

TANCET Quantitative Aptitude

Sample Paper – 6

Duration: 24 Minutes

Maximum Marks: 20

Instructions

- This paper contains **20 Multiple Choice Questions (MCQs)**.
- Each correct answer carries **+1 mark**.
- Each wrong answer carries a penalty of $-\frac{1}{4}$ **mark**.
- Unattempted questions carry **0 marks**.
- Time allowed: **24 minutes**. Maximum marks: **20**.
- Choose the single best option (A), (B), (C), or (D) for each question.

Section A — Quantitative Aptitude (Q1–Q20)

Q1. Find the unit digit of 3^{63} .

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

Q2. Find the smallest number that leaves a remainder of 2 when divided by 3, 4, and 5.

- (A) 62
- (B) 32
- (C) 42
- (D) 52



Q3. The expression $x^2 - 6x + 13$ can be written in the form $(x - a)^2 + b$. What is the minimum value of the expression?

- (A) 5
- (B) 4
- (C) 3
- (D) 9

Q4. The equation $x^3 - 6x^2 + 11x - 6 = 0$ has roots α, β, γ . Find $\alpha\beta + \beta\gamma + \gamma\alpha$.

- (A) 6
- (B) -6
- (C) -11
- (D) 11

Q5. Two successive discounts of 20% and 10% are equivalent to a single discount of:

- (A) 25%
- (B) 26%
- (C) 28%
- (D) 30%

Q6. An item costs Rs. 500 exclusive of GST. If the GST rate is 18%, find the final price payable by the customer.

- (A) Rs. 590
- (B) Rs. 580
- (C) Rs. 600
- (D) Rs. 560



Q7. Find the mean proportional between 4 and 64.

- (A) 8
- (B) 16
- (C) 32
- (D) 48

Q8. Liquids A, B, and C are mixed in the ratio 2:3:5. The densities of A, B, and C are 0.8, 1.0, and 1.2 g/mL respectively. Find the average density of the mixture (in g/mL).

- (A) 1.00
- (B) 1.02
- (C) 1.04
- (D) 1.06

Q9. A cricketer's average score after 15 innings is 40. After the 16th inning, his average rises to 42. What did he score in the 16th inning?

- (A) 62
- (B) 68
- (C) 72
- (D) 80

Q10. A and B start simultaneously from towns P and Q, which are 300 km apart, and travel towards each other. A travels at 60 km/h and B at 90 km/h. After how many hours do they meet?

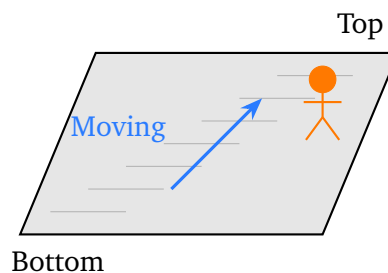


- (A) 2 h



- (B) 2.5 h
- (C) 3 h
- (D) 4 h

Q11. A person can walk up a *stationary* escalator in 60 steps. The same escalator, when moving and carrying a *stationary* person, brings the person to the top in 40 steps. In how many steps can the person walk up the *moving* escalator?



- (A) 20
- (B) 24
- (C) 30
- (D) 36

Q12. A can finish a job in 10 days and B can finish it in 15 days. They work together for 5 days, after which A leaves. How many more days does B need alone to complete the remaining work?

- (A) 2 days
- (B) 2 days 8 hours
- (C) 3 days
- (D) 2.5 days



Q13. A pipe can fill a tank in 10 hours. Due to a leak at the bottom, it now takes 12 hours to fill the tank completely. How long will the leak alone take to empty a full tank?

- (A) 20 h
- (B) 40 h
- (C) 60 h
- (D) 120 h

Q14. A dealer wants to earn a profit of 25% after offering a discount of 20% on the marked price. By what percentage above the cost price should the dealer mark the article?

- (A) 56.25%
- (B) 50%
- (C) 45%
- (D) 40%

Q15. What principal will yield Rs. 450 as Simple Interest at 6% per annum in 5 years?

- (A) Rs. 1200
- (B) Rs. 1500
- (C) Rs. 1800
- (D) Rs. 2000

Q16. An AP has first term 3, last term 57, and exactly 10 terms. Find the average of the 5th and 6th terms (i.e., the middle value of the AP).

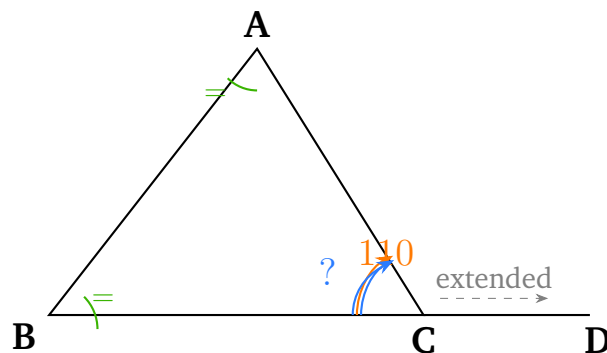
- (A) 27
- (B) 28
- (C) 29
- (D) 30



Q17. Three consecutive terms of a GP are 2, x , and 18. Find the value of x .

- (A) 9
- (B) 4
- (C) 6
- (D) 8

Q18. An exterior angle of a triangle measures 110. If the two non-adjacent interior angles are equal, find the interior angle adjacent to the exterior angle.



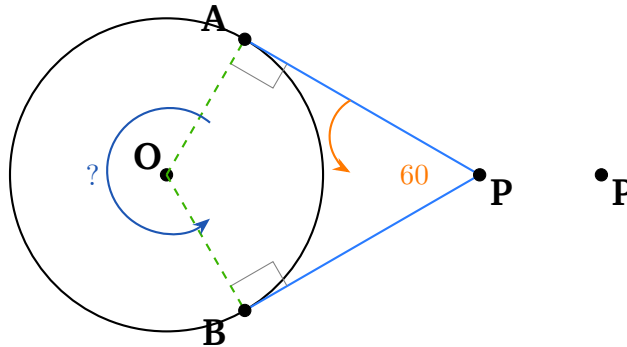
- (A) 70
- (B) 55
- (C) 110
- (D) 40

Q19. A hollow cylinder has outer radius 10 cm, inner radius 8 cm, and height 14 cm. Find its volume. (Use $\pi = \frac{22}{7}$)

- (A) 1232 cm^3
- (B) 1584 cm^3
- (C) 1760 cm^3
- (D) 2112 cm^3



Q20. Two tangents PA and PB are drawn from an external point P to a circle with centre O. The tangents touch the circle at A and B respectively. If $\angle APB = 60^\circ$, find $\angle AOB$.



- (A) 60
- (B) 90
- (C) 100
- (D) 120

Detailed Solutions

Q1. Find the unit digit of 3^{63} .

Solution

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

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

Divide the exponent by 4: $63 = 4 \times 15 + 3$, so $63 \bmod 4 = 3$.

The unit digit of 3^{63} equals the unit digit of $3^3 = 27$, which is 7.

Answer: (C)

Q2. Find the smallest number that leaves a remainder of 2 when divided by 3, 4, and 5.

Solution

If a number N leaves remainder 2 when divided by 3, 4, and 5, then $N - 2$ is divisible by all three.



$$\text{LCM}(3, 4, 5) = 60$$

The smallest positive $N - 2$ is 60, so the smallest $N = 60 + 2 = \mathbf{62}$.

Verification: $62 = 3 \times 20 + 2$; $62 = 4 \times 15 + 2$; $62 = 5 \times 12 + 2$. ✓

Answer: (A)

Q3. Express $x^2 - 6x + 13$ in the form $(x - a)^2 + b$ and find the minimum value.

Solution

Complete the square:

$$x^2 - 6x + 13 = (x^2 - 6x + 9) + 4 = (x - 3)^2 + 4$$

Since $(x - 3)^2 \geq 0$ for all real x , the minimum value is 4 (attained at $x = 3$).

Answer: (B)

Q4. For $x^3 - 6x^2 + 11x - 6 = 0$ with roots α, β, γ , find $\alpha\beta + \beta\gamma + \gamma\alpha$.

Solution

For a cubic $ax^3 + bx^2 + cx + d = 0$, Vieta's formulas give:

$$\alpha + \beta + \gamma = -\frac{b}{a}, \quad \alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}, \quad \alpha\beta\gamma = -\frac{d}{a}$$

Here $a = 1$, $b = -6$, $c = 11$, $d = -6$. Therefore:

$$\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a} = \frac{11}{1} = \mathbf{11}$$

Note: The roots are 1, 2, 3 and indeed $1 \cdot 2 + 2 \cdot 3 + 3 \cdot 1 = 2 + 6 + 3 = 11$. ✓

Answer: (D)

Q5. Find the single discount equivalent to successive discounts of 20% and 10%.

Solution

After a 20% discount, the price becomes 80% of the original. After a further 10% dis-



count it becomes 90% of that:

$$\text{Effective multiplier} = 0.80 \times 0.90 = 0.72$$

$$\text{Equivalent single discount} = 1 - 0.72 = 0.28 = \mathbf{28\%}$$

Answer: (C)

Q6. An item costs Rs. 500 exclusive of GST at 18%. Find the final price.

Solution

$$\text{GST amount} = 500 \times \frac{18}{100} = \text{Rs. } 90$$

$$\text{Final price} = 500 + 90 = \text{Rs. } \mathbf{590}$$

Answer: (A)

Q7. Find the mean proportional between 4 and 64.

Solution

The mean proportional between a and b is $\sqrt{ab}$:

$$\sqrt{4 \times 64} = \sqrt{256} = \mathbf{16}$$

$$\text{Verification: } \frac{4}{16} = \frac{16}{64} = \frac{1}{4}. \checkmark$$

Answer: (B)

Q8. Liquids A:B:C = 2:3:5 with densities 0.8, 1.0, 1.2 g/mL. Find average density.

Solution

Using the weighted average formula with total parts = $2 + 3 + 5 = 10$:

$$\bar{\rho} = \frac{2 \times 0.8 + 3 \times 1.0 + 5 \times 1.2}{10} = \frac{1.6 + 3.0 + 6.0}{10} = \frac{10.6}{10} = \mathbf{1.06 \text{ g/mL}}$$

Answer: (D)



Q9. Average after 15 innings = 40; after 16th inning average = 42. Find score in 16th inning.

Solution

$$\text{Total after 15 innings} = 15 \times 40 = 600$$

$$\text{Total after 16 innings} = 16 \times 42 = 672$$

$$\text{Score in 16th inning} = 672 - 600 = \mathbf{72}$$

Answer: (C)

Q10. A (60 km/h) and B (90 km/h) start simultaneously from P and Q, 300 km apart, towards each other. When do they meet?

Solution

When two objects move towards each other, their speeds add up:

$$\text{Combined speed} = 60 + 90 = 150 \text{ km/h}$$

$$\text{Time to meet} = \frac{\text{Distance}}{\text{Combined speed}} = \frac{300}{150} = \mathbf{2 \text{ hours}}$$

At that point, A has covered $60 \times 2 = 120$ km and B has covered $90 \times 2 = 180$ km. Total = 300 km. ✓

Answer: (A)

Q11. Person walks stationary escalator in 60 steps; escalator carries stationary person in 40 steps. Steps to walk up the moving escalator?

Solution

Let the total number of steps on the escalator be N .

- Person's rate: $\frac{N}{60}$ steps per unit time.
- Escalator's rate: $\frac{N}{40}$ steps per unit time.
- Combined rate: $\frac{N}{60} + \frac{N}{40} = N \left(\frac{2+3}{120} \right) = \frac{N}{24}$ steps per unit time.

$$\begin{aligned} \text{Time to reach top} &= \frac{N}{N/24} = 24 \text{ units. Steps walked by the person in that time} \\ &= \frac{N}{60} \times 24 = \frac{24N}{60} = \frac{2N}{5}. \end{aligned}$$



But the question asks for how many steps the person *takes*. The person takes $\frac{N}{60} \times T$ steps where T is the total time. Since the combined system covers all N steps:

$$T = \frac{N}{\frac{N}{24}} = 24 \text{ time units}$$

$$\text{Steps taken by person} = \frac{N}{60} \times 24 = \frac{2N}{5}$$

For the standard interpretation where $N = 60$ (person's steps on stationary escalator),
steps = $\frac{2 \times 60}{5} = 24$.

Answer: (B)

Q12. A (10 days) and B (15 days) work together for 5 days; then A leaves. How many more days does B need?

Solution

$$\text{A's rate} = \frac{1}{10} \text{ job/day, } \text{B's rate} = \frac{1}{15} \text{ job/day}$$

$$\text{Combined rate} = \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{1}{6} \text{ job/day}$$

$$\text{Work done in 5 days together} = 5 \times \frac{1}{6} = \frac{5}{6}$$

$$\text{Remaining work} = 1 - \frac{5}{6} = \frac{1}{6}$$

$$\text{Time for B alone} = \frac{1/6}{1/15} = \frac{1}{6} \times 15 = \frac{15}{6} = 2.5 \text{ days}$$

B needs 2.5 more days.

Answer: (D)

Q13. A pipe fills a tank in 10 hours; with a leak it takes 12 hours. How long does the leak alone take to empty the full tank?

Solution

Let the leak empty the tank in L hours.

$$\text{Effective filling rate} = \frac{1}{10} - \frac{1}{L} = \frac{1}{12}$$



$$\frac{1}{L} = \frac{1}{10} - \frac{1}{12} = \frac{6-5}{60} = \frac{1}{60}$$

$$L = 60 \text{ hours}$$

Answer: (C)

Q14. A dealer wants 25% profit after a 20% discount. What should the mark-up % be on cost price?

Solution

Let Cost Price (CP) = Rs. 100. Required Selling Price (SP) = Rs. 125.

After a 20% discount, SP = 80% of Marked Price (MP):

$$MP \times 0.80 = 125 \implies MP = \frac{125}{0.80} = \text{Rs. } 156.25$$

$$\text{Mark-up} = \frac{MP - CP}{CP} \times 100 = \frac{156.25 - 100}{100} \times 100 = 56.25\%$$

Answer: (A)

Q15. Find the principal that yields Rs. 450 as SI at 6% p.a. in 5 years.

Solution

Using the Simple Interest formula $SI = \frac{P \times R \times T}{100}$:

$$450 = \frac{P \times 6 \times 5}{100} \implies P = \frac{450 \times 100}{30} = \frac{45000}{30} = \text{Rs. } 1500$$

Answer: (B)

Q16. AP: first term $a = 3$, last term $l = 57$, $n = 10$ terms. Find the average of the 5th and 6th terms.

Solution

$$\text{Common difference: } d = \frac{l - a}{n - 1} = \frac{57 - 3}{9} = \frac{54}{9} = 6.$$

$$T_5 = 3 + (5 - 1) \times 6 = 3 + 24 = 27$$

$$T_6 = 3 + (6 - 1) \times 6 = 3 + 30 = 33$$



$$\text{Average of } T_5 \text{ and } T_6 = \frac{27 + 33}{2} = \frac{60}{2} = 30$$

$$\text{Alternatively: Sum} = \frac{n}{2}(a + l) = \frac{10}{2}(3 + 57) = 5 \times 60 = 300; \text{ mean} = 300/10 = 30. \checkmark$$

Answer: (D)

Q17. Three consecutive terms of a GP are 2, x , 18. Find x .

Solution

In a GP, the square of the middle term equals the product of the outer terms:

$$x^2 = 2 \times 18 = 36 \implies x = \pm 6$$

Taking the positive value (consistent with the positive terms given): $x = 6$.

Verification: Common ratio $r = 6/2 = 3$ and $18/6 = 3$. $\checkmark$

Answer: (C)

Q18. Exterior angle of a triangle = 110. The two non-adjacent interior angles are equal. Find the interior angle adjacent to the exterior angle.

Solution

The **Exterior Angle Theorem** states that an exterior angle equals the sum of the two non-adjacent interior angles.

Let each equal non-adjacent interior angle = θ :

$$\theta + \theta = 110 \implies \theta = 55$$

The interior angle adjacent to the exterior angle (they form a straight line):

$$\angle_{\text{adjacent}} = 180 - 110 = 70$$

Check: Sum of interior angles = $70 + 55 + 55 = 180$. $\checkmark$

Answer: (A)



Q19. Hollow cylinder: outer radius $R = 10$ cm, inner radius $r = 8$ cm, height $h = 14$ cm. Find volume.

Solution

$$V = \pi h(R^2 - r^2) = \frac{22}{7} \times 14 \times (10^2 - 8^2)$$

$$= \frac{22}{7} \times 14 \times (100 - 64) = 22 \times 2 \times 36 = 44 \times 36 = \mathbf{1584 \text{ cm}^3}$$

Answer: (B)

Q20. Two tangents PA, PB from external point P to circle (centre O); $\angle APB = 60$. Find $\angle AOB$.

Solution

Since $OA \perp PA$ and $OB \perp PB$ (radius to tangent point is perpendicular to tangent):

$$\angle OAP = \angle OBP = 90$$

In quadrilateral OAPB, the sum of all interior angles = 360:

$$\angle AOB + \angle OAP + \angle APB + \angle OBP = 360$$

$$\angle AOB + 90 + 60 + 90 = 360$$

$$\angle AOB = 360 - 240 = \mathbf{120}$$

Answer: (D)

Answer Key

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



Marking Scheme: +1 for correct • $-\frac{1}{4}$ for incorrect • 0 for unattempted

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