TANCET — Quantitative Aptitude

Sample Paper 9

Tamil Nadu Common Entrance Test | Quantitative Aptitude Section

Questions	Total Marks	Duration	Marking Scheme
20	20	24 minutes	$+1$ correct | $-\frac{1}{4}$ wrong | 0 unattempted

Instructions

1. This section contains **20 multiple-choice questions**, each carrying **1 mark**.
2. Each question has **four options** (A), (B), (C), (D); only **one** is correct.
3. A correct answer awards $+1$ mark; an incorrect answer deducts $\frac{1}{4}$ mark.
4. Unattempted questions carry **zero** marks.
5. Use of calculators or electronic devices is **not** permitted.

SECTION: Quantitative Aptitude (Q1 – Q20)

Q1. Find the LCM of 12, 18, and 24.

(A) 72

(B) 48

(C) 36

(D) 96

Solution

Prime factorise each number:

$$12 = 2^2 \times 3$$
$$18 = 2 \times 3^2$$
$$24 = 2^3 \times 3$$

LCM takes the highest power of each prime factor:

$$\text{LCM}(12,\ 18,\ 24) = 2^3 \times 3^2 = 8 \times 9 = \boxed{72}$$

Answer: (A)

Q2. Find the remainder when 7^{50} is divided by 100.

(A) 07

(B) 49

(C) 43

(D) 01

Solution

The last two digits of powers of 7 repeat in a cycle of 4:

$$7^1 \equiv 07, \quad 7^2 \equiv 49, \quad 7^3 \equiv 43, \quad 7^4 \equiv 01 \pmod{100}$$

Find the position in the cycle: $50 \div 4$ gives remainder **2**.

Therefore $7^{50} \equiv 7^2 \equiv \boxed{49} \pmod{100}$.

Answer: (B)

Q3. For the quadratic equation $x^2 - 7x + 10 = 0$ with roots α and β, find the value of $\alpha^2 + \beta^2$.

(A) 21

(B) 25

(C) 29

(D) 49

Solution

By Vieta's formulas for $x^2 - 7x + 10 = 0$:

$$\alpha + \beta = 7, \qquad \alpha\beta = 10$$

Using the identity $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$:

$$\alpha^2 + \beta^2 = 7^2 - 2(10) = 49 - 20 = \boxed{29}$$

Answer: (C)

Q4. Solve the system of equations: $x + y = 12$ and $3x - y = 4$. Find the value of $x + 2y$.

(A) 16

(B) 18

(C) 14

(D) 20

Solution

Step 1: Add the two equations to eliminate y:

$$(x + y) + (3x - y) = 12 + 4 \implies 4x = 16 \implies x = 4$$

Step 2: Substitute into $x + y = 12$:

$$y = 12 - 4 = 8$$

Step 3: Find $x + 2y$:

$$x + 2y = 4 + 2(8) = 4 + 16 = \boxed{20}$$

Answer: (D)

Q5. The population of a town is 50,000. It increases by 20% in year 1 and then decreases by 10% in year 2. Find the population at the end of year 2.

(A) 54,000

(B) 55,000

(C) 52,500

(D) 56,000

Solution

After year 1 (20% increase):

$$P_1 = 50000 \times 1.20 = 60000$$

After year 2 (10% decrease):

$$P_2 = 60000 \times 0.90 = \boxed{54{,}000}$$

Answer: (A)

Q6. An article is sold at a profit of 25%. If the cost price is Rs. 240, find the selling price.

(A) Rs. 280

(B) Rs. 300

(C) Rs. 320

(D) Rs. 260

Solution

$$\text{SP} = \text{CP} \times \left(1 + \frac{\text{Profit\%}}{100}\right) = 240 \times \frac{125}{100} = 240 \times 1.25 = \boxed{\text{Rs. } 300}$$

Answer: (B)

Q7. Two numbers are in the ratio $3 : 5$. Their LCM is 120. Find the larger of the two numbers.

(A) 24

(B) 35

(C) 40

(D) 45

Solution

Let the two numbers be $3k$ and $5k$. Since $\gcd(3, 5) = 1$, we have:

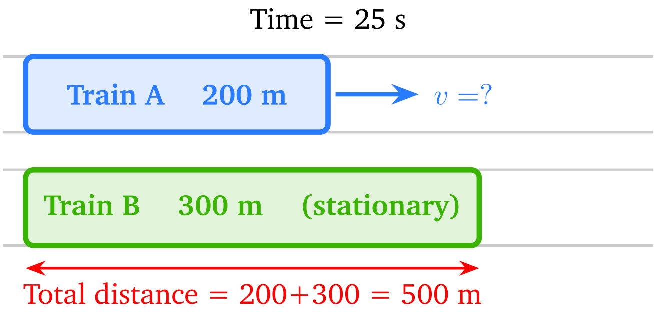
$$\text{LCM}(3k,\ 5k) = 15k = 120 \implies k = 8$$

The two numbers are $3 \times 8 = 24$ and $5 \times 8 = 40$.

The larger number is $\boxed{40}$.

Answer: (C)

Q8. Train A (length 200 m) passes stationary Train B (length 300 m) completely in 25 seconds. Find the speed of Train A in km/h.



(A) 60 km/h

(B) 64 km/h

(C) 68 km/h

(D) 72 km/h

Solution

To pass completely, Train A must cover a distance equal to the sum of both lengths:

$$d = 200 + 300 = 500 \text{ m}$$

Speed of Train A:

$$v = \frac{d}{t} = \frac{500}{25} = 20 \text{ m/s}$$

Converting to km/h:

$$v = 20 \times \frac{18}{5} = \boxed{72 \text{ km/h}}$$

Answer: (D)

Q9. A can complete a work in 6 days and B in 12 days. They work together for 2 days, after which A leaves. How many more days does B alone take to finish the remaining work?

(A) 6 days

(B) 8 days

(C) 4 days

(D) 3 days

Solution

Work done per day: A $= \frac{1}{6}$, B $= \frac{1}{12}$.

Combined rate $= \frac{1}{6} + \frac{1}{12} = \frac{2}{12} + \frac{1}{12} = \frac{3}{12} = \frac{1}{4}$ work/day.

Work done in 2 days together $= 2 \times \frac{1}{4} = \frac{1}{2}$.

Remaining work $= 1 - \frac{1}{2} = \frac{1}{2}$.

Days for B alone to finish:

$$t = \frac{1/2}{1/12} = \frac{1}{2} \times 12 = \boxed{6 \text{ days}}$$

Answer: (A)

Q10. The average of 8 numbers is 25. If the number 15 is replaced by 43, what is the new average?

(A) 27

(B) 28.5

(C) 26.5

(D) 30

Solution

Original sum $= 8 \times 25 = 200$.

New sum after replacement $= 200 - 15 + 43 = 228$.

New average:

$$\bar{x}_{\text{new}} = \frac{228}{8} = \boxed{28.5}$$

Answer: (B)

Q11. Find the compound interest on Rs. 10,000 at 10% p.a. compounded annually for 2 years.

(A) Rs. 1800

(B) Rs. 2000

(C) Rs. 2100

(D) Rs. 1900

Solution

$$A = P\left(1 + \frac{r}{100}\right)^n = 10000 \times \left(1 + \frac{10}{100}\right)^2 = 10000 \times (1.1)^2 = 10000 \times 1.21 = \text{Rs. } 12{,}100$$

$$\text{CI} = A - P = 12100 - 10000 = \boxed{\text{Rs. } 2100}$$

Answer: (C)

Q12. The 5th term of a geometric progression is 48 and the common ratio is 2. Find the 1st term of the GP.

(A) 6

(B) 4

(C) 8

(D) 3

Solution

The n-th term of a GP is $T_n = a \cdot r^{n-1}$.

For the 5th term with $r = 2$:

$$T_5 = a \cdot 2^{5-1} = a \cdot 2^4 = 16a = 48$$

$$a = \frac{48}{16} = \boxed{3}$$

Answer: (D)

Q13. In how many ways can 5 people be arranged in a row?

(A) 120

(B) 60

(C) 24

(D) 100

Solution

The number of ways to arrange n distinct objects in a row is $n!$

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = \boxed{120}$$

Answer: (A)

Q14. A bag contains 4 red balls and 6 blue balls. Two balls are drawn at random without replacement. Find the probability that both balls drawn are red.

(A) $\frac{1}{5}$

(B) $\frac{2}{15}$

(C) $\frac{1}{10}$

(D) $\frac{4}{45}$

Solution

Total balls $= 4 + 6 = 10$.

Number of ways to choose 2 from 10:

$$\binom{10}{2} = \frac{10 \times 9}{2} = 45$$

Number of ways to choose 2 red balls from 4:

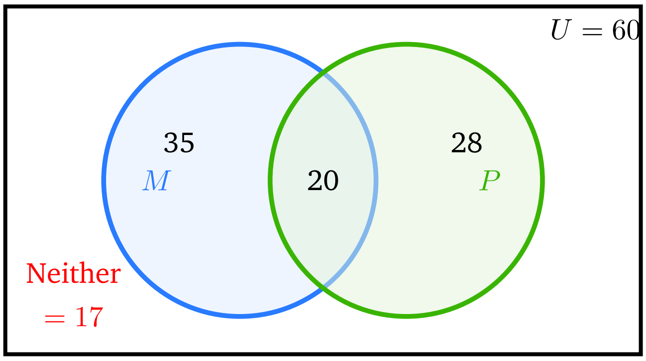
$$\binom{4}{2} = \frac{4 \times 3}{2} = 6$$

Required probability:

$$P = \frac{6}{45} = \boxed{\frac{2}{15}}$$

Answer: (B)

Q15. In a class of 60 students, 35 study Maths, 28 study Physics, and 20 study both subjects. How many students study *neither* subject?



(A) 15

(B) 20

(C) 17

(D) 12

Solution

By the inclusion-exclusion principle:

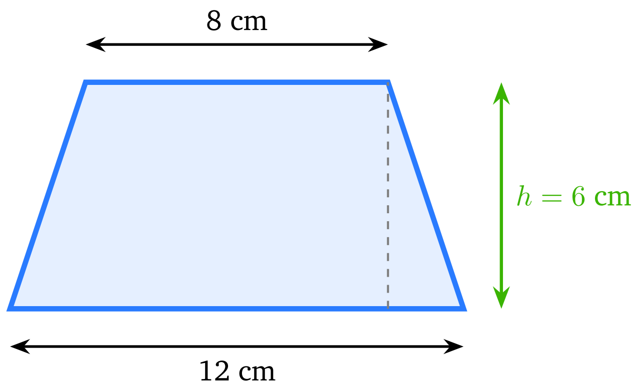
$$|M \cup P| = |M| + |P| - |M \cap P| = 35 + 28 - 20 = 43$$

Students studying neither subject:

$$\text{Neither} = 60 - |M \cup P| = 60 - 43 = \boxed{17}$$

Answer: (C)

Q16. A trapezium has parallel sides of 12 cm and 8 cm, with a perpendicular height of 6 cm between them. Find its area.



(A) 48 cm^2

(B) 54 cm^2

(C) 72 cm^2

(D) 60 cm^2

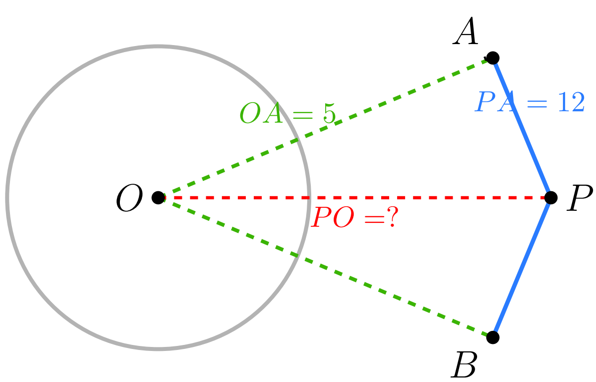
Solution

The area of a trapezium with parallel sides a and b and height h is:

$$\text{Area} = \frac{1}{2}(a+b)\times h = \frac{1}{2}(12+8)\times 6 = \frac{1}{2}\times 20\times 6 = \boxed{60\ \text{cm}^2}$$

Answer: (D)

Q17. From an external point P, two tangents PA and PB are drawn to a circle with centre O and radius 5 cm. If $PA = 12$ cm, find the distance PO.



(A) 13 cm

(B) 11 cm

(C) 15 cm

(D) 17 cm

Solution

Since the radius to the point of tangency is perpendicular to the tangent, $\angle OAP = 90°$. Applying the Pythagorean theorem in $\triangle OAP$:

$$PO^2 = PA^2 + OA^2 = 12^2 + 5^2 = 144 + 25 = 169$$

$$PO = \sqrt{169} = \boxed{13 \text{ cm}}$$

Answer: (A)

Q18. If $\sin\theta + \cos\theta = \sqrt{2}$, find the value of $\sin\theta \cdot \cos\theta$.

(A) 1

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

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

(D) 0

Solution

Square both sides of $\sin\theta + \cos\theta = \sqrt{2}$:

$$(\sin\theta + \cos\theta)^2 = (\sqrt{2})^2$$

$$\sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta = 2$$

Since $\sin^2\theta + \cos^2\theta = 1$:

$$1 + 2\sin\theta\cos\theta = 2 \implies \sin\theta\cos\theta = \boxed{\frac{1}{2}}$$

Answer: (B)

Q19. Simplify: $\log_2 32 + \log_3 27$.

(A) 6

(B) 7

(C) 8

(D) 9

Solution

Evaluate each term using the definition $\log_b(b^k) = k$:

$$\log_2 32 = \log_2 2^5 = 5$$

$$\log_3 27 = \log_3 3^3 = 3$$

Therefore:

$$\log_2 32 + \log_3 27 = 5 + 3 = \boxed{8}$$

Answer: (C)

Q20. Simplify: $\left(\sqrt{5} + \sqrt{3}\right)\left(\sqrt{5} - \sqrt{3}\right)$.

$$\left(\sqrt{5} + \sqrt{3}\right)\left(\sqrt{5} - \sqrt{3}\right) \longrightarrow 5 - 3 = 2$$

Using the identity $(a+b)(a-b) = a^2 - b^2, \quad a = \sqrt{5}, \quad b = \sqrt{3}$

(A) $\sqrt{15}$

(B) 8

(C) $\sqrt{2}$

(D) 2

Solution

Apply the algebraic identity $(a+b)(a-b) = a^2 - b^2$ with $a = \sqrt{5}$ and $b = \sqrt{3}$:

$$\left(\sqrt{5} + \sqrt{3}\right)\left(\sqrt{5} - \sqrt{3}\right) = (\sqrt{5})^2 - (\sqrt{3})^2 = 5 - 3 = \boxed{2}$$

Answer: (D)

ANSWER KEY

Quick Reference Answer Key

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

Distribution: A $\times$ 5 (Q1, Q5, Q9, Q13, Q17) | B $\times$ 5 (Q2, Q6, Q10, Q14, Q18) | C $\times$ 5 (Q3, Q7, Q11, Q15, Q19) | D $\times$ 5 (Q4, Q8, Q12, Q16, Q20)

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