

TANCET Quantitative Aptitude

Sample Paper – 1

Duration: 24 Minutes

Maximum Marks: 20

Instructions

- This paper contains **20 MCQs** (single correct answer), modelled on the Quantitative Aptitude section of the **TANCET MBA** entrance examination.
- Each correct answer carries **+1 mark**. Each wrong answer carries a penalty of $-\frac{1}{4}$ **mark** (0.25 marks deducted). Unattempted questions carry **no penalty**.
- **Only one** option is correct for each question.
- **Syllabus:** Class 10–12 level Arithmetic, Algebra, and Number Theory.
- Personal calculators, mobile phones, and electronic gadgets are **strictly prohibited**. Rough work may be done in the space provided on the question paper.

Section: Quantitative Aptitude (20 Questions, 20 Marks)

Q1. What is the HCF (Highest Common Factor) of 84 and 126?

- (A) 14
- (B) 21
- (C) 42
- (D) 63

Q2. What is the remainder when 2^{10} is divided by 7?

- (A) 2
- (B) 3
- (C) 4
- (D) 5

Q3. In the system of equations $3x + 2y = 16$ and $x - y = 2$, what is the value of y ?

- (A) 1



- (B) 2
- (C) 3
- (D) 4

Q4. The roots of the quadratic equation $x^2 - 7x + 12 = 0$ are α and β . What is the value of $\alpha^2 + \beta^2$?

- (A) 7
- (B) 12
- (C) 13
- (D) 25

Q5. A shopkeeper first increases the price of an article by 20% and then decreases it by 10%. What is the net percentage change in the price?

- (A) 8% increase
- (B) 10% increase
- (C) 8% decrease
- (D) 10% decrease

Q6. The population of a town is P_0 . If it grows at 5% per annum (compounded annually), what will be the population after 2 years?

- (A) $1.05 P_0$
- (B) $1.10 P_0$
- (C) $1.1025 P_0$
- (D) $1.25 P_0$

Q7. Rs. 560 is divided among A, B, and C in the ratio 3 : 4 : 7. What is B's share?

- (A) Rs. 120
- (B) Rs. 160
- (C) Rs. 280



(D) Rs. 240

Q8. Two acid solutions, one containing 30% acid and the other 60% acid, are mixed to obtain a solution with 45% acid. In what ratio should the two solutions be mixed?

(A) 1 : 2

(B) 2 : 3

(C) 3 : 2

(D) 1 : 1

Q9. The average of 8 numbers is 25. Two of the numbers, 30 and 50, are removed from the set. What is the average of the remaining 6 numbers?

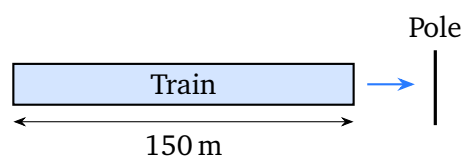
(A) 18

(B) 19

(C) 20

(D) 21

Q10. A train 150 m long crosses a stationary pole in 10 seconds. What is the speed of the train in km/h?



(A) 54 km/h

(B) 45 km/h

(C) 60 km/h

(D) 72 km/h

Q11. A car travels the first 100 km at 50 km/h and the next 100 km at 100 km/h. What is the average speed for the entire journey?

(A) 60 km/h



- (B) $66\frac{2}{3}$ km/h
- (C) 75 km/h
- (D) 80 km/h

Q12. A can complete a job in 12 days and B can complete the same job in 18 days. If both work together, in how many days will the job be finished?

- (A) 6 days
- (B) 6.5 days
- (C) 7 days
- (D) 7.2 days

Q13. Pipe A can fill a tank in 20 minutes and Pipe B can fill the same tank in 30 minutes. If both pipes are opened simultaneously, how long will it take to fill the tank completely?

- (A) 12 minutes
- (B) 15 minutes
- (C) 18 minutes
- (D) 25 minutes

Q14. An article is purchased for Rs. 400 and sold at a profit of 25%. What is the selling price?

- (A) Rs. 425
- (B) Rs. 450
- (C) Rs. 500
- (D) Rs. 480

Q15. Find the Simple Interest on Rs. 5000 at 8% per annum for 3 years.

- (A) Rs. 1000
- (B) Rs. 1200
- (C) Rs. 1500



(D) Rs. 1800

Q16. Find the 15th term of the arithmetic progression: 4, 7, 10, ...

(A) 40

(B) 42

(C) 44

(D) 46

Q17. In the geometric progression 2, 6, 18, ..., find the 5th term.

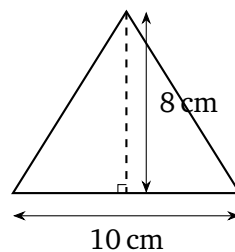
(A) 162

(B) 54

(C) 486

(D) 324

Q18. A triangle has a base of 10 cm and a corresponding height of 8 cm. Find its area.



(A) 30 cm^2

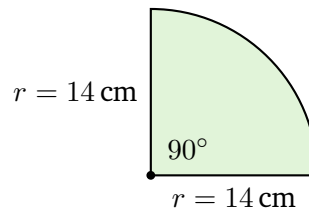
(B) 36 cm^2

(C) 40 cm^2

(D) 45 cm^2

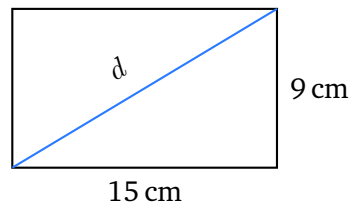
Q19. Find the area of a sector of a circle with radius 14 cm and central angle 90° . (Use $\pi = \frac{22}{7}$)





- (A) 144 cm^2
- (B) 154 cm^2
- (C) 176 cm^2
- (D) 196 cm^2

Q20. A rectangle has length 15 cm and breadth 9 cm. Find the length of its diagonal.



- (A) 12 cm
- (B) 15 cm
- (C) 16 cm
- (D) $3\sqrt{34} \text{ cm}$



Detailed Solutions

Solution

Q1 — Number System: HCF of 84 and 126

Concept: The HCF is found by prime factorisation — take the lowest power of each common prime factor.

Step 1 — Prime factorise both numbers:

$$84 = 2^2 \times 3 \times 7 \quad 126 = 2 \times 3^2 \times 7$$

Step 2 — Identify common primes with their lowest powers:

$$\text{HCF} = 2^1 \times 3^1 \times 7^1 = 2 \times 3 \times 7 = 42$$

Why other options are wrong:

- (A) 14: A common factor but not the *highest* ($14 \times 3 = 42$ also divides both).
- (B) 21: Also a common factor, but 42 is larger and still divides both numbers.
- (D) 63: Does not divide 84 ($84 \div 63$ is not an integer), so cannot be a common factor.

Answer: (C) [Go Back to Q 1](#)

Solution

Q2 — Number System: Remainder of 2^{10} divided by 7

Concept: Powers of 2 modulo 7 repeat in a cycle of length 3.

Step 1 — Find the cycle:

$$2^1 \equiv 2, \quad 2^2 \equiv 4, \quad 2^3 \equiv 8 \equiv 1 \pmod{7}$$

Cycle length = 3.

Step 2 — Express the exponent modulo the cycle length:

$$10 = 3 \times 3 + 1 \implies 2^{10} \equiv 2^1 \equiv 2 \pmod{7}$$

Why other options are wrong:

- (B) 3: No power of 2 in the repeating cycle gives remainder 3 mod 7.
- (C) 4: This is $2^2 \pmod{7}$, not 2^{10} .



- (D) 5: No power of 2 in the cycle gives remainder 5 mod 7.

Answer: (A) [Go Back to Q 2](#)

Solution

Q3 — Algebra: Solving a 2-variable linear system

Concept: Use substitution — express one variable in terms of the other, then substitute.

Step 1 — From the second equation:

$$x - y = 2 \implies x = y + 2$$

Step 2 — Substitute into the first equation:

$$3(y + 2) + 2y = 16 \implies 3y + 6 + 2y = 16 \implies 5y = 10 \implies \boxed{y = 2}$$

Step 3 — Find x (for completeness):

$$x = y + 2 = 4$$

Why other options are wrong:

- (A) $y = 1$: Gives $x = 3$; check: $3(3) + 2(1) = 11 \neq 16$.
- (C) $y = 3$: Gives $x = 5$; check: $3(5) + 2(3) = 21 \neq 16$.
- (D) $y = 4$: Gives $x = 6$; check: $3(6) + 2(4) = 26 \neq 16$.

Answer: (B) [Go Back to Q 3](#)

Solution

Q4 — Algebra: $\alpha^2 + \beta^2$ for a quadratic equation

Concept: Vieta's formulas: $\alpha + \beta = -\frac{b}{a} = 7$ and $\alpha\beta = \frac{c}{a} = 12$.

Step 1 — Apply the algebraic identity:

$$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = 7^2 - 2(12) = 49 - 24 = 25$$



Step 2 — Verify by factoring:

$$x^2 - 7x + 12 = (x - 3)(x - 4) = 0 \implies \alpha = 3, \beta = 4$$

$$\alpha^2 + \beta^2 = 9 + 16 = 25 \checkmark$$

Why other options are wrong:

- (A) 7: This is $\alpha + \beta$, the sum of roots.
- (B) 12: This is $\alpha\beta$, the product of roots.
- (C) 13: Would require $2\alpha\beta = 36$, i.e. $\alpha\beta = 18$, but it equals 12.

Answer: (D) [Go Back to Q 4](#)

Solution

Q5 — Percentages: Successive price changes

Concept: For successive changes of $+a\%$ then $-b\%$, the net change is $\left(a - b - \frac{ab}{100}\right)\%$.

Step 1 — Apply the formula ($a = 20$, $b = 10$):

$$\text{Net change} = 20 - 10 - \frac{20 \times 10}{100} = 10 - 2 = +8\%$$

Step 2 — Verify with a base price of Rs. 100:

$$100 \xrightarrow{+20\%} 120 \xrightarrow{-10\%} 108$$

Net change = $+8\%$ (increase). $\checkmark$

Why other options are wrong:

- (B) 10% increase: Ignores the multiplicative interaction; $20 - 10 = 10$ is only the additive result.
- (C) 8% decrease: Sign error; the final price is higher, not lower.
- (D) 10% decrease: Both magnitude and sign are incorrect.

Answer: (A) [Go Back to Q 5](#)



Solution**Q6 — Percentages: Compound annual population growth**

Concept: Compound growth formula $P = P_0(1 + r)^n$.

Step 1 — Substitute ($r = 0.05$, $n = 2$):

$$P = P_0 \times (1.05)^2 = P_0 \times 1.1025 = 1.1025 P_0$$

Step 2 — Expand $(1.05)^2$ to confirm:

$$(1.05)^2 = 1 + 2(0.05) + (0.05)^2 = 1.00 + 0.10 + 0.0025 = 1.1025$$

Why other options are wrong:

- (A) $1.05 P_0$: Only one year of growth has been applied.
- (B) $1.10 P_0$: Uses simple interest logic ($P_0 \times 2 \times 0.05 = 0.10 P_0$ added), not compound.
- (D) $1.25 P_0$: Corresponds to 25% total growth, far above 5% p.a. for 2 years.

Answer: (C) [Go Back to Q 6](#)

Solution**Q7 — Ratio & Proportion: Dividing Rs. 560 in ratio 3 : 4 : 7**

Concept: Each person's share = $\frac{\text{own ratio part}}{\text{total parts}} \times \text{total amount}$.

Step 1 — Total parts:

$$3 + 4 + 7 = 14$$

Step 2 — B's share (4 parts):

$$B = \frac{4}{14} \times 560 = \frac{2240}{14} = \text{Rs. } 160$$

Why other options are wrong:

- (A) Rs. 120: This is A's share ($\frac{3}{14} \times 560 = 120$).
- (C) Rs. 280: This is C's share ($\frac{7}{14} \times 560 = 280$).
- (D) Rs. 240: No ratio part of 14 yields 240 from a total of 560.

Answer: (B) [Go Back to Q 7](#)



Solution**Q8 — Mixtures & Alligation**

Concept: Alligation rule — ratio of quantities = inverse ratio of differences of individual concentrations from the mean.

Step 1 — Compute differences from the mean (45%):

Stronger (60%) deviates from mean by: $60 - 45 = 15$

Weaker (30%) deviates from mean by: $45 - 30 = 15$

Step 2 — Mixing ratio (weaker : stronger):

$$\text{Ratio} = 15 : 15 = 1 : 1$$

Step 3 — Verify:

$$\frac{1 \times 30 + 1 \times 60}{1 + 1} = \frac{90}{2} = 45\% \checkmark$$

Why other options are wrong:

- (A) 1 : 2: Gives $\frac{30+120}{3} = 50\%$, not 45%.
- (B) 2 : 3: Gives $\frac{60+180}{5} = 48\%$, not 45%.
- (C) 3 : 2: Gives $\frac{90+120}{5} = 42\%$, not 45%.

Answer: (D) [Go Back to Q 8](#)

Solution**Q9 — Averages: Removing two numbers**

Concept: Total sum = Average $\times$ Count. Remove the given numbers, then recalculate.

Step 1 — Total sum of the 8 numbers:

$$S = 25 \times 8 = 200$$

Step 2 — Subtract the two removed numbers (30 and 50):

$$S_{\text{new}} = 200 - 30 - 50 = 120$$

Step 3 — Average of remaining 6 numbers:

$$\bar{x} = \frac{120}{6} = 20$$



Why other options are wrong:

- (A) 18: Implies remaining sum = 108, so removed sum = $92 \neq 80$.
- (B) 19: Implies remaining sum = 114, so removed sum = $86 \neq 80$.
- (D) 21: Implies remaining sum = 126, so removed sum = $74 \neq 80$.

Answer: (C) [Go Back to Q 9](#)

Solution

Q10 — Time, Speed & Distance: Speed of a train crossing a pole

Concept: When a train crosses a stationary point object (pole), the distance covered equals the *length of the train*.

Step 1 — Identify values:

$$d = 150 \text{ m}, \quad t = 10 \text{ s}$$

Step 2 — Speed in m/s:

$$v = \frac{d}{t} = \frac{150}{10} = 15 \text{ m/s}$$

Step 3 — Convert to km/h (multiply by $\frac{18}{5}$):

$$v = 15 \times \frac{18}{5} = 54 \text{ km/h}$$

Why other options are wrong:

- (B) 45 km/h: Corresponds to 12.5 m/s; train would take $150/12.5 = 12 \text{ s}$, not 10.
- (C) 60 km/h: Corresponds to $\approx 16.67 \text{ m/s}$; train would take $\approx 9 \text{ s}$, not 10.
- (D) 72 km/h: Corresponds to 20 m/s; train would take 7.5 s, not 10.

Answer: (A) [Go Back to Q 10](#)

Solution

Q11 — Time, Speed & Distance: Average speed for equal distances

Concept: When the *same distance* is covered at two different speeds, the average speed is the harmonic mean:

$$v_{\text{avg}} = \frac{2 v_1 v_2}{v_1 + v_2}$$



Step 1 — Apply the formula ($v_1 = 50$, $v_2 = 100$):

$$v_{\text{avg}} = \frac{2 \times 50 \times 100}{50 + 100} = \frac{10000}{150} = \frac{200}{3} = 66\frac{2}{3} \text{ km/h}$$

Step 2 — Verify using actual times:

$$t_1 = \frac{100}{50} = 2 \text{ h}, \quad t_2 = \frac{100}{100} = 1 \text{ h}, \quad v_{\text{avg}} = \frac{200}{3} \approx 66.67 \text{ km/h} \checkmark$$

Why other options are wrong:

- (A) 60 km/h: No basis in this problem's data.
- (C) 75 km/h: Simple arithmetic mean $\frac{50+100}{2} = 75$; valid only when *time* spent at each speed is equal.
- (D) 80 km/h: Exceeds the harmonic mean; impossible.

Answer: (B) [Go Back to Q 11](#)

Solution

Q12 — Work & Time: A and B working together

Concept: Combined rate = sum of individual rates; time = reciprocal of combined rate.

Step 1 — Individual rates:

$$A = \frac{1}{12} \text{ job/day}, \quad B = \frac{1}{18} \text{ job/day}$$

Step 2 — Combined rate:

$$\frac{1}{12} + \frac{1}{18} = \frac{3}{36} + \frac{2}{36} = \frac{5}{36} \text{ job/day}$$

Step 3 — Time to complete the job:

$$t = \frac{1}{5/36} = \frac{36}{5} = 7.2 \text{ days}$$

Why other options are wrong:

- (A) 6 days: Combined rate would need to be $\frac{1}{6} \approx 0.167$; actual is $\frac{5}{36} \approx 0.139$.
- (B) 6.5 days: Combined rate $\approx 0.154 > 0.139$.
- (C) 7 days: Combined rate $\approx 0.143 > 0.139$.



Answer: (D) [Go Back to Q 12](#)

Solution

Q13 — Pipes & Cisterns: Both pipes open simultaneously

Concept: Combined filling rate = sum of individual filling rates.

Step 1 — Individual rates:

$$\text{Pipe A} = \frac{1}{20} \text{ tank/min}, \quad \text{Pipe B} = \frac{1}{30} \text{ tank/min}$$

Step 2 — Combined rate:

$$\frac{1}{20} + \frac{1}{30} = \frac{3}{60} + \frac{2}{60} = \frac{5}{60} = \frac{1}{12} \text{ tank/min}$$

Step 3 — Time to fill:

$$t = 12 \text{ minutes}$$

Why other options are wrong:

- (B) 15 min: Would need combined rate $\frac{1}{15}$; actual combined rate is $\frac{1}{12}$ (faster).
- (C) 18 min: Slower than even Pipe A alone (20 min); impossible.
- (D) 25 min: Slower than either pipe individually; clearly incorrect when both are open.

Answer: (A) [Go Back to Q 13](#)

Solution

Q14 — Profit & Loss: Selling price at 25% profit

Concept: $SP = CP \times \left(1 + \frac{\text{Profit}\%}{100}\right)$

Step 1 — Substitute values:

$$SP = 400 \times \left(1 + \frac{25}{100}\right) = 400 \times 1.25 = \text{Rs. } 500$$

Step 2 — Verify:

$$\text{Profit} = 500 - 400 = \text{Rs. } 100 = 25\% \text{ of } 400 \checkmark$$

Why other options are wrong:



- (A) Rs. 425: Profit = Rs. 25 = 6.25%, not 25%.
- (B) Rs. 450: Profit = Rs. 50 = 12.5%, not 25%.
- (D) Rs. 480: Profit = Rs. 80 = 20%, not 25%.

Answer: (C) [Go Back to Q 14](#)

Solution

Q15 — Simple Interest

Concept: $SI = \frac{P \times R \times T}{100}$

Step 1 — Substitute ($P = 5000$, $R = 8$, $T = 3$):

$$SI = \frac{5000 \times 8 \times 3}{100} = \frac{120000}{100} = \text{Rs. } 1200$$

Why other options are wrong:

- (A) Rs. 1000: Matches $R \approx 6.67\%$, not 8%.
- (C) Rs. 1500: Matches $T = 3.75$ years, not 3.
- (D) Rs. 1800: Matches $T = 4.5$ years, not 3.

Answer: (B) [Go Back to Q 15](#)

Solution

Q16 — Arithmetic Progression: 15th term

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

Step 1 — Identify first term and common difference:

$$a = 4, \quad d = 7 - 4 = 3$$

Step 2 — Compute the 15th term:

$$a_{15} = 4 + (15 - 1) \times 3 = 4 + 14 \times 3 = 4 + 42 = 46$$

Why other options are wrong:

- (A) 40: Corresponds to $n = 13$ ($4 + 12 \times 3 = 40$).



- (B) 42: Corresponds to $n = 14 - \frac{1}{3}$ — not an integer term.
- (C) 44: Corresponds to $n = 14 + \frac{1}{3}$ — not an integer term.

Answer: (D) [Go Back to Q 16](#)

Solution

Q17 — Geometric Progression: 5th term

Concept: n -th term of a GP: $a_n = a \cdot r^{n-1}$.

Step 1 — Identify first term and common ratio:

$$a = 2, \quad r = \frac{6}{2} = 3$$

Step 2 — Compute the 5th term:

$$a_5 = 2 \times 3^4 = 2 \times 81 = 162$$

Why other options are wrong:

- (B) 54: This is the 4th term ($2 \times 3^3 = 54$).
- (C) 486: This is the 6th term ($2 \times 3^5 = 486$).
- (D) 324: $324/2 = 162$, and $3^n = 162$ has no integer solution; not a term of this GP.

Answer: (A) [Go Back to Q 17](#)

Solution

Q18 — Geometry: Area of a triangle

Concept: Area = $\frac{1}{2} \times \text{base} \times \text{height}$

Step 1 — Substitute values:

$$\text{Area} = \frac{1}{2} \times 10 \times 8 = \frac{80}{2} = 40 \text{ cm}^2$$

Why other options are wrong:

- (A) 30 cm^2 : Requires height = 6 cm, not 8.
- (B) 36 cm^2 : Requires height = 7.2 cm, not 8.



- (D) 45 cm^2 : Requires height = 9 cm, not 8.

Answer: (C) [Go Back to Q 18](#)

Solution

Q19 — Mensuration: Area of a sector

Concept: $\text{Area} = \frac{\theta}{360} \times \pi r^2$

Step 1 — Substitute ($\theta = 90^\circ$, $r = 14$, $\pi = \frac{22}{7}$):

$$\text{Area} = \frac{90}{360} \times \frac{22}{7} \times 14^2 = \frac{1}{4} \times \frac{22}{7} \times 196$$

Step 2 — Simplify:

$$= \frac{1}{4} \times 22 \times 28 = \frac{1}{4} \times 616 = 154 \text{ cm}^2$$

Why other options are wrong:

- (A) 144 cm^2 : Arithmetic error in the simplification.
- (C) 176 cm^2 : Would correspond to $\theta \approx 103^\circ$, not 90° .
- (D) 196 cm^2 : This is simply $r^2 = 14^2$; fails to apply both $\frac{\theta}{360}$ and π .

Answer: (B) [Go Back to Q 19](#)

Solution

Q20 — Geometry: Diagonal of a rectangle

Concept: By the Pythagorean theorem, the diagonal of a rectangle with sides ℓ and b is:

$$d = \sqrt{\ell^2 + b^2}$$

Step 1 — Substitute ($\ell = 15 \text{ cm}$, $b = 9 \text{ cm}$):

$$d = \sqrt{15^2 + 9^2} = \sqrt{225 + 81} = \sqrt{306}$$

Step 2 — Simplify the surd:

$$306 = 9 \times 34 \implies \sqrt{306} = 3\sqrt{34} \text{ cm}$$



Approximate value: $\sqrt{34} \approx 5.831$, so $d \approx 17.49$ cm.

Why other options are wrong:

- (A) 12 cm: $12^2 = 144 \neq 306$.
- (B) 15 cm: Equal to the length; would require zero breadth.
- (C) 16 cm: $16^2 = 256 \neq 306$.

Answer: (D) [Go Back to Q 20](#)



Answer Key

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

