ATMA Quantitative Skills
Sample Paper – 9

Duration: 60 Minutes **Maximum Marks: 60**

Instructions

- This paper contains **60** Multiple Choice Questions (Single Correct Answer) arranged in **two parts (Part I: Q1–Q30, Part II: Q31–Q60)**, modelled on the Quantitative Skills portion of **ATMA** (AIMS Test for Management Admissions).
- Each correct answer carries **+1 marks**. There is **a penalty of** 0.25 **mark** for each incorrect answer, while unattempted questions earn **0**.
- Only **one** option is correct. Choose carefully.
- Syllabus level: **Quantitative aptitude (arithmetic, algebra, geometry, modern maths, data interpretation)**
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Part I (Q1–Q30)

Q1. The number $\overline{47a6}$ (a four-digit number with unknown tens digit a) is divisible by 11. The value of a is

(A) 7

(B) 9

(C) 5

(D) 3

Q2. The remainder when 4^{61} is divided by 6 is

(A) 2

(B) 0

(C) 1

(D) 4

Q3. When the price of petrol increased by 25%, a motorist reduced his monthly petrol usage by 10%. The percentage change in his monthly petrol bill is

(A) 12.5% increase

(B) 15% increase

(C) 10% increase

(D) 12.5% decrease

Q4. In an examination, a student must score 40% to pass. A candidate who scored 175 marks failed by 35 marks. The maximum marks of the examination are

(A) 640

(B) 600

(C) 525

(D) 750

Q5. P and Q enter a partnership. P invests $\text{Rs. } 50{,}000$ and after 3 months Q joins with $\text{Rs. } 60{,}000$. At the end of the year the profit is $\text{Rs. } 13{,}300$. Q's share (in Rupees) is

(A) $\text{Rs. } 7600$

(B) $\text{Rs. } 6300$

(C) $\text{Rs. } 7000$

(D) $\text{Rs. } 5700$

Q6. The average weight of 8 oarsmen in a boat is increased by 1.5 kg when one of the crew, who weighs 52 kg, is replaced by a new man. The weight (in kg) of the new man is

(A) 58

(B) 60

(C) 62

(D) 64

Q7. The cost price of 15 articles is equal to the selling price of 12 articles. The profit percentage is

(A) 25%

(B) 20%

(C) 15%

(D) 30%

Q8. A shopkeeper marks an article 50% above its cost price and then offers a discount of 20% on the marked price. His profit percentage is

(A) 25%

(B) 30%

(C) 20%

(D) 15%

Q9. A sum of $\text{Rs. } 6250$ amounts to $\text{Rs. } 7290$ in 2 years under compound interest, compounded annually. The annual rate of interest is

(A) 6%

(B) 8%

(C) 9%

(D) 10%

Q10. A student walking from home to school at 4 km/h reaches 5 minutes late, but walking at 5 km/h reaches 10 minutes early. The distance (in km) from home to school is

(A) 4

(B) 6

(C) 3

(D) 5

Q11. Two trains of lengths 150 m and 100 m are running on parallel tracks in the same direction at 68 km/h and 50 km/h. The time (in seconds) the faster train takes to completely overtake the slower one is

(A) 50

(B) 40

(C) 25

(D) 45

Q12. A and B together can finish a job in 12 days, while B and C together can finish it in 16 days. If A works alone for 5 days and then B alone for 7 days, C finishes the remaining work in 13 days. The number of days in which C alone can do the whole work is

(A) 16

(B) 20

(C) 24

(D) 30

Q13. Two taps can fill a tank in 12 minutes and 15 minutes respectively, while an outlet pipe can empty it in 20 minutes. If all three are opened together, the time (in minutes) to fill the empty tank is

(A) 12

(B) 10

(C) 8

(D) 15

Q14. The cost of 4 chairs and 3 tables is $\text{Rs. } 2100$, while the cost of 5 chairs and 2 tables is $\text{Rs. } 1750$. The cost (in Rupees) of one table is

(A) 500

(B) 450

(C) 550

(D) 400

Q15. If α and β are the roots of $x^2 - 8x + 15 = 0$, then the value of $\frac{1}{\alpha} + \frac{1}{\beta}$ is

(A) $\frac{15}{8}$

(B) $\frac{1}{15}$

(C) $\frac{1}{8}$

(D) $\frac{8}{15}$

Q16. The number of integers x that satisfy $x^2 - 7x + 10 \leq 0$ is

(A) 2

(B) 3

(C) 4

(D) 5

Q17. The sum of the first 15 terms of an arithmetic progression whose 8th term is 20 is

(A) 280

(B) 300

(C) 320

(D) 260

Q18. The number of distinct arrangements of the letters of the word MATHS is

(A) 120

(B) 60

(C) 24

(D) 720

Q19. A box contains 7 white and 5 black balls. The number of ways of selecting 3 balls so that exactly 2 are white is

(A) 35

(B) 70

(C) 210

(D) 105

Q20. A bag contains 5 red, 4 green and 3 blue marbles. One marble is drawn at random. The probability that it is *not* blue is

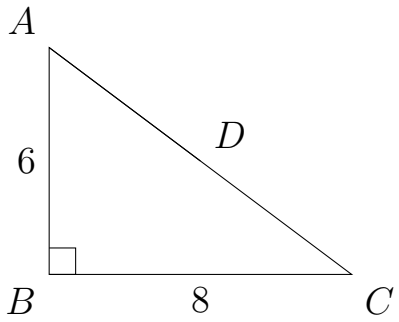
(A) $\frac{1}{4}$

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

(C) $\frac{2}{3}$

(D) $\frac{5}{12}$

Q21. In the figure, $\triangle ABC$ has a right angle at A. The median AD is drawn to the hypotenuse BC. If $AB = 6$ cm and $AC = 8$ cm, the length of the median AD (in cm) is



(A) 4

(B) 6

(C) 7

(D) 5

Q22. Each interior angle of a regular polygon measures 144°. The number of sides of the polygon is

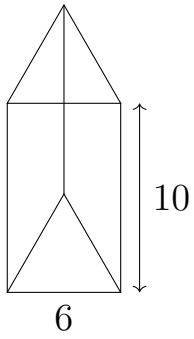
(A) 10

(B) 8

(C) 12

(D) 9

Q23. A right prism has an equilateral-triangular base of side 6 cm and a height of 10 cm. Its total surface area (in cm^2) is



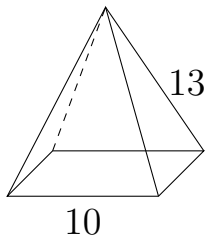
(A) $180 + 9\sqrt{3}$

(B) $180 + 36\sqrt{3}$

(C) $180 + 18\sqrt{3}$

(D) $90 + 18\sqrt{3}$

Q24. A right pyramid stands on a square base of side 10 cm and has a slant height of 13 cm. Its total surface area (in cm^2) is



(A) 320

(B) 360

(C) 260

(D) 400

Q25. If $\log_{10} x + \log_{10}(x-3) = 1$, then the value of x is

(A) 2

(B) 10

(C) 7

(D) 5

Q26. In a class of 90 students, every student studies at least one of Statistics and Economics. 55 study Statistics and 48 study Economics. The number of students who study both subjects is

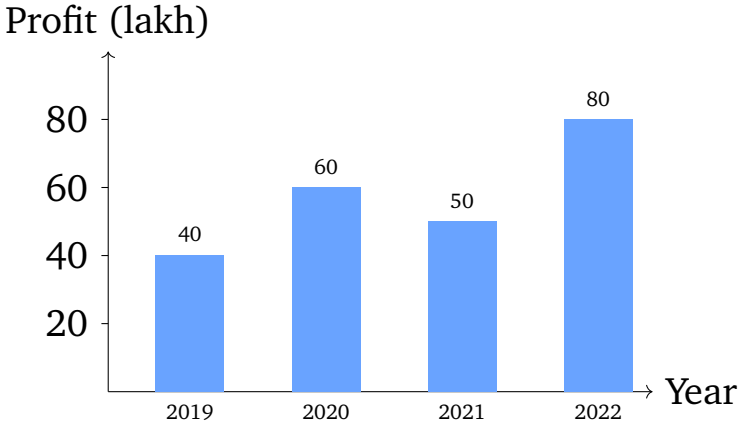
(A) 13

(B) 7

(C) 42

(D) 35

Q27. Directions (Q27–Q29): The bar graph shows the profit (in $\mathrm{Rs.}$ lakh) earned by a company in four consecutive years.



The total profit earned over the four years (in $\mathrm{Rs.}$ lakh) is

(A) 220

(B) 230

(C) 210

(D) 240

Q28. (Refer to the bar graph in Q27.) The percentage increase in profit from 2021 to 2022 is

(A) 50%

(B) 40%

(C) 60%

(D) 30%

Q29. (Refer to the bar graph in Q27.) The ratio of the profit earned in 2019 to that earned in 2021 is

(A) $5 : 4$

(B) $4 : 5$

(C) $1 : 2$

(D) $2 : 3$

Q30. **Data Sufficiency:** What is the value of the positive integer n?

Statement I: n is a two-digit multiple of 12.
Statement II: n lies between 20 and 30.

Choose the correct option:

(A) Both statements together are sufficient, but neither alone is sufficient.

(B) Statement I alone is sufficient, but Statement II alone is not.

(C) Each statement alone is sufficient.

(D) Statement II alone is sufficient, but Statement I alone is not.

Part II (Q31–Q60)

Q31. The unit digit of the expression $4^{37} + 6^{29} + 9^{18}$ is

(A) 9

(B) 3

(C) 1

(D) 5

Q32. The least number which when divided by 16, 24 and 36 leaves a remainder of 7 in each case is

(A) 295

(B) 151

(C) 144

(D) 137

Q33. The length of a rectangle is increased by 20% and its breadth is decreased by 10%. The percentage change in its area is

(A) 10% increase

(B) 12% increase

(C) 9% increase

(D) 8% increase

Q34. In a town, 60% of the population are men and the rest are women. 40% of the men and 25% of the women are literate. The percentage of the total population that is literate is

(A) 34%

(B) 30%

(C) 32.5%

(D) 36%

Q35. Two numbers are in the ratio $4 : 7$. If 8 is subtracted from each, the ratio becomes $2 : 5$. The larger number is

(A) 16

(B) 24

(C) 28

(D) 21

Q36. In what ratio must water be mixed with milk costing $\text{Rs. } 40$ per litre so that, by selling the mixture at $\text{Rs. } 40$ per litre, the dealer gains 25%?

(A) $1 : 5$

(B) $1 : 4$

(C) $1 : 3$

(D) $2 : 5$

Q37. A man sold two watches for $\text{Rs. } 990$ each. On one he gained 10% and on the other he lost 10%. His overall percentage on the whole transaction is

(A) 1% gain

(B) No profit no loss

(C) 2% loss

(D) 1% loss

Q38. After allowing a discount of 12% on the marked price, a shopkeeper still gains 10%. If the marked price of an article is $\text{Rs. } 220$, the cost price (in Rupees) is

(A) 176

(B) 180

(C) 160

(D) 200

Q39. A sum of money becomes $\text{Rs.}\,2420$ in 2 years and $\text{Rs.}\,2662$ in 3 years at compound interest, compounded annually. The original sum (in Rupees) is

(A) 2200

(B) 2100

(C) 2000

(D) 1900

Q40. A boat covers 36 km downstream in 3 hours and the same distance upstream in 4.5 hours. The speed of the boat in still water (in km/h) is

(A) 9

(B) 10

(C) 11

(D) 12

Q41. A man travels the first 120 km of a journey at 40 km/h and the next 120 km at 60 km/h. His average speed for the whole journey (in km/h) is

(A) 50

(B) 52

(C) 45

(D) 48

Q42. 10 women can complete a piece of work in 7 days, and 10 children take 14 days to complete the same work. The number of days in which 5 women and 10 children together can complete the work is

(A) 7

(B) 8

(C) 6

(D) 10

Q43. Pipe A can fill a tank in 16 hours and pipe B in 24 hours. Both pipes are opened together, but pipe B is closed after 6 hours. The total time (in hours) taken to fill the tank is

(A) 14

(B) 10

(C) 12

(D) 15

Q44. The sum of the digits of a two-digit number is 9. When the digits are reversed, the new number is 27 less than the original number. The original number is

(A) 54

(B) 72

(C) 81

(D) 63

Q45. For what value of k does the equation $x^2 - kx + 9 = 0$ have two equal real roots (with $k > 0$)?

(A) 6

(B) 9

(C) 3

(D) 12

Q46. The solution set of the inequality $\dfrac{2x+1}{x-3} \leq 0$ is

(A) $x < -\frac{1}{2}$ or $x > 3$

(B) $-\frac{1}{2} \leq x < 3$

(C) $-\frac{1}{2} < x \leq 3$

(D) $x \geq 3$

Q47. The sum to infinity of the geometric series $9 + 6 + 4 + \frac{8}{3} + \cdots$ is

(A) 18

(B) 24

(C) 27

(D) 36

Q48. The number of triangles that can be formed by joining any three of 10 points in a plane, no three of which are collinear, is

(A) 30

(B) 45

(C) 720

(D) 120

Q49. The number of ways in which 4 men and 4 women can be seated alternately in a row is

(A) 1152

(B) 576

(C) 288

(D) 40320

Q50. Two dice are thrown together. The probability that the product of the numbers shown is an even number is

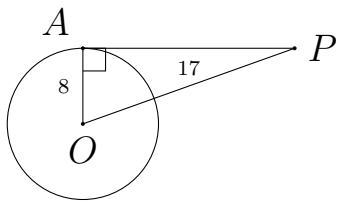
(A) $\frac{1}{4}$

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

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

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

Q51. In the figure, O is the centre of the circle and PA is a tangent at A. If $OP = 17$ cm and the radius $OA = 8$ cm, the length of the tangent PA (in cm) is



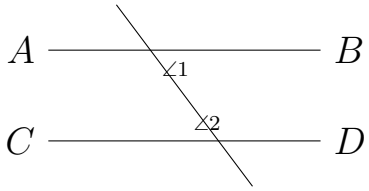
(A) 13

(B) 9

(C) 15

(D) 12

Q52. In the figure, $AB \parallel CD$ and a transversal cuts them. If $\angle 1 = (2x + 30)^\circ$ and the co-interior angle $\angle 2 = (3x + 20)^\circ$, the value of x is



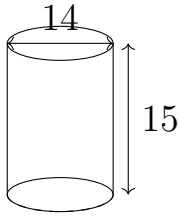
(A) 30

(B) 20

(C) 24

(D) 26

Q53. A solid right circular cylinder has a base diameter of 14 cm and a height of 15 cm. Its curved (lateral) surface area (take $\pi = \frac{22}{7}$), in cm^2, is



(A) 660

(B) 440

(C) 880

(D) 330

Q54. A right circular cone has a base radius of 5 cm and a slant height of 13 cm. Its volume (take $\pi = \frac{22}{7}$), in cm^3, is

(A) 300

(B) $\dfrac{2200}{7}$

(C) $\dfrac{1100}{7}$

(D) $\dfrac{4400}{7}$

Q55. The value of $\log_2 8 + \log_3 81 - \log_5 125$ is

(A) 3

(B) 5

(C) 4

(D) 6

Q56. If $f(x) = 3x - 2$ and $g(x) = x^2 + 1$, then the value of $g(f(2))$ is

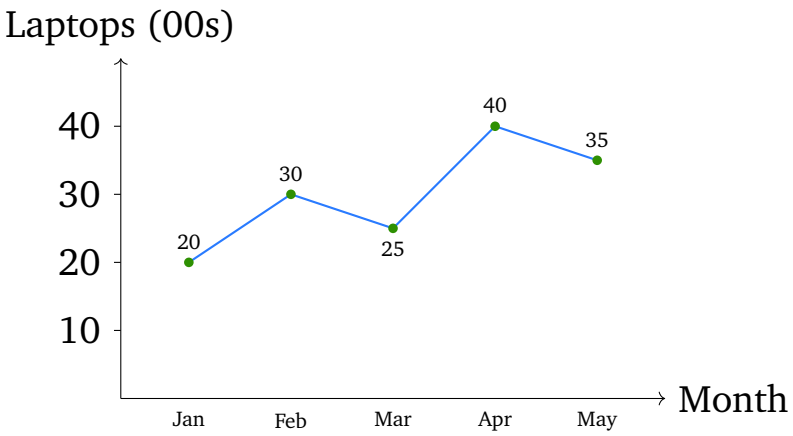
(A) 9

(B) 10

(C) 25

(D) 17

Q57. **Directions (Q57–Q59):** The line graph shows the number of laptops (in hundreds) sold by a store over five months.



The total number of laptops sold over the five months (in hundreds) is

(A) 140

(B) 160

(C) 145

(D) 150

Q58. (Refer to the line graph in Q57.) The percentage decrease in sales from April to May is

(A) 12.5%

(B) 10%

(C) 15%

(D) 20%

Q59. (Refer to the line graph in Q57.) The average number of laptops sold per month over the five months (in hundreds) is

(A) 28

(B) 30

(C) 32

(D) 25

Q60. **Data Sufficiency:** Is the integer m divisible by 6?

Statement I: m is divisible by 3.

Statement II: m is an even number.

Choose the correct option:

(A) Statement I alone is sufficient, but Statement II alone is not.

(B) Statement II alone is sufficient, but Statement I alone is not.

(C) Both statements together are sufficient, but neither alone is sufficient.

(D) Each statement alone is sufficient.

Detailed Solutions

Q1.

Solution

Concept — Divisibility by 11: A number is divisible by 11 when the difference between the sum of digits in odd places and the sum in even places is 0 or a multiple of 11.

Step 1 — Identify the digit positions: For $\overline{4\,7\,a\,6}$ (from the left), odd places hold 4 and a; even places hold 7 and 6.

Step 2 — Form the difference: $(4 + a) - (7 + 6) = a - 9$.

Step 3 — Set the rule: For divisibility, $a - 9$ must be 0 or ± 11. Since a is a single digit 0–9, the only possibility is $a - 9 = 0$, giving $a = 9$.

Why other options are wrong:

- $a = 7, 5, 3$ give differences $-2, -4, -6$, none a multiple of 11.

Final Answer: $a = 9 \Rightarrow$ B

Answer: (B) Go Back to Q1

Q2.

Solution

Concept — Remainders of powers: Look for a repeating pattern of $4^n \bmod 6$.

Step 1 — Compute small powers: $4^1 = 4 \Rightarrow 4 \bmod 6 = 4$. $4^2 = 16 \Rightarrow 16 \bmod 6 = 4$.

Step 2 — Spot the pattern: Every power 4^n (for $n \geq 1$) leaves remainder 4 on division by 6, because $4 \times 4 = 16 \equiv 4$.

Step 3 — Apply to 4^{61}: The remainder is 4.

Why other options are wrong:

- 2, 0 and 1 ignore the constant remainder pattern.

Final Answer: remainder $= 4 \Rightarrow$ D

Answer: (D) Go Back to Q2

Q3.

Solution

Concept — Combined percentage change: New bill factor $=$ (price factor) $\times$ (usage factor).

Step 1 — Price factor: A 25% rise gives factor 1.25.

Step 2 — Usage factor: A 10% cut gives factor 0.90.

Step 3 — Net factor: $1.25 \times 0.90 = 1.125$, i.e. the bill becomes 112.5% of the original.

Step 4 — Net change: $112.5\% - 100\% = 12.5\%$ increase.

Why other options are wrong:

- 15% and 10% add or subtract the percentages wrongly.
- A decrease reverses the sign.

Final Answer: 12.5% increase $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q3

Q4.

Solution

Concept — Passing marks from a failing score: Passing marks $=$ scored marks $+$ shortfall.

Step 1 — Find the passing marks: $175 + 35 = 210$.

Step 2 — Relate to maximum marks: Passing marks are 40% of the maximum M, so $0.40M = 210$.

Step 3 — Solve: $M = \dfrac{210}{0.40} = \dfrac{2100}{4} = 525$.

Why other options are wrong:

- 640, 600 and 750 do not give $0.40M = 210$.

Final Answer: maximum marks $= 525 \Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q4

Q5.

Solution

Concept — Profit sharing by capital $\times$ time: Each partner's share is proportional to investment $\times$ months active.

Step 1 — P's capital-months: P invests for all 12 months: $50{,}000 \times 12 = 6{,}00{,}000$.

Step 2 — Q's capital-months: Q joins after 3 months, so 9 months: $60{,}000 \times 9 = 5{,}40{,}000$.

Step 3 — Ratio of shares: $6{,}00{,}000 : 5{,}40{,}000 = 60 : 54 = 10 : 9$. Total parts $= 19$.

Step 4 — Q's share: $\frac{9}{19} \times 13{,}300 = 9 \times 700 = \text{Rs. } 6300$.

Why other options are wrong:

- $\text{Rs. } 7000$ is P's share; $\text{Rs. } 5700$ uses a wrong ratio.

Final Answer: Q's share $= \text{Rs. } 6300 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q5

Q6.

Solution

Concept — Average change on replacement: Total increase in weight = number of people $\times$ rise in average.

Step 1 — Total increase: $8 \times 1.5 = 12$ kg.

Step 2 — Account for the swap: Replacing the 52 kg man causes the total to rise by 12 kg, so the new man weighs $52 + 12 = 64$ kg.

Why other options are wrong:

- 58, 60 and 62 use too small a total increase.

Final Answer: new man $= 64$ kg $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q6

Q7.

Solution

Concept — CP of m articles $=$ SP of n articles: Profit $\% = \dfrac{m-n}{n} \times 100$.

Step 1 — Identify m and n: $m = 15$, $n = 12$.

Step 2 — Apply the formula: Profit $\% = \dfrac{15-12}{12} \times 100 = \dfrac{3}{12} \times 100 = 25\%$.

Why other options are wrong:

- 20% would need $m : n = 6 : 5$; 15% and 30% use wrong ratios.

Final Answer: profit $= 25\% \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q7

Q8.

Solution

Concept — Mark-up then discount: Take CP $= 100$, mark up, then apply the discount factor.

Step 1 — Marked price: CP $= 100$, marked up 50% gives MP $= 150$.

Step 2 — Apply 20% discount: SP $= 150 \times 0.80 = 120$.

Step 3 — Profit percentage: $\dfrac{120-100}{100} \times 100 = 20\%$.

Why other options are wrong:

- 25% and 30% overstate the profit; 15% understates it.

Final Answer: profit $= 20\% \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q8

Q9.

Solution

Concept — Compound amount formula: $A = P\left(1 + \frac{r}{100}\right)^t$.

Step 1 — Form the ratio: $\frac{A}{P} = \frac{7290}{6250} = \frac{729}{625}$.

Step 2 — Recognise the square: $\frac{729}{625} = \left(\frac{27}{25}\right)^2$, so $\left(1 + \frac{r}{100}\right)^2 = \left(\frac{27}{25}\right)^2$.

Step 3 — Solve for r: $1 + \frac{r}{100} = \frac{27}{25} = 1.08$, so $r = 8\%$.

Why other options are wrong:

- 6%, 9% and 10% do not give the ratio $\frac{729}{625}$.

Final Answer: rate $= 8\% \Rightarrow$ B

Answer: (B) Go Back to Q9

Q10.

Solution

Concept — Early/late timing: The difference in arrival times equals the difference in travel times at the two speeds.

Step 1 — Time gap: Late by 5 min and early by 10 min means the slower walk takes 15 min more, i.e. $\frac{15}{60} = \frac{1}{4}$ hour more.

Step 2 — Set up with distance d: $\frac{d}{4} - \frac{d}{5} = \frac{1}{4}$.

Step 3 — Simplify: $\frac{5d - 4d}{20} = \frac{1}{4} \Rightarrow \frac{d}{20} = \frac{1}{4}$.

Step 4 — Solve: $d = \frac{20}{4} = 5$ km.

Why other options are wrong:

- 4, 6 and 3 km do not satisfy the 15-minute gap.

Final Answer: distance $= 5$ km $\Rightarrow$ D

Answer: (D) Go Back to Q10

Q11.

Solution

Concept — Overtaking on the same direction: Use the relative speed (difference) and the sum of the two lengths.

Step 1 — Relative speed: $68 - 50 = 18$ km/h $= 18 \times \frac{5}{18} = 5$ m/s.

Step 2 — Total distance to clear: $150 + 100 = 250$ m.

Step 3 — Time: $\dfrac{250}{5} = 50$ s.

Why other options are wrong:

- 40, 25 and 45 s use a wrong relative speed or length sum.

Final Answer: time $= 50$ s $\Rightarrow$ A

Answer: (A) Go Back to Q11

Q12.

Solution

Concept — Work rates with substitution: Convert the staggered work into total units, then isolate C.

Step 1 — Take LCM as total work: Let total work $= 240$ units. $A + B$ rate $= \frac{240}{12} = 20$; $B + C$ rate $= \frac{240}{16} = 15$ units/day.

Step 2 — Use the staggered phase: A for 5 days, B for 7 days, C for 13 days finishes 240. Write $5A + 7B + 13C = 240$ (rates in units/day).

Step 3 — Substitute group rates: $A + B = 20$ and $B + C = 15$. Rewrite $5A + 7B + 13C = 5(A + B) + 2(B + C) + 11C = 5(20) + 2(15) + 11C = 130 + 11C$.

Step 4 — Solve for C: $130 + 11C = 240 \Rightarrow 11C = 110 \Rightarrow C = 10$ units/day.

Step 5 — Days for C alone: $\dfrac{240}{10} = 24$ days.

Why other options are wrong:

- 16, 20 and 30 do not satisfy the staggered equation.

Final Answer: C alone $= 24$ days $\Rightarrow$ C

Answer: (C) Go Back to Q12

Q13.

Solution

Concept — Net filling rate: Add the inlet rates and subtract the outlet rate.

Step 1 — Individual rates: $\frac{1}{12}$, $\frac{1}{15}$ (fill) and $\frac{1}{20}$ (empty) per minute.

Step 2 — Net rate (LCD $= 60$): $\frac{5}{60} + \frac{4}{60} - \frac{3}{60} = \frac{6}{60} = \frac{1}{10}$ per minute.

Step 3 — Time to fill: $\dfrac{1}{1/10} = 10$ minutes.

Why other options are wrong:

- 12, 8 and 15 mis-add the three rates.

Final Answer: time $= 10$ minutes $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Pair of linear equations: Let chair $= c$, table $= t$ and eliminate one variable.

Step 1 — Form equations: $4c + 3t = 2100 \ldots$ (i); $5c + 2t = 1750 \ldots$ (ii).

Step 2 — Eliminate c: Multiply (i) by 5 and (ii) by 4: $20c + 15t = 10500$ and $20c + 8t = 7000$.

Step 3 — Subtract: $7t = 3500 \Rightarrow t = 500$.

Why other options are wrong:

- 450, 550 and 400 do not satisfy both equations.

Final Answer: one table $= \text{Rs. } 500 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q14

Q15.

Solution

Concept — Symmetric functions of roots: $\frac{1}{\alpha}+\frac{1}{\beta}=\frac{\alpha+\beta}{\alpha\beta}$.

Step 1 — Sum and product of roots: For $x^2-8x+15=0$, $\alpha+\beta=8$ and $\alpha\beta=15$.

Step 2 — Substitute: $\frac{1}{\alpha}+\frac{1}{\beta}=\frac{8}{15}$.

Why other options are wrong:

- $\frac{15}{8}$ inverts the expression; $\frac{1}{15}$ and $\frac{1}{8}$ drop the sum or product.

Final Answer: $\frac{1}{\alpha}+\frac{1}{\beta}=\frac{8}{15}\Rightarrow$ D

Answer: (D) Go Back to Q15

Q16.

Solution

Concept — Quadratic inequality: Factor and read off the interval between the roots.

Step 1 — Factor: $x^2-7x+10=(x-2)(x-5)$.

Step 2 — Solve ≤ 0: The product is ≤ 0 for $2\leq x\leq 5$.

Step 3 — Count integers: $x\in\{2,3,4,5\}$ gives 4 integer values.

Why other options are wrong:

- 2 or 3 miss endpoints; 5 includes a value outside the interval.

Final Answer: 4 integers $\Rightarrow$ C

Answer: (C) Go Back to Q16

Q17.

Solution

Concept — Sum of an AP via the middle term: For an odd number of terms, the sum = (number of terms) × (middle term).

Step 1 — Locate the middle term: For 15 terms, the middle is the 8th term = 20.

Step 2 — Compute the sum: $S_{15} = 15 \times 20 = 300$.

Why other options are wrong:

- 280, 320 and 260 use a wrong middle term or count.

Final Answer: sum = 300 ⇒ B

Answer: (B) Go Back to Q17

Q18.

Solution

Concept — Arrangements of distinct letters: n distinct objects can be ordered in $n!$ ways.

Step 1 — Count the letters: MATHS has 5 distinct letters.

Step 2 — Apply $n!$: $5! = 120$.

Why other options are wrong:

- 60 divides by a repeat that does not exist; $24 = 4!$; $720 = 6!$.

Final Answer: 120 arrangements ⇒ A

Answer: (A) Go Back to Q18

Q19.

Solution

Concept — Selection with a fixed composition: Multiply the choices for each colour.

Step 1 — Choose 2 white from 7: $\binom{7}{2} = 21$.

Step 2 — Choose 1 black from 5: $\binom{5}{1} = 5$.

Step 3 — Multiply: $21 \times 5 = 105$.

Why other options are wrong:

- $35 = \binom{7}{3}$ ignores the colour split; 70 and 210 misuse the counts.

Final Answer: 105 ways $\Rightarrow$ D

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Complement rule: $P(\text{not blue}) = 1 - P(\text{blue})$.

Step 1 — Total marbles: $5 + 4 + 3 = 12$.

Step 2 — Probability of blue: $\frac{3}{12} = \frac{1}{4}$.

Step 3 — Complement: $1 - \frac{1}{4} = \frac{3}{4}$.

Why other options are wrong:

- $\frac{1}{4}$ is the probability of blue itself; $\frac{2}{3}$ and $\frac{5}{12}$ miscount.

Final Answer: $P = \frac{3}{4} \Rightarrow$ B

Answer: (B) Go Back to Q20

Q21.

Solution

Concept — Median to the hypotenuse: In a right triangle, the median to the hypotenuse equals half the hypotenuse.

Step 1 — Find the hypotenuse: $BC = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$ cm.

Step 2 — Median length: $AD = \frac{BC}{2} = \frac{10}{2} = 5$ cm.

Why other options are wrong:

- 4 and 6 are the legs' halves; 7 is unrelated.

Final Answer: $AD = 5$ cm $\Rightarrow$ D

Answer: (D) Go Back to Q21

Q22.

Solution

Concept — Interior angle of a regular polygon: Each interior angle $= \dfrac{(n-2)\times 180^\circ}{n}$.

Step 1 — Set up the equation: $\dfrac{(n-2)\times 180}{n} = 144$.

Step 2 — Clear the denominator: $180n - 360 = 144n$.

Step 3 — Solve: $36n = 360 \Rightarrow n = 10$.

Why other options are wrong:

- $n = 8$ gives 135°; $n = 12$ gives 150°; $n = 9$ gives 140°.

Final Answer: $n = 10$ sides $\Rightarrow$ A

Answer: (A) Go Back to Q22

Q23.

Solution

Concept — Total surface area of a prism: TSA $=$ $2 \times$ (base area) $+$ (perimeter of base) $\times$ (height).

Step 1 — Area of equilateral base: $\dfrac{\sqrt{3}}{4} \times 6^2 = \dfrac{\sqrt{3}}{4} \times 36 = 9\sqrt{3}$ cm^2.

Step 2 — Two bases: $2 \times 9\sqrt{3} = 18\sqrt{3}$ cm^2.

Step 3 — Lateral area: Perimeter $= 3 \times 6 = 18$ cm; lateral area $= 18 \times 10 = 180$ cm^2.

Step 4 — Add: TSA $= 180 + 18\sqrt{3}$ cm^2.

Why other options are wrong:

- $180 + 9\sqrt{3}$ counts only one base; $180 + 36\sqrt{3}$ doubles the base area again; $90 + 18\sqrt{3}$ halves the lateral area.

Final Answer: TSA $= 180 + 18\sqrt{3}$ cm^2 $\Rightarrow$ C

Answer: (C) Go Back to Q23

Q24.

Solution

Concept — TSA of a square pyramid: TSA = base area $+4 \times \frac{1}{2} \times$ (base side) $\times$ (slant height).

Step 1 — Base area: $10 \times 10 = 100$ cm^2.

Step 2 — Lateral area: $4 \times \dfrac{1}{2} \times 10 \times 13 = 2 \times 10 \times 13 = 260$ cm^2.

Step 3 — Add: TSA $= 100 + 260 = 360$ cm^2.

Why other options are wrong:

- 260 is only the lateral area; 320 and 400 misuse the slant height.

Final Answer: TSA $= 360$ cm$^2 \Rightarrow$ B

Answer: (B) Go Back to Q24

Q25.

Solution

Concept — Log of a product: $\log_{10} A + \log_{10} B = \log_{10}(AB)$, and $\log_{10} 10 = 1$.

Step 1 — Combine: $\log_{10}\big(x(x-3)\big) = 1$.

Step 2 — Remove the log: $x(x-3) = 10^1 = 10$.

Step 3 — Solve the quadratic: $x^2 - 3x - 10 = 0 \Rightarrow (x-5)(x+2) = 0$, so $x = 5$ or $x = -2$.

Step 4 — Reject the invalid root: A logarithm needs $x > 3$, so $x = 5$.

Why other options are wrong:

- 2 and 7 are not roots; 10 does not satisfy $x(x-3) = 10$.

Final Answer: $x = 5 \Rightarrow$ D

Answer: (D) Go Back to Q25

Q26.

Solution

Concept — Inclusion–exclusion: $|A \cup B| = |A| + |B| - |A \cap B|$.

Step 1 — Everyone studies at least one: $|A \cup B| = 90$.

Step 2 — Substitute: $90 = 55 + 48 - |A \cap B|$.

Step 3 — Solve: $|A \cap B| = 103 - 90 = 13$.

Why other options are wrong:

- 7, 42 and 35 misapply the inclusion–exclusion count.

Final Answer: both subjects $= 13$ students $\Rightarrow$ A

Answer: (A) Go Back to Q26

Q27.

Solution

Concept — Reading totals off a bar graph: Add the bar heights.

Step 1 — List the values: $2019 = 40$, $2020 = 60$, $2021 = 50$, $2022 = 80$ (in lakh).

Step 2 — Add: $40 + 60 + 50 + 80 = 230$.

Why other options are wrong:

- 220, 210 and 240 misread one bar.

Final Answer: total $=$ Rs. 230 lakh $\Rightarrow$ B

Answer: (B) Go Back to Q27

Q28.

Solution

Concept — Percentage increase: $\dfrac{\text{rise}}{\text{base}} \times 100$.

Step 1 — Identify values: $2021 = 50$, $2022 = 80$.

Step 2 — Rise: $80 - 50 = 30$.

Step 3 — Percentage: $\dfrac{30}{50} \times 100 = 60\%$.

Why other options are wrong:

- 50%, 40% and 30% use a wrong base or rise.

Final Answer: increase $= 60\% \Rightarrow$ C

Answer: (C) Go Back to Q28

Q29.

Solution

Concept — Ratio from a bar graph: Read each year's value and reduce the ratio to lowest terms.

Step 1 — Read the bars: 2019 profit $= 40$ lakh and 2021 profit $= 50$ lakh.

Step 2 — Form the ratio: $40 : 50$.

Step 3 — Reduce: Divide both terms by 10: $40 : 50 = 4 : 5$.

Why other options are wrong:

- $5 : 4$ reverses the order; $1 : 2$ and $2 : 3$ misread the bar heights.

Final Answer: ratio $= 4 : 5 \Rightarrow$ B

Answer: (B) Go Back to Q29

Q30.

Solution

Concept — Data sufficiency: Test each statement for a unique value.

Step 1 — Statement I alone: Two-digit multiples of 12 are $12, 24, 36, 48, 60, 72, 84, 96$ – many values, not unique. Not sufficient.

Step 2 — Statement II alone: n between 20 and 30 allows $21, 22, \ldots, 29$ – not unique. Not sufficient.

Step 3 — Combine: A two-digit multiple of 12 between 20 and 30 is only 24. Unique value. Both together are sufficient.

Why other options are wrong:

- Neither statement alone pins down n, so options claiming single-statement sufficiency fail.

Final Answer: both together sufficient, neither alone $\Rightarrow$ A

Answer: (A) Go Back to Q30

Q31.

Solution

Concept — Unit digits of powers: Use the cyclicity of the last digit of each base.

Step 1 — Unit digit of 4^{37}: Powers of 4 cycle $4, 6, 4, 6, \ldots$; odd exponents end in 4. So 4^{37} ends in 4.

Step 2 — Unit digit of 6^{29}: Any power of 6 ends in 6.

Step 3 — Unit digit of 9^{18}: Powers of 9 cycle $9, 1, 9, 1, \ldots$; even exponents end in 1. So 9^{18} ends in 1.

Step 4 — Add the unit digits: $4 + 6 + 1 = 11$, whose unit digit is 1.

Why other options are wrong:

- 9, 3 and 5 come from wrong cyclicities.

Final Answer: unit digit $= 1 \Rightarrow$ C

Answer: (C) Go Back to Q31

Q32.

Solution

Concept — Common remainder via LCM: The number is LCM $\times\, k + r$; the least such is LCM $+ r$.

Step 1 — LCM of $16, 24, 36$: $16 = 2^4$, $24 = 2^3 \cdot 3$, $36 = 2^2 \cdot 3^2$. LCM $= 2^4 \cdot 3^2 = 144$.

Step 2 — Add the remainder: Least number $= 144 + 7 = 151$.

Why other options are wrong:

- 144 omits the remainder; 137 subtracts it instead of adding.

Final Answer: least number $= 151 \Rightarrow$ B

Answer: (B) Go Back to Q32

Q33.

Solution

Concept — Area change from length and breadth changes: New area factor = (length factor) $\times$ (breadth factor).

Step 1 — Factors: Length $\times 1.20$, breadth $\times 0.90$.

Step 2 — Area factor: $1.20 \times 0.90 = 1.08$.

Step 3 — Percentage change: $108\% - 100\% = 8\%$ increase.

Why other options are wrong:

- 10% and 12% add the percentages; 9% uses wrong factors.

Final Answer: 8% increase $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q33

Q34.

Solution

Concept — Weighted literacy: Combine the literate fractions of men and women.

Step 1 — Take a population of 100**:** Men $= 60$, women $= 40$.

Step 2 — Literate men: 40% of $60 = 24$.

Step 3 — Literate women: 25% of $40 = 10$.

Step 4 — Total literate fraction: $\dfrac{24+10}{100} = \dfrac{34}{100} = 34\%$.

Why other options are wrong:

- 30%, 32.5% and 36% misweight the two groups.

Final Answer: literate $= 34\% \Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q34

Q35.

Solution

Concept — Ratio with a shift: Introduce the proportionality constant and solve.

Step 1 — Let the numbers be: $4k$ and $7k$.

Step 2 — Apply the shift: $\frac{4k-8}{7k-8} = \frac{2}{5}$.

Step 3 — Cross-multiply: $5(4k-8) = 2(7k-8) \Rightarrow 20k - 40 = 14k - 16$.

Step 4 — Solve: $6k = 24 \Rightarrow k = 4$. Larger number $= 7k = 28$.

Why other options are wrong:

- $16 = 4k$ is the smaller number; 24 and 21 use a wrong k.

Final Answer: larger number $= 28 \Rightarrow$ C

Answer: (C) Go Back to Q35

Q36.

Solution

Concept — Water as free dilution: Selling water-diluted milk at the milk price means the "profit" comes from the free water.

Step 1 — Required gain fraction: A 25% gain means cost : gain $= 100 : 25 = 4 : 1$.

Step 2 — Interpret with water: Cost of 4 parts of milk is recovered, and 1 extra part (water) is pure profit. So water : milk $= 1 : 4$.

Step 3 — State the ratio: Water : milk $= 1 : 4$.

Why other options are wrong:

- $1 : 5$ gives a 20% gain; $1 : 3$ gives about 33%; $2 : 5$ does not match 25%.

Final Answer: water : milk $= 1 : 4 \Rightarrow$ B

Answer: (B) Go Back to Q36

Q37.

Solution

Concept — Equal SP, equal ± gain/loss: Selling two items at the same price with $+x\%$ and $-x\%$ always gives a net loss of $\left(\frac{x}{10}\right)^2\%$.

Step 1 — Apply the shortcut: Here $x = 10$, so net loss $= \left(\frac{10}{10}\right)^2 = 1\%$.

Step 2 — Confirm by figures: $\text{CP}_1 = \frac{990}{1.1} = 900$; $\text{CP}_2 = \frac{990}{0.9} = 1100$. Total CP $= 2000$, total SP $= 1980$, loss $= 20$ on $2000 = 1\%$.

Why other options are wrong:

- "No profit no loss" and "1% gain" ignore that equal $\pm$ percentages always yield a loss.

Final Answer: 1% loss $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q37

Q38.

Solution

Concept — Discount and profit chain: SP $=$ MP $\times(1 -$ discount$)$ and SP $=$ CP $\times(1 +$ profit$)$.

Step 1 — Selling price from MP: $220 \times (1 - 0.12) = 220 \times 0.88 = 193.6$.

Step 2 — Cost price from SP: $\text{CP} = \dfrac{193.6}{1.10} = 176$.

Why other options are wrong:

- 180, 160 and 200 do not satisfy both the 12% discount and 10% gain.

Final Answer: CP $= \text{Rs. } 176 \Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q38

Q39.

Solution

Concept — Consecutive CI amounts: The ratio of successive yearly amounts gives $1 + \frac{r}{100}$; then divide back to the principal.

Step 1 — Find the rate factor: $\dfrac{2662}{2420} = 1.1$, so $1 + \frac{r}{100} = 1.1$ and $r = 10\%$.

Step 2 — Back out the principal: The 2-year amount $= P(1.1)^2 = 2420$, so $P = \dfrac{2420}{1.21} = 2000$.

Why other options are wrong:

- 2200, 2100 and 1900 do not satisfy $P(1.1)^2 = 2420$.

Final Answer: principal $= \text{Rs. } 2000 \Rightarrow$ C

Answer: (C) Go Back to Q39

Q40.

Solution

Concept — Boat in stream: Still-water speed $= \frac{1}{2}$(downstream speed + upstream speed).

Step 1 — Downstream speed: $\dfrac{36}{3} = 12$ km/h.

Step 2 — Upstream speed: $\dfrac{36}{4.5} = 8$ km/h.

Step 3 — Still-water speed: $\dfrac{12 + 8}{2} = 10$ km/h.

Why other options are wrong:

- 9, 11 and 12 misaverage the two speeds.

Final Answer: still-water speed $= 10$ km/h $\Rightarrow$ B

Answer: (B) Go Back to Q40

Q41.

Solution

Concept — Average speed: Average speed $= \dfrac{\text{total distance}}{\text{total time}}$.

Step 1 — Time for first leg: $\dfrac{120}{40} = 3$ h.

Step 2 — Time for second leg: $\dfrac{120}{60} = 2$ h.

Step 3 — Combine: Total distance $= 240$ km, total time $= 5$ h, average $= \dfrac{240}{5} = 48$ km/h.

Why other options are wrong:

- 50 is the arithmetic mean of the speeds, which is wrong for equal distances; 52 and 45 miscompute.

Final Answer: average speed $= 48$ km/h $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q41

Q42.

Solution

Concept — Combined rates of two worker types: Find each group's daily rate and add.

Step 1 — Rate of 10 women: $\dfrac{1}{7}$ work/day, so 5 women do $\dfrac{1}{14}$ work/day.

Step 2 — Rate of 10 children: $\dfrac{1}{14}$ work/day.

Step 3 — Combined rate: $\dfrac{1}{14} + \dfrac{1}{14} = \dfrac{2}{14} = \dfrac{1}{7}$ work/day.

Step 4 — Days needed: $\dfrac{1}{1/7} = 7$ days.

Why other options are wrong:

- 8, 6 and 10 misadd the two rates.

Final Answer: time $= 7$ days $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q42

Q43.

Solution

Concept — Pipe closed partway: Compute the work done while both run, then let the remaining pipe finish alone.

Step 1 — Rates: A fills $\frac{1}{16}$, B fills $\frac{1}{24}$ per hour.

Step 2 — Work in first 6 hours (both open): $6\left(\frac{1}{16}+\frac{1}{24}\right) = 6\left(\frac{3+2}{48}\right) = 6 \times \frac{5}{48} = \frac{30}{48} = \frac{5}{8}$.

Step 3 — Remaining work: $1 - \frac{5}{8} = \frac{3}{8}$.

Step 4 — A alone finishes: After B closes, only A ($\frac{1}{16}$ per hour) runs. Time $= \dfrac{3/8}{1/16} = \frac{3}{8} \times 16 = 6$ h.

Step 5 — Total time: $6 + 6 = 12$ h.

Why other options are wrong:

- 14, 10 and 15 mis-handle the remaining $\frac{3}{8}$ of the tank.

Final Answer: total time $= 12$ h $\Rightarrow$ C

Answer: (C) Go Back to Q43

Q44.

Solution

Concept — Two-digit number with digit reversal: Let the number be $10a + b$ with $a + b = 9$.

Step 1 — Reversal condition: Original $-$ reversed $= 27$, i.e. $(10a+b)-(10b+a) = 27$.

Step 2 — Simplify: $9a - 9b = 27 \Rightarrow a - b = 3$.

Step 3 — Solve with the sum: $a + b = 9$ and $a - b = 3$ give $a = 6$, $b = 3$.

Step 4 — Form the number: $10(6) + 3 = 63$.

Why other options are wrong:

- 54 has $a - b = 1$; 72 has $a - b = 5$; 81 has digit sum 9 but $a - b = 7$.

Final Answer: number $= 63 \Rightarrow$ D

Answer: (D) Go Back to Q44

Q45.

Solution

Concept — Equal roots condition: A quadratic ax^2+bx+c has equal roots when the discriminant $b^2-4ac=0$.

Step 1 — Write the discriminant: For x^2-kx+9, $\Delta = k^2-4(1)(9) = k^2-36$.

Step 2 — Set to zero: $k^2-36=0 \Rightarrow k^2=36$.

Step 3 — Take the positive root: $k=6$ (since $k>0$).

Why other options are wrong:

- 9, 3 and 12 do not make the discriminant zero.

Final Answer: $k=6 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q45

Q46.

Solution

Concept — Rational inequality: A quotient is ≤ 0 between its zero (numerator $=0$) and its pole (denominator $=0$), including the zero but excluding the pole.

Step 1 — Critical points: Numerator zero at $x=-\frac{1}{2}$; denominator zero at $x=3$.

Step 2 — Sign analysis: The expression is negative between $-\frac{1}{2}$ and 3. At $x=-\frac{1}{2}$ it equals 0 (allowed); at $x=3$ it is undefined (excluded).

Step 3 — Write the set: $-\frac{1}{2} \leq x < 3$.

Why other options are wrong:

- The first option is where the quotient is positive; the others misplace the open/closed ends.

Final Answer: $-\frac{1}{2} \leq x < 3 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q46

Q47.

Solution

Concept — Sum to infinity of a GP: $S_\infty = \dfrac{a}{1-r}$ for $|r| < 1$.

Step 1 — Identify a and r: $a = 9$, $r = \dfrac{6}{9} = \dfrac{2}{3}$.

Step 2 — Apply the formula: $S_\infty = \dfrac{9}{1-\frac{2}{3}} = \dfrac{9}{\frac{1}{3}} = 9 \times 3 = 27$.

Why other options are wrong:

- 18, 24 and 36 use a wrong ratio or first term.

Final Answer: sum $= 27 \Rightarrow$ C

Answer: (C) Go Back to Q47

Q48.

Solution

Concept — Triangles from non-collinear points: Choosing any 3 of n points gives a triangle, so the count is $\binom{n}{3}$.

Step 1 — Apply with $n = 10$: $\binom{10}{3} = \dfrac{10 \times 9 \times 8}{3 \times 2 \times 1}$.

Step 2 — Compute: $\dfrac{720}{6} = 120$.

Why other options are wrong:

- 30 and 45 undercount; 720 forgets to divide by 3!.

Final Answer: 120 triangles $\Rightarrow$ D

Answer: (D) Go Back to Q48

Q49.

Solution

Concept — Alternating arrangement: Fix one gender's pattern, then arrange each group and account for the two starting choices.

Step 1 — Arrange the men: 4 men in a row $= 4! = 24$ ways.

Step 2 — Arrange the women in the gaps: 4 women in their slots $= 4! = 24$ ways.

Step 3 — Two alternating patterns: The row can start with a man (MWMW...) or a woman (WMWM...), giving a factor of 2.

Step 4 — Multiply: $2 \times 24 \times 24 = 1152$.

Why other options are wrong:

- 576 omits the factor of 2; 288 halves it again; $40320 = 8!$ ignores the alternating rule.

Final Answer: 1152 ways $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q49

Q50.

Solution

Concept — Even product via complement: The product is odd only when both dice are odd; otherwise it is even.

Step 1 — Probability both odd: Each die is odd with probability $\frac{3}{6} = \frac{1}{2}$, so both odd $= \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.

Step 2 — Complement: $P(\text{even product}) = 1 - \frac{1}{4} = \frac{3}{4}$.

Why other options are wrong:

- $\frac{1}{4}$ is the odd-product probability; $\frac{1}{2}$ and $\frac{2}{3}$ miscount.

Final Answer: $P = \dfrac{3}{4} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q50

Q51.

Solution

Concept — Tangent–radius right angle: The radius is perpendicular to the tangent at the point of contact, so $\triangle OAP$ is right-angled at A.

Step 1 — Apply Pythagoras: $PA^2 = OP^2 - OA^2 = 17^2 - 8^2$.

Step 2 — Compute: $289 - 64 = 225$, so $PA = \sqrt{225} = 15$ cm.

Why other options are wrong:

- 13, 9 and 12 come from wrong Pythagorean triples.

Final Answer: $PA = 15$ cm $\Rightarrow$ C

Answer: (C) Go Back to Q51

Q52.

Solution

Concept — Co-interior angles: When two parallel lines are cut by a transversal, co-interior (allied) angles are supplementary, summing to $180°$.

Step 1 — Set up the equation: $(2x + 30) + (3x + 20) = 180$.

Step 2 — Simplify: $5x + 50 = 180$.

Step 3 — Solve: $5x = 130 \Rightarrow x = 26$.

Why other options are wrong:

- 30, 20 and 24 do not make the two angles supplementary.

Final Answer: $x = 26 \Rightarrow$ D

Answer: (D) Go Back to Q52

Q53.

Solution

Concept — Curved surface area of a cylinder: CSA $= 2\pi rh$.

Step 1 — Radius: Diameter 14 cm gives $r = 7$ cm.

Step 2 — Apply the formula: CSA $= 2 \times \frac{22}{7} \times 7 \times 15$.

Step 3 — Compute: $2 \times 22 \times 15 = 660$ cm^2.

Why other options are wrong:

- 440 uses $r = 7$ with $h = 10$; 880 doubles wrongly; 330 halves the CSA.

Final Answer: CSA $= 660$ cm$^2 \Rightarrow$ A

Answer: (A) Go Back to Q53

Q54.

Solution

Concept — Volume of a cone: $V = \frac{1}{3}\pi r^2 h$, where $h = \sqrt{l^2 - r^2}$.

Step 1 — Find the height: $h = \sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12$ cm.

Step 2 — Apply the volume formula: $V = \frac{1}{3} \times \frac{22}{7} \times 5^2 \times 12 = \frac{1}{3} \times \frac{22}{7} \times 25 \times 12$.

Step 3 — Compute: $\frac{22}{7} \times 25 \times 4 = \frac{2200}{7}$ cm^3 (since $\frac{12}{3} = 4$).

Why other options are wrong:

- 300 ignores π; $\frac{1100}{7}$ halves the result; $\frac{4400}{7}$ doubles it.

Final Answer: $V = \dfrac{2200}{7}$ cm$^3 \Rightarrow$ B

Answer: (B) Go Back to Q54

Q55.

Solution

Concept — Logarithm of a power: $\log_b b^k = k$.

Step 1 — Evaluate each term: $\log_2 8 = \log_2 2^3 = 3$; $\log_3 81 = \log_3 3^4 = 4$; $\log_5 125 = \log_5 5^3 = 3$.

Step 2 — Combine: $3 + 4 - 3 = 4$.

Why other options are wrong:

- 3, 5 and 6 mis-evaluate one of the logarithms.

Final Answer: value $= 4 \Rightarrow$ C

Answer: (C) Go Back to Q55

Q56.

Solution

Concept — Composition of functions: Evaluate the inner function first, then the outer.

Step 1 — Inner value $f(2)$: $f(2) = 3(2) - 2 = 4$.

Step 2 — Outer value $g(4)$: $g(4) = 4^2 + 1 = 16 + 1 = 17$.

Why other options are wrong:

- 9, 10 and 25 come from swapping f and g or a wrong inner value.

Final Answer: $g(f(2)) = 17 \Rightarrow$ D

Answer: (D) Go Back to Q56

Q57.

Solution

Concept — Reading a line graph total: Add the plotted values.

Step 1 — List the values: Jan $= 20$, Feb $= 30$, Mar $= 25$, Apr $= 40$, May $= 35$ (in hundreds).

Step 2 — Add: $20 + 30 + 25 + 40 + 35 = 150$.

Why other options are wrong:

- 140, 160 and 145 misread one month's value.

Final Answer: total $= 150$ hundred $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q57

Q58.

Solution

Concept — Percentage decrease: $\dfrac{\text{fall}}{\text{base}} \times 100$.

Step 1 — Identify values: Apr $= 40$, May $= 35$.

Step 2 — Fall: $40 - 35 = 5$.

Step 3 — Percentage: $\dfrac{5}{40} \times 100 = 12.5\%$.

Why other options are wrong:

- 10%, 15% and 20% use a wrong base or fall.

Final Answer: decrease $= 12.5\% \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q58

Q59.

Solution

Concept — Average: Total $\div$ number of months.

Step 1 — Total: From Q57, total $= 150$ hundred.

Step 2 — Divide by 5: $\dfrac{150}{5} = 30$.

Why other options are wrong:

- 28, 32 and 25 use a wrong total or count.

Final Answer: average $= 30$ hundred $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q59

Q60.

Solution

Concept — Divisibility by 6: A number is divisible by 6 exactly when it is divisible by both 2 and 3.

Step 1 — Statement I alone: Divisible by 3 only (e.g. 9 is not divisible by 6, but 12 is). Not sufficient.

Step 2 — Statement II alone: Even only (e.g. 8 is not divisible by 6, but 12 is). Not sufficient.

Step 3 — Combine: Divisible by 3 and by 2 together guarantees divisibility by 6 (a definite "yes"). Both together are sufficient.

Why other options are wrong:

- Neither single statement settles the question, so single-statement options fail.

Final Answer: both together sufficient, neither alone $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q60

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	D	3	A	4	C	5	B
6	D	7	A	8	C	9	B	10	D
11	A	12	C	13	B	14	A	15	D
16	C	17	B	18	A	19	D	20	B
21	D	22	A	23	C	24	B	25	D
26	A	27	B	28	C	29	B	30	A
31	C	32	B	33	D	34	A	35	C
36	B	37	D	38	A	39	C	40	B
41	D	42	A	43	C	44	D	45	A
46	B	47	C	48	D	49	A	50	B
51	C	52	D	53	A	54	B	55	C
56	D	57	D	58	A	59	B	60	C