

TANCET Quantitative Aptitude

Sample Paper – 4

Duration: 24 Minutes

Maximum Marks: 20

Instructions

1. This paper contains **20 Multiple Choice Questions (MCQs)**, each with a single correct answer, modelled on the Quantitative Aptitude section of TANCET MBA entrance.
2. **Marking Scheme:** Each correct answer carries **+1 mark**. Each wrong answer carries $-\frac{1}{4}$ mark. Unattempted questions carry **no penalty**.
3. Only **one** option is correct for each question.
4. **Syllabus:** Class 10–12 level Arithmetic, Algebra, and Number Theory.
5. Personal calculators, mobile phones, and electronic gadgets are **strictly prohibited**.

Section: Quantitative Aptitude (20 Questions)

Q1. What fraction is equivalent to the repeating decimal $0.\overline{142857}$?

- (A) $\frac{1}{6}$
(B) $\frac{1}{8}$
(C) $\frac{1}{7}$
(D) $\frac{2}{13}$

Q2. What is the unit digit of 7^{53} ?

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



Q3. A father is currently 4 times as old as his son. Eight years later, the father will be 2.5 times as old as the son. What is the father's current age (in years)?

- (A) 24
- (B) 28
- (C) 36
- (D) 32

Q4. If $3x + y = 9$ and $xy = 6$, find the value of $9x^2 + y^2$.

- (A) 81
- (B) 45
- (C) 36
- (D) 27

Q5. An item has a marked price of Rs. 2000. A discount of 15% is offered. What is the selling price?

- (A) Rs. 1700
- (B) Rs. 1750
- (C) Rs. 1650
- (D) Rs. 1800

Q6. A person spends 70% of his income. His income increases by 20% and his spending increases by 10%. What is the percentage change in his savings?

- (A) 50% increase
- (B) 30% increase
- (C) $\frac{160}{3}\%$ increase (approx. 53.33%)
- (D) 40% increase



Q7. A, B, and C invest capitals in the ratio 2 : 3 : 5. A invests for 12 months, B for 8 months, and C for 6 months. What is the ratio of their profits?

(A) 1 : 1 : 1

(B) 2 : 3 : 5

(C) 3 : 4 : 5

(D) 4 : 4 : 5

Q8. A container holds 40 litres of pure milk. 8 litres are withdrawn and replaced with water. The same process is repeated once more. How many litres of milk remain in the container?

(A) 28.8 litres

(B) 25.6 litres

(C) 24.0 litres

(D) 26.4 litres

Q9. The average of 10 numbers is 30. One number, 50, is replaced by 20. What is the new average?

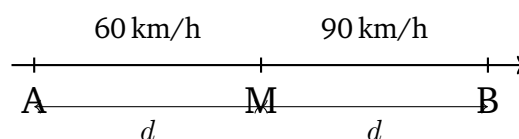
(A) 27

(B) 28

(C) 30

(D) 32

Q10. A car travels equal distances at 60 km/h and 90 km/h. What is the average speed for the whole journey?



(A) 70 km/h

(B) 75 km/h



(C) 72 km/h

(D) 80 km/h

Q11. The upstream speed of a boat is 8 km/h and the downstream speed is 14 km/h. Find the speed of the stream (in km/h).

(A) 2

(B) 4

(C) 6

(D) 3

Q12. A and B together can finish a work in 10 days; B and C together in 12 days; A and C together in 15 days. How many days will A, B, and C together take to finish the same work?

(A) 6 days

(B) 8 days

(C) 10 days

(D) 12 days

Q13. An inlet pipe can fill a tank in 6 hours. An outlet pipe can drain it in 9 hours. If both pipes are opened simultaneously, how many hours will it take to fill the tank?

(A) 18 hours

(B) 15 hours

(C) 12 hours

(D) 10 hours



Q14. A dealer sells two articles each at Rs. 990: one at a profit of 10% and the other at a loss of 10%. What is the net result of the transaction?

- (A) No profit, no loss
- (B) Rs. 20 profit
- (C) Rs. 20 loss
- (D) Rs. 40 loss

Q15. Find the difference between compound interest and simple interest on Rs. 10,000 at 10% per annum for 2 years.

- (A) Rs. 50
- (B) Rs. 75
- (C) Rs. 150
- (D) Rs. 100

Q16. How many terms of the arithmetic progression 3, 7, 11, 15, ... must be taken so that their sum equals 300?

- (A) 10
- (B) 12
- (C) 14
- (D) 15

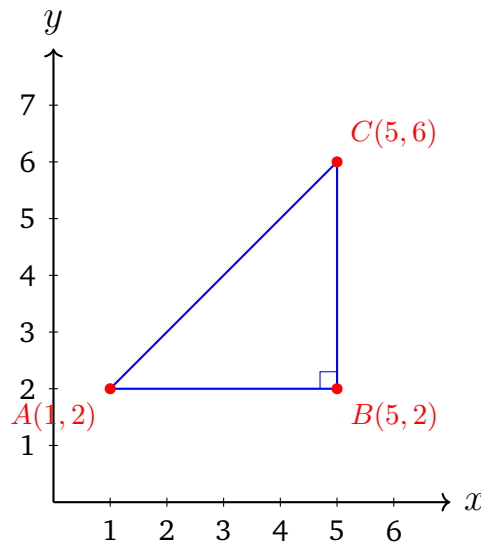
Q17. Find the sum of the infinite geometric progression:

$$1 + \frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \dots$$

- (A) $\frac{3}{2}$
- (B) $\frac{2}{3}$
- (C) 2
- (D) $\frac{4}{3}$

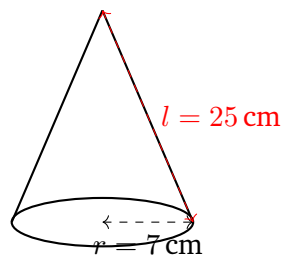


Q18. Points $A(1, 2)$, $B(5, 2)$, and $C(5, 6)$ are plotted on a coordinate plane and connected to form a triangle. Find the area of triangle ABC (in square units).



- (A) 6 sq. units
- (B) 10 sq. units
- (C) 8 sq. units
- (D) 16 sq. units

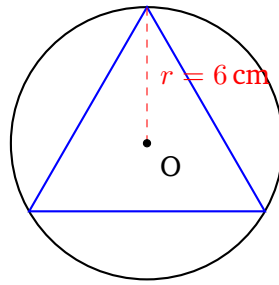
Q19. A cone has base radius $r = 7$ cm and slant height $l = 25$ cm. Find the total surface area of the cone. (Use $\pi = \frac{22}{7}$.)



- (A) 660 cm^2
- (B) 550 cm^2
- (C) 792 cm^2
- (D) 704 cm^2



Q20. An equilateral triangle is inscribed in a circle of radius 6 cm. Find the side length of the triangle.



- (A) $3\sqrt{3}$ cm
- (B) $6\sqrt{3}$ cm
- (C) 9 cm
- (D) 12 cm



Answer Key

Click a letter to jump to its solution.

Questions 1–20

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



Detailed Solutions

Solution

Q1 – Number System: Repeating Decimals to Fractions

Concept: A purely repeating decimal with 6-digit block $\overline{d_1d_2d_3d_4d_5d_6}$ equals that block divided by 999999.

Working:

$$0.\overline{142857} = \frac{142857}{999999}$$

Simplify: $999999 \div 142857 = 7$, so $\frac{142857}{999999} = \frac{1}{7}$.

Verification: $1 \div 7 = 0.142857142857 \dots = 0.\overline{142857} \checkmark$

Why other options are wrong:

- (A) $1/6 = 0.1\overline{6}$ – different repeating pattern.
- (B) $1/8 = 0.125$ – terminating decimal, not repeating.
- (D) $2/13 = 0.\overline{153846}$ – different six-digit block.

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

Solution

Q2 – Number System: Unit Digit of Powers

Concept: The unit digits of powers of 7 cycle with period 4:

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

Working:

$$53 = 4 \times 13 + 1 \implies 53 \equiv 1 \pmod{4}$$

Position 1 in the cycle gives unit digit = 7.

Why other options are wrong:

- (B) 9 – unit digit of $7^2, 7^6, \dots$ (exponents $\equiv 2 \pmod{4}$).
- (C) 3 – unit digit of $7^3, 7^7, \dots$ (exponents $\equiv 3 \pmod{4}$).
- (D) 1 – unit digit of $7^4, 7^8, \dots$ (exponents $\equiv 0 \pmod{4}$).

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



Solution**Q3 – Algebra: Age Problem**

Concept: Form simultaneous equations from two age conditions.

Working:

Let son's present age = x years, father's present age = $4x$ years.

Eight years later:

$$4x + 8 = 2.5(x + 8)$$

$$4x + 8 = 2.5x + 20 \implies 1.5x = 12 \implies x = 8$$

Father's current age = $4 \times 8 = 32$ years.

Check: In 8 years – father = 40, son = 16; $40 = 2.5 \times 16$ ✓

Why other options are wrong:

- (A) 24 – gives son = 6; in 8 years: $32 \neq 2.5 \times 14$.
- (B) 28 – gives son = 7; in 8 years: $36 \neq 2.5 \times 15$.
- (C) 36 – gives son = 9; in 8 years: $44 \neq 2.5 \times 17$.

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

Solution**Q4 – Algebra: Algebraic Identity**

Concept: Use the identity $(3x + y)^2 = 9x^2 + 6xy + y^2$.

Working:

$$(3x + y)^2 = 9x^2 + 6xy + y^2$$

$$9^2 = 9x^2 + 6(6) + y^2 \implies 81 = 9x^2 + y^2 + 36$$

$$9x^2 + y^2 = 81 - 36 = 45$$

Why other options are wrong:

- (A) 81 – that is $(3x + y)^2$, not $9x^2 + y^2$.
- (C) 36 – that is $6xy$, a term subtracted, not the answer.
- (D) 27 – arithmetic error (subtracting 54 instead of 36).

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



Solution**Q5 – Percentages: Discount on Marked Price**

Concept: $SP = MP \times \left(1 - \frac{\text{discount}}{100}\right)$

Working:

$$SP = 2000 \times \left(1 - \frac{15}{100}\right) = 2000 \times 0.85 = \text{Rs. } 1700$$

Why other options are wrong:

- (B) Rs. 1750 – corresponds to a 12.5% discount.
- (C) Rs. 1650 – corresponds to a 17.5% discount.
- (D) Rs. 1800 – corresponds to only a 10% discount.

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

Solution**Q6 – Percentages: Change in Savings**

Concept: Savings = Income – Expenditure. Track changes step by step.

Working:

Let original income = 100 units.

- Original spending = 70, original savings = 30.
- New income = $100 \times 1.20 = 120$.
- New spending = $70 \times 1.10 = 77$.
- New savings = $120 - 77 = 43$.

$$\% \text{ change in savings} = \frac{43 - 30}{30} \times 100 = \frac{13}{30} \times 100 = \frac{1300}{30} = \frac{130}{3} \approx 53.33\% \text{ increase}$$

Why other options are wrong:

- (A) 50% – would require new savings = 45, not 43.
- (B) 30% – would require new savings = 39, not 43.
- (D) 40% – would require new savings = 42, not 43.

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



Solution**Q7 – Ratio & Proportion: Partnership Profit**

Concept: Profit share $\propto$ Capital $\times$ Time.

Working:

$$\text{A's share} = 2 \times 12 = 24$$

$$\text{B's share} = 3 \times 8 = 24$$

$$\text{C's share} = 5 \times 6 = 30$$

$$\text{Ratio} = 24 : 24 : 30 = 4 : 4 : 5$$

Why other options are wrong:

- (A) 1 : 1 : 1 – ignores different time periods.
- (B) 2 : 3 : 5 – original capital ratio, ignoring time factor.
- (C) 3 : 4 : 5 – incorrect multiplication of capital and time.

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

Solution**Q8 – Mixtures: Repeated Replacement**

Concept: After n replacements, milk remaining $= V \left(1 - \frac{k}{V}\right)^n$, where V is total volume and k is amount withdrawn each time.

Working:

$$V = 40 \text{ litres, } k = 8 \text{ litres, } n = 2.$$

$$\text{Milk remaining} = 40 \times \left(\frac{40 - 8}{40}\right)^2 = 40 \times \left(\frac{32}{40}\right)^2 = 40 \times \frac{1024}{1600} = 40 \times 0.64 = \mathbf{25.6 \text{ litres}}$$

Step-by-step check:

- After 1st replacement: milk $= 40 \times \frac{32}{40} = 32$ litres.
- After 2nd replacement: milk $= 32 \times \frac{32}{40} = 25.6$ litres ✓

Why other options are wrong:

- (A) 28.8 – result of only one replacement ($40 \times 0.8 \times 0.9$, wrong formula).
- (C) 24.0 – incorrect; would result from removing 10 litres each time.
- (D) 26.4 – arithmetic error in the replacement formula.



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

Solution

Q9 – Averages: Replacement Effect

Concept: New sum = Old sum – removed number + added number.

Working:

$$\text{Old sum} = 10 \times 30 = 300.$$

$$\text{New sum} = 300 - 50 + 20 = 270.$$

$$\text{New average} = \frac{270}{10} = 27.$$

Why other options are wrong:

- (B) 28 – would require new sum = 280; but $300 - 50 + 20 = 270 \neq 280$.
- (C) 30 – the old average; the replacement changed the sum.
- (D) 32 – average would increase only if a larger number replaced 50.

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

Solution

Q10 – Time, Speed & Distance: Average Speed for Equal Distances

Concept: When two equal distances are covered at speeds v_1 and v_2 , the average speed $= \frac{2v_1v_2}{v_1 + v_2}$ (harmonic mean).

Working:

$$\bar{v} = \frac{2 \times 60 \times 90}{60 + 90} = \frac{10800}{150} = 72 \text{ km/h}$$

Verification: Let each half = d km.

- Time for first half = $d/60$ h; time for second half = $d/90$ h.
- Total time = $d/60 + d/90 = d(3 + 2)/180 = 5d/180 = d/36$ h.
- Total distance = $2d$; average speed = $2d \div (d/36) = 72 \text{ km/h} \checkmark$

Why other options are wrong:

- (A) 70 – simple arithmetic mean, not valid for equal distances.
- (B) 75 – midpoint of 60 and 90 in arithmetic sense; incorrect.
- (D) 80 – no standard formula yields this result here.

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



Solution**Q11 – Time, Speed & Distance: Boat and Stream****Concept:**

$$\text{Speed of stream} = \frac{\text{Downstream speed} - \text{Upstream speed}}{2}$$

Working:

$$\text{Speed of stream} = \frac{14 - 8}{2} = \frac{6}{2} = 3 \text{ km/h}$$

$$\text{Also: Speed of boat in still water} = \frac{14 + 8}{2} = 11 \text{ km/h.}$$

Why other options are wrong:

- (A) 2 – would require downstream – upstream = 4; here it is 6.
- (B) 4 – would require downstream – upstream = 8; incorrect.
- (C) 6 – that is the full difference, not half of it.

Answer: (D) [Go Back to Q 11](#)**Solution****Q12 – Work & Time: Three-Person Collaboration****Concept:** Work rates add; use the identity for three pairs.**Working:**

$$\begin{aligned}\frac{1}{A} + \frac{1}{B} &= \frac{1}{10} \\ \frac{1}{B} + \frac{1}{C} &= \frac{1}{12} \\ \frac{1}{A} + \frac{1}{C} &= \frac{1}{15}\end{aligned}$$

Adding all three:

$$2\left(\frac{1}{A} + \frac{1}{B} + \frac{1}{C}\right) = \frac{1}{10} + \frac{1}{12} + \frac{1}{15} = \frac{6 + 5 + 4}{60} = \frac{15}{60} = \frac{1}{4}$$

$$\frac{1}{A} + \frac{1}{B} + \frac{1}{C} = \frac{1}{8}$$

Together they finish the work in **8 days**.**Why other options are wrong:**

- (A) 6 days – combined rate would be $1/6$; actual rate is $1/8$.
- (C) 10 days – that is A and B's combined time alone.



- (D) 12 days – that is B and C's combined time alone.

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

Solution

Q13 – Pipes & Cisterns: Simultaneous Inlet and Outlet

Concept: Net filling rate = Inlet rate – Outlet rate.

Working:

$$\text{Net rate} = \frac{1}{6} - \frac{1}{9} = \frac{3-2}{18} = \frac{1}{18}$$

Tank fills in 18 hours.

Why other options are wrong:

- (B) 15 hours – would need net rate $1/15$; actual rate is $1/18$.
- (C) 12 hours – would be result if drain time were 12 h (rate $1/6 - 1/12 = 1/12$).
- (D) 10 hours – does not follow from the given pipe rates.

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

Solution

Q14 – Profit & Loss: Equal SP with Equal Percentage Gain/Loss

Concept: When two articles are sold at the same price, one at $x\%$ profit and one at $x\%$ loss, there is always a net loss of $\left(\frac{x}{10}\right)^2 \%$.

Working:

- CP of item sold at 10% profit: $\frac{990}{1.10} = \text{Rs. } 900$.
- CP of item sold at 10% loss: $\frac{990}{0.90} = \text{Rs. } 1100$.
- Total CP = $900 + 1100 = \text{Rs. } 2000$.
- Total SP = $990 + 990 = \text{Rs. } 1980$.
- **Net Loss** = $2000 - 1980 = \text{Rs. } 20$.

Formula check: $\text{Loss}\% = (x/10)^2 = (10/10)^2 = 1\%$ of total CP = $1\% \times 2000 = \text{Rs. } 20 \checkmark$

Why other options are wrong:

- (A) No profit/loss – common misconception; 10% gain and 10% loss on different CPs never cancel.



- (B) Rs. 20 profit – wrong sign; there is always a net loss in this scenario.
- (D) Rs. 40 loss – double the actual loss.

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

Solution

Q15 – Simple and Compound Interest: Difference Formula

Concept: For principal P , rate r , and 2 years:

$$CI - SI = P \left(\frac{r}{100} \right)^2$$

Working:

$$CI - SI = 10000 \times \left(\frac{10}{100} \right)^2 = 10000 \times 0.01 = \text{Rs. } 100$$

Verification:

- $SI = 10000 \times 10 \times 2/100 = \text{Rs. } 2000$.
- $CI = 10000[(1.1)^2 - 1] = 10000 \times 0.21 = \text{Rs. } 2100$.
- $\text{Difference} = 2100 - 2000 = \text{Rs. } 100 \checkmark$

Why other options are wrong:

- (A) Rs. 50 – result for 5% rate or half the time.
- (B) Rs. 75 – result for $r \approx 8.66\%$.
- (C) Rs. 150 – result for $r \approx 12.25\%$.

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

Solution

Q16 – Arithmetic Progression: Sum of Terms

Concept: $S_n = \frac{n}{2}[2a + (n - 1)d]$.

Working:

AP: 3, 7, 11, 15, ... so $a = 3$, $d = 4$.

$$S_n = \frac{n}{2}[2(3) + (n - 1)(4)] = \frac{n}{2}[6 + 4n - 4] = \frac{n}{2}(4n + 2) = n(2n + 1)$$



Set $S_n = 300$:

$$n(2n + 1) = 300 \implies 2n^2 + n - 300 = 0$$

Discriminant $= 1 + 2400 = 2401 = 49^2$.

$$n = \frac{-1 + 49}{4} = \frac{48}{4} = 12$$

Check: $S_{12} = 12 \times 25 = 300 \checkmark$

Why other options are wrong:

- (A) $10 - S_{10} = 10 \times 21 = 210 \neq 300$.
- (C) $14 - S_{14} = 14 \times 29 = 406 \neq 300$.
- (D) $15 - S_{15} = 15 \times 31 = 465 \neq 300$.

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

Solution

Q17 – Geometric Progression: Sum of Infinite GP

Concept: For $|r| < 1$, sum of infinite GP $= \frac{a}{1 - r}$.

Working:

First term $a = 1$, common ratio $r = \frac{1/3}{1} = \frac{1}{3}$.

$$S_{\infty} = \frac{1}{1 - \frac{1}{3}} = \frac{1}{\frac{2}{3}} = \frac{3}{2} = 1.5$$

Verification: Partial sums: $1, \frac{4}{3}, \frac{13}{9}, \frac{40}{27} \rightarrow \frac{3}{2}$ as $n \rightarrow \infty \checkmark$

Why other options are wrong:

- (B) $2/3$ – that is the common ratio r , not the sum.
- (C) 2 – would apply if $a = 2$ or $r = 1/2$.
- (D) $4/3$ – sum of first two terms only $(1 + 1/3)$.

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

Solution

Q18 – Coordinate Geometry: Area of Triangle

Concept: Area using coordinate formula, or directly for a right triangle: $\frac{1}{2} \times \text{base} \times$



height.

Working:

$A(1, 2), B(5, 2), C(5, 6)$.

AB is horizontal: length = $5 - 1 = 4$ units.

BC is vertical: length = $6 - 2 = 4$ units.

Right angle is at B (one side horizontal, other vertical).

$$\text{Area} = \frac{1}{2} \times AB \times BC = \frac{1}{2} \times 4 \times 4 = 8 \text{ sq. units}$$

Verification via shoelace:

$$\text{Area} = \frac{1}{2} |x_A(y_B - y_C) + x_B(y_C - y_A) + x_C(y_A - y_B)| = \frac{1}{2} |1(2 - 6) + 5(6 - 2) + 5(2 - 2)| = \frac{1}{2} |-4 + 20 + 0| = \frac{16}{2} = 8$$

Why other options are wrong:

- (A) 6 – would require base $\times$ height = 12, not 16.
- (B) 10 – would require base $\times$ height = 20.
- (D) 16 – forgetting the $\frac{1}{2}$ factor.

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

Solution

Q19 – Mensuration: Total Surface Area of a Cone

Concept: TSA of cone = $\pi r(r + l)$, where r = base radius, l = slant height.

Working:

$r = 7 \text{ cm}, l = 25 \text{ cm}, \pi = 22/7$.

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

Component areas:

- Curved surface area = $\pi r l = \frac{22}{7} \times 7 \times 25 = 550 \text{ cm}^2$.
- Base area = $\pi r^2 = \frac{22}{7} \times 49 = 154 \text{ cm}^2$.
- TSA = $550 + 154 = 704 \text{ cm}^2$ ✓

Why other options are wrong:

- (A) 660 – incorrect combination of r and l .



- (B) 550 – only the curved surface area, base not included.
- (C) 792 – arithmetic error; possibly used $r = 9$ or wrong π .

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

Solution

Q20 – Geometry: Equilateral Triangle Inscribed in a Circle

Concept: For an equilateral triangle with side a inscribed in a circle of radius R (circumradius):

$$R = \frac{a}{\sqrt{3}} \implies a = R\sqrt{3}$$

Working:

$$R = 6 \text{ cm.}$$

$$a = 6\sqrt{3} \text{ cm}$$

Derivation: Each vertex subtends a 120 arc. Using the extended law of sines, $a = 2R \sin(60) = 2 \times 6 \times \frac{\sqrt{3}}{2} = 6\sqrt{3} \checkmark$

Why other options are wrong:

- (A) $3\sqrt{3}$ – result for $R = 3$ cm, not 6 cm.
- (C) 9 cm – does not follow from any standard formula for $R = 6$.
- (D) 12 cm – that would be the diameter, not the side length.

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

