ATMA Quantitative Skills
Sample Paper – 6

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 of positive integers less than 100 that are divisible by neither 2 nor 3 is

(A) 30

(B) 36

(C) 33

(D) 50

Q2. The remainder when 2^{50} is divided by 7 is

(A) 4

(B) 2

(C) 1

(D) 6

Q3. If the radius of a circle is increased by 20%, the percentage increase in its area is

(A) 40%

(B) 44%

(C) 20%

(D) 24%

Q4. A candidate scored 36% in an examination and failed by 24 marks. Another candidate scored 48% and got 36 marks more than the pass mark. The maximum marks of the examination are

(A) 450

(B) 400

(C) 480

(D) 500

Q5. A and B start a business. A invests $\text{Rs. } 30{,}000$ for the whole year while B invests $\text{Rs. } 40{,}000$ but only for the last 6 months. If the annual profit is $\text{Rs. } 25{,}000$, A's share (in Rupees) is

(A) $\text{Rs. } 15{,}000$

(B) $\text{Rs. } 12{,}500$

(C) $\text{Rs. } 10{,}000$

(D) $\text{Rs. } 18{,}000$

Q6. The average of 11 consecutive natural numbers is 30. The largest of these numbers is

(A) 34

(B) 35

(C) 36

(D) 33

Q7. A dishonest dealer claims to sell goods at cost price but uses a weight of 800 grams in place of a 1 kilogram weight. His profit percentage is

(A) 20%

(B) 22%

(C) 30%

(D) 25%

Q8. The marked price of an article is $\text{Rs. } 1200$. After two successive discounts of 10% and 15%, the selling price (in Rupees) is

(A) $\text{Rs. } 900$

(B) $\text{Rs. } 930$

(C) $\text{Rs. } 918$

(D) $\text{Rs. } 960$

Q9. The difference between the compound interest and the simple interest on a sum of $\text{Rs. } 10{,}000$ for 2 years at 5% per annum is

(A) $\text{Rs. } 25$

(B) $\text{Rs. } 50$

(C) $\text{Rs. } 30$

(D) $\text{Rs. } 20$

Q10. A man walks from his home to office at 5 km/h and reaches 6 minutes late. Walking at 6 km/h he reaches 4 minutes early. The distance from his home to office (in km) is

(A) 4

(B) 6

(C) 4.5

(D) 5

Q11. A train running at 72 km/h crosses a pole in 12 seconds. The length of the train (in metres) is

(A) 200

(B) 240

(C) 260

(D) 300

Q12. A can complete a task in 20 days and B in 30 days. They work together for 6 days, after which A leaves. The number of additional days B needs to finish the remaining work is

(A) 15

(B) 12

(C) 18

(D) 10

Q13. Pipe A can fill a tank in 10 hours and pipe B in 15 hours. Both are opened together, but after 3 hours pipe B is closed. The total time (in hours) to fill the tank is

(A) 6

(B) 6.5

(C) 7

(D) 8

Q14. The sum of two numbers is 40 and their difference is 8. The product of the two numbers is

(A) 360

(B) 384

(C) 396

(D) 400

Q15. If one root of the equation $x^2 - 6x + k = 0$ is twice the other, then the value of k is

(A) 6

(B) 4

(C) 9

(D) 8

Q16. The number of integer values of x satisfying $|x - 3| \leq 4$ is

(A) 9

(B) 8

(C) 7

(D) 10

Q17. The 15th term of the arithmetic progression $7, 11, 15, 19, \ldots$ is

(A) 59

(B) 67

(C) 63

(D) 71

Q18. The number of different arrangements of the letters of the word "LEVEL" is

(A) 60

(B) 30

(C) 120

(D) 20

Q19. In how many ways can 4 boys and 3 girls be seated in a row so that all the girls sit together?

(A) 144

(B) 576

(C) 5040

(D) 720

Q20. A card is drawn at random from a well-shuffled pack of 52 cards. The probability that it is either a king or a heart is

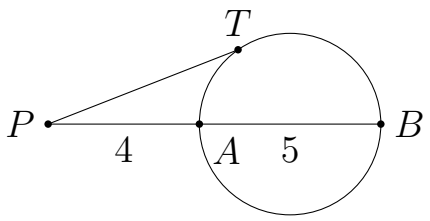
(A) $\frac{4}{13}$

(B) $\frac{17}{52}$

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

(D) $\frac{1}{13}$

Q21. In the figure, PT is a tangent to the circle at T and PAB is a secant. If $PA = 4$ cm and $PB = 9$ cm, the length of the tangent PT (in cm) is



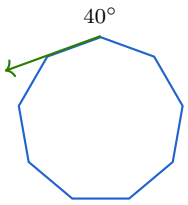
(A) 5

(B) $\sqrt{13}$

(C) 6

(D) $\sqrt{20}$

Q22. In the figure, the exterior angle of the regular polygon at each vertex is $40°$. The number of sides of the polygon is



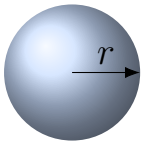
(A) 8

(B) 9

(C) 10

(D) 12

Q23. A solid sphere has a surface area of 616 cm^2. Its volume (in cm^3, take $\pi = \frac{22}{7}$) is



Surface area $= 616$

(A) $1437\frac{1}{3}$ cm^3

(B) 1232 cm^3

(C) 1540 cm^3

(D) 1078 cm^3

Q24. A hemispherical bowl has an inner radius of 6 cm. The volume of water (in cm^3) it can hold when completely filled is (take $\pi = \frac{22}{7}$)

(A) 462

(B) 904.32

(C) 288π

(D) 452.57

Q25. If $2^x = 8^{y+1}$ and $9^y = 3^{x-9}$, then the value of $x + y$ is

(A) 24

(B) 27

(C) 21

(D) 30

Q26. In a survey of 120 people, 65 read newspaper A, 45 read newspaper B, and 20 read both. The number of people who read neither newspaper is

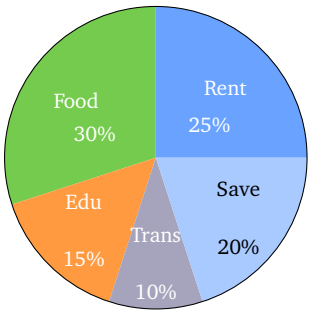
(A) 30

(B) 25

(C) 35

(D) 40

Q27. **Directions (Q27–Q29):** The pie chart shows the percentage distribution of the monthly expenditure of a family whose total monthly income is Rs. 48,000.



The amount (in Rupees) the family spends on Food is

(A) Rs. 12,000

(B) Rs. 9600

(C) Rs. 14,400

(D) Rs. 7200

Q28. (Refer to the pie chart in Q27.) The amount spent on Rent exceeds the amount spent on Transport by (in Rupees)

(A) Rs. 6000

(B) Rs. 7200

(C) Rs. 4800

(D) Rs. 8400

Q29. (Refer to the pie chart in Q27.) The central angle of the sector representing Education is

(A) 45°

(B) 36°

(C) 60°

(D) 54°

Q30. **Data Sufficiency:** What is the present age of the father?

Statement I: The father is 30 years older than his son.
Statement II: Five years ago the father was four times as old as his son.

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.

Part II (Q31–Q60)

Q31. The largest number which divides 1305, 4665 and 6905 leaving the same remainder in each case is

(A) 1170

(B) 560

(C) 260

(D) 1120

Q32. The number of trailing zeros at the end of $25!$ is

(A) 6

(B) 5

(C) 7

(D) 4

Q33. If 30% of a number is 45, then 80% of the same number is

(A) 100

(B) 120

(C) 135

(D) 150

Q34. The salary of an employee is first increased by 20% and then decreased by 20%. The net change in the salary is

(A) No change

(B) 4% increase

(C) 4% decrease

(D) 2% decrease

Q35. The ratio of two numbers is $5 : 8$. If 6 is added to each, the ratio becomes $2 : 3$. The smaller number is

(A) 30

(B) 35

(C) 40

(D) 25

Q36. A vessel contains 40 litres of pure milk. 8 litres are drawn out and replaced with water; this operation is repeated once more. The quantity of milk now left in the vessel (in litres) is

(A) 30.4

(B) 24

(C) 28.8

(D) 25.6

Q37. A trader buys 12 apples for $\text{Rs. } 10$ and sells 10 apples for $\text{Rs. } 12$. His profit percentage is

(A) 20%

(B) 44%

(C) 40%

(D) 24%

Q38. The cost price of 20 articles equals the selling price of 16 articles. The profit percentage is

(A) 20%

(B) 16%

(C) 25%

(D) 30%

Q39. A sum of money amounts to $\text{Rs. } 1200$ in 3 years and to $\text{Rs. } 1400$ in 5 years at simple interest. The principal (in Rupees) is

(A) Rs. 900

(B) Rs. 1000

(C) Rs. 850

(D) Rs. 950

Q40. A man covers half of a journey at 40 km/h and the remaining half at 60 km/h. His average speed for the whole journey (in km/h) is

(A) 50

(B) 48

(C) 45

(D) 52

Q41. Two cyclists start at the same time from the same point and travel in opposite directions at 12 km/h and 18 km/h. After how many hours will they be 90 km apart?

(A) 5

(B) 4.5

(C) 2.5

(D) 3

Q42. 8 men can complete a piece of work in 15 days. After 5 days, 4 more men join them. The remaining work is then completed in

(A) 8 days

(B) $7\frac{1}{2}$ days

(C) $6\frac{2}{3}$ days

(D) 5 days

Q43. A cistern has a leak that can empty it in 12 hours. A tap that admits 4 litres per minute is turned on, and now the full cistern is emptied in 20 hours. The capacity of the cistern (in litres) is

(A) 7200

(B) 6000

(C) 4800

(D) 8400

Q44. The sum of the present ages of a mother and her daughter is 50 years. Five years ago the mother was four times as old as her daughter. The present age of the mother (in years) is

(A) 38

(B) 37

(C) 40

(D) 35

Q45. If the sum of the roots of $2x^2 - kx + 8 = 0$ equals their product, then the value of k is

(A) 4

(B) 2

(C) 6

(D) 8

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

(A) $-3 < x < 2$

(B) $x > 2$ only

(C) $x < -3$ or $x > 2$

(D) $x > -3$

Q47. The sum of the first n terms of a series is $n^2 + 2n$. The 10th term of the series is

(A) 21

(B) 20

(C) 23

(D) 19

Q48. The number of diagonals in a regular polygon of 10 sides is

(A) 45

(B) 40

(C) 30

(D) 35

Q49. A box contains 6 red and 4 green balls. The number of ways of choosing 3 balls so that exactly 2 are red is

(A) 40

(B) 60

(C) 120

(D) 30

Q50. Two cards are drawn at random without replacement from a pack of 52 cards. The probability that both are aces is

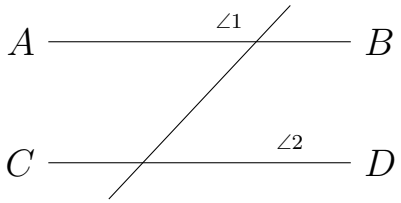
(A) $\dfrac{1}{169}$

(B) $\dfrac{1}{26}$

(C) $\dfrac{1}{221}$

(D) $\dfrac{2}{221}$

Q51. In the figure, $AB \parallel CD$ and a transversal cuts them. If $\angle 1 = (3x + 20)^\circ$ and the corresponding angle $\angle 2 = (5x - 10)^\circ$, then $\angle 1$ equals



(A) 65°

(B) 60°

(C) 70°

(D) 55°

Q52. The sides of a triangle are 7 cm, 24 cm and 25 cm. The area of the triangle (in cm^2) is

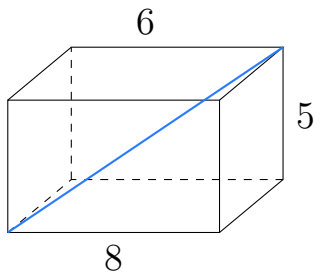
(A) 96

(B) 84

(C) 120

(D) 168

Q53. A cuboid has dimensions 8 cm $\times$ 6 cm $\times$ 5 cm. The length of its longest diagonal (in cm) is



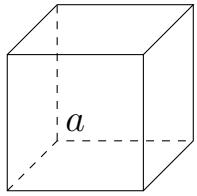
(A) $\sqrt{100}$

(B) 11

(C) $\sqrt{120}$

(D) $5\sqrt{5}$

Q54. If the total surface area of a cube is 294 cm^2, then its volume (in cm^3) is



(A) 216

(B) 512

(C) 343

(D) 294

Q55. The value of $\log_3 27 + \log_2 32 - \log_5 25$ is

(A) 6

(B) 5

(C) 8

(D) 7

Q56. If $f(x) = \dfrac{x+1}{x-1}$ for $x \neq 1$, then $f(f(2))$ equals

(A) 3

(B) 2

(C) $\frac{1}{3}$

(D) 1

Q57. **Directions (Q57–Q59):** The table shows the number of units produced (in thousands) by four factories P, Q, R and S in two years.

Year	P	Q	R	S
2022	40	55	35	50
2023	50	45	60	45

The total production of all four factories in the year 2022 (in thousands) is

(A) 200

(B) 190

(C) 170

(D) 180

Q58. (Refer to the table in Q57.) Which factory recorded the largest percentage increase in production from 2022 to 2023?

(A) Factory R

(B) Factory P

(C) Factory Q

(D) Factory S

Q59. (Refer to the table in Q57.) The ratio of the total production of factory P (over both years) to that of factory S (over both years) is

(A) $10 : 9$

(B) $8 : 9$

(C) $18 : 19$

(D) $19 : 18$

Q60. **Data Sufficiency:** Is the quadrilateral $ABCD$ a square?

Statement I: All four sides of $ABCD$ are equal.
Statement II: All four angles of $ABCD$ are right angles.

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) Each statement alone is sufficient.

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

Detailed Solutions

Q1.

Solution

Concept — Inclusion-exclusion for divisibility: Count integers from 1 to 99 divisible by 2 or 3, then subtract from 99.

Step 1 — Count multiples of 2: $\lfloor 99/2 \rfloor = 49$.

Step 2 — Count multiples of 3: $\lfloor 99/3 \rfloor = 33$.

Step 3 — Count multiples of 6: $\lfloor 99/6 \rfloor = 16$.

Step 4 — Apply inclusion-exclusion: Divisible by 2 or $3 = 49 + 33 - 16 = 66$. Divisible by neither $= 99 - 66 = 33$.

Why other options are wrong:

- 30 and 36 drop or mishandle the overlap of multiples of 6.
- 50 counts only the odd numbers.

Final Answer: 33 such integers $\Rightarrow$ C

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Cyclic remainders of powers: Powers of 2 modulo 7 repeat in a cycle. Find the cycle length and locate 2^{50} within it.

Step 1 — Build the cycle: $2^1 = 2$, $2^2 = 4$, $2^3 = 8 \equiv 1 \pmod 7$. The cycle length is 3: remainders $2, 4, 1$ repeat.

Step 2 — Locate the exponent: $50 = 3 \times 16 + 2$, so $2^{50} \equiv 2^2 \pmod 7$.

Step 3 — Read off the remainder: $2^2 = 4$, so the remainder is 4.

Why other options are wrong:

- 2 and 1 correspond to exponents $\equiv 1$ or $\equiv 0 \pmod 3$.
- 6 is not a value that appears in this cycle.

Final Answer: remainder $= 4 \Rightarrow$ A

Answer: (A) Go Back to Q2

Q3.

Solution

Concept — Area scales as the square of the radius: If the radius is multiplied by a factor k, the area is multiplied by k^2.

Step 1 — Radius factor: A 20% increase means the new radius is 1.2 times the old.

Step 2 — Area factor: New area factor $= (1.2)^2 = 1.44$.

Step 3 — Percentage increase: $1.44 - 1 = 0.44$, i.e. a 44% increase.

Why other options are wrong:

- 40% doubles the radius percentage instead of squaring the factor.
- 20% and 24% ignore the squaring of the radius.

Final Answer: area rises by $44\% \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q3

Q4.

Solution

Concept — Pass mark from two score conditions: Both candidates' marks are measured against the same pass mark, so equate two expressions for it.

Step 1 — Let maximum marks be M: First candidate scored $0.36M$ and fell short of the pass mark by 24, so pass mark $= 0.36M + 24$.

Step 2 — Second candidate: Scored $0.48M$, which is 36 above the pass mark, so pass mark $= 0.48M - 36$.

Step 3 — Equate and solve: $0.36M + 24 = 0.48M - 36 \Rightarrow 60 = 0.12M \Rightarrow M = 500$.

Why other options are wrong:

- 450, 400, 480 do not satisfy $0.12M = 60$.

Final Answer: maximum marks $= 500 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q4

Q5.

Solution

Concept — Profit by capital $\times$ time: Each partner's share is proportional to the product of capital and the duration invested.

Step 1 — A's capital-months: $30{,}000 \times 12 = 360{,}000$.

Step 2 — B's capital-months: $40{,}000 \times 6 = 240{,}000$.

Step 3 — Ratio of shares: $360{,}000 : 240{,}000 = 3 : 2$, so 5 parts in all.

Step 4 — A's share: $\frac{3}{5} \times 25{,}000 = 15{,}000$.

Why other options are wrong:

- $\text{Rs. } 10{,}000$ is B's share.
- $\text{Rs. } 12{,}500$ splits the profit equally, ignoring time.

Final Answer: A gets $\text{Rs. } 15{,}000 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — Average of consecutive numbers: For an odd count of consecutive numbers, the average is the middle term.

Step 1 — Identify the middle term: With 11 numbers, the 6th (middle) term equals the average, so it is 30.

Step 2 — Find the largest: The largest is 5 terms above the middle: $30 + 5 = 35$.

Why other options are wrong:

- 33 and 34 count too few steps from the middle.
- 36 counts one step too many.

Final Answer: largest number $= 35 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q6

Q7.

Solution

Concept — False weight gain: When a true cost is charged for less goods, profit $\% = \dfrac{\text{true weight} - \text{false weight}}{\text{false weight}} \times 100$.

Step 1 — Error in weight: The dealer gives 800 g but charges for 1000 g, so the shortfall is 200 g.

Step 2 — Profit percentage: $\dfrac{1000 - 800}{800} \times 100 = \dfrac{200}{800} \times 100 = 25\%$.

Why other options are wrong:

- 20% wrongly divides by 1000 instead of 800.
- 22% and 30% do not match the gain on the cost of goods given.

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

Answer: (D) Go Back to Q7

Q8.

Solution

Concept — Successive discounts: Apply each discount factor in turn to the marked price.

Step 1 — After first discount: $1200 \times (1 - 0.10) = 1200 \times 0.90 = 1080$.

Step 2 — After second discount: $1080 \times (1 - 0.15) = 1080 \times 0.85 = 918$.

Why other options are wrong:

- $\text{Rs. } 900$ adds the discounts to a flat 25%, ignoring compounding.
- $\text{Rs. } 930$ and $\text{Rs. } 960$ misapply one of the factors.

Final Answer: selling price $= \text{Rs. } 918 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q8

Q9.

Solution

Concept — CI minus SI for 2 years: The difference equals $P\left(\frac{r}{100}\right)^2$.

Step 1 — Apply the formula: Difference $= 10{,}000 \times \left(\frac{5}{100}\right)^2$.

Step 2 — Evaluate: $10{,}000 \times \frac{25}{10{,}000} = 25$.

Why other options are wrong:

- $\text{Rs. } 50$ uses $\frac{r}{100}$ to the first power.
- $\text{Rs. } 30$ and $\text{Rs. } 20$ do not follow from the squared-rate formula.

Final Answer: difference $= \text{Rs. } 25 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q9

Q10.

Solution

Concept — Same distance, two timings: The time difference between the two speeds equals the early plus late gap.

Step 1 — Total time gap: Late by 6 min plus early by 4 min gives a difference of 10 minutes $= \frac{1}{6}$ hour.

Step 2 — Set up using distance d: $\frac{d}{5} - \frac{d}{6} = \frac{1}{6}$.

Step 3 — Solve: $\frac{6d - 5d}{30} = \frac{1}{6} \Rightarrow \frac{d}{30} = \frac{1}{6} \Rightarrow d = 5$ km.

Why other options are wrong:

- 4 and 4.5 use a wrong time gap.
- 6 comes from inverting the speeds.

Final Answer: distance $= 5$ km $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q10

Q11.

Solution

Concept — Train crossing a pole: The distance covered equals the train's own length.

Step 1 — Convert speed: 72 km/h $= 72 \times \dfrac{5}{18} = 20$ m/s.

Step 2 — Length: Length $=$ speed $\times$ time $= 20 \times 12 = 240$ m.

Why other options are wrong:

- 200 and 300 misconvert the speed or the time.
- 260 uses a wrong product.

Final Answer: length $= 240$ m $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q11

Q12.

Solution

Concept — Combined work then remainder: Find work done together, then time for one worker on the rest.

Step 1 — Combined rate: $\dfrac{1}{20} + \dfrac{1}{30} = \dfrac{3}{60} + \dfrac{2}{60} = \dfrac{5}{60} = \dfrac{1}{12}$ per day.

Step 2 — Work in 6 days: $6 \times \dfrac{1}{12} = \dfrac{1}{2}$, so half the work remains.

Step 3 — B finishes the rest: B's rate is $\dfrac{1}{30}$ per day, so time $= \dfrac{1/2}{1/30} = 15$ days.

Why other options are wrong:

- 12 and 10 use a wrong remaining fraction.
- 18 overstates the leftover work.

Final Answer: B needs 15 more days $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q12

Q13.

Solution

Concept — One pipe closed partway: Compute the work done in the joint phase, then the time for the remaining pipe alone.

Step 1 — Rates: A fills $\frac{1}{10}$ per hour, B fills $\frac{1}{15}$ per hour.

Step 2 — Work in the first 3 hours (both open): $3 \times \left(\frac{1}{10} + \frac{1}{15}\right) = 3 \times \left(\frac{3}{30} + \frac{2}{30}\right) = 3 \times \frac{5}{30} = 3 \times \frac{1}{6} = \frac{1}{2}$.

Step 3 — Work remaining: $1 - \frac{1}{2} = \frac{1}{2}$ of the tank is still empty.

Step 4 — A finishes the remaining half: A alone fills at $\frac{1}{10}$ per hour, so time $= \frac{1/2}{1/10} = \frac{1}{2} \times 10 = 5$ hours.

Step 5 — Total time: $3 + 5 = 8$ hours.

Why other options are wrong:

- 6 and 6.5 understate the time A needs alone.
- 7 uses a wrong remaining fraction.

Final Answer: total time $= 8$ hours $\Rightarrow$ D

Answer: (D) Go Back to Q13

Q14.

Solution

Concept — Sum and difference: If $x + y = S$ and $x - y = D$, then $x = \frac{S + D}{2}$, $y = \frac{S - D}{2}$.

Step 1 — Find the numbers: $x = \frac{40 + 8}{2} = 24$, $y = \frac{40 - 8}{2} = 16$.

Step 2 — Product: $24 \times 16 = 384$.

Why other options are wrong:

- 360, 396, 400 do not match 24×16.
- 400 would need both numbers to be 20, i.e. zero difference.

Final Answer: product $= 384 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q14

Q15.

Solution

Concept — Roots in a given ratio: Let the roots be α and 2α; use sum and product of roots.

Step 1 — Sum of roots: $\alpha + 2\alpha = 3\alpha = 6 \Rightarrow \alpha = 2$.

Step 2 — Product of roots: $\alpha \cdot 2\alpha = 2\alpha^2 = k$.

Step 3 — Compute k: $2 \times (2)^2 = 2 \times 4 = 8$.

Why other options are wrong:

- 6 confuses k with the sum of the roots.
- 4 and 9 use wrong values of α.

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

Answer: (D) Go Back to Q15

Q16.

Solution

Concept — Absolute-value inequality: $|x - a| \leq b$ means $a - b \leq x \leq a + b$.

Step 1 — Rewrite: $|x - 3| \leq 4$ gives $-4 \leq x - 3 \leq 4$.

Step 2 — Solve: Add 3 throughout: $-1 \leq x \leq 7$.

Step 3 — Count integers: The integers $-1, 0, 1, 2, 3, 4, 5, 6, 7$ number 9.

Why other options are wrong:

- 8 drops one endpoint.
- 7 and 10 miscount the inclusive range.

Final Answer: 9 integer values $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q16

Q17.

Solution

Concept — nth term of an AP: $a_n = a + (n-1)d$.

Step 1 — Identify a and d: First term $a = 7$, common difference $d = 11 - 7 = 4$.

Step 2 — Apply for $n = 15$: $a_{15} = 7 + (15-1) \times 4 = 7 + 56 = 63$.

Why other options are wrong:

- 59 uses $n = 14$.
- 67 and 71 use $n = 16$ or 17.

Final Answer: $a_{15} = 63 \Rightarrow$ C

Answer: (C) Go Back to Q17

Q18.

Solution

Concept — Arrangements with repetition: Divide $n!$ by the factorials of the counts of repeated letters.

Step 1 — Count letters: "LEVEL" has 5 letters: L appears twice, E appears twice, V once.

Step 2 — Apply the formula: $\frac{5!}{2!\,2!} = \frac{120}{4} = 30$.

Why other options are wrong:

- 120 treats all letters as distinct.
- 60 divides by only one 2!; 20 over-divides.

Final Answer: 30 arrangements $\Rightarrow$ B

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Group treated as a single block: Tie the girls into one unit, arrange the units, then arrange within the unit.

Step 1 — Form the block: Treat the 3 girls as one block; together with 4 boys there are 5 units to arrange: $5! = 120$ ways.

Step 2 — Arrange within the block: The 3 girls permute among themselves in $3! = 6$ ways.

Step 3 — Multiply: $120 \times 6 = 720$.

Why other options are wrong:

- 5040 is 7!, the count with no grouping restriction.
- 144 and 576 omit one of the two factors.

Final Answer: 720 arrangements $\Rightarrow$ D

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Probability of A or B: $P(K \cup H) = P(K) + P(H) - P(K \cap H)$.

Step 1 — Individual probabilities: $P(\text{king}) = \frac{4}{52}$, $P(\text{heart}) = \frac{13}{52}$.

Step 2 — Overlap: The king of hearts is counted in both: $P(\text{king and heart}) = \frac{1}{52}$.

Step 3 — Combine: $\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$.

Why other options are wrong:

- $\frac{17}{52}$ forgets to subtract the shared card.
- $\frac{1}{4}$ and $\frac{1}{13}$ use only one event.

Final Answer: probability $= \frac{4}{13} \Rightarrow$ A

Answer: (A) Go Back to Q20

Q21.

Solution

Concept — Tangent-secant relation: For a tangent PT and a secant through A and B, $PT^2 = PA \times PB$.

Step 1 — Substitute the lengths: $PT^2 = PA \times PB = 4 \times 9 = 36$.

Step 2 — Take the square root: $PT = \sqrt{36} = 6$ cm.

Why other options are wrong:

- 5 uses $PA \times AB = 4 \times 5$ then mis-roots.
- $\sqrt{13}$ and $\sqrt{20}$ subtract instead of multiplying the secant segments.

Final Answer: $PT = 6$ cm $\Rightarrow$ C

Answer: (C) Go Back to Q21

Q22.

Solution

Concept — Exterior angle of a regular polygon: Each exterior angle $= \dfrac{360^\circ}{n}$, where n is the number of sides.

Step 1 — Set up: $\dfrac{360^\circ}{n} = 40^\circ$.

Step 2 — Solve for n: $n = \dfrac{360}{40} = 9$.

Why other options are wrong:

- 8 gives an exterior angle of 45°.
- 10 gives 36° and 12 gives 30°.

Final Answer: 9 sides $\Rightarrow$ B

Answer: (B) Go Back to Q22

Q23.

Solution

Concept — Sphere from surface area to volume: Use $4\pi r^2$ to find r, then $\frac{4}{3}\pi r^3$ for the volume.

Step 1 — Find the radius: $4\times\frac{22}{7}\times r^2 = 616 \Rightarrow r^2 = \frac{616\times 7}{4\times 22} = \frac{4312}{88} = 49 \Rightarrow r = 7$ cm.

Step 2 — Volume: $\frac{4}{3}\times\frac{22}{7}\times 7^3 = \frac{4}{3}\times\frac{22}{7}\times 343 = \frac{4}{3}\times 22\times 49 = \frac{4312}{3} = 1437\frac{1}{3}$ cm^3.

Why other options are wrong:

- 1232 uses the surface-area formula again in place of the volume.
- 1540 and 1078 misuse the radius.

Final Answer: volume $= 1437\frac{1}{3}$ cm$^3 \Rightarrow$ A

Answer: (A) Go Back to Q23

Q24.

Solution

Concept — Volume of a hemisphere: $V = \frac{2}{3}\pi r^3$.

Step 1 — Substitute $r = 6$**:** $V = \frac{2}{3}\times\frac{22}{7}\times 6^3 = \frac{2}{3}\times\frac{22}{7}\times 216$.

Step 2 — Simplify: $\frac{2\times 216}{3} = 144$, so $V = 144\times\frac{22}{7} = \frac{3168}{7} \approx 452.57$ cm^3.

Why other options are wrong:

- 462 misreads the fraction $\frac{3168}{7}$.
- 904.32 uses the full-sphere volume; 288π keeps π unevaluated and equals the sphere value.

Final Answer: volume ≈ 452.57 cm$^3 \Rightarrow$ D

Answer: (D) Go Back to Q24

Q25.

Solution

Concept — Equating exponents on a common base: Rewrite all powers with the same base and match exponents.

Step 1 — First equation: $2^x = 8^{y+1} = 2^{3(y+1)} \Rightarrow x = 3y + 3$.

Step 2 — Second equation: $9^y = 3^{2y}$ and 3^{x-9} give $2y = x - 9$.

Step 3 — Solve the system: Substitute $x = 3y+3$ into $2y = x-9$: $2y = 3y+3-9 \Rightarrow 2y = 3y - 6 \Rightarrow y = 6$. Then $x = 3(6) + 3 = 21$.

Step 4 — Compute $x + y$: $21 + 6 = 27$.

Why other options are wrong:

- 24, 21, 30 arise from sign slips when matching exponents.

Final Answer: $x + y = 27 \Rightarrow$ B

Answer: (B) Go Back to Q25

Q26.

Solution

Concept — Neither category via inclusion-exclusion: Read at least one $= n(A) + n(B) - n(A \cap B)$; neither = total − that.

Step 1 — Read at least one: $65 + 45 - 20 = 90$.

Step 2 — Read neither: $120 - 90 = 30$.

Why other options are wrong:

- 25 and 35 mishandle the overlap of 20.
- 40 ignores the both-readers entirely.

Final Answer: 30 read neither $\Rightarrow$ A

Answer: (A) Go Back to Q26

Q27.

Solution

Concept — Reading a pie chart: A sector's value = its percentage applied to the total.

Step 1 — Food percentage: Food occupies 30% of the chart.

Step 2 — Compute the amount: 30% of $48{,}000 = 0.30 \times 48{,}000 = 14{,}400$.

Why other options are wrong:

- $\text{Rs. } 12{,}000$ is the Rent amount (25%).
- $\text{Rs. } 9600$ is Savings (20%); $\text{Rs. } 7200$ is Education (15%).

Final Answer: Food $= \text{Rs. } 14{,}400 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q27

Q28.

Solution

Concept — Difference of two sectors: Subtract the two percentage amounts.

Step 1 — Rent amount: 25% of $48{,}000 = 12{,}000$.

Step 2 — Transport amount: 10% of $48{,}000 = 4800$.

Step 3 — Difference: $12{,}000 - 4800 = 7200$.

Why other options are wrong:

- $\text{Rs. } 6000$ uses a 12.5% gap rather than 15%.
- $\text{Rs. } 4800$ is the Transport amount itself.

Final Answer: difference $= \text{Rs. } 7200 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q28

Q29.

Solution

Concept — Percentage to central angle: A sector's central angle $= \dfrac{\text{percentage}}{100} \times 360°$.

Step 1 — Education percentage: Education is 15%.

Step 2 — Convert to degrees: $\dfrac{15}{100} \times 360° = 54°$.

Why other options are wrong:

- $36°$ corresponds to 10% (Transport).
- $45°$ and $60°$ correspond to 12.5% and 16.7%.

Final Answer: central angle $= 54° \Rightarrow$ D

Answer: (D) Go Back to Q29

Q30.

Solution

Concept — Data sufficiency: Test each statement alone, then together.

Step 1 — Statement I alone: $F = S + 30$ gives one equation in two unknowns; the father's age is not fixed. Not sufficient.

Step 2 — Statement II alone: $(F - 5) = 4(S - 5)$ is also a single equation in two unknowns. Not sufficient.

Step 3 — Both together: Substitute $F = S + 30$ into $F - 5 = 4(S - 5)$: $S + 25 = 4S - 20 \Rightarrow 3S = 45 \Rightarrow S = 15$, so $F = 45$. A unique value is obtained.

Why other options are wrong:

- Neither statement alone pins down two unknowns.
- Together they give a unique answer, so they are not insufficient.

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

Answer: (C) Go Back to Q30

Q31.

Solution

Concept — Common remainder divisor: The required number is the HCF of the differences of the given numbers.

Step 1 — Compute differences: $4665 - 1305 = 3360$, $6905 - 4665 = 2240$, $6905 - 1305 = 5600$.

Step 2 — HCF of differences: $3360 = 2^5 \times 3 \times 5 \times 7$, $2240 = 2^6 \times 5 \times 7$. Common factors: $2^5 \times 5 \times 7 = 1120$. Check $5600 = 2^5 \times 5^2 \times 7$ shares 1120.

Step 3 — Conclusion: The largest such divisor is 1120.

Why other options are wrong:

- 1170 does not divide all three differences.
- 560 and 260 are proper factors, not the largest.

Final Answer: the number is $1120 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q31

Q32.

Solution

Concept — Trailing zeros of a factorial: Count factors of 5, since factors of 2 are more plentiful.

Step 1 — Count multiples of 5: $\lfloor 25/5 \rfloor = 5$.

Step 2 — Count multiples of 25: $\lfloor 25/25 \rfloor = 1$.

Step 3 — Total: $5 + 1 = 6$ trailing zeros.

Why other options are wrong:

- 5 forgets the extra 5 inside 25.
- 7 and 4 miscount the higher powers of 5.

Final Answer: 6 trailing zeros $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q32

Q33.

Solution

Concept — Find the whole, then a new percentage: Recover the number from one percentage, then apply another.

Step 1 — Find the number: $0.30 \times N = 45 \Rightarrow N = \dfrac{45}{0.30} = 150$.

Step 2 — Compute 80%: $0.80 \times 150 = 120$.

Why other options are wrong:

- 100 and 135 use a wrong base number.
- 150 is the number itself, i.e. 100%.

Final Answer: 80% of the number $= 120 \Rightarrow$ B

Answer: (B) Go Back to Q33

Q34.

Solution

Concept — Equal up-and-down percentage: An $x\%$ rise followed by an $x\%$ fall always gives a net fall of $\dfrac{x^2}{100}\%$.

Step 1 — Combine factors: Net factor $= 1.20 \times 0.80 = 0.96$.

Step 2 — Net change: $0.96 - 1 = -0.04$, i.e. a 4% decrease.

Why other options are wrong:

- "No change" ignores that the two operations act on different bases.
- 4% increase has the wrong sign; 2% uses a wrong formula.

Final Answer: 4% decrease $\Rightarrow$ C

Answer: (C) Go Back to Q34

Q35.

Solution

Concept — Ratio with equal addition: Let the numbers be $5k$ and $8k$ and apply the new ratio.

Step 1 — Set up the equation: $\dfrac{5k+6}{8k+6} = \dfrac{2}{3}$.

Step 2 — Cross-multiply: $3(5k+6) = 2(8k+6) \Rightarrow 15k+18 = 16k+12$.

Step 3 — Solve: $18-12 = 16k-15k \Rightarrow k = 6$. The smaller number $= 5k = 30$.

Why other options are wrong:

- 40 is the larger number ($8k = 48$ is also wrong here).
- 35 and 25 use a wrong value of k.

Final Answer: smaller number $= 30 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q35

Q36.

Solution

Concept — Repeated replacement: After n replacements, milk left $= V\left(1-\dfrac{a}{V}\right)^n$.

Step 1 — Identify values: $V = 40$, $a = 8$, $n = 2$, so the retained fraction each step is $1-\dfrac{8}{40} = \dfrac{4}{5}$.

Step 2 — Apply twice: Milk left $= 40 \times \left(\dfrac{4}{5}\right)^2 = 40 \times \dfrac{16}{25} = \dfrac{640}{25} = 25.6$ litres.

Why other options are wrong:

- 30.4 removes 8 litres only once.
- 24 and 28.8 use the wrong retained fraction.

Final Answer: milk left $= 25.6$ litres $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q36

Q37.

Solution

Concept — Profit from unequal buy and sell rates: Find cost and selling price per apple, then the percentage gain.

Step 1 — Cost per apple: $\frac{10}{12} = \frac{5}{6}$ rupees.

Step 2 — Selling price per apple: $\frac{12}{10} = \frac{6}{5}$ rupees.

Step 3 — Profit percentage: $\frac{\frac{6}{5} - \frac{5}{6}}{\frac{5}{6}} \times 100 = \frac{\frac{36-25}{30}}{\frac{5}{6}} \times 100 = \frac{11/30}{5/6} \times 100 = \frac{11}{30} \times \frac{6}{5} \times 100 = \frac{11}{25} \times 100 = 44\%$.

Why other options are wrong:

- 20% and 24% compare only one rate.
- 40% rounds the fraction $\frac{11}{25}$ incorrectly.

Final Answer: profit $= 44\% \Rightarrow$ B

Answer: (B) Go Back to Q37

Q38.

Solution

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

Step 1 — Identify m and n: CP of 20 $=$ SP of 16, so $m = 20$, $n = 16$.

Step 2 — Apply the formula: $\frac{20-16}{16} \times 100 = \frac{4}{16} \times 100 = 25\%$.

Why other options are wrong:

- 20% divides by 20 instead of 16.
- 16% and 30% do not follow from the relation.

Final Answer: profit $= 25\% \Rightarrow$ C

Answer: (C) Go Back to Q38

Q39.

Solution

Concept — SI from two amounts: The interest per year is constant, so the gap between two amounts gives the yearly interest.

Step 1 — Interest for 2 years: $1400 - 1200 = 200$ over $5 - 3 = 2$ years, so yearly interest $= 100$.

Step 2 — Interest for 3 years: $3 \times 100 = 300$.

Step 3 — Principal: $1200 - 300 = 900$.

Why other options are wrong:

- Rs. 1000 subtracts only 2 years of interest.
- Rs. 850 and Rs. 950 use a wrong yearly interest.

Final Answer: principal $=$ Rs. $900 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q39

Q40.

Solution

Concept — Average speed over equal halves: For two equal distances, average speed is the harmonic mean $\dfrac{2v_1v_2}{v_1+v_2}$.

Step 1 — Substitute speeds: $\dfrac{2 \times 40 \times 60}{40+60} = \dfrac{4800}{100}$.

Step 2 — Evaluate: $\dfrac{4800}{100} = 48$ km/h.

Why other options are wrong:

- 50 is the arithmetic mean, valid only for equal times.
- 45 and 52 do not match the harmonic mean.

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

Answer: (B) Go Back to Q40

Q41.

Solution

Concept — Opposite directions add speeds: The separation grows at the sum of the two speeds.

Step 1 — Relative speed: $12 + 18 = 30$ km/h.

Step 2 — Time for 90 km gap: $\frac{90}{30} = 3$ hours.

Why other options are wrong:

- 5 and 4.5 use one speed only.
- 2.5 uses the wrong relative speed.

Final Answer: time $= 3$ hours $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q41

Q42.

Solution

Concept — Man-days remain constant: Total work $=$ men $\times$ days; track work done and work left.

Step 1 — Total work: $8 \times 15 = 120$ man-days.

Step 2 — Work done in first 5 days: $8 \times 5 = 40$ man-days, leaving $120 - 40 = 80$ man-days.

Step 3 — Remaining work with 12 men: Now $8 + 4 = 12$ men work, so time $= \frac{80}{12} = \frac{20}{3} = 6\frac{2}{3}$ days.

Why other options are wrong:

- 8 days ignores the extra men.
- $7\frac{1}{2}$ and 5 use a wrong man-day count.

Final Answer: remaining work in $6\frac{2}{3}$ days $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q42

Q43.

Solution

Concept — Leak and inflow together: With the tap on the net emptying rate slows; the difference gives the inflow's effect.

Step 1 — Rates as fractions of the cistern: Leak alone empties at $\frac{1}{12}$ per hour. With the tap, net emptying is $\frac{1}{20}$ per hour.

Step 2 — Inflow rate (fraction): Tap inflow $= \frac{1}{12} - \frac{1}{20} = \frac{5-3}{60} = \frac{2}{60} = \frac{1}{30}$ of the cistern per hour.

Step 3 — Convert to litres: Tap admits 4 litres/min $= 4 \times 60 = 240$ litres/hour, and this equals $\frac{1}{30}$ of the capacity. So capacity $= 240 \times 30 = 7200$ litres.

Why other options are wrong:

- 6000 and 4800 use a wrong net fraction.
- 8400 multiplies by an incorrect factor.

Final Answer: capacity $= 7200$ litres $\Rightarrow$ A

Answer: (A) Go Back to Q43

Q44.

Solution

Concept — Two age conditions: Use the present-sum and the past-multiple relation.

Step 1 — Let present ages be M and D: $M + D = 50$.

Step 2 — Past condition: $M - 5 = 4(D-5) \Rightarrow M - 5 = 4D - 20 \Rightarrow M = 4D - 15$.

Step 3 — Solve: Substitute into the sum: $4D - 15 + D = 50 \Rightarrow 5D = 65 \Rightarrow D = 13$, so $M = 50 - 13 = 37$.

Why other options are wrong:

- 38 and 40 break the past-multiple condition.
- 35 gives a daughter aged 15, failing $M - 5 = 4(D-5)$.

Final Answer: mother's age $= 37 \Rightarrow$ B

Answer: (B) Go Back to Q44

Q45.

Solution

Concept — Sum and product of roots: For $ax^2 + bx + c = 0$, sum of roots $= -\dfrac{b}{a}$ and product of roots $= \dfrac{c}{a}$.

Step 1 — Identify coefficients: Here $a = 2$, $b = -k$, $c = 8$.

Step 2 — Write sum and product: Sum $= -\dfrac{-k}{2} = \dfrac{k}{2}$; product $= \dfrac{8}{2} = 4$.

Step 3 — Apply the condition: Sum equals product gives $\dfrac{k}{2} = 4 \Rightarrow k = 8$.

Why other options are wrong:

- 4 sets the sum equal to the constant term 8 wrongly halved.
- 2 and 6 come from misreading a or c.

Final Answer: $k = 8 \Rightarrow$ D

Answer: (D) Go Back to Q45

Q46.

Solution

Concept — Sign of a quotient: $\dfrac{x-2}{x+3} > 0$ when numerator and denominator share the same sign.

Step 1 — Critical points: The expression is zero or undefined at $x = 2$ and $x = -3$.

Step 2 — Test the three intervals:

- $x < -3$: numerator < 0, denominator < 0, quotient > 0. ✓
- $-3 < x < 2$: numerator < 0, denominator > 0, quotient < 0.
- $x > 2$: both positive, quotient > 0. ✓

Step 3 — Combine: The solution is $x < -3$ or $x > 2$.

Why other options are wrong:

- "$-3 < x < 2$" is exactly where the quotient is negative.
- "$x > 2$ only" and "$x > -3$" drop the other valid interval.

Final Answer: $x < -3$ or $x > 2 \Rightarrow$ C

Answer: (C) Go Back to Q46

Q47.

Solution

Concept — Term from partial sums: $a_n = S_n - S_{n-1}$.

Step 1 — Compute S_{10}: $S_{10} = 10^2 + 2(10) = 100 + 20 = 120$.

Step 2 — Compute S_9: $S_9 = 9^2 + 2(9) = 81 + 18 = 99$.

Step 3 — Tenth term: $a_{10} = 120 - 99 = 21$.

Why other options are wrong:

- 20 and 19 use a wrong S_9.
- 23 adds instead of subtracting.

Final Answer: $a_{10} = 21 \Rightarrow$ A

Answer: (A) Go Back to Q47

Q48.

Solution

Concept — Diagonals of a polygon: A polygon with n sides has $\frac{n(n-3)}{2}$ diagonals.

Step 1 — Substitute $n = 10$: $\frac{10 \times (10-3)}{2} = \frac{10 \times 7}{2}$.

Step 2 — Evaluate: $\frac{70}{2} = 35$.

Why other options are wrong:

- 45 counts all line segments $\binom{10}{2}$ including sides.
- 40 and 30 misapply the formula.

Final Answer: 35 diagonals $\Rightarrow$ D

Answer: (D) Go Back to Q48

Q49.

Solution

Concept — Choosing with a fixed split: Multiply the ways of choosing reds by the ways of choosing greens.

Step 1 — Choose 2 reds from 6: $\binom{6}{2} = 15$.

Step 2 — Choose 1 green from 4: $\binom{4}{1} = 4$.

Step 3 — Multiply: $15 \times 4 = 60$.

Why other options are wrong:

- 40 and 120 use wrong combinations.
- 30 halves the correct count.

Final Answer: 60 ways $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q49

Q50.

Solution

Concept — Without-replacement probability: Multiply the probability of the first ace by that of the second, given the first.

Step 1 — First ace: $\dfrac{4}{52} = \dfrac{1}{13}$.

Step 2 — Second ace: $\dfrac{3}{51} = \dfrac{1}{17}$.

Step 3 — Multiply: $\dfrac{1}{13} \times \dfrac{1}{17} = \dfrac{1}{221}$.

Why other options are wrong:

- $\dfrac{1}{169}$ uses replacement ($\frac{4}{52}$ twice).
- $\dfrac{2}{221}$ doubles the count; $\dfrac{1}{26}$ uses only one draw.

Final Answer: probability $= \dfrac{1}{221} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q50

Q51.

Solution

Concept — Corresponding angles are equal: When a transversal cuts parallel lines, corresponding angles are equal.

Step 1 — Set the angles equal: $3x + 20 = 5x - 10$.

Step 2 — Solve for x: $20 + 10 = 5x - 3x \Rightarrow 30 = 2x \Rightarrow x = 15$.

Step 3 — Find $\angle 1$: $3(15) + 20 = 45 + 20 = 65°$.

Why other options are wrong:

- $60°$ and $70°$ use a wrong value of x.
- $55°$ misreads the coefficient of x.

Final Answer: $\angle 1 = 65° \Rightarrow$ A

Answer: (A) Go Back to Q51

Q52.

Solution

Concept — Right triangle by Pythagoras check: If $a^2 + b^2 = c^2$, the triangle is right-angled and area $= \frac{1}{2}ab$.

Step 1 — Verify right angle: $7^2 + 24^2 = 49 + 576 = 625 = 25^2$, so the triangle is right-angled with legs 7 and 24.

Step 2 — Compute area: $\frac{1}{2} \times 7 \times 24 = \frac{168}{2} = 84$ cm^2.

Why other options are wrong:

- 168 forgets the factor $\frac{1}{2}$.
- 96 and 120 use wrong leg lengths.

Final Answer: area $= 84$ cm$^2 \Rightarrow$ B

Answer: (B) Go Back to Q52

Q53.

Solution

Concept — Space diagonal of a cuboid: Diagonal $= \sqrt{l^2 + b^2 + h^2}$.

Step 1 — Square the edges: $8^2 + 6^2 + 5^2 = 64 + 36 + 25 = 125$.

Step 2 — Take the root: $\sqrt{125} = \sqrt{25 \times 5} = 5\sqrt{5}$ cm.

Why other options are wrong:

- $\sqrt{100} = 10$ drops the 25 term.
- 11 and $\sqrt{120}$ mis-add the squares.

Final Answer: diagonal $= 5\sqrt{5}$ cm $\Rightarrow$ D

Answer: (D) Go Back to Q53

Q54.

Solution

Concept — Cube surface area to volume: Surface area $= 6a^2$ gives the edge; volume $= a^3$.

Step 1 — Find the edge: $6a^2 = 294 \Rightarrow a^2 = 49 \Rightarrow a = 7$ cm.

Step 2 — Compute the volume: $a^3 = 7^3 = 343$ cm^3.

Why other options are wrong:

- 216 and 512 correspond to edges 6 and 8.
- 294 repeats the surface area.

Final Answer: volume $= 343$ cm^3 $\Rightarrow$ C

Answer: (C) Go Back to Q54

Q55.

Solution

Concept — Logarithm of a power on its own base: $\log_b b^k = k$.

Step 1 — Evaluate each term: $\log_3 27 = \log_3 3^3 = 3$; $\log_2 32 = \log_2 2^5 = 5$; $\log_5 25 = \log_5 5^2 = 2$.

Step 2 — Combine: $3 + 5 - 2 = 6$.

Why other options are wrong:

- 5 and 7 mis-evaluate one logarithm.
- 8 adds the last term instead of subtracting it.

Final Answer: value $= 6 \Rightarrow$ A

Answer: (A) Go Back to Q55

Q56.

Solution

Concept — Composite function: Compute $f(2)$ first, then feed it into f again.

Step 1 — Inner value: $f(2) = \dfrac{2+1}{2-1} = \dfrac{3}{1} = 3$.

Step 2 — Outer value: $f(3) = \dfrac{3+1}{3-1} = \dfrac{4}{2} = 2$.

Why other options are wrong:

- 3 is only the inner value $f(2)$.
- $\dfrac{1}{3}$ and 1 misapply the rule at the second step.

Final Answer: $f(f(2)) = 2 \Rightarrow$ B

Answer: (B) Go Back to Q56

Q57.

Solution

Concept — Reading totals from a table: Add the entries in the relevant row.

Step 1 — Pick the 2022 row: P $= 40$, Q $= 55$, R $= 35$, S $= 50$.

Step 2 — Add: $40 + 55 + 35 + 50 = 180$ thousand.

Why other options are wrong:

- 200 adds a 2023 entry by mistake.
- 190 and 170 misread a single cell.

Final Answer: total $= 180$ thousand $\Rightarrow$ D

Answer: (D) Go Back to Q57

Q58.

Solution

Concept — Largest percentage increase: Compare $\frac{\text{rise}}{\text{base}}$ for each factory.

Step 1 — Compute each change:

- P: $\frac{50-40}{40} = 25\%$.
- Q: $\frac{45-55}{55} < 0$ (a decrease).
- R: $\frac{60-35}{35} = \frac{25}{35} \approx 71.4\%$.
- S: $\frac{45-50}{50} < 0$ (a decrease).

Step 2 — Pick the largest: Factory R has the largest increase at about 71.4%.

Why other options are wrong:

- P rises by only 25%.
- Q and S actually fell.

Final Answer: Factory R $\Rightarrow$ A

Answer: (A) Go Back to Q58

Q59.

Solution

Concept — Ratio of two-year totals: Add each factory's two yearly figures, then form the ratio.

Step 1 — Factory P total: $40 + 50 = 90$.

Step 2 — Factory S total: $50 + 45 = 95$.

Step 3 — Form and simplify the ratio: $90 : 95 = 18 : 19$ (dividing both by 5).

Why other options are wrong:

- $19 : 18$ inverts the order of P and S.
- $10 : 9$ and $8 : 9$ mis-add the yearly totals.

Final Answer: ratio $= 18 : 19 \Rightarrow$ C

Answer: (C) Go Back to Q59

Q60.

Solution

Concept — Conditions for a square: A square needs both equal sides and right angles; neither alone is enough.

Step 1 — Statement I alone: Equal sides give a rhombus, which need not be a square. Not sufficient.

Step 2 — Statement II alone: Four right angles give a rectangle, which need not be a square. Not sufficient.

Step 3 — Both together: Equal sides and right angles together force a square. Sufficient only when combined.

Why other options are wrong:

- Either statement alone leaves a rhombus or a rectangle, not necessarily a square.

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

Answer: (D) Go Back to Q60

Answer Key

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