- 20 adds base and height.
- 21 halves a wrong value.

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

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

Q44.

Solution

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

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

Step 2 — Confirm: Since $\tan \theta = \frac{\sin \theta}{\cos \theta}$, $\tan 30^\circ = \frac{1/2}{\sqrt{3}/2} = \frac{1}{\sqrt{3}}$.

Why other options are wrong:

- $\sqrt{3}$ is $\tan 60^\circ$.
- 1 is $\tan 45^\circ$ and $\frac{\sqrt{3}}{2}$ is $\sin 60^\circ$.

Final Answer: $\tan 30^\circ = \frac{1}{\sqrt{3}} \Rightarrow \boxed{\text{D}}$

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



Q45.

Solution

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

Step 1 — Recall the value: $\cos 90^\circ = 0$.

Step 2 — Confirm: The cosine falls from 1 at 0° to 0 at 90° .

Why other options are wrong:

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

Final Answer: $\cos 90^\circ = 0 \Rightarrow$ A

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

Q46.

Solution

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

Step 1 — Recall the value: $\sin 45^\circ = \frac{1}{\sqrt{2}}$.

Step 2 — Confirm: It comes from an isosceles right triangle where the two legs are equal.

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: $\sin 45^\circ = \frac{1}{\sqrt{2}} \Rightarrow$ C

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



Q47.

Solution

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

Step 1 — Write the relation: $\tan 45^\circ = \frac{25}{d}$, where d is the distance.

Step 2 — Use $\tan 45^\circ = 1$: $1 = \frac{25}{d}.$

Step 3 — Solve for d : $d = 25$ m.

Why other options are wrong:

- 50 doubles the height.
- $25\sqrt{3}$ would use a 30° angle.
- 12.5 halves the height.

Final Answer: Distance = 25 m $\Rightarrow$ **B**

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

Q48.

Solution

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

Step 1 — Add the numbers: $10 + 20 + 30 + 40 = 100.$

Step 2 — Divide by the count: $\frac{100}{4} = 25.$

Why other options are wrong:

- 100 is the sum, not the mean.
- 40 is the largest value.
- 30 uses a wrong divisor.

Final Answer: Mean = 25 $\Rightarrow$ **D**

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



Q49.

Solution

Concept — Median (even number of values): When the data has an even count, the median is the average of the two middle values.

Step 1 — Arrange in order: 4, 6, 8, 10 (already increasing).

Step 2 — Find the two middle values: With 4 values, the middle two are 6 and 8.

Step 3 — Average them: $\text{Median} = \frac{6 + 8}{2} = \frac{14}{2} = 7.$

Why other options are wrong:

- 6 and 8 are the two middle values, not the median.
- 28 is the sum of all the values.

Final Answer: Median = 7 $\Rightarrow$ **A**

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

Q50.

Solution

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

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

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

Why other options are wrong:

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

Final Answer: Probability of a tail = $\frac{1}{2} \Rightarrow$ **B**

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



Answer Key

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

