SET Quantitative

Sample Paper – 2

Duration: 16 Minutes **Maximum Marks: 16**

Instructions

- This paper contains **16 questions** carrying **1 mark each**.
- Syllabus: Arithmetic, Algebra, Geometry, Data Interpretation, and Probability — class 9–10 level, as tested in SET (Symbiosis Entrance Test).
- Marking scheme: **+1** for every correct answer; **no negative marking**.
- All questions are compulsory. Each question has exactly one correct option.
- Use the Answer Key at the end to verify your responses after attempting the paper.

Section: Quantitative Aptitude

Q1. The price of sugar increases by 25%. By what percentage must a household reduce its consumption so that the expenditure on sugar remains unchanged?

(A) 25%

(B) 20%

(C) 15%

(D) 10%

Q2. The average of 5 consecutive even numbers is 18. What is the largest of the five numbers?

(A) 20

(B) 18

(C) 24

(D) 22

Q3. The population of a town is 120 000. If it increases at the rate of 10% per year, what will it be after 2 years?

(A) 1 45 200

(B) 1 40 000

(C) 1 44 000

(D) 1 32 000

Q4. Which of the following numbers is divisible by both 4 and 9?

(A) 1234

(B) 5678

(C) 1296

(D) 2349

Q5. The sum of the digits of a two-digit number is 9. If the digits are reversed, the new number exceeds the original by 27. Find the original number.

(A) 27

(B) 36

(C) 45

(D) 18

Q6. Find the compounded ratio of $2 : 3$ and $4 : 5$.

(A) $8 : 10$

(B) $6 : 15$

(C) $4 : 9$

(D) $8 : 15$

Q7. A invests Rs. 10 000 for 6 months and B invests Rs. 6 000 for 12 months in a business. What is the ratio of their profits?

(A) $5 : 6$

(B) $1 : 1$

(C) $3 : 4$

(D) $2 : 3$

Q8. A shirt is sold for Rs. 440 at a profit of 10%. What was its cost price?

(A) Rs. 360

(B) Rs. 420

(C) Rs. 400

(D) Rs. 480

Q9. One article is sold at Rs. 990 at a gain of 10%, and another at Rs. 990 at a loss of 10%. What is the net result on the overall transaction?

(A) Profit of Rs. 20

(B) Loss of Rs. 20

(C) No profit, no loss

(D) Loss of Rs. 40

Q10. A car covers a distance of 60 km at 30 km/h and the next 60 km at 60 km/h. What is the average speed for the entire journey?

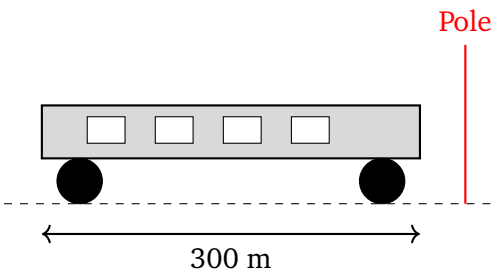
(A) 45 km/h

(B) 50 km/h

(C) 42 km/h

(D) 40 km/h

Q11. A train 300 m long passes a stationary pole in 30 seconds. What is the speed of the train in km/h?



(A) 36 km/h

(B) 30 km/h

(C) 45 km/h

(D) 54 km/h

Q12. Find the roots of the equation $x^2 - 7x + 12 = 0$.

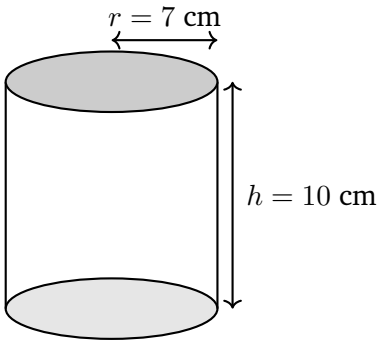
(A) $x = 2$ and $x = 6$

(B) $x = -3$ and $x = 4$

(C) $x = 3$ and $x = 4$

(D) $x = 1$ and $x = 12$

Q13. A cylinder has radius 7 cm and height 10 cm. Find its volume. (Use $\pi = \frac{22}{7}$)



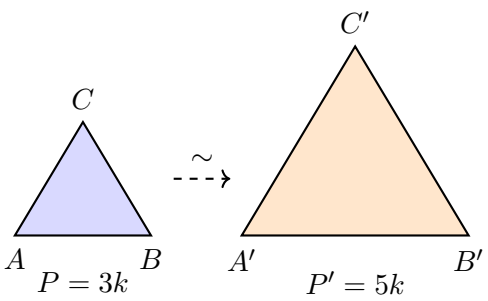
(A) 1320 cm^3

(B) 1540 cm^3

(C) 2200 cm^3

(D) 770 cm^3

Q14. Two similar triangles have their perimeters in the ratio $3 : 5$. If the area of the smaller triangle is 36 cm^2, find the area of the larger triangle.



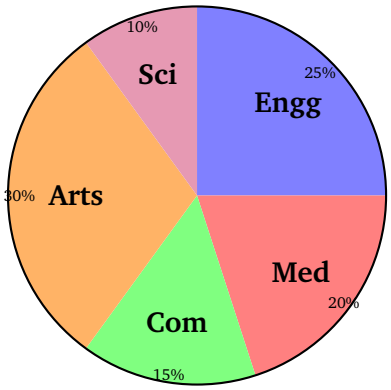
(A) 60 cm^2

(B) 72 cm^2

(C) 80 cm^2

(D) 100 cm^2

Q15. The pie chart below shows the distribution of 600 students across five streams. How many students are enrolled in the Arts stream?



(A) 180

(B) 150

(C) 120

(D) 90

Q16. In how many different ways can the letters of the word "MATHS" be arranged?

(A) 60

(B) 20

(C) 120

(D) 720

Detailed Solutions

Q1.

Solution

Concept — Percentage Change in Consumption: When price increases by $r\%$, consumption must decrease by $\frac{r}{100+r} \times 100\%$ to keep expenditure unchanged.

Step 1 — Identify the price increase: Price increases by $r = 25\%$.

Step 2 — Calculate required reduction:

$$\text{Reduction} = \frac{25}{100+25} \times 100 = \frac{25}{125} \times 100 = 20\%$$

Why other options are wrong:

- Option A: 25% — This would reduce consumption by the same percentage as the price rise, but expenditure = price $\times$ consumption, so a symmetric reduction is not correct.
- Option B: 20% — **Correct.**
- Option C: 15% — Insufficient reduction; expenditure would still rise.
- Option D: 10% — Far too small; derived by simple arithmetic error.

Final Answer: Household must reduce consumption by 20% $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q 1

Q2.

Solution

Concept — Consecutive Even Numbers: Five consecutive even numbers can be written as $n,\ n+2,\ n+4,\ n+6,\ n+8$. Their average equals the middle term $n+4$.

Step 1 — Set up the equation:

$$n + 4 = 18 \implies n = 14$$

Step 2 — Find the largest number:

$$\text{Largest} = n + 8 = 14 + 8 = 22$$

Why other options are wrong:

- Option A: 20 — This is $n + 6$, the second-largest, not the largest.
- Option B: 18 — This is the average (middle term), not the largest.
- Option C: 24 — Incorrect; would require $n = 16$, giving average 20, not 18.
- Option D: 22 — **Correct.**

Final Answer: The largest of the five numbers is 22 $\Rightarrow$ D

Answer: (D) Go Back to Q 2

Q3.

Solution

Concept — Compound Growth: Population after n years at annual rate $r\%$ is $P\left(1+\frac{r}{100}\right)^n$.

Step 1 — Apply the formula:

$$P_2 = 1{,}20{,}000 \times \left(1+\frac{10}{100}\right)^2 = 1{,}20{,}000 \times 1.10 \times 1.10$$

Step 2 — Compute:

$$= 1{,}20{,}000 \times 1.21 = 1{,}45{,}200$$

Why other options are wrong:

- Option A: 1 45 200 — **Correct.**
- Option B: 1 40 000 — Uses simple interest approach for one year only.
- Option C: 1 44 000 — Uses $1{,}20{,}000 \times 1.20$ (simple, not compound).
- Option D: 1 32 000 — Applies 10% only once: $1{,}20{,}000 \times 1.10$.

Final Answer: Population after 2 years = 1 45 200 $\Rightarrow$ A

Answer: (A) Go Back to Q 3

Q4.

Solution

Concept — Divisibility Rules: A number is divisible by 4 if its last two digits form a number divisible by 4. A number is divisible by 9 if the sum of its digits is divisible by 9.

Step 1 — Check 1296 for divisibility by 4:

$$96 \div 4 = 24 \quad \checkmark$$

Step 2 — Check 1296 for divisibility by 9:

$$1 + 2 + 9 + 6 = 18, \quad 18 \div 9 = 2 \quad \checkmark$$

Why other options are wrong:

- Option A: 1234 — Last two digits 34; $34 \div 4 = 8.5$ (not divisible by 4).
- Option B: 5678 — Last two digits 78; $78 \div 4 = 19.5$ (not divisible by 4).
- Option C: 1296 — **Correct.**
- Option D: 2349 — Digit sum $= 2 + 3 + 4 + 9 = 18$ (divisible by 9), but last two digits 49; $49 \div 4 = 12.25$ (not divisible by 4).

Final Answer: 1296 is divisible by both 4 and 9 $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q 4

Q5.

Solution

Concept — Two-Digit Number Puzzle: Let the tens digit be a and units digit be b. The original number is $10a + b$.

Step 1 — Set up equations:

$$a + b = 9 \qquad \text{and} \qquad (10b + a) - (10a + b) = 27$$

$$\Rightarrow 9b - 9a = 27 \Rightarrow b - a = 3$$

Step 2 — Solve simultaneously:

$$a + b = 9 \text{ and } b - a = 3 \Rightarrow 2b = 12 \Rightarrow b = 6,\ a = 3$$

$$\text{Original number} = 10(3) + 6 = 36$$

Why other options are wrong:

- Option A: 27 — Digits 2 and 7; reversed = 72; $72 - 27 = 45 \neq 27$.
- Option B: 36 — **Correct.** Reversed = 63; $63 - 36 = 27$ ✓.
- Option C: 45 — Reversed = 54; $54 - 45 = 9 \neq 27$.
- Option D: 18 — Digits 1 and 8; digit sum = 9 ✓, but reversed = 81; $81 - 18 = 63 \neq 27$.

Final Answer: The original number is 36 $\Rightarrow$ B

Answer: (B) Go Back to Q 5

Q6.

Solution

Concept — Compounded Ratio: The compounded ratio of $a : b$ and $c : d$ is $(a \times c) : (b \times d)$.

Step 1 — Apply the formula:

$$\text{Compounded ratio} = (2 \times 4) : (3 \times 5) = 8 : 15$$

Step 2 — Verify it cannot be simplified: $\gcd(8, 15) = 1$, so $8 : 15$ is already in lowest terms.

Why other options are wrong:

- Option A: $8 : 10$ — Multiplied numerators correctly but used $3 \times 5 = 10$ only partially; should be 15.
- Option B: $6 : 15$ — Adds instead of multiplying the first terms: $2 + 4 = 6$.
- Option C: $4 : 9$ — Incorrect multiplication; unrelated to either ratio.
- Option D: $8 : 15$ — **Correct.**

Final Answer: Compounded ratio = $8 : 15$ $\Rightarrow$ D

Answer: (D) Go Back to Q 6

Q7.

Solution

Concept — Partnership Profit: Profit is shared in proportion to capital $\times$ time (capital-months).

Step 1 — Compute capital-months:

$$\text{A's share} = 10{,}000 \times 6 = 60{,}000$$

$$\text{B's share} = 6{,}000 \times 12 = 72{,}000$$

Step 2 — Find the ratio:

$$60{,}000 : 72{,}000 = 5 : 6$$

Why other options are wrong:

- Option A: $5 : 6$ — **Correct.**
- Option B: $1 : 1$ — Ignores the different investment periods.
- Option C: $3 : 4$ — Ratio of capital only (10000:6000 is not 3:4 anyway).
- Option D: $2 : 3$ — Ratio of capitals $10000 : 6000 = 5 : 3$, not accounted with time.

Final Answer: Profit ratio of A to B $= 5 : 6 \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q 7

Q8.

Solution

Concept — Profit and Loss: $\text{SP} = \text{CP} \times \left(1 + \dfrac{\text{Profit\%}}{100}\right)$, so $\text{CP} = \dfrac{\text{SP}}{1 + \text{Profit\%}/100}$.

Step 1 — Apply the formula:

$$\text{CP} = \frac{440}{1 + 10/100} = \frac{440}{1.10} = 400$$

Step 2 — Verify: $400 \times 1.10 = 440$ ✓

Why other options are wrong:

- Option A: Rs. 360 — Implies SP of $360 \times 1.10 = 396$, not Rs. 440.

- Option B: Rs. 420 — Implies SP of $420 \times 1.10 = 462$, not Rs. 440.
- Option C: Rs. 400 — **Correct.**
- Option D: Rs. 480 — Would mean a loss, not a profit.

Final Answer: Cost price = Rs. 400 $\Rightarrow$ C

Answer: (C) Go Back to Q 8

Q9.

Solution

Concept — Equal SP Gain/Loss Trap: When two articles are sold at the same price, one at $x\%$ gain and the other at $x\%$ loss, the net result is always a **loss**.

Step 1 — Find cost prices:

$$\text{CP}_1 = \frac{990}{1.10} = 900 \quad (10\% \text{ gain})$$

$$\text{CP}_2 = \frac{990}{0.90} = 1{,}100 \quad (10\% \text{ loss})$$

Step 2 — Compute net result:

$$\text{Total CP} = 900 + 1{,}100 = 2{,}000$$

$$\text{Total SP} = 990 + 990 = 1{,}980$$

$$\text{Net Loss} = 2{,}000 - 1{,}980 = \text{Rs. } 20$$

Why other options are wrong:

- Option A: Profit of Rs. 20 — Direction of result is wrong; this is a loss scenario.
- Option B: Loss of Rs. 20 — **Correct.**
- Option C: No profit, no loss — Incorrect; equal-SP transactions always result in a loss.
- Option D: Loss of Rs. 40 — Doubles the actual loss; arithmetic error.

Final Answer: Net result is a loss of Rs. 20 $\Rightarrow$ B

Answer: (B) Go Back to Q 9

Q10.

Solution

Concept — Average Speed: When equal distances are covered at different speeds, average speed $= \dfrac{2v_1v_2}{v_1+v_2}$.

Step 1 — Calculate total time:

$$t_1 = \frac{60}{30} = 2 \text{ h}, \quad t_2 = \frac{60}{60} = 1 \text{ h}, \quad \text{Total time} = 3 \text{ h}$$

Step 2 — Calculate average speed:

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}} = \frac{120}{3} = 40 \text{ km/h}$$

Why other options are wrong:

- Option A: 45 km/h — Simple arithmetic mean of 30 and 60; valid only for equal time, not equal distance.
- Option B: 50 km/h — Midpoint assumption; incorrect here.
- Option C: 42 km/h — No standard derivation leads to this value.
- Option D: 40 km/h — **Correct.**

Final Answer: Average speed = 40 km/h $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q 10

Q11.

Solution

Concept — Train Speed: When a train of length L passes a stationary point (pole/post), the distance covered equals the length of the train.

Step 1 — Calculate speed in m/s:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{300 \text{ m}}{30 \text{ s}} = 10 \text{ m/s}$$

Step 2 — Convert m/s to km/h:

$$10 \text{ m/s} \times \frac{3600}{1000} = 10 \times 3.6 = 36 \text{ km/h}$$

Why other options are wrong:

- Option A: 36 km/h — **Correct.**
- Option B: 30 km/h — Uses wrong time or distance; corresponds to ≈ 8.33 m/s.
- Option C: 45 km/h — Corresponds to 12.5 m/s; incorrect computation.
- Option D: 54 km/h — Corresponds to 15 m/s; uses 300/20 instead of 300/30.

Final Answer: Speed of the train = 36 km/h $\Rightarrow$ A

Answer: (A) Go Back to Q 11

Q12.

Solution

Concept — Quadratic Factorisation: For $x^2 - 7x + 12 = 0$, find two numbers whose product is 12 and sum is 7.

Step 1 — Factorise:

$$x^2 - 7x + 12 = (x - 3)(x - 4) = 0$$

Step 2 — Solve:

$$x - 3 = 0 \Rightarrow x = 3 \quad \text{or} \quad x - 4 = 0 \Rightarrow x = 4$$

Verification: $3^2 - 7(3) + 12 = 9 - 21 + 12 = 0$ ✓and $4^2 - 7(4) + 12 = 16 - 28 + 12 = 0$ ✓

Why other options are wrong:

- Option A: $x = 2$ and $x = 6$ — Product = 12 ✓, but sum = 8 $\neq$ 7.
- Option B: $x = -3$ and $x = 4$ — Product = $-12 \neq 12$.
- Option C: $x = 3$ and $x = 4$ — **Correct.**
- Option D: $x = 1$ and $x = 12$ — Product = 12 ✓, but sum = 13 $\neq$ 7.

Final Answer: Roots are $x = 3$ and $x = 4 \Rightarrow$ C

Answer: (C) Go Back to Q 12

Q13.

Solution

Concept — Volume of Cylinder: $V = \pi r^2 h$, where r is radius and h is height.

Step 1 — Substitute values:

$$V = \frac{22}{7} \times 7^2 \times 10 = \frac{22}{7} \times 49 \times 10$$

Step 2 — Simplify:

$$V = 22 \times 7 \times 10 = 1{,}540 \text{ cm}^3$$

Why other options are wrong:

- Option A: 1320 cm^3 — Uses $r = 6$ instead of 7 ($\pi \times 36 \times 10 \approx 1131$ or different error).
- Option B: 1540 cm^3 — **Correct.**
- Option C: 2200 cm^3 — Forgets to cancel 7 with $\frac{22}{7}$, uses $49 \times 10 \times \frac{22}{7}$ with error.
- Option D: 770 cm^3 — Divides final answer by 2; uses $h = 5$ or halves erroneously.

Final Answer: Volume of cylinder = 1 540 $\text{cm}^3 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q 13

Q14.

Solution

Concept — Areas of Similar Triangles: If two similar triangles have corresponding sides (or perimeters) in ratio $k : 1$, their areas are in ratio $k^2 : 1$.

Step 1 — Find the area ratio:

$$\frac{\text{Perimeter}_1}{\text{Perimeter}_2} = \frac{3}{5} \implies \frac{\text{Area}_1}{\text{Area}_2} = \left(\frac{3}{5}\right)^2 = \frac{9}{25}$$

Step 2 — Compute larger area:

$$\frac{36}{\text{Area}_2} = \frac{9}{25} \implies \text{Area}_2 = 36 \times \frac{25}{9} = 4 \times 25 = 100 \text{ cm}^2$$

Why other options are wrong:

- Option A: 60 cm^2 — Uses ratio $3:5$ directly: $36 \times \frac{5}{3} = 60$; forgets to square.
- Option B: 72 cm^2 — Uses ratio $1:2$ erroneously.
- Option C: 80 cm^2 — No standard derivation from the given data.
- Option D: 100 cm^2 — **Correct.**

Final Answer: Area of the larger triangle $= 100$ cm^2 $\Rightarrow$ D

Answer: (D) Go Back to Q 14

Q15.

Solution

Concept — Pie Chart Interpretation: The number of students in a sector $= \frac{\text{Percentage}}{100} \times$ Total.

Step 1 — Read the Arts percentage from the pie chart: Arts sector = 30%.

Step 2 — Calculate Arts students:

$$\text{Arts students} = \frac{30}{100} \times 600 = 180$$

Why other options are wrong:

- Option A: 180 — **Correct.**
- Option B: 150 — Corresponds to 25% (Engineering sector).
- Option C: 120 — Corresponds to 20% (Medical sector).
- Option D: 90 — Corresponds to 15% (Commerce sector).

Final Answer: Students in Arts stream = 180 $\Rightarrow$ A

Answer: (A) Go Back to Q 15

Q16.

Solution

Concept — Permutations: The number of ways to arrange n distinct objects is $n!$ (n factorial).

Step 1 — Count distinct letters in MATHS: M, A, T, H, S — all 5 letters are distinct.

Step 2 — Calculate arrangements:

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

Why other options are wrong:

- Option A: 60 — Equals $5!/2$; incorrectly assumes one letter repeats.
- Option B: 20 — Equals $5!/6$; no basis in the problem.
- Option C: 120 — **Correct.**
- Option D: 720 — Equals $6!$; uses 6 letters instead of 5.

Final Answer: Number of arrangements of MATHS $= 120 \Rightarrow$ C

Answer: (C) Go Back to Q 16

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	D	15	A
16	C								