

TANCET — Quantitative Aptitude

Sample Paper 10

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. What is the last digit of 3^{74} ?

- (A) 3
(B) 7
(C) 1
(D) 9

Solution

The last digits of powers of 3 follow a cycle of length 4:

$$3^1 \rightarrow 3, \quad 3^2 \rightarrow 9, \quad 3^3 \rightarrow 7, \quad 3^4 \rightarrow 1, \quad 3^5 \rightarrow 3, \dots$$

Divide the exponent by 4 to find the position in the cycle:

$$74 \div 4 = 18 \text{ remainder } 2$$

Remainder 2 corresponds to the 2nd position in the cycle, so the last digit of 3^{74} is 9.**Answer: (D)**

Q2. How many integers between 1 and 200 (inclusive) are divisible by *both* 4 and 6?

- (A) 8
- (B) 12
- (C) 16
- (D) 20

Solution

A number divisible by both 4 and 6 must be divisible by their LCM.

$$\text{LCM}(4, 6) = 12$$

Count of multiples of 12 from 1 to 200:

$$\left\lfloor \frac{200}{12} \right\rfloor = \lfloor 16.67 \rfloor = \boxed{16}$$

Answer: (C)

Q3. If α and β are the roots of $x^2 + 5x + 6 = 0$, find $\alpha^3 + \beta^3$.

- (A) -125
- (B) -35
- (C) 35
- (D) 125

Solution

By Vieta's formulas: $\alpha + \beta = -5$ and $\alpha\beta = 6$.

Use the identity $\alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)$:

$$\begin{aligned}\alpha^3 + \beta^3 &= (-5)^3 - 3(6)(-5) \\ &= -125 + 90 \\ &= \boxed{-35}\end{aligned}$$

Answer: (B)



Q4. The sum of the digits of a two-digit number is 9. When the digits are reversed, the new number exceeds the original by 27. Find the original number.

- (A) 36
- (B) 45
- (C) 27
- (D) 18

Solution

Let the tens digit be a and the units digit be b .

Condition 1 (digit sum): $a + b = 9$.

Condition 2 (reversal exceeds original by 27):

$$(10b + a) - (10a + b) = 27 \implies 9(b - a) = 27 \implies b - a = 3$$

Solving: $a + b = 9$ and $b - a = 3$ give $b = 6$, $a = 3$.

Original number = $10a + b = 10(3) + 6 = \boxed{36}$.

Answer: (A)

Q5. A shopkeeper marks up his goods by 40% above cost price and then offers a discount of 20% on the marked price. Find his net profit percentage.

- (A) 8%
- (B) 10%
- (C) 20%
- (D) 12%

Solution

Let the cost price be Rs. 100.

Marked Price = $100 \times 1.40 = \text{Rs. } 140$.

Selling Price = $140 \times (1 - 0.20) = 140 \times 0.80 = \text{Rs. } 112$.

$$\text{Profit\%} = \frac{112 - 100}{100} \times 100 = \boxed{12\%}$$



Answer: (D)

Q6. A man buys two articles for Rs. 600 each. He sells one at a 20% profit and the other at a 20% loss. What is his net loss?

- (A) Rs. 24
- (B) Rs. 36
- (C) Rs. 48
- (D) Rs. 60

Solution

When two articles are bought at the same cost price and one is sold at $x\%$ profit while the other is sold at $x\%$ loss, the net result is always a **loss** given by $\frac{x^2}{100}\%$.

Total cost price = $2 \times 600 = \text{Rs. } 1200$.

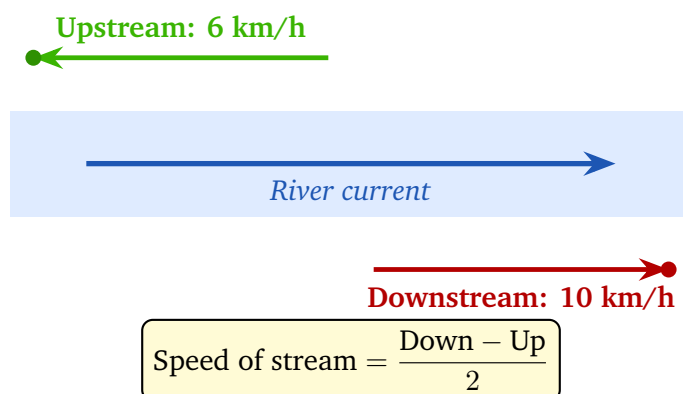
$$\text{Net loss\%} = \frac{(20)^2}{100} = \frac{400}{100} = 4\%$$

$$\text{Net loss} = 1200 \times \frac{4}{100} = \boxed{\text{Rs. } 48}$$

Verification: $SP_1 = 600 \times 1.20 = 720$; $SP_2 = 600 \times 0.80 = 480$; Total SP = $1200 - 48 = 1152$. ✓

Answer: (C)

Q7. A boat travels upstream at 6 km/h and downstream at 10 km/h. Find the speed of the stream.



- (A) 1 km/h



- (B) 2 km/h
(C) 3 km/h
(D) 4 km/h

Solution

Let the speed of the boat in still water be b and the speed of the stream be s .

$$b + s = 10 \quad (\text{downstream})$$

$$b - s = 6 \quad (\text{upstream})$$

Subtracting the second equation from the first:

$$2s = 10 - 6 = 4 \implies s = \boxed{2 \text{ km/h}}$$

Answer: (B)

Q8. 6 men can complete a job in 8 days. How many men are needed to complete the same job in 4 days?

- (A) 12
(B) 10
(C) 9
(D) 8

Solution

Total work = (men) $\times$ (days) = $6 \times 8 = 48$ man-days.

If the job must be done in 4 days:

$$N \times 4 = 48 \implies N = \frac{48}{4} = \boxed{12 \text{ men}}$$

Answer: (A)

Q9. Pipe A fills a cistern in 10 minutes, Pipe B fills it in 15 minutes, and Pipe C empties it in 30 minutes. If all three are opened simultaneously, how long does it take to fill the cistern?

- (A) 6 min



- (B) 6.5 min
- (C) 7 min
- (D) 7.5 min

Solution

Net filling rate per minute (LCM of 10, 15, 30 is 30):

$$\frac{1}{10} + \frac{1}{15} - \frac{1}{30} = \frac{3}{30} + \frac{2}{30} - \frac{1}{30} = \frac{4}{30} = \frac{2}{15}$$

Time to fill the cistern:

$$t = \frac{1}{2/15} = \frac{15}{2} = \boxed{7.5 \text{ min}}$$

Answer: (D)

Q10. The average age of a group of 5 students is 14 years. A new student of age 20 joins the group. What is the new average age?

- (A) 14 years
- (B) 16 years
- (C) 15 years
- (D) 17 years

Solution

Sum of ages of original group = $5 \times 14 = 70$ years.

New sum after the 6th student joins = $70 + 20 = 90$ years.

$$\text{New average} = \frac{90}{6} = \boxed{15 \text{ years}}$$

Answer: (C)

Q11. In how many years will Rs. 8,000 amount to Rs. 9,261 at 5% p.a. compound interest (compounded annually)?

- (A) 1 year
- (B) 3 years
- (C) 4 years



(D) 5 years

Solution

Using $A = P(1 + r)^n$:

$$9261 = 8000 \times (1.05)^n \implies (1.05)^n = \frac{9261}{8000} = 1.157625$$

Check: $(1.05)^3 = 1.05 \times 1.05 \times 1.05 = 1.1025 \times 1.05 = 1.157625$.

Therefore $n = \boxed{3 \text{ years}}$.

Answer: (B)

Q12. The sum of the first n terms of an AP is given by $S_n = 3n^2 + 5n$. Find the 10th term of the AP.

(A) 62

(B) 55

(C) 65

(D) 68

Solution

The n th term is $T_n = S_n - S_{n-1}$.

$$S_n = 3n^2 + 5n$$

$$S_{n-1} = 3(n-1)^2 + 5(n-1) = 3n^2 - 6n + 3 + 5n - 5 = 3n^2 - n - 2$$

$$T_n = S_n - S_{n-1} = (3n^2 + 5n) - (3n^2 - n - 2) = 6n + 2$$

$$T_{10} = 6(10) + 2 = \boxed{62}$$

Answer: (A)

Q13. A committee of 3 members is to be formed from 6 men and 4 women such that at least 1 woman is included. In how many ways can this be done?

(A) 80

(B) 84



(C) 96

(D) 100

Solution

Use the complementary method:

Total ways to choose any 3 from 10 people:

$$\binom{10}{3} = \frac{10 \times 9 \times 8}{3 \times 2 \times 1} = 120$$

Ways to choose 3 with *no women* (all men):

$$\binom{6}{3} = \frac{6 \times 5 \times 4}{3 \times 2 \times 1} = 20$$

Ways with **at least 1 woman**:

$$120 - 20 = \boxed{100}$$

Answer: (D)

Q14. A fair die is rolled twice. Find the probability that the sum of the two numbers obtained is 8.

Shaded cells: sum = 8 (5 outcomes)

6		8			
5			8		
4				8	
3					8
2					
1					
	1	2	3	4	5

Die 1

- (A) $\frac{1}{6}$
 (B) $\frac{1}{9}$
 (C) $\frac{5}{36}$
 (D) $\frac{7}{36}$



Solution

Total outcomes when a die is rolled twice = $6 \times 6 = 36$.

Favorable outcomes (pairs summing to 8): (2, 6), (3, 5), (4, 4), (5, 3), (6, 2) — that is 5 outcomes.

$$P(\text{sum} = 8) = \frac{5}{36} = \boxed{\frac{5}{36}}$$

Answer: (C)

Q15. In a survey of 100 people: 60 read newspaper A, 40 read newspaper B, and 20 read both. How many people read neither newspaper?

- (A) 10
- (B) 20
- (C) 30
- (D) 40

Solution

By the inclusion-exclusion principle:

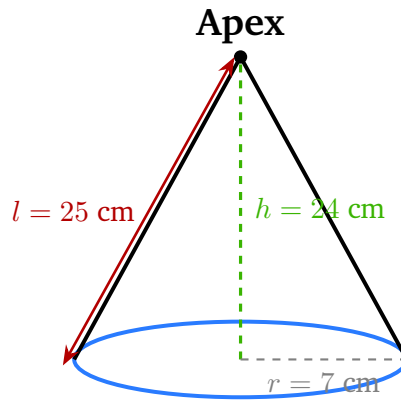
$$|A \cup B| = |A| + |B| - |A \cap B| = 60 + 40 - 20 = 80$$

People who read **neither**:

$$100 - 80 = \boxed{20}$$

Answer: (B)

Q16. A right circular cone has base radius $r = 7$ cm and slant height $l = 25$ cm. Find its *total* surface area. (Use $\pi = \frac{22}{7}$)



- (A) 704 cm^2
- (B) 616 cm^2
- (C) 550 cm^2
- (D) 462 cm^2

Solution

Verify height using Pythagoras: $h = \sqrt{l^2 - r^2} = \sqrt{625 - 49} = \sqrt{576} = 24 \text{ cm}$.

Total Surface Area = $\pi r(r + l)$:

$$\text{TSA} = \frac{22}{7} \times 7 \times (7 + 25) = 22 \times 32 = \boxed{704 \text{ cm}^2}$$

Answer: (A)

Q17. In $\triangle ABC$, $\angle B = 90^\circ$, $AB = 6$ cm, and $BC = 8$ cm. Find the length of the median drawn from B to side AC .

- (A) 4 cm
- (B) 6 cm
- (C) 8 cm
- (D) 5 cm



Solution

By the Pythagorean theorem:

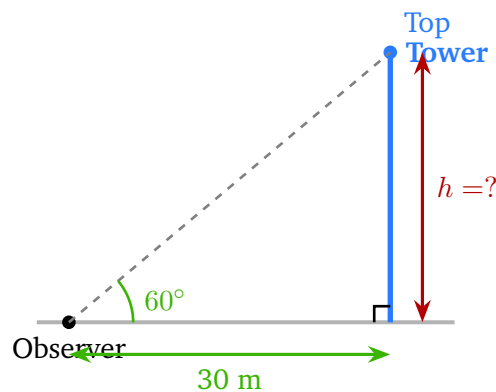
$$AC = \sqrt{AB^2 + BC^2} = \sqrt{36 + 64} = \sqrt{100} = 10 \text{ cm}$$

Key property: In a right triangle, the median drawn from the right angle to the hypotenuse equals *half the hypotenuse*:

$$\text{Median from } B = \frac{AC}{2} = \frac{10}{2} = \boxed{5 \text{ cm}}$$

Answer: (D)

Q18. The angle of elevation of the top of a tower from a point 30 m away from its base (on level ground) is 60° . Find the height of the tower.



- (A) 15 m
- (B) $15\sqrt{3}$ m
- (C) $30\sqrt{3}$ m
- (D) $60\sqrt{3}$ m

Solution

Let the height of the tower be h .

Using $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$:

$$\tan 60^\circ = \frac{h}{30} \implies h = 30 \tan 60^\circ = 30\sqrt{3}$$

$$\therefore h = \boxed{30\sqrt{3} \text{ m}}$$



Answer: (C)**Q19.** Given that $\log 2 = 0.3010$, find the value of $\log 8$.

- (A) 0.6020
(B) 0.9030
(C) 1.2040
(D) 0.4515

Solution

Express 8 as a power of 2:

$$\log 8 = \log 2^3 = 3 \log 2 = 3 \times 0.3010 = \boxed{0.9030}$$

Answer: (B)**Q20.** Simplify: $4^{3/2} \times 8^{2/3}$.

- (A) 32
(B) 24
(C) 16
(D) 48

Solution

Express each base as a power of 2:

$$4^{3/2} = (2^2)^{3/2} = 2^{2 \times \frac{3}{2}} = 2^3 = 8$$

$$8^{2/3} = (2^3)^{2/3} = 2^{3 \times \frac{2}{3}} = 2^2 = 4$$

$$4^{3/2} \times 8^{2/3} = 8 \times 4 = \boxed{32}$$

Answer: (A)**ANSWER KEY****Quick Reference Answer Key**

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

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

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