FDDI AIST Quantitative & Analytical Ability

Sample Paper – 7

Duration: 25 Minutes **Maximum Marks: 25**

Instructions

- This paper contains **25** Multiple Choice Questions (Single Correct Answer), modelled on the Quantitative & Analytical Ability section of **FDDI AIST**.
- Each correct answer carries **+1 mark**. There is **no negative marking** for incorrect or unattempted answers.
- Only **one** option is correct per question.
- Syllabus level: **Class 10–12 Mathematics and basic analytical reasoning.**
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Q1. What is the remainder when 2^{100} is divided by 3?

(A) 1

(B) 0

(C) 2

(D) None of these

Q2. Find the sum of all positive multiples of 4 that are at most 100.

(A) 1,200

(B) 1,300

(C) 1,400

(D) 1,500

Q3. If $x - \frac{1}{x} = 4$, find the value of $x^2 + \frac{1}{x^2}$.

(A) 14

(B) 16

(C) 18

(D) 20

Q4. An alloy has zinc and copper in ratio 1:3 (i.e., 25 g zinc, 75 g copper per 100 g). How many grams of zinc must be added to 100 g of this alloy to make the ratio 1:2?

(A) 10 g

(B) 12 g

(C) 15 g

(D) 12.5 g

Q5. A, B and C share profits in the ratio 4:5:6. If total monthly profit is Rs. 3,000, what are B's annual earnings from profit?

(A) Rs. 12,000

(B) Rs. 15,000

(C) Rs. 18,000

(D) Rs. 20,000

Q6. The tax rate on an item increased from 15% to 20%. By what percentage did the tax amount increase?

(A) 5%

(B) $33.\overline{3}\%$

(C) 25%

(D) 30%

Q7. An article costs Rs. 4,800. It is sold at a 15% loss. What is the loss amount?

(A) Rs. 600

(B) Rs. 680

(C) Rs. 720

(D) Rs. 750

Q8. An article originally priced at Rs. 2,500 is marked up by 20%, then given a 20% discount. What is the overall result?

(A) 4% profit

(B) 2% loss

(C) No profit, no loss

(D) 4% loss

Q9. Worker A is twice as efficient as worker B. B alone takes 30 days. How many days will they take together?

(A) 10 days

(B) 8 days

(C) 12 days

(D) 6 days

Q10. Pipe A fills a tank in 12 hours, Pipe B in 15 hours. Pipe C (outlet) empties it in 8 hours. With all three open, how long to fill the tank?

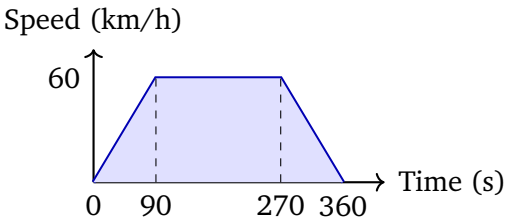
(A) 35 h

(B) 40 h

(C) 45 h

(D) 50 h

Q11. A train accelerates uniformly from rest to 60 km/h in 90 s, travels at 60 km/h for 180 s, then decelerates uniformly to rest in 90 s. Using the speed-time graph below, find the average speed of the train.



(A) 40 km/h

(B) 50 km/h

(C) 45 km/h

(D) 55 km/h

Q12. A thief starts running when a policeman spots him, with a 100 m head start. The thief runs at 8 km/h and the policeman at 10 km/h. After how many minutes does the policeman catch the thief?

(A) 2 minutes

(B) 2.5 minutes

(C) 3.5 minutes

(D) 3 minutes

Q13. Rs. 7,500 is invested and earns Rs. 3,000 as simple interest in 4 years. What is the annual rate of interest?

(A) 10%

(B) 8%

(C) 12%

(D) 15%

Q14. Find the compound interest on Rs. 25,000 at 12% per annum for 3 years.

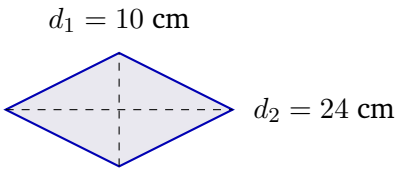
(A) Rs. 9,500

(B) Rs. 10,123

(C) Rs. 10,500

(D) Rs. 11,000

Q15. A rhombus has diagonals of 24 cm and 10 cm. Find its area.



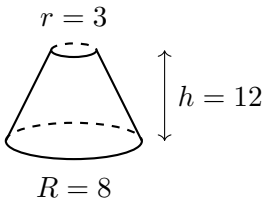
(A) 100 cm^2

(B) 110 cm^2

(C) 120 cm^2

(D) 130 cm^2

Q16. A frustum has top radius 3 cm, bottom radius 8 cm and height 12 cm. Find its volume. (Use $\pi = \frac{22}{7}$)



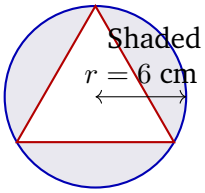
(A) 200π cm^3

(B) 300π cm^3

(C) 350π cm^3

(D) 388π cm^3

Q17. An equilateral triangle is inscribed in a circle of radius 6 cm. Find the area of the shaded region between the circle and the triangle. (Use $\pi = 3.14$, $\sqrt{3} = 1.73$)



(A) $(36\pi - 27\sqrt{3})$ cm^2

(B) 67 cm^2

(C) 65 cm^2

(D) 70 cm^2

Q18. Three fair coins are tossed simultaneously. What is the probability of getting at least 2 tails?

(A) $\frac{3}{8}$

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

(C) $\frac{5}{8}$

(D) $\frac{3}{4}$

Q19. Ten points lie in a plane with no three of them collinear. How many line segments can be drawn joining pairs of points?

(A) 40

(B) 42

(C) 45

(D) 50

Q20. The average of 4 numbers is 30. A fifth number is added and the average drops to 28. What is the fifth number?

(A) 25

(B) 15

(C) 10

(D) 20

Q21. The average of 6 numbers is 50. One of the numbers, which equals 80, is replaced by 20. What is the new average?

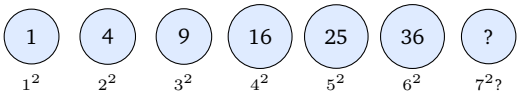
(A) 40

(B) 45

(C) 50

(D) 55

Q22. What is the next term in the series: $1,\ 4,\ 9,\ 16,\ 25,\ 36,\ __?$



(A) 42

(B) 45

(C) 49

(D) 64

Q23. A code shifts each letter one place forward in the alphabet (A→B, B→C, . . . , Z→A). Under this code, the word TEACHER becomes UFBDIFS. What is the code for STUDENT?

(A) TUVFFQU

(B) TUVEFOU

(C) STUDFNT

(D) SVVFGPU

Q24. A is B's sister. B is C's brother. C is D's father. How is A related to D?

(A) Grandmother

(B) Mother

(C) Aunt

(D) Niece

Q25. P walks 6 m East, then 8 m North, then 6 m West. What is his final distance from the starting point?

(A) 10 m

(B) 12 m

(C) 6 m

(D) 8 m

Detailed Solutions

Q1.

Solution

Quick Solution: Concept: Modular Arithmetic. **Chapter:** Number System. To find the remainder of a large power, look for a repeating cycle in the remainders. **Answer:** A.

Concept — Modular Arithmetic: To find the remainder of a large power, look for a repeating cycle in the remainders.

Step 1 — Find the pattern: $2^1 \equiv 2 \pmod 3$, $\quad 2^2 = 4 \equiv 1 \pmod 3$.
The remainders cycle with period 2: $2, 1, 2, 1, \ldots$

Step 2 — Apply to 2^{100}: Since 100 is even, $2^{100} = (2^2)^{50} \equiv 1^{50} = 1 \pmod 3$.

Why other options are wrong:

- Option B (0): 2^n is never divisible by 3.
- Option C (2): Remainder 2 occurs only for odd powers of 2.
- Option D: A definite answer exists.

Final Answer: Remainder is 1 $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q1

Q2.

Solution

Quick Solution: Concept: Arithmetic Series. **Chapter:** Number System. The sum of an AP is $S = \frac{n}{2}(a + l)$ or $S = \frac{n}{2}[2a + (n-1)d]$. **Answer:** B.

Concept — Arithmetic Series: The sum of an AP is $S = \frac{n}{2}(a + l)$ or $S = \frac{n}{2}[2a + (n-1)d]$.

Step 1 — Identify the series: Multiples of 4 up to 100: $4, 8, 12, \ldots, 100$. Here $a = 4$, $d = 4$, $l = 100$.
Number of terms: $n = \frac{100-4}{4} + 1 = 25$.

Step 2 — Compute the sum: $S = 4(1+2+\cdots+25) = 4 \times \dfrac{25 \times 26}{2} = 4 \times 325 = 1{,}300$.

Why other options are wrong:

- Option A (1200): Uses $n = 24$ (misses the last term 100).

- Option C (1400): Over-counts terms.
- Option D (1500): Incorrect series limit.

Final Answer: Sum $= 1{,}300 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q2

Q3.

Solution

Quick Solution: Concept: Algebraic Identity. **Chapter:** Algebra. $(x - \frac{1}{x})^2 = x^2 - 2 + \frac{1}{x^2}$. **Answer:** C.

Concept — Algebraic Identity: $(x - \frac{1}{x})^2 = x^2 - 2 + \frac{1}{x^2}$.

Step 1 — Square both sides: $(x - \frac{1}{x})^2 = 4^2 = 16$.

Step 2 — Expand and solve: $x^2 - 2 + \dfrac{1}{x^2} = 16 \implies x^2 + \dfrac{1}{x^2} = 16 + 2 = 18$.

Why other options are wrong:

- Option A (14): Subtracts 2 instead of adding.
- Option B (16): Forgets to add the constant $+2$.
- Option D (20): Adds 4 instead of 2.

Final Answer: $x^2 + \frac{1}{x^2} = 18 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q3

Q4.

Solution

Quick Solution: Concept: Ratio and Alligation. **Chapter:** Ratio & Proportion. When adding one component, the other stays fixed; adjust the ratio accordingly. **Answer:** D.

Concept — Ratio and Alligation: When adding one component, the other stays fixed; adjust the ratio accordingly.

Step 1 — Initial composition: Zinc : Copper $= 1 : 3$ in 100 g alloy $\Rightarrow$ Zinc $= 25$ g, Copper $= 75$ g.

Step 2 — Desired ratio: New ratio $= 1 : 2 \Rightarrow$ Zinc needed $= \frac{75}{2} = 37.5$ g (copper stays at 75 g).

Step 3 — Zinc to be added: $37.5 - 25 = \mathbf{12.5}$ g.

Why other options are wrong:

- Option A (10 g): Gives ratio 35:75 $\neq$ 1:2.
- Option B (12 g): Gives ratio 37:75 $\neq$ 1:2.
- Option C (15 g): Gives ratio 40:75 $\neq$ 1:2.

Final Answer: Add 12.5 g of zinc $\Rightarrow$ D

Answer: (D) Go Back to Q4

Q5.

Solution

Quick Solution: Concept: Profit Sharing in Ratio. **Chapter:** Ratio & Proportion. Each partner's share = (their ratio part / total parts) $\times$ total profit. **Answer:** A.

Concept — Profit Sharing in Ratio: Each partner's share = (their ratio part / total parts) $\times$ total profit.

Step 1 — B's monthly share: Total parts $= 4 + 5 + 6 = 15$.
$B_{\text{monthly}} = \frac{5}{15} \times 3{,}000 = 1{,}000$ Rs.

Step 2 — B's annual share: $1{,}000 \times 12 = \mathbf{12{,}000}$ Rs.

Why other options are wrong:

- Option B (15,000): This would be B's share if ratio were 5:5:5 (equal).
- Option C (18,000): Corresponds to C's annual share (ratio 6).
- Option D (20,000): Exceeds even C's correct share.

Final Answer: B's annual earnings = Rs. 12,000 $\Rightarrow$ A

Answer: (A) Go Back to Q5

Q6.

Solution

Quick Solution: Concept: Percentage Change. **Chapter:** Percentage. % increase $= \dfrac{\text{New} - \text{Old}}{\text{Old}} \times 100$. **Answer:** B.

Concept — Percentage Change: % increase $= \dfrac{\text{New} - \text{Old}}{\text{Old}} \times 100$.

Step 1 — Compute percentage increase in tax rate: $\%$ increase $= \dfrac{20 - 15}{15} \times 100 = \dfrac{5}{15} \times 100 = 33.\overline{3}\%$.

Why other options are wrong:

- Option A (5%): This is the absolute increase in rate, not percentage change.
- Option C (25%): Uses new rate 20 as base instead of old rate 15.
- Option D (30%): Incorrect calculation.

Final Answer: Tax increased by $33.\overline{3}\% \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q6

Q7.

Solution

Quick Solution: Concept: Loss Calculation. **Chapter:** Profit & Loss. Loss = Cost Price $\times$ Loss%. **Answer:** C.

Concept — Loss Calculation: Loss = Cost Price $\times$ Loss%.

Step 1 — Calculate the loss: Loss $= 0.15 \times 4{,}800 =$ **720** Rs.

Step 2 — Verify selling price: SP $= 4{,}800 - 720 = 4{,}080$ Rs.

Why other options are wrong:

- Option A (600): Corresponds to 12.5% loss.
- Option B (680): Corresponds to $\approx 14.2\%$ loss.
- Option D (750): Corresponds to 15.625% loss.

Final Answer: Loss $=$ Rs. 720 $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q7

Q8.

Solution

Quick Solution: Concept: Successive Discounts/Mark-up. **Chapter:** Discount. Net effect of $+x\%$ then $-x\%$ is always a loss of $\left(\frac{x}{10}\right)^2\%$. **Answer:** D.

Concept — Successive Discounts/Mark-up: Net effect of $+x\%$ then $-x\%$ is always a loss of $\left(\frac{x}{10}\right)^2\%$.

Step 1 — Marked price: MP $= 2{,}500 \times 1.20 = 3{,}000$ Rs.

Step 2 — Selling price after discount: SP $= 3{,}000 \times 0.80 = 2{,}400$ Rs.

Step 3 — Result: Loss $= 2{,}500 - 2{,}400 = 100$ Rs.
$$\text{Loss\%} = \frac{100}{2{,}500} \times 100 = 4\%.$$

Why other options are wrong:

- Option A (4% profit): SP $<$ CP so it's a loss, not profit.
- Option B (2% loss): Underestimates the effect of compounding.
- Option C (no loss): True only if percentages are different (e.g., $+20\%$ then -16.67%).

Final Answer: 4% loss $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q8

Q9.

Solution

Quick Solution: Concept: Work and Efficiency. **Chapter:** Time & Work. If A is twice as efficient as B, A takes half the time B takes. **Answer:** A.

Concept — Work and Efficiency: If A is twice as efficient as B, A takes half the time B takes.

Step 1 — A's time alone: B takes 30 days $\Rightarrow$ A takes $30/2 = 15$ days.

Step 2 — Combined rate: $\frac{1}{15} + \frac{1}{30} = \frac{2+1}{30} = \frac{3}{30} = \frac{1}{10}$.

Step 3 — Days together: Time $= 10$ days.

Why other options are wrong:

- Option B (8 days): Incorrect combined rate.
- Option C (12 days): Ignores A's higher efficiency.

- Option D (6 days): Overestimates combined efficiency.

Final Answer: Together they take 10 days $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q9

Q10.

Solution

Quick Solution: Concept: Pipes and Cisterns. **Chapter:** Pipes & Cisterns. Net rate = (sum of filling rates) − (emptying rate). **Answer:** B.

Concept — Pipes and Cisterns: Net rate = (sum of filling rates) − (emptying rate).

Step 1 — Individual rates (fraction of tank per hour): A fills: $\frac{1}{12}$, B fills: $\frac{1}{15}$, C empties: $\frac{1}{8}$.

Step 2 — Net rate with all three open:

$$\frac{1}{12}+\frac{1}{15}-\frac{1}{8}=\frac{10+8-15}{120}=\frac{3}{120}=\frac{1}{40}.$$

Step 3 — Time to fill: $t = 40$ hours.

Why other options are wrong:

- Option A (35 h): Arithmetic error in LCM computation.
- Option C (45 h): Incorrect net rate.
- Option D (50 h): Over-estimates C's impact.

Final Answer: Tank fills in 40 hours $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q10

Q11.

Solution

Quick Solution: Concept: Speed-Time Graph. **Chapter:** Time & Distance. Distance = area under the speed-time graph (trapezoid here). **Answer:** C.

Concept — Speed-Time Graph: Distance = area under the speed-time graph (trapezoid here).

Step 1 — Convert speed: 60 km/h $= \dfrac{60 \times 1000}{3600} = \dfrac{50}{3}$ m/s.

Step 2 — Compute total distance (trapezoid area):

$$d = \tfrac{1}{2} \times \tfrac{50}{3} \times 90 \; + \; \tfrac{50}{3} \times 180 \; + \; \tfrac{1}{2} \times \tfrac{50}{3} \times 90 = 750 + 3{,}000 + 750 = 4{,}500 \text{ m}.$$

Step 3 — Average speed: Total time $= 90 + 180 + 90 = 360$ s.
$\bar{v} = \dfrac{4{,}500}{360} = 12.5$ m/s $= 12.5 \times \dfrac{18}{5} = 45$ km/h.

Why other options are wrong:

- Option A (40 km/h): Ignores trapezoidal shape (only uses middle section).
- Option B (50 km/h): Simple average of 0 and 60, not weighted by time.
- Option D (55 km/h): Over-estimates.

Final Answer: Average speed $= 45$ km/h $\Rightarrow$ C

Answer: (C) Go Back to Q11

Q12.

Solution

Quick Solution: Concept: Relative Speed. **Chapter:** Time & Distance. When chasing, relative speed = speed of chaser − speed of target. **Answer:** D.

Concept — Relative Speed: When chasing, relative speed = speed of chaser − speed of target.

Step 1 — Relative speed: $10 - 8 = 2$ km/h $= \dfrac{2000}{3600} = \dfrac{5}{9}$ m/s.

Step 2 — Time to close the 100 m gap: $t = \dfrac{100}{5/9} = \dfrac{100 \times 9}{5} = 180$ s $= 3$ minutes.

Why other options are wrong:

- Option A (2 min): Incorrect relative speed calculation.
- Option B (2.5 min): Corresponds to a 5/6 m/s relative speed.
- Option C (3.5 min): Over-estimates time.

Final Answer: Policeman catches thief in 3 minutes $\Rightarrow$ D

Answer: (D) Go Back to Q12

Q13.

Solution

Quick Solution: Concept: Simple Interest Formula. **Chapter:** Simple Interest. $SI = \dfrac{P \times R \times T}{100}$, so $R = \dfrac{SI \times 100}{P \times T}$. **Answer:** A.

Concept — Simple Interest Formula: $SI = \dfrac{P \times R \times T}{100}$, so $R = \dfrac{SI \times 100}{P \times T}$.

Step 1 — Substitute values:

$$R = \frac{3{,}000 \times 100}{7{,}500 \times 4} = \frac{3{,}00{,}000}{30{,}000} = 10\%.$$

Why other options are wrong:

- Option B (8%): SI would only be Rs. 2,400 at 8%.
- Option C (12%): SI would be Rs. 3,600 at 12%.
- Option D (15%): SI would be Rs. 4,500 at 15%.

Final Answer: Rate $= 10\% \Rightarrow$ A

Answer: (A) Go Back to Q13

Q14.

Solution

Quick Solution: Concept: Compound Interest. **Chapter:** Compound Interest. $A = P\left(1 + \dfrac{r}{100}\right)^n$; $CI = A - P$. **Answer:** B.

Concept — Compound Interest: $A = P\left(1 + \dfrac{r}{100}\right)^n$; $CI = A - P$.

Step 1 — Compute amount:

$$A = 25{,}000 \times (1.12)^3.$$

$(1.12)^2 = 1.2544$; $(1.12)^3 = 1.2544 \times 1.12 = 1.404928$.
$A = 25{,}000 \times 1.404928 = 35{,}123.2 \approx 35{,}123$.

Step 2 — Compound Interest: $CI = 35{,}123 - 25{,}000 =$ **10,123** Rs.

Why other options are wrong:

- Option A (9,500): Less than 3-year SI ($= 9{,}000$) but not compounded correctly.

- Option C (10,500): Over-estimates slightly.
- Option D (11,000): Significant over-estimate.

Final Answer: CI $\approx$ Rs. 10,123 $\Rightarrow$ B

Answer: (B) Go Back to Q14

Q15.

Solution

Quick Solution: Concept: Area of Rhombus. **Chapter:** Mensuration 2D. Area $= \frac{d_1 \times d_2}{2}$, where d_1 and d_2 are the diagonals. **Answer:** C.

Concept — Area of Rhombus: Area $= \frac{d_1 \times d_2}{2}$, where d_1 and d_2 are the diagonals.

Step 1 — Apply the formula:

$$\text{Area} = \frac{24 \times 10}{2} = \frac{240}{2} = 120 \text{ cm}^2.$$

Why other options are wrong:

- Option A (100 cm^2): Uses $10 \times 10 = 100$ (wrong diagonal values).
- Option B (110 cm^2): Arithmetic error.
- Option D (130 cm^2): Over-estimates.

Final Answer: Area $= 120$ cm^2 $\Rightarrow$ C

Answer: (C) Go Back to Q15

Q16.

Solution

Quick Solution: Concept: Volume of Frustum. **Chapter:** Mensuration 3D. $V = \frac{\pi h}{3}(R^2 + r^2 + Rr)$. **Answer:** D.

Concept — Volume of Frustum: $V = \frac{\pi h}{3}(R^2 + r^2 + Rr)$.

Step 1 — Substitute values ($R = 8$, $r = 3$, $h = 12$):

$$R^2 = 64, \quad r^2 = 9, \quad Rr = 24.$$

$$V = \frac{\pi \times 12}{3}(64 + 9 + 24) = \pi \times 4 \times 97 = 388\pi \text{ cm}^3.$$

Why other options are wrong:

- Option A (200π): Uses incorrect radius values.
- Option B (300π): Arithmetic error in the sum $R^2 + r^2 + Rr$.
- Option C (350π): Slight under-estimate.

Final Answer: $V = 388\pi$ cm^3 $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q16

Q17.

Solution

Quick Solution: Concept: Inscribed Equilateral Triangle. **Chapter:** Mensuration Combined. For circumradius R, side $a = R\sqrt{3}$ and area $= \frac{\sqrt{3}}{4}a^2$. **Answer:** A.

Concept — Inscribed Equilateral Triangle: For circumradius R, side $a = R\sqrt{3}$ and area $= \frac{\sqrt{3}}{4}a^2$.

Step 1 — Side of equilateral triangle: $a = 6\sqrt{3}$ cm.

Step 2 — Area of triangle: $= \frac{\sqrt{3}}{4}(6\sqrt{3})^2 = \frac{\sqrt{3}}{4} \times 108 = 27\sqrt{3}$ cm^2.

Step 3 — Area of circle: $= \pi r^2 = 36\pi$ cm^2.

Step 4 — Shaded area: $= 36\pi - 27\sqrt{3}$ cm^2 $\approx 36(3.14) - 27(1.73) \approx 113.04 - 46.71 \approx 66.33$ cm^2.

Why other options are wrong:

- Option B (67 cm^2): Close approximation but loses the exact form.
- Option C (65 cm^2): Under-estimates.
- Option D (70 cm^2): Over-estimates.

Final Answer: Shaded area $= (36\pi - 27\sqrt{3})$ cm^2 $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q17

Q18.

Solution

Quick Solution: Concept: Probability with Coins. **Chapter:** Probability. Sample space for 3 coins has $2^3 = 8$ equally likely outcomes. **Answer:** B.

Concept — Probability with Coins: Sample space for 3 coins has $2^3 = 8$ equally likely outcomes.

Step 1 — Favourable outcomes (at least 2 tails): Exactly 2 tails: TTH, THT, HTT (3 outcomes).
Exactly 3 tails: TTT (1 outcome).
Total favourable $= 4$.

Step 2 — Probability: $P(\geq 2 \text{ tails}) = \dfrac{4}{8} = \dfrac{1}{2}$.

Why other options are wrong:

- Option A ($\frac{3}{8}$): Counts only exactly 2 tails (misses TTT).
- Option C ($\frac{5}{8}$): Over-counts favourable outcomes.
- Option D ($\frac{3}{4}$): Incorrect favourable count of 6.

Final Answer: $P = \dfrac{1}{2} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q18

Q19.

Solution

Quick Solution: Concept: Combinations. **Chapter:** Combinations. A line segment requires choosing 2 points from n; given no three are collinear, $\binom{n}{2}$ segments exist. **Answer:** C.

Concept — Combinations: A line segment requires choosing 2 points from n; given no three are collinear, $\binom{n}{2}$ segments exist.

Step 1 — Apply formula:

$$\binom{10}{2} = \frac{10!}{2!\,8!} = \frac{10 \times 9}{2} = 45.$$

Why other options are wrong:

- Option A (40): Under-counts; corresponds to $\binom{9}{2} + 4$.
- Option B (42): Off by 3 from the correct answer.

- Option D (50): Overcounts (possibly 10×5).

Final Answer: 45 line segments $\Rightarrow$ C

Answer: (C) Go Back to Q19

Q20.

Solution

Quick Solution: Concept: Average and Sum. **Chapter:** Averages. Sum $= n \times \bar{x}$. **Answer:** D.

Concept — Average and Sum: Sum $= n \times \bar{x}$.

Step 1 — Sum of original 4 numbers: $S_4 = 4 \times 30 = 120$.

Step 2 — Sum of 5 numbers: $S_5 = 5 \times 28 = 140$.

Step 3 — Fifth number: 5th $= S_5 - S_4 = 140 - 120 = \mathbf{20}$.

Why other options are wrong:

- Option A (25): Would raise the average slightly.
- Option B (15): $S_5 = 135 \Rightarrow \bar{x} = 27 \neq 28$.
- Option C (10): $S_5 = 130 \Rightarrow \bar{x} = 26 \neq 28$.

Final Answer: Fifth number $= 20 \Rightarrow$ D

Answer: (D) Go Back to Q20

Q21.

Solution

Quick Solution: Concept: Effect of Replacement on Average. **Chapter:** Averages. New sum = Old sum − removed number + new number. **Answer:** A.

Concept — Effect of Replacement on Average: New sum = Old sum − removed number + new number.

Step 1 — Original sum: $S = 6 \times 50 = 300$.

Step 2 — New sum after replacement: $S' = 300 - 80 + 20 = 240$.

Step 3 — New average: $\bar{x}' = \dfrac{240}{6} = 40$.

Why other options are wrong:

- Option B (45): Corresponds to removing 30 (not 80) from the sum.
- Option C (50): No change; only possible if 80 were replaced by 80.
- Option D (55): Average would increase, but it should decrease since $20 < 80$.

Final Answer: New average $= 40 \Rightarrow$ A

Answer: (A) Go Back to Q21

Q22.

Solution

Quick Solution: Concept: Pattern Recognition (Perfect Squares). **Chapter:** Analytical — Series. The series consists of squares of consecutive natural numbers. **Answer:** C.

Concept — Pattern Recognition (Perfect Squares): The series consists of squares of consecutive natural numbers.

Step 1 — Identify pattern: $1 = 1^2,\ 4 = 2^2,\ 9 = 3^2,\ 16 = 4^2,\ 25 = 5^2,\ 36 = 6^2$.

Step 2 — Next term: $7^2 = 49$.

Why other options are wrong:

- Option A (42): Not a perfect square.
- Option B (45): Not a perfect square.
- Option D (64): $= 8^2$; skips 49.

Final Answer: Next term $= 49 \Rightarrow$ C

Answer: (C) Go Back to Q22

Q23.

Solution

Quick Solution: Concept: Shift Cipher (Caesar Cipher $+1$). **Chapter:** Coding-Decoding. Each letter is replaced by the next letter in the alphabet; Z wraps around to A. **Answer:** B.

Concept — Shift Cipher (Caesar Cipher $+1$): Each letter is replaced by the next letter in the alphabet; Z wraps around to A.

Step 1 — Encode STUDENT letter by letter:

$$S \to T, \quad T \to U, \quad U \to V, \quad D \to E, \quad E \to F, \quad N \to O, \quad T \to U.$$

Step 2 — Coded word: STUDENT $\to$ **TUVEFOU**.

Why other options are wrong:

- Option A (TUVFFQU): Incorrect encoding of D, N, T.
- Option C (STUDFNT): Letters not shifted at all.
- Option D (SVVFGPU): Uses $+2$ shift for some letters.

Final Answer: Code is TUVEFOU $\Rightarrow$ B

Answer: (B) Go Back to Q23

Q24.

Solution

Quick Solution: Concept: Blood Relations. **Chapter:** Blood Relations. Trace each relationship step by step. **Answer:** C.

Concept — Blood Relations: Trace each relationship step by step.

Step 1 — Establish the family tree: A is B's sister $\Rightarrow$ A and B are siblings (A is female).
B is C's brother $\Rightarrow$ B and C are siblings $\Rightarrow$ A, B, C are all siblings (A is female).
C is D's father $\Rightarrow$ D is C's child.

Step 2 — Determine A's relation to D: A is C's sibling; C is D's father; A is female $\Rightarrow$ A is D's **aunt**.

Why other options are wrong:

- Option A (Grandmother): A is same generation as C, not C's parent.
- Option B (Mother): A is not C's wife; A is C's sibling.
- Option D (Niece): That would make D the elder relative.

Final Answer: A is D's Aunt $\Rightarrow$ C

Answer: (C) Go Back to Q24

Q25.

Solution

Quick Solution: Concept: Direction Sense and Distance. **Chapter:** Direction Sense. Track net displacement along each axis. **Answer:** D.

Concept — Direction Sense and Distance: Track net displacement along each axis.

Step 1 — Track movements: 6 m East, then 8 m North, then 6 m West.

Step 2 — Net displacement: East–West: $6\text{ E} - 6\text{ W} = 0$ m.
North–South: 8 m North.

Step 3 — Final distance from start: $d = \sqrt{0^2 + 8^2} = \sqrt{64} = \mathbf{8}$ m.

Why other options are wrong:

- Option A (10 m): Would require $\sqrt{6^2 + 8^2} = 10$, but east and west cancel.
- Option B (12 m): Over-estimate; ignores cancellation.
- Option C (6 m): Only the east or west component, not the north.

Final Answer: Distance $= 8$ m $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q25

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	B	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	C	23	B	24	C	25	D