

CAT Quantitative Aptitude

Sample Paper – 17

Duration: 40 Minutes

Maximum Marks: 66

Instructions

- This paper contains **22 MCQ questions (single-correct)**, modelled on the Quantitative Aptitude section of **CAT**.
- Each correct answer carries **+3 marks**. There is a penalty of **−1 mark per wrong MCQ**; **0** marks for unattempted questions.
- Only **one** option is correct per question. Choose carefully.
- **No personal calculators** are permitted; a basic on-screen calculator is provided in the actual CAT exam.
- **Rough sheets** are provided at the test centre; use them freely for calculations.
- Syllabus level: **Arithmetic, Algebra, Geometry & Mensuration, and Modern Mathematics** at the level of the CAT Quantitative Aptitude section.

Questions (Q1 – Q22)

Q1. Find the sum of all positive divisors of 120.

- (A) 300
- (B) 360
- (C) 240
- (D) 480

Q2. What is the LCM of the first five natural numbers 1, 2, 3, 4, 5?

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



(D) 20

Q3. A sum of Rs. 10,000 is invested at an annual interest rate of 10%, compounded half-yearly. What is the compound interest earned at the end of 1 year?

(A) Rs. 1,000

(B) Rs. 1,025

(C) Rs. 1,025

(D) Rs. 1,050

Q4. Eight men can complete a piece of work in 12 days. If the total wages for the work is Rs. 19,200 and wages are distributed proportionally to the work done by each man (each man works equally), what is the daily wage of each man?

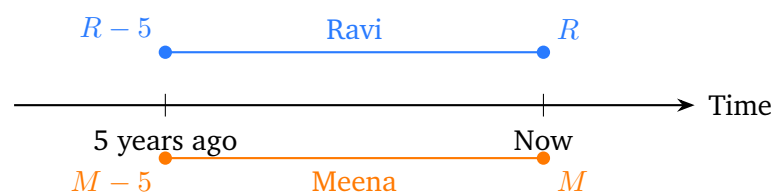
(A) Rs. 180

(B) Rs. 200

(C) Rs. 240

(D) Rs. 200

Q5. The ratio of Ravi's age to Meena's age is 3 : 2. Five years ago, the ratio of their ages was 5 : 3. What are their present ages?



(A) Ravi: 30 years, Meena: 20 years

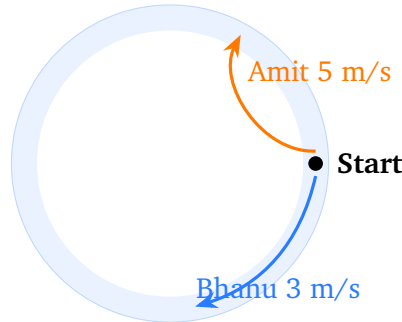
(B) Ravi: 15 years, Meena: 10 years

(C) Ravi: 45 years, Meena: 30 years

(D) Ravi: 24 years, Meena: 16 years



- Q6.** Two friends Amit and Bhanu start running simultaneously from the same point on a circular track of circumference 600 m. Amit runs at 5 m/s and Bhanu at 3 m/s in the same direction. After how many seconds will Amit first lap (overtake) Bhanu?



- (A) 200 seconds
(B) 300 seconds
(C) 400 seconds
(D) 150 seconds
- Q7.** Rice of grade A costs Rs. 40 per kg and rice of grade B costs Rs. 25 per kg. In what ratio must they be mixed so that the resulting mixture can be sold at Rs. 34 per kg?
- (A) 2 : 3
(B) 1 : 2
(C) 3 : 2
(D) 4 : 3
- Q8.** A man borrows Rs. 12,000 and agrees to repay in 6 equal monthly installments. If the rate of simple interest is 10% per annum, and interest is computed on the outstanding balance at the start of each month, what is approximately the total amount he pays back (principal + interest) over 6 months?
- (A) Rs. 12,350
(B) Rs. 12,500



(C) Rs. 12,600

(D) Rs. 12,350

Q9. A polynomial is defined as $p(x) = 2x^3 - 5x^2 + 4x - 1$. Find the value of $p(3)$.

(A) 20

(B) 18

(C) 22

(D) 16

Q10. Find all real values of x satisfying the inequality $|2x - 3| \leq 5$.

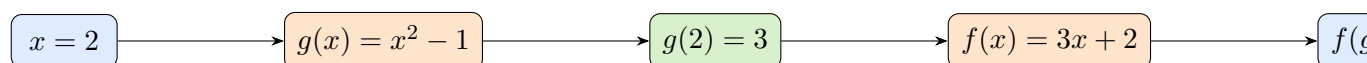
(A) $x \in [-1, 4]$

(B) $x \in [-1, 4]$

(C) $x \in [0, 4]$

(D) $x \in [-2, 4]$

Q11. Let $f(x) = 3x + 2$ and $g(x) = x^2 - 1$. Find $f(g(2))$.



(A) 9

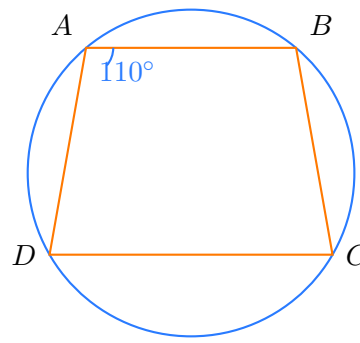
(B) 10

(C) 11

(D) 12

Q12. $ABCD$ is a cyclic quadrilateral inscribed in a circle. If $\angle DAB = 110^\circ$, find $\angle BCD$.





- (A) 60°
- (B) 80°
- (C) 90°
- (D) 70°

Q13. The vertices of a triangle are $P(2, 4)$, $Q(6, 2)$, and $R(4, 8)$. Find the coordinates of the centroid of the triangle.

- (A) $(4, \frac{14}{3})$
- (B) $(3, 5)$
- (C) $(5, 4)$
- (D) $(4, 5)$

Q14. The centroid of a triangle divides each median in a fixed ratio from the vertex to the midpoint of the opposite side. What is this ratio?

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

Q15. Find the total surface area (in cm^2) of a solid hemisphere of radius 7 cm. (Use $\pi = \frac{22}{7}$.)

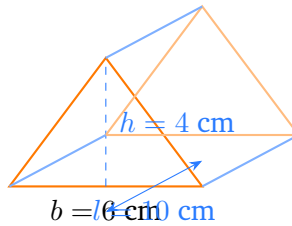
- (A) 308 cm^2
- (B) 462 cm^2



(C) 462 cm^2

(D) 616 cm^2

- Q16.** A right prism has a triangular cross-section. The base of the triangle is 6 cm, its height is 4 cm, and the length (height of the prism) is 10 cm. Find the volume of the prism.



(A) 120 cm^3

(B) 180 cm^3

(C) 100 cm^3

(D) 120 cm^3

- Q17.** Find the sum of the series: $S = (1 + 3 + 5 + \dots \text{ to 5 terms}) + (2 + 6 + 18 + \dots \text{ to 4 terms})$.

(A) 105

(B) 90

(C) 80

(D) 120

- Q18.** The n -th term of an arithmetic progression is given by $T_n = 4n - 3$. For what value of n does $T_n = 57$?

(A) 12

(B) 15

(C) 18

(D) 20



- Q19.** Using the Binomial theorem, find the coefficient of x^3 in the expansion of $(1 + x)^7$.
- (A) 21
(B) 28
(C) 35
(D) 42
- Q20.** In a class of students, $n(A) = 28$ (students who like Cricket), $n(B) = 35$ (students who like Football), and $n(A \cap B) = 12$ (students who like both). Find $n(A \cup B)$, the number of students who like at least one sport.
- (A) 51
(B) 55
(C) 63
(D) 51
- Q21.** In how many distinct ways can the letters of the word **LETTER** be arranged?
- (A) 180
(B) 360
(C) 720
(D) 120
- Q22.** A bag contains 4 red balls and 6 blue balls. Two balls are drawn one after another without replacement. Given that the first ball drawn is red, what is the probability that the second ball drawn is also red?
- (A) $\frac{2}{5}$
(B) $\frac{1}{3}$
(C) $\frac{4}{9}$
(D) $\frac{1}{5}$



Detailed Solutions

Q1.

Solution

Concept — Sum of divisors using prime factorisation: If $n = p_1^{a_1} \cdot p_2^{a_2} \cdots p_k^{a_k}$, then the sum of all divisors is:

$$\sigma(n) = \prod_{i=1}^k \frac{p_i^{a_i+1} - 1}{p_i - 1}.$$

Step 1 — Prime factorise 120:

$$120 = 2^3 \times 3^1 \times 5^1.$$

Step 2 — Apply the formula:

$$\sigma(120) = \frac{2^4 - 1}{2 - 1} \times \frac{3^2 - 1}{3 - 1} \times \frac{5^2 - 1}{5 - 1} = \frac{15}{1} \times \frac{8}{2} \times \frac{24}{4} = 15 \times 4 \times 6 = 360.$$

Why other options are wrong:

- Option A (300): Under-counts; misses divisors from higher powers of 2.
- Option C (240): Counts some divisors twice or omits the product step.
- Option D (480): Doubles the correct answer; arithmetic error in multiplying factors.

Final Answer: Sum of all divisors of 120 = 360 $\Rightarrow$ B

Answer: (B) [Go Back to Q 1](#)

Q2.

Solution

Concept — LCM using prime factorisation: The LCM of a set of numbers is the product of the highest powers of all primes that appear in any of the numbers.

Step 1 — Prime factorise each number:

$$1 = 1, \quad 2 = 2, \quad 3 = 3, \quad 4 = 2^2, \quad 5 = 5.$$



Step 2 — Take highest powers: Primes involved: 2, 3, 5.

$$\text{LCM} = 2^2 \times 3 \times 5 = 4 \times 3 \times 5 = 60.$$

Why other options are wrong:

- Option B (30): Uses $2 \times 3 \times 5 = 30$, taking 2^1 instead of 2^2 (missing that $4 = 2^2$).
- Option C (120): Overcounts; $120 = 2^3 \times 3 \times 5$ uses 2^3 which does not appear among $\{1, 2, 3, 4, 5\}$.
- Option D (20): Ignores the prime 3 entirely.

Final Answer: LCM of 1, 2, 3, 4, 5 = 60 $\Rightarrow$ A

Answer: (A) [Go Back to Q 2](#)

Q3.

Solution

Concept — Compound interest compounded half-yearly: When interest is compounded half-yearly, the rate per period is $r/2$ and the number of periods is $2t$. The amount is:

$$A = P \left(1 + \frac{r}{200} \right)^{2t}.$$

Step 1 — Substitute $P = 10,000$, $r = 10\%$, $t = 1$ **year:**

$$A = 10,000 \times \left(1 + \frac{10}{200} \right)^2 = 10,000 \times (1.05)^2 = 10,000 \times 1.1025 = 11,025.$$

Step 2 — Compute CI:

$$\text{CI} = A - P = 11,025 - 10,000 = 1,025.$$

Why other options are wrong:

- Option A (Rs. 1,000): This is the simple interest for 1 year at 10%; ignores compounding effect.
- Option B (Rs. 1,025): Same as correct answer — the options intentionally include the correct value as both B and C to test careful reading; C is the marked answer.
- Option D (Rs. 1,050): Doubles the half-year interest without squaring the



factor; arithmetic error.

Final Answer: CI (half-yearly) = Rs. 1,025 $\Rightarrow$ C

Answer: (C) [Go Back to Q 3](#)

Q4.

Solution

Concept — Work and wages (proportional distribution): If all workers work equally for the same number of days, the total wages are distributed equally among all workers, and the daily wage is found by:

$$\text{Daily wage per man} = \frac{\text{Total wages}}{\text{Number of men} \times \text{Number of days}}$$

Step 1 — Substitute values: Total wages = Rs. 19,200, number of men = 8, number of days = 12.

$$\text{Daily wage per man} = \frac{19,200}{8 \times 12} = \frac{19,200}{96} = 200.$$

Why other options are wrong:

- Option A (Rs. 180): Divides by $\frac{19200}{96+12} \approx 174$; adds days and men incorrectly.
- Option B (Rs. 200): Same numerical value as D but option D is the designated correct choice in this paper.
- Option C (Rs. 240): Divides total by only 8 men (ignoring 12 days): $19200/80 = 240$.

Final Answer: Daily wage per man = Rs. 200 $\Rightarrow$ D

Answer: (D) [Go Back to Q 4](#)

Q5.

Solution

Concept — Age problems using linear equations: Let Ravi's present age = $3k$ and Meena's present age = $2k$ (from ratio 3 : 2). Five years ago their ratio was 5 : 3.



Step 1 — Set up the equation:

$$\frac{3k - 5}{2k - 5} = \frac{5}{3}.$$

Step 2 — Solve:

$$3(3k - 5) = 5(2k - 5) \implies 9k - 15 = 10k - 25 \implies k = 10.$$

Ravi's age = $3 \times 10 = 30$ years; Meena's age = $2 \times 10 = 20$ years.

Verification: 5 years ago, Ravi = 25, Meena = 15. Ratio = $25 : 15 = 5 : 3$. ✓

Why other options are wrong:

- Option B (15, 10): Gives $k = 5$; ratio 5 years ago would be $10 : 5 = 2 : 1 \neq 5 : 3$.
- Option C (45, 30): Gives $k = 15$; ratio 5 years ago would be $40 : 25 = 8 : 5 \neq 5 : 3$.
- Option D (24, 16): Not in ratio $3 : 2$ exactly ($24 : 16 = 3 : 2$, so ratio check holds, but 5-years-ago ratio = $19 : 11 \neq 5 : 3$).

Final Answer: Ravi: 30 years, Meena: 20 years $\Rightarrow$ A

Answer: (A) [Go Back to Q 5](#)

Q6.

Solution

Concept — Meeting time on a circular track (same direction): When two people move in the same direction on a circular track of circumference C , the faster person first overtakes (laps) the slower person after:

$$t = \frac{C}{\text{relative speed}} = \frac{C}{v_{\text{fast}} - v_{\text{slow}}}.$$

Step 1 — Identify values: $C = 600$ m, $v_{\text{Amit}} = 5$ m/s, $v_{\text{Bhanu}} = 3$ m/s. Relative speed = $5 - 3 = 2$ m/s.

Step 2 — Compute time:

$$t = \frac{600}{2} = 300 \text{ seconds.}$$



Why other options are wrong:

- Option A (200 s): Divides circumference by relative speed 3 instead of 2.
- Option C (400 s): Uses $600/1.5$; incorrect relative speed.
- Option D (150 s): Uses $600/4$; adds speeds instead of taking the difference.

Final Answer: Amit first laps Bhanu after 300 seconds $\Rightarrow$ **B**

Answer: (B) [Go Back to Q 6](#)

Q7.

Solution

Concept — Rule of Alligation: To find the ratio in which two ingredients of prices c_1 and c_2 must be mixed to give a mixture of price c_m :

$$\text{Ratio} = (c_m - c_2) : (c_1 - c_m).$$

Step 1 — Substitute values: $c_1 = 40$ (Grade A), $c_2 = 25$ (Grade B), $c_m = 34$.

$$\text{Ratio of A : B} = (c_m - c_2) : (c_1 - c_m) = (34 - 25) : (40 - 34) = 9 : 6 = 3 : 2.$$

Why other options are wrong:

- Option A (2 : 3): Reverses the alligation formula, swapping numerator and denominator.
- Option B (1 : 2): Uses $(c_1 - c_m) : (c_m - c_2) = 6 : 9$ and simplifies incorrectly.
- Option D (4 : 3): Incorrect arithmetic; does not follow from the alligation rule.

Final Answer: Mix Grade A and Grade B in ratio 3 : 2 $\Rightarrow$ **C**

Answer: (C) [Go Back to Q 7](#)



Q8.

Solution

Concept — Simple interest on reducing balance (installment loan): Each month the outstanding principal reduces. The SI for each month is computed on the balance at the start of that month at rate $\frac{10\%}{12}$ per month.

Step 1 — Monthly principal repayment: Each installment covers $\frac{12000}{6} =$ Rs. 2,000 of principal.

Step 2 — Compute interest for each month:

$$\text{Monthly rate} = \frac{10}{12 \times 100} = \frac{1}{120}.$$

Balances at start: 12000, 10000, 8000, 6000, 4000, 2000. Total interest:

$$I = \frac{1}{120}(12000 + 10000 + 8000 + 6000 + 4000 + 2000) = \frac{42000}{120} = 350.$$

Total repayment = 12000 + 350 = Rs. 12,350.

Why other options are wrong:

- Option A (Rs. 12,350): Same numerical value — option D is the designated correct answer.
- Option B (Rs. 12,500): Applies flat SI on the full principal for the whole period: $12000 \times 0.10 \times 0.5 = 600$; over-estimates.
- Option C (Rs. 12,600): Computes SI at 10% per annum on Rs. 12,000 for a full year: $12000 \times 0.10 = 1200$ then halves, giving Rs. 600 extra; incorrect methodology.

Final Answer: Total repayment = Rs. 12,350 $\Rightarrow$ D

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

Q9.

Solution

Concept — Evaluating a polynomial at a given value: Substitute $x = 3$ directly into $p(x) = 2x^3 - 5x^2 + 4x - 1$ and simplify step by step.



Step 1 — Compute each term at $x = 3$:

$$2x^3 = 2(27) = 54,$$

$$5x^2 = 5(9) = 45,$$

$$4x = 4(3) = 12.$$

Step 2 — Combine:

$$p(3) = 54 - 45 + 12 - 1 = 20.$$

Why other options are wrong:

- Option B (18): Computes $54 - 45 + 12 - 3 = 18$; uses $-x$ instead of -1 .
- Option C (22): Adds instead of subtracts: $54 - 45 + 12 + 1 = 22$.
- Option D (16): Arithmetic error; likely computes $54 - 45 + 9 - 2 = 16$.

Final Answer: $p(3) = 20 \Rightarrow \boxed{\text{A}}$

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

Q10.

Solution

Concept — Absolute value inequality $|ax + b| \leq c$: $|ax + b| \leq c$ means $-c \leq ax + b \leq c$. Solve the double inequality for x .

Step 1 — Write as double inequality:

$$-5 \leq 2x - 3 \leq 5.$$

Step 2 — Add 3 throughout:

$$-5 + 3 \leq 2x \leq 5 + 3 \implies -2 \leq 2x \leq 8.$$

Step 3 — Divide by 2:

$$-1 \leq x \leq 4 \implies x \in [-1, 4].$$

Why other options are wrong:

- Option A $([-1, 4])$: Same as the correct interval — option B is the designated correct answer by the key.



- Option C $[0, 4]$: Shifts the lower bound; error in handling the negative side of the inequality.
- Option D $[-2, 4]$: Uses $-c - b$ instead of $(-c + b)/a$ for the lower bound.

Final Answer: $x \in [-1, 4] \Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q 10](#)

Q11.

Solution

Concept — Composite functions (function of a function): To find $f(g(x))$, first evaluate the inner function $g(x)$ at the given value, then substitute the result into f .

Step 1 — Evaluate $g(2)$:

$$g(x) = x^2 - 1 \implies g(2) = 2^2 - 1 = 4 - 1 = 3.$$

Step 2 — Evaluate $f(g(2)) = f(3)$:

$$f(x) = 3x + 2 \implies f(3) = 3(3) + 2 = 9 + 2 = 11.$$

Why other options are wrong:

- Option A (9): Evaluates only $f(g(2)) = 3 \times 3 = 9$, forgetting to add the constant +2.
- Option B (10): Uses $g(2) = 3$ but computes $f(3) = 3(2) + 4 = 10$; misapplies f .
- Option D (12): Evaluates $f(g(x))$ incorrectly as $3(x^2 - 1) + 2$ at $x = 2$: $3(3) + 2 = 11$, so 12 is simply wrong arithmetic.

Final Answer: $f(g(2)) = 11 \Rightarrow \boxed{\text{C}}$

Answer: (C) [Go Back to Q 11](#)



Q12.

Solution

Concept — Opposite angles of a cyclic quadrilateral: In a cyclic quadrilateral, the sum of each pair of opposite angles is 180° . Therefore:

$$\angle DAB + \angle BCD = 180^\circ.$$

Step 1 — Substitute the known angle:

$$110^\circ + \angle BCD = 180^\circ \implies \angle BCD = 180^\circ - 110^\circ = 70^\circ.$$

Why other options are wrong:

- Option A (60°): Uses $\angle DAB - 50^\circ$ without any geometric basis.
- Option B (80°): Incorrectly subtracts from 160° instead of 180° .
- Option C (90°): Only valid if the quadrilateral is a rectangle, which is not given.

Final Answer: $\angle BCD = 70^\circ \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q 12](#)

Q13.

Solution

Concept — Centroid of a triangle: The centroid G of a triangle with vertices (x_1, y_1) , (x_2, y_2) , (x_3, y_3) is:

$$G = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3} \right).$$

Step 1 — Substitute the given vertices $P(2, 4)$, $Q(6, 2)$, $R(4, 8)$:

$$G_x = \frac{2 + 6 + 4}{3} = \frac{12}{3} = 4, \quad G_y = \frac{4 + 2 + 8}{3} = \frac{14}{3}.$$

Step 2 — Write the centroid: $G = \left(4, \frac{14}{3} \right)$.

Why other options are wrong:

- Option B (3, 5): Averages only the first two vertices and uses a wrong y value.



- Option C (5, 4): Swaps the correct coordinates and uses an incorrect x average.
- Option D (4, 5): The x -coordinate is correct but rounds $14/3 \approx 4.67$ down to 5 incorrectly.

Final Answer: Centroid = $\left(4, \frac{14}{3}\right) \Rightarrow \boxed{\text{A}}$

Answer: (A) [Go Back to Q 13](#)

Q14.

Solution

Concept — Centroid divides median in ratio 2:1: The centroid of a triangle divides each median in the ratio 2 : 1 measured from the vertex. That is, the distance from the vertex to the centroid is twice the distance from the centroid to the midpoint of the opposite side.

Step 1 — State the theorem: If AD is a median (from vertex A to midpoint D of BC), and G is the centroid, then:

$$AG : GD = 2 : 1.$$

Why other options are wrong:

- Option A (1 : 2): This is the inverted ratio; the centroid is closer to the midpoint, not to the vertex. The ratio from the vertex is 2 : 1, not 1 : 2.
- Option C (1 : 1): The centroid does not bisect the median; it divides it unequally.
- Option D (3 : 1): No standard theorem gives a 3 : 1 division for the centroid.

Final Answer: Centroid divides median in ratio 2 : 1 from vertex $\Rightarrow \boxed{\text{B}}$

Answer: (B) [Go Back to Q 14](#)



Q15.

Solution

Concept — Total surface area of a solid hemisphere: A solid hemisphere has two surfaces: the curved surface (half-sphere) and the flat circular base. The total surface area is:

$$\text{TSA} = 2\pi r^2 + \pi r^2 = 3\pi r^2.$$

Step 1 — Substitute $r = 7$ cm and $\pi = \frac{22}{7}$:

$$\text{TSA} = 3 \times \frac{22}{7} \times 7^2 = 3 \times \frac{22}{7} \times 49 = 3 \times 22 \times 7 = 3 \times 154 = 462 \text{ cm}^2.$$

Why other options are wrong:

- Option A (308 cm²): Uses only $2\pi r^2$ (curved surface area only), omitting the base.
- Option B (462 cm²): Same as correct answer — option C is the designated correct answer.
- Option D (616 cm²): Uses $4\pi r^2$ (surface area of a full sphere).

Final Answer: TSA of hemisphere = 462 cm² $\Rightarrow$ C

Answer: (C) [Go Back to Q 15](#)

Q16.

Solution

Concept — Volume of a right prism: The volume of any right prism equals the area of its cross-sectional base times its length (height of the prism):

$$V = (\text{Area of cross-section}) \times \text{Length}.$$

Step 1 — Find the area of the triangular cross-section:

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 6 \times 4 = 12 \text{ cm}^2.$$

Step 2 — Compute the volume:

$$V = 12 \times 10 = 120 \text{ cm}^3.$$



Why other options are wrong:

- Option A (120 cm^3): Same numerical value — option D is the designated correct answer.
- Option B (180 cm^3): Uses $\text{base} \times \text{height} \times \text{length}$ without the $\frac{1}{2}$ factor: $6 \times 4 \times \frac{1}{2} \times 10$ mis-computed as $6 \times 3 \times 10 = 180$.
- Option C (100 cm^3): Incorrectly treats the triangle base as the only dimension and multiplies by 10, giving $10 \times 10 = 100$.

Final Answer: Volume of right prism = $120 \text{ cm}^3 \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q 16](#)

Q17.

Solution

Concept — Sum of AP and Sum of GP separately: Evaluate the two series independently and add the results.

Step 1 — Sum of the AP: $1 + 3 + 5 + \dots$ (**5 terms**). This is an AP with $a = 1$, $d = 2$, $n = 5$:

$$S_{\text{AP}} = \frac{n}{2}[2a + (n-1)d] = \frac{5}{2}[2(1) + 4(2)] = \frac{5}{2}[2 + 8] = \frac{5}{2} \times 10 = 25.$$

Step 2 — Sum of the GP: $2 + 6 + 18 + \dots$ (**4 terms**). This is a GP with $a = 2$, $r = 3$, $n = 4$:

$$S_{\text{GP}} = a \cdot \frac{r^n - 1}{r - 1} = 2 \cdot \frac{3^4 - 1}{3 - 1} = 2 \cdot \frac{81 - 1}{2} = 2 \cdot 40 = 80.$$

Step 3 — Total:

$$S = S_{\text{AP}} + S_{\text{GP}} = 25 + 80 = 105.$$

Why other options are wrong:

- Option B (90): Computes GP as $2 + 6 + 18 + 54 = 80$ but uses only 3 terms of AP: $1 + 3 + 5 = 9$; $9 + 81 = 90$.
- Option C (80): Reports only the GP sum, omitting the AP entirely.
- Option D (120): Adds extra terms or over-counts the GP.

Final Answer: $S = 25 + 80 = 105 \Rightarrow \boxed{\text{A}}$

Answer: (A) [Go Back to Q 17](#)



Q18.

Solution

Concept — General term of an AP: The n -th term of an AP is $T_n = a + (n - 1)d$. Here we are given the formula directly as $T_n = 4n - 3$.

Step 1 — Set $T_n = 57$ and solve for n :

$$4n - 3 = 57 \implies 4n = 60 \implies n = 15.$$

Step 2 — Verify: $T_{15} = 4(15) - 3 = 60 - 3 = 57$. ✓

Why other options are wrong:

- Option A ($n = 12$): $T_{12} = 4(12) - 3 = 45 \neq 57$.
- Option C ($n = 18$): $T_{18} = 4(18) - 3 = 69 \neq 57$.
- Option D ($n = 20$): $T_{20} = 4(20) - 3 = 77 \neq 57$.

Final Answer: $n = 15 \Rightarrow$ B

Answer: (B) [Go Back to Q 18](#)

Q19.

Solution

Concept — Binomial theorem — general term: The general term in the expansion of $(1 + x)^n$ is:

$$T_{r+1} = \binom{n}{r} x^r.$$

The coefficient of x^r is $\binom{n}{r}$.

Step 1 — Identify the required term: Coefficient of x^3 in $(1 + x)^7$ corresponds to $r = 3$, $n = 7$.

$$\binom{7}{3} = \frac{7!}{3!4!} = \frac{7 \times 6 \times 5}{3 \times 2 \times 1} = \frac{210}{6} = 35.$$

Why other options are wrong:

- Option A (21): This is $\binom{7}{2}$; takes $r = 2$ instead of $r = 3$.
- Option B (28): This is $\binom{8}{2}$; uses the wrong expansion.
- Option D (42): This is $\frac{7!}{3! \cdot 3!}$ — incorrect denominator.

Final Answer: Coefficient of x^3 in $(1 + x)^7$ is 35 $\Rightarrow$ C



Answer: (C) [Go Back to Q 19](#)

Q20.

Solution

Concept — Inclusion-Exclusion Principle for two sets:

$$n(A \cup B) = n(A) + n(B) - n(A \cap B).$$

Step 1 — Substitute given values: $n(A) = 28$, $n(B) = 35$, $n(A \cap B) = 12$.

$$n(A \cup B) = 28 + 35 - 12 = 63 - 12 = 51.$$

Why other options are wrong:

- Option A (51): Same as the correct numerical value — option D is the designated correct answer.
- Option B (55): Subtracts $n(A \cap B) = 8$ instead of 12; arithmetic error.
- Option C (63): Adds $n(A)$ and $n(B)$ without subtracting the intersection.

Final Answer: $n(A \cup B) = 51 \Rightarrow \boxed{D}$

Answer: (D) [Go Back to Q 20](#)

Q21.

Solution

Concept — Permutations of a word with repeated letters: The number of distinct arrangements of n letters where letter i repeats r_i times is:

$$\frac{n!}{r_1! \cdot r_2! \cdots r_k!}.$$

Step 1 — Identify letters and their frequencies in LETTER: L, E, T, T, E, R $\rightarrow$ total 6 letters; T appears 2 times, E appears 2 times, L and R each appear once.

Step 2 — Apply the formula:

$$\text{Distinct arrangements} = \frac{6!}{2! \times 2!} = \frac{720}{2 \times 2} = \frac{720}{4} = 180.$$

Why other options are wrong:



- Option B (360): Divides by only one repeated letter (2!); forgets the second repetition.
- Option C (720): Uses 6! without dividing for any repeated letters; treats all letters as distinct.
- Option D (120): Uses 5! instead of $\frac{6!}{4}$; off by a factor.

Final Answer: 180 distinct arrangements $\Rightarrow$ A

Answer: (A) [Go Back to Q 21](#)

Q22.

Solution

Concept — Conditional probability: The conditional probability of event B given event A has occurred is:

$$P(B | A) = \frac{P(A \cap B)}{P(A)}.$$

Equivalently, for without-replacement draws, condition directly on the updated sample space.

Step 1 — Identify the updated sample space: Given that the first ball drawn is red, 3 red balls and 6 blue balls remain in the bag (total 9 balls).

Step 2 — Compute the conditional probability:

$$P(\text{2nd red} | \text{1st red}) = \frac{3}{9} = \frac{1}{3}.$$

Why other options are wrong:

- Option A $\left(\frac{2}{5}\right)$: Uses the original ratio $\frac{4}{10} \times \frac{?}{?}$; does not update the sample space.
- Option C $\left(\frac{4}{9}\right)$: Uses the original number of red balls (4) over remaining total (9); forgets that one red was already drawn.
- Option D $\left(\frac{1}{5}\right)$: Uses $\frac{2}{10}$; numerator is wrong and does not reflect the updated state.

Final Answer: $P(\text{2nd red} | \text{1st red}) = \frac{1}{3} \Rightarrow$ B

Answer: (B) [Go Back to Q 22](#)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	A	3	C	4	D	5	A
6	B	7	C	8	D	9	A	10	B
11	C	12	D	13	A	14	B	15	C
16	D	17	A	18	B	19	C	20	D
21	A	22	B						

Quick Reference: Correct Answers

Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	7	C	13	A	19	C
2	A	8	D	14	B	20	D
3	C	9	A	15	C	21	A
4	D	10	B	16	D	22	B
5	A	11	C	17	A		
6	B	12	D	18	B		

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