CAT Quantitative Aptitude

Sample Paper – 15

Duration: 40 Minutes **Maximum Marks: 66**

Instructions

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

Questions (Q1 – Q22)

Q1. What is the unit digit of 13^{75}?

(A) 3

(B) 7

(C) 9

(D) 1

Q2. What is the remainder when 7^{100} is divided by 48?

(A) 7

(B) 24

(C) 0

(D) 1

Q3. If the compound interest on a sum for 2 years at 20% per annum is Rs. 4,400, find the principal.

(A) Rs. 8,000

(B) Rs. 9,000

(C) Rs. 10,000

(D) Rs. 12,000

Q4. A price is first increased by 25% and then decreased by 20%. What is the net percentage change?

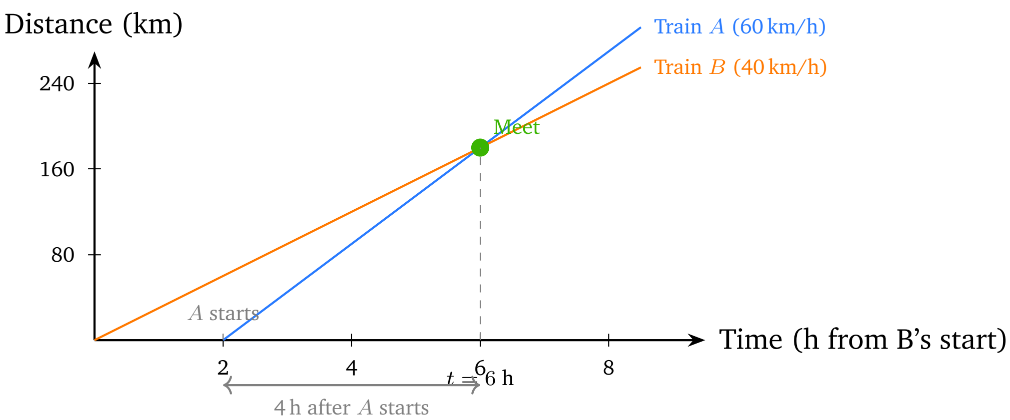
(A) 0%

(B) 5% increase

(C) 5% decrease

(D) 2% increase

Q5. Train B leaves a station at 40 km/h. Train A leaves the same station 2 hours later at 60 km/h in the same direction. How many hours after A's departure will A catch up with B?



(A) 2 hours

(B) 3 hours

(C) 5 hours

(D) 4 hours

Q6. A 40-litre solution contains acid and water in the ratio 1:3 (i.e., the solution is 25% acid). How many litres of water must be added to make the acid concentration 10%?

(A) 50 L

(B) 60 L

(C) 40 L

(D) 80 L

Q7. A invests Rs. 6,000 for 12 months; B invests Rs. 8,000 from July 1st (i.e., for 6 months). If the total annual profit is Rs. 3,000, find A's share.

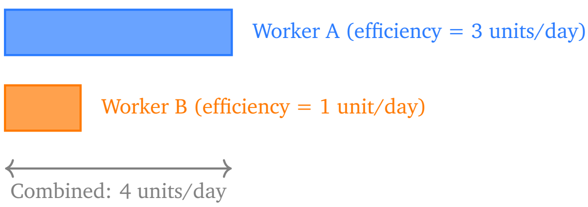
(A) Rs. 1,800

(B) Rs. 1,500

(C) Rs. 2,000

(D) Rs. 1,200

Q8. Worker A is 3 times as efficient as worker B. Together they complete a piece of work in 6 days. How many days would B alone take to finish the work?



(A) 18 days

(B) 20 days

(C) 24 days

(D) 30 days

Q9. Two articles are each sold for Rs. 600. On one, the seller makes a 20% profit; on the other, he incurs a 20% loss. What is his net result on the entire transaction?

(A) 4% profit

(B) No profit/no loss

(C) 2% loss

(D) 4% loss

Q10. The average of 8 numbers is 20. If two numbers 24 and 28 are removed, what is the average of the remaining numbers?

(A) 17

(B) 18

(C) 19

(D) 16

Q11. The 3rd term of an arithmetic progression is 7 and the 7th term is 15. Find the first term.

(A) 3

(B) 5

(C) 1

(D) 7

Q12. Solve the system of equations $2x + y = 7$ and $x - y = 2$. Find the value of x.

(A) 1

(B) 2

(C) 3

(D) 4

Q13. Evaluate $\log_8\left(\frac{1}{64}\right)$.

(A) -3

(B) -2

(C) 2

(D) 3

Q14. Find all values of x satisfying $x^2 - 5x + 6 < 0$.

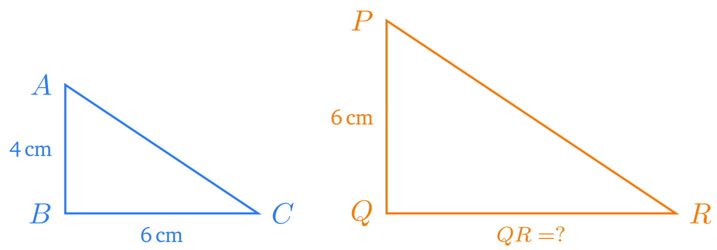
(A) $x < 2$ or $x > 3$

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

(C) $0 < x < 6$

(D) $2 < x < 3$

Q15. In the figure, $\triangle ABC \sim \triangle PQR$. If $AB = 4\,\text{cm}$, $BC = 6\,\text{cm}$, and $PQ = 6\,\text{cm}$, find QR.



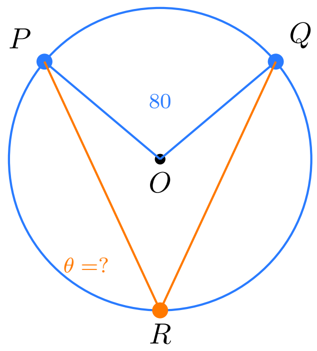
(A) 7 cm

(B) 8 cm

(C) 9 cm

(D) 12 cm

Q16. In a circle with centre O, an arc PQ subtends an angle of 80 at the centre. What is the angle subtended by the same arc at any point R on the remaining part of the circle?



(A) 40°

(B) 80°

(C) 160°

(D) 20°

Q17. A right circular cone has base circumference 44 cm and height 24 cm. Find its volume (use $\pi = 22/7$).

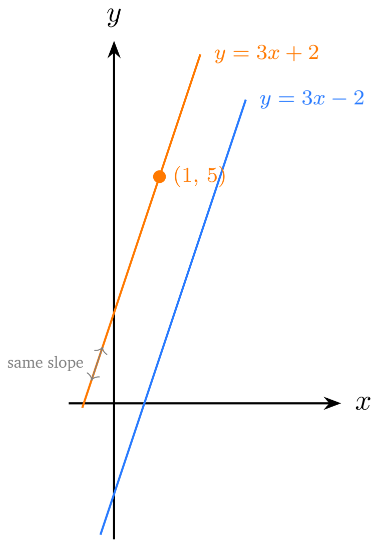
(A) 1,056 cm^3

(B) 1,232 cm^3

(C) 1,540 cm^3

(D) 2,464 cm^3

Q18. Find the equation of the line passing through $(1, 5)$ and parallel to $y = 3x - 2$.



(A) $y = 3x - 2$

(B) $y = 3x - 4$

(C) $y = 3x$

(D) $y = 3x + 2$

Q19. Find the length of the space diagonal of a cuboid with dimensions 6 cm, 8 cm and 24 cm.

(A) 22 cm

(B) 24 cm

(C) 26 cm

(D) 28 cm

Q20. In how many ways can 5 people be arranged in a row such that 2 specific people are always next to each other?

(A) 48

(B) 36

(C) 24

(D) 60

Q21. A bag contains 5 red, 3 blue and 2 green balls. One ball is drawn at random. Find the probability that it is not red.

(A) $\frac{3}{10}$

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

(C) $\frac{3}{5}$

(D) $\frac{2}{5}$

Q22. Two unbiased dice are thrown. Find the probability that the sum of the numbers obtained is 7.

(A) $\frac{1}{9}$

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

(C) $\frac{2}{9}$

(D) $\frac{1}{6}$

Detailed Solutions

Q1.

Solution

Concept – The unit digit of powers of any integer depends only on the unit digit of the base. The unit digits of powers of 3 follow a cycle of period 4: $3^1 \to 3$, $3^2 \to 9$, $3^3 \to 7$, $3^4 \to 1$, then the cycle repeats.

Step 1 – Identify the unit digit of the base: 13 has unit digit 3.

Step 2 – Find the position of 75 in the cycle of 4:

$$75 = 4 \times 18 + 3 \implies \text{remainder} = 3.$$

Step 3 – The unit digit of 3^3 is 7. Therefore the unit digit of 13^{75} is **7**.

Why other options are wrong:

- Option A (3): Unit digit of 3^1; corresponds to remainder 1 in the cycle, not 3.
- Option C (9): Unit digit of 3^2; corresponds to 75 with remainder 2, which is incorrect.
- Option D (1): Unit digit of 3^4; corresponds to 75 with remainder 0 (i.e., divisible by 4), but $75 = 4 \times 18 + 3$.

Final Answer: Unit digit of 13^{75} is $7 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q 1

Q2.

Solution

Concept – To find the remainder of a large power, look for a pattern or use modular arithmetic. Here we check small powers of 7 modulo 48.

Step 1 – Compute $7^2 \pmod{48}$:

$$7^2 = 49 = 48 + 1 \equiv 1 \pmod{48}.$$

Step 2 – Express 7^{100} using this result:

$$7^{100} = (7^2)^{50} \equiv 1^{50} = 1 \pmod{48}.$$

Why other options are wrong:

- Option A (7): This would require $7^{100} \equiv 7 \pmod{48}$, but since $7^2 \equiv 1$, the remainder must be 1.
- Option B (24): $24 = 48/2$; this is not achievable by any power of 7 modulo 48 given $7^2 \equiv 1$.
- Option C (0): This would require 48 divides 7^{100}, but $\gcd(7, 48) = 1$ so no power of 7 is divisible by 48.

Final Answer: Remainder $= 1 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q 2

Q3.

Solution

Concept – Compound Interest (CI) for 2 years at rate r per annum:

$$\text{CI} = P\left[\left(1 + \frac{r}{100}\right)^2 - 1\right].$$

Step 1 – Substitute $r = 20\%$ and CI $= 4{,}400$:

$$4400 = P\big[(1.20)^2 - 1\big] = P[1.44 - 1] = 0.44\,P.$$

Step 2 – Solve for P:

$$P = \frac{4400}{0.44} = 10{,}000.$$

Why other options are wrong:

- Option A (Rs. 8,000): $0.44 \times 8000 = 3520 \neq 4400$.
- Option B (Rs. 9,000): $0.44 \times 9000 = 3960 \neq 4400$.
- Option D (Rs. 12,000): $0.44 \times 12000 = 5280 \neq 4400$.

Final Answer: Principal $=$ Rs. $10{,}000 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q 3

Q4.

Solution

Concept – When a quantity is changed by successive percentages, the net multiplier is the product of the individual multipliers. An increase of 25% gives a multiplier of 1.25; a decrease of 20% gives a multiplier of 0.80.

Step 1 – Compute the net multiplier:

$$1.25 \times 0.80 = 1.00.$$

Step 2 – Since the net multiplier is exactly 1, the net change is 0% – the original price is restored.

Why other options are wrong:

- Option B (5% increase): Adds the percentages: $25 - 20 = 5$; this ignores the compounding effect.
- Option C (5% decrease): Subtracts the larger from the smaller; also an incorrect arithmetic approach.
- Option D (2% increase): Uses a different incorrect shortcut formula.

Final Answer: Net percentage change $= 0\% \Rightarrow \boxed{\text{A}}$

$\boxed{\textbf{Answer: (A)}}$ Go Back to Q 4

Q5.

Solution

Concept – When two objects travel in the same direction from the same starting point at different speeds, the faster one catches the slower one when they have covered the same distance. Let t be the time (in hours) after Train A's departure.

Step 1 – Express the distances from the starting station at time t after A departs:

$$\text{Distance covered by } B = 40(t+2) \quad \text{(B left 2 hours earlier)},$$
$$\text{Distance covered by } A = 60t.$$

Step 2 – Set the distances equal and solve:

$$60t = 40(t+2) \implies 60t = 40t + 80 \implies 20t = 80 \implies t = 4 \text{ hours.}$$

Step 3 – Verify: After 4 h, A has travelled $60 \times 4 = 240$ km; B has travelled $40 \times 6 = 240$ km. ✓

Why other options are wrong:

- Option A (2 hours): After 2 h, A is at 120 km; B is at $40 \times 4 = 160$ km. A has not caught up yet.
- Option B (3 hours): After 3 h, A is at 180 km; B is at $40 \times 5 = 200$ km. Still not equal.
- Option C (5 hours): After 5 h, A is at 300 km; B is at $40 \times 7 = 280$ km. A has overshot.

Final Answer: A catches B after **4 hours** from A's departure $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q 5

Q6.

Solution

Concept – When water is added to a solution, the amount of acid (solute) remains constant. We use the invariant: acid quantity before = acid quantity after.

Step 1 – Find the initial amount of acid:

$$\text{Ratio acid:water} = 1 : 3, \quad \text{Total} = 40 \text{ L} \implies \text{Acid} = \frac{1}{4} \times 40 = 10 \text{ L}.$$

Step 2 – Let w litres of water be added. New acid concentration must be 10%:

$$\frac{10}{40 + w} = 0.10 \implies 40 + w = \frac{10}{0.10} = 100 \implies w = 60 \text{ L}.$$

Why other options are wrong:

- Option A (50 L): $10/(40 + 50) = 10/90 \approx 11.1\% \neq 10\%$.
- Option C (40 L): $10/(40 + 40) = 10/80 = 12.5\% \neq 10\%$.
- Option D (80 L): $10/(40 + 80) = 10/120 \approx 8.3\% \neq 10\%$.

Final Answer: Add 60 litres of water $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q 6

Q7.

Solution

Concept – When partners invest for different durations, profit is shared in the ratio of (investment $\times$ time).

Step 1 – Compute the effective capital contributions:

$$A = \text{Rs.}\, 6{,}000 \times 12 = 72{,}000,$$
$$B = \text{Rs.}\, 8{,}000 \times 6 = 48{,}000.$$

Step 2 – Simplify the ratio:

$$A : B = 72{,}000 : 48{,}000 = 3 : 2.$$

Step 3 – Calculate A's share of the profit:

$$\text{A's share} = \frac{3}{3+2} \times 3{,}000 = \frac{3}{5} \times 3{,}000 = \text{Rs.}\, 1{,}800.$$

Why other options are wrong:

- Option B (Rs. 1,500): Uses a ratio of 1:1 or computes $3000/2 = 1500$.
- Option C (Rs. 2,000): Uses an equal split of $3000/3 \times 2$, ignoring the actual ratio.
- Option D (Rs. 1,200): Uses B's share fraction $(2/5)$ instead of A's $(3/5)$ but applies it incorrectly.

Final Answer: A's share $= \text{Rs.}\, 1{,}800 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q 7

Q8.

Solution

Concept – If A is 3 times as efficient as B, their work rates are in the ratio 3:1. If B's rate is k units per day, then A's rate is $3k$ units per day. Total rate together $= 4k$.

Step 1 – Use the combined rate to find k:

$$\text{Together they complete the work in 6 days} \implies 4k = \frac{1}{6} \implies k = \frac{1}{24}.$$

Step 2 – Find the time for B alone:

$$\text{B's rate} = k = \frac{1}{24} \implies \text{B alone takes } 24 \text{ days.}$$

Why other options are wrong:

- Option A (18 days): Corresponds to a rate of $1/18$; would require $4k = 1/6 \Rightarrow k = 1/24$, and $3 \times 1/18 = 1/6$ (this is A's rate, not B's rate with the given ratio).
- Option B (20 days): $k = 1/20$ would give combined rate $4/20 = 1/5$, meaning 5 days together, not 6.
- Option D (30 days): $k = 1/30$ would give combined rate $4/30 = 2/15$, meaning 7.5 days together, not 6.

Final Answer: B alone takes 24 days $\Rightarrow \boxed{\text{C}}$

Answer: (C) **Go Back to Q 8**

Q9.

Solution

Concept – When two articles are sold at the same selling price (SP), one at $x\%$ profit and one at $x\%$ loss, the net result is always a *loss*. The loss percentage is given by $\left(\frac{x}{10}\right)^2\%$.

Step 1 – Find the cost prices from the selling prices:

$$\text{SP}_1 = 600,\ 20\% \text{ profit} \implies \text{CP}_1 = \frac{600}{1.20} = 500.$$

$$\text{SP}_2 = 600,\ 20\% \text{ loss} \implies \text{CP}_2 = \frac{600}{0.80} = 750.$$

Step 2 – Compute net result:

$$\text{Total CP} = 500 + 750 = 1250, \quad \text{Total SP} = 600 + 600 = 1200.$$

$$\text{Loss} = 1250 - 1200 = 50, \quad \text{Loss\%} = \frac{50}{1250} \times 100 = 4\%.$$

Why other options are wrong:

- Option A (4% profit): The transaction always results in a loss when SP is equal and profit/loss percentages are equal; never a profit.

- Option B (no profit/no loss): Incorrectly assumes cost prices are also equal; they are not when the profit/loss percentages differ.
- Option C (2% loss): Uses an incorrect formula such as $x^2/200$ instead of $x^2/100$.

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

Answer: (D) Go Back to Q 9

Q10.

Solution

Concept – Average $=$ Sum $\div$ Count. When values are removed, recompute the sum and divide by the new count.

Step 1 – Find the original sum:

$$\text{Sum of 8 numbers} = 20 \times 8 = 160.$$

Step 2 – Remove the two numbers:

$$\text{New sum} = 160 - 24 - 28 = 108.$$

Step 3 – Find the new average with the remaining 6 numbers:

$$\text{New average} = \frac{108}{6} = 18.$$

Why other options are wrong:

- Option A (17): Would require new sum $= 17 \times 6 = 102$, but $160 - 24 - 28 = 108 \neq 102$.
- Option C (19): Would require new sum $= 19 \times 6 = 114$, but the correct sum is 108.
- Option D (16): Would require new sum $= 16 \times 6 = 96$; incorrect.

Final Answer: New average $= 18 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q 10

Q11.

Solution

Concept – In an Arithmetic Progression (AP), the n-th term is $a_n = a + (n-1)d$, where a is the first term and d is the common difference.

Step 1 – Set up equations from the given terms:

$$a_3 = a + 2d = 7 \quad \cdots (1)$$

$$a_7 = a + 6d = 15 \quad \cdots (2)$$

Step 2 – Subtract equation (1) from (2):

$$(a + 6d) - (a + 2d) = 15 - 7 \implies 4d = 8 \implies d = 2.$$

Step 3 – Substitute $d = 2$ into equation (1):

$$a + 2(2) = 7 \implies a + 4 = 7 \implies a = 3.$$

Why other options are wrong:

- Option B (5): If $a = 5$, then $a_3 = 5 + 4 = 9 \neq 7$.
- Option C (1): If $a = 1$, then $a_3 = 1 + 4 = 5 \neq 7$.
- Option D (7): If $a = 7$, then $a_3 = 7 + 4 = 11 \neq 7$.

Final Answer: First term $a = 3 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q 11

Q12.

Solution

Concept – A system of two linear equations can be solved by elimination (adding or subtracting equations to cancel one variable) or substitution.

Step 1 – Write the two equations:

$$2x + y = 7 \quad \cdots (1)$$

$$x - y = 2 \quad \cdots (2)$$

Step 2 – Add the two equations to eliminate y:

$$(2x + y) + (x - y) = 7 + 2 \implies 3x = 9 \implies x = 3.$$

Step 3 – Verify: From (2), $y = x - 2 = 1$. Check in (1): $2(3) + 1 = 7$ ✓.

Why other options are wrong:

- Option A ($x = 1$): Substituting into (1): $2 + y = 7 \Rightarrow y = 5$; check (2): $1 - 5 = -4 \neq 2$.
- Option B ($x = 2$): $4 + y = 7 \Rightarrow y = 3$; check (2): $2 - 3 = -1 \neq 2$.
- Option D ($x = 4$): $8 + y = 7 \Rightarrow y = -1$; check (2): $4 - (-1) = 5 \neq 2$.

Final Answer: $x = 3 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q 12

Q13.

Solution

Concept – By definition, $\log_b(x) = y$ means $b^y = x$. We convert $1/64$ to a power of 8.

Step 1 – Express 64 as a power of 8:

$$8^1 = 8, \quad 8^2 = 64.$$

Step 2 – Write $1/64$ as a power of 8:

$$\frac{1}{64} = \frac{1}{8^2} = 8^{-2}.$$

Step 3 – Apply the logarithm:

$$\log_8\left(\frac{1}{64}\right) = \log_8\left(8^{-2}\right) = -2.$$

Why other options are wrong:

- Option A (-3): This would mean $8^{-3} = 1/512 \neq 1/64$.
- Option C (2): Drops the negative sign; $8^2 = 64$, not $1/64$.
- Option D (3): $8^3 = 512 \neq 1/64$.

Final Answer: $\log_8(1/64) = -2 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q 13

Q14.

Solution

Concept – To solve a quadratic inequality, factorise the quadratic and determine where the product is negative (the parabola opens upward, so it is negative between its roots).

Step 1 – Factorise:

$$x^2 - 5x + 6 = (x-2)(x-3).$$

Step 2 – Find where the product is negative:

$$(x-2)(x-3) < 0.$$

This holds when one factor is positive and the other is negative, i.e., when $2 < x < 3$.

Step 3 – Verify: At $x = 2.5$: $(0.5)(-0.5) = -0.25 < 0$ ✓.

Why other options are wrong:

- Option A ($x < 2$ or $x > 3$): This is where $(x-2)(x-3) > 0$, not < 0.
- Option B ($x < -3$ or $x > -2$): Confuses the roots; the roots are $+2$ and $+3$, not -3 and -2.
- Option C ($0 < x < 6$): An incorrect interval that does not come from the factored form.

Final Answer: $2 < x < 3 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q 14

Q15.

Solution

Concept – Similar triangles have corresponding sides in equal ratios (scale factor). If $\triangle ABC \sim \triangle PQR$, then:

$$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{CA}{RP}.$$

Step 1 – Identify the corresponding sides:

$$AB \leftrightarrow PQ, \quad BC \leftrightarrow QR.$$

Given: $AB = 4$ cm, $BC = 6$ cm, $PQ = 6$ cm.

Step 2 – Set up the proportion and solve for QR:

$$\frac{AB}{PQ} = \frac{BC}{QR} \implies \frac{4}{6} = \frac{6}{QR} \implies QR = \frac{6 \times 6}{4} = \frac{36}{4} = 9 \text{ cm}.$$

Why other options are wrong:

- Option A (7 cm): Does not satisfy the proportion $4/6 = 6/7$; $4 \times 7 = 28 \neq 36$.
- Option B (8 cm): $4 \times 8 = 32 \neq 36$.
- Option D (12 cm): Uses the incorrect ratio $BC/AB = 6/4$ upside down: $6 \times 8 = 12$; reverses the similar triangle correspondence.

Final Answer: $QR = 9$ cm $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q 15

Q16.

Solution

Concept – The Inscribed Angle Theorem states: the angle subtended by an arc at the centre of a circle is twice the angle subtended by the same arc at any point on the remaining part of the circle.

Step 1 – Identify the central angle:

$$\angle POQ = 80.$$

Step 2 – Apply the Inscribed Angle Theorem:

$$\angle PRQ = \frac{\angle POQ}{2} = \frac{80}{2} = 40.$$

Why other options are wrong:

- Option B (80°): Confuses the inscribed angle with the central angle; the inscribed angle is half of the central angle, not equal to it.
- Option C (160°): Doubles the central angle instead of halving it.
- Option D (20°): Halves the central angle twice: $80/4 = 20$; no such rule exists.

Final Answer: Inscribed angle $= 40 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q 16

Q17.

Solution

Concept – Volume of a right circular cone: $V = \dfrac{1}{3}\pi r^2 h$. The base circumference $= 2\pi r$.

Step 1 – Find the base radius from the circumference:

$$2\pi r = 44 \implies r = \frac{44}{2\pi} = \frac{44}{2 \times \frac{22}{7}} = \frac{44 \times 7}{44} = 7 \text{ cm}.$$

Step 2 – Calculate the volume:

$$V = \frac{1}{3}\times\frac{22}{7}\times 7^2\times 24 = \frac{1}{3}\times\frac{22}{7}\times 49\times 24 = \frac{1}{3}\times 22\times 7\times 24 = \frac{22\times 7\times 24}{3} = 22\times 7\times 8 = 1232 \text{ cm}^3.$$

Why other options are wrong:

- Option A (1,056 cm^3): Uses $h = 21$ or an incorrect radius; $22 \times 6 \times 8 = 1056$.
- Option C (1,540 cm^3): Omits the factor of $1/3$: $\frac{22}{7} \times 49 \times 7 \approx$ some incorrect path.
- Option D (2,464 cm^3): Omits the $1/3$: $\frac{22}{7} \times 49 \times 24 = 3696$; some other error produces 2464.

Final Answer: Volume $= 1{,}232$ cm$^3 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q 17

Q18.

Solution

Concept – Parallel lines have equal slopes. The slope-intercept form is $y = mx + c$. Given a slope m and a point (x_0, y_0), the line equation is found via: $y - y_0 = m(x - x_0)$.

Step 1 – Identify the slope of the given line:

$$y = 3x - 2 \implies m = 3.$$

Step 2 – The parallel line has the same slope $m = 3$ and passes through $(1, 5)$:

$$y - 5 = 3(x - 1) \implies y - 5 = 3x - 3 \implies y = 3x + 2.$$

Step 3 – Verify: At $x = 1$: $y = 3(1) + 2 = 5$ ✓.

Why other options are wrong:

- Option A ($y = 3x - 2$): This is the original line; the required line passes through $(1, 5)$, but $3(1) - 2 = 1 \neq 5$.
- Option B ($y = 3x - 4$): At $x = 1$: $y = 3 - 4 = -1 \neq 5$.
- Option C ($y = 3x$): At $x = 1$: $y = 3 \neq 5$.

Final Answer: $y = 3x + 2 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q 18

Q19.

Solution

Concept – The space diagonal of a cuboid with dimensions l, b, h is given by:

$$d = \sqrt{l^2 + b^2 + h^2}.$$

Step 1 – Substitute $l = 6$, $b = 8$, $h = 24$:

$$d = \sqrt{6^2 + 8^2 + 24^2} = \sqrt{36 + 64 + 576} = \sqrt{676}.$$

Step 2 – Evaluate the square root:

$$\sqrt{676} = 26 \text{ cm} \quad (\text{since } 26^2 = 676).$$

Why other options are wrong:

- Option A (22 cm): $22^2 = 484 \neq 676$.
- Option B (24 cm): $24^2 = 576$; this is only h^2, not $l^2 + b^2 + h^2$.
- Option D (28 cm): $28^2 = 784 \neq 676$.

Final Answer: Space diagonal $= 26$ cm $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q 19

Q20.

Solution

Concept – When two specific people must always be adjacent, treat them as a single unit. The number of arrangements is then (number of units)! $\times$ (internal arrangements of the pair).

Step 1 – Treat the 2 specific people as one unit:

$$\text{Total units} = (5 - 2) + 1 = 4.$$

Step 2 – Count arrangements:

$$\text{Arrangements of 4 units in a row} = 4! = 24.$$

$$\text{Internal arrangements of the pair} = 2! = 2.$$

$$\text{Total} = 4! \times 2! = 24 \times 2 = 48.$$

Why other options are wrong:

- Option B (36): Computes $3! \times 3! = 6 \times 6 = 36$; incorrectly treats the pair as filling 3 spots.
- Option C (24): Uses only $4!$ without accounting for the 2 internal arrangements of the pair.
- Option D (60): Equals $5!/2 = 60$; divides total arrangements by 2 rather than using the grouped-unit method.

Final Answer: 48 ways $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q 20

Q21.

Solution

Concept – Classical probability: $P(\text{event}) = \dfrac{\text{number of favourable outcomes}}{\text{total outcomes}}$.

Step 1 – Count the balls:

$$\text{Red} = 5, \quad \text{Blue} = 3, \quad \text{Green} = 2, \quad \text{Total} = 10.$$

Step 2 – Find $P(\text{not red})$:

$$P(\text{not red}) = \frac{\text{Blue} + \text{Green}}{\text{Total}} = \frac{3+2}{10} = \frac{5}{10} = \frac{1}{2}.$$

Why other options are wrong:

- Option A $(3/10)$: Counts only blue balls; omits green.
- Option C $(3/5)$: Equals $6/10$; perhaps incorrectly counts non-red as 6.
- Option D $(2/5)$: Counts only green balls: $2/10 = 1/5$; or blue only: $3/10$. Neither gives $2/5 = 4/10$.

Final Answer: $P(\text{not red}) = \dfrac{1}{2} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q 21

Q22.

Solution

Concept – When two dice are thrown, the total number of outcomes is $6 \times 6 = 36$. Each outcome (i, j) is equally likely.

Step 1 – List all outcomes where the sum equals 7:

$$(1,6),\ (2,5),\ (3,4),\ (4,3),\ (5,2),\ (6,1). \quad \text{Total: 6 outcomes.}$$

Step 2 – Compute the probability:

$$P(\text{sum} = 7) = \frac{6}{36} = \frac{1}{6}.$$

Why other options are wrong:

- Option A $(1/9)$: Corresponds to 4 favourable outcomes out of 36; there are

6, not 4.

- Option B $(1/4)$: Corresponds to 9 favourable outcomes; incorrect count.
- Option C $(2/9)$: Corresponds to 8 favourable outcomes; no sum on two dice has 8 equally likely ways of giving 7.

Final Answer: $P(\text{sum} = 7) = \dfrac{1}{6} \Rightarrow \boxed{\text{D}}$

Answer: (D) **Go Back to Q 22**

Answer Key

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

Quick Reference: Correct Answers

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