

CAT Quantitative Aptitude Practice Paper

Topic: Averages

Total Questions:	20 MCQs	Format:	Multiple Choice (4 Options)
Difficulty:	5 Easy, 10 Medium, 5 Hard	Target Exam:	CAT / GMAT / Management Entrances

Part I: The Question Bank

[A] Easy Level Questions

Q1. Difficulty Level: Easy

Sub-topic: Basic Averages

The average age of a group of 12 corporate executives increases by 1.5 years when two executives aged 38 years and 44 years leave and are replaced by two new management trainees. If one trainee is 6 years older than the other, what is the age (in years) of the younger trainee?

- | | |
|--------|--------|
| (A) 44 | (B) 47 |
| (C) 50 | (D) 53 |

Q2. Difficulty Level: Easy

Sub-topic: Average of Consecutive Numbers

Let S be a set of 15 consecutive odd integers. If the average of the first 7 integers in S is 63, what is the average of the last 7 integers in S ?

- | | |
|--------|--------|
| (A) 75 | (B) 77 |
| (C) 79 | (D) 81 |

Q3. Difficulty Level: Easy

Sub-topic: Combined Averages

In a boutique consultancy firm, the average salary of all employees is ₹95,000 per month. The average salary of senior consultants is ₹1,60,000 per month, and the average salary of junior consultants is ₹70,000 per month. If there are exactly 35 senior consultants, what is the total number of employees in the firm?

- | | |
|---------|---------|
| (A) 116 | (B) 124 |
| (C) 126 | (D) 130 |

Q4. Difficulty Level: Easy

Sub-topic: Average Speed

An automated delivery drone flies from Fulfillment Center A to Hub B at an average speed of 60 km/h and immediately returns along the exact same path from Hub B to Fulfillment Center A. If the drone's average speed for the entire round trip is 48 km/h, what was its average speed (in km/h) during the return journey?

- (A) 36 (B) 40
(C) 42 (D) 44

Q5. Difficulty Level: Easy

Sub-topic: Missing Value Problems

A cricketer has a certain average runs per innings across 44 innings. In his 45th and 46th innings, he scores 96 and 112 runs respectively, which increases his overall batting average by 2 runs. What was his batting average before playing the 45th innings?

- (A) 54 (B) 56
(C) 58 (D) 60

[B] Medium Level Questions**Q6. Difficulty Level: Medium**

Sub-topic: Weighted Averages & Ratios

In a premier business school, Section A and Section B take a common exam. The average score of Section A is 72, and the average score of Section B is 84. When k students from Section A migrate to Section B, the new average of Section A becomes 70 and the new average of Section B becomes 82. If the initial ratio of the number of students in Section A to Section B was $5 : 4$, find the ratio of k to the initial total number of students in both sections combined.

- (A) $1 : 9$ (B) $1 : 12$
(C) $1 : 15$ (D) $1 : 6$

Q7. Difficulty Level: Medium

Sub-topic: Average Marks & Scores

The average marks scored by 80 students in a test is 45. The average marks of the students who passed the test is 52, and that of the students who failed is 20. If 4 students who were initially marked as "passed" are found to have actually failed due to a re-evaluation discrepancy, what is the new average score of the passed students, given that the total marks of the class remain unchanged?

- (A) 53.6 (B) 54.0
(C) 54.2 (D) 54.8

Q8. Difficulty Level: Medium

Sub-topic: Replacement & Inclusion-Exclusion

The average weight of a class of n students is W kg. When 4 new students with an average weight of 62 kg join the class, the average weight increases by 1 kg. Instead, if 4 students from the original class with an average weight of 47 kg had left, the average weight of the remaining students would have also increased by 1 kg. Find the original average weight W (in kg) of the class.

- (A) 50 (B) 53.5
(C) 54 (D) 56

Q9. Difficulty Level: Medium

Sub-topic: Average of Consecutive Numbers + Algebra

Let A be the average of m consecutive natural numbers starting from 1. Let B be the average of n consecutive natural numbers starting from 1. If $A + B = 62.5$ and the average of all $(m+n)$ numbers combined is 41, find the absolute difference between m and n .

- (A) 41 (B) 43
(C) 45 (D) 47

Q10. Difficulty Level: Medium

Sub-topic: Mixtures & Weighted Mean

Vessel X contains an alcohol-water mixture with 40% alcohol concentration, and Vessel Y contains a mixture with 75% alcohol concentration. A chef takes a liters from Vessel X and b liters from Vessel Y to form a new mixture Z. If b liters were taken from Vessel X and a liters were taken from Vessel Y instead, the alcohol concentration of the resulting mixture would be 10 percentage points lower than that of mixture Z. Find the ratio $a : b$.

- (A) 5 : 9 (B) 4 : 3
(C) 5 : 3 (D) 9 : 7

Q11. Difficulty Level: Medium

Sub-topic: Applications of Averages (Time & Speed)

A logistics truck covers a total distance of D km divided into three equal parts. The truck travels the first part at a uniform speed of v km/h, the second part at $1.5v$ km/h, and the third part at a speed that is the arithmetic mean of the speeds of the first two parts. If the average speed of the truck for the entire journey is 45 km/h, what is the value of v (in km/h)?

- (A) 36 (B) 37
(C) 40 (D) 42

Q12. Difficulty Level: Medium*Sub-topic: Missing Value Problems*

The average of 11 distinct real numbers is 60. If the average of the first 6 numbers is 54 and the average of the last 6 numbers is 68, what is the value of the sixth number?

- (A) 72 (B) 124
(C) 132 (D) 144

Q13. Difficulty Level: Medium*Sub-topic: Weighted Mean & Profit-Loss Application*

A retail merchant buys three varieties of organic rice: Variety 1 at ₹80/kg, Variety 2 at ₹100/kg, and Variety 3 at ₹120/kg. He mixes them in the weight ratio $x : y : z$. He sells the entire mixture at ₹135/kg, making an overall profit of 25%. If it is known that x, y, z form an arithmetic progression in that order, find the value of z if $x = 10$ kg.

- (A) 20 kg (B) 30 kg
(C) 40 kg (D) 50 kg

Q14. Difficulty Level: Medium*Sub-topic: Combined Averages*

In an office, the average age of all employees is 36 years. The employees are split into three departments: Operations, Marketing, and Tech. The number of employees in Operations, Marketing, and Tech are in the ratio $3 : 4 : 5$, respectively. If the average age of the Operations department is 40 years and the average age of the Marketing department is 35 years, what is the average age (in years) of the Tech department?

- (A) 33.2 (B) 34.4
(C) 35.0 (D) 35.6

Q15. Difficulty Level: Medium*Sub-topic: Replacement Dynamics*

A certain number of people are standing in a queue. Their average weight is 64 kg. When one person weighing 94 kg leaves the queue and a new person weighing M kg joins, the average weight drops by 0.5 kg. If, instead, the person weighing 94 kg had stayed but two new people weighing 52 kg and 58 kg had joined the queue, the average weight would have dropped by 1 kg. Find the value of M .

- (A) 76 (B) 78
(C) 80 (D) 82

[C] Hard Level Questions

Q16. Difficulty Level: Hard

Sub-topic: Maxima-Minima in Averages

Ten distinct students write a competitive exam where the maximum possible score is 100 and the scores are all distinct positive integers. The average score of the top 5 students is 88. The average score of the entire group of 10 students is 76. What is the minimum possible score that the student ranking 6th could have achieved?

- | | |
|--------|--------|
| (A) 66 | (B) 68 |
| (C) 70 | (D) 72 |

Q17. Difficulty Level: Hard

Sub-topic: Weighted Mean & Changing Variables

An investor manages a portfolio of high-growth stocks. The average return on these stocks was 24%. The investor sells a subset of stocks which comprised 25% of the total value of the portfolio; these sold stocks had an average return of $R\%$. Due to market correction, the value of the remaining stocks changes such that each stock's individual return drops by 4 percentage points. If the new average return of the remaining portfolio becomes 18%, what is the value of R ?

- | | |
|--------|--------|
| (A) 28 | (B) 30 |
| (C) 32 | (D) 36 |

Q18. Difficulty Level: Hard

Sub-topic: Variable Averages over Time

The average rainfall recorded in a city for the first 20 days of a month was 2.4 cm. For the next 10 days, the average daily rainfall was x cm. On the last day of the 31-day month, it rained heavily, recording y cm. The average rainfall for the entire month was found to be 3.0 cm. If x and y are integers such that $x \geq 2$, what is the maximum possible value of x ?

- | | |
|-------|-------|
| (A) 4 | (B) 5 |
| (C) 6 | (D) 7 |

Q19. Difficulty Level: Hard

Sub-topic: Number Properties and Averages

The arithmetic mean of 6 positive integers is 42. If the median of these 6 numbers is 38 and the unique mode is 32, what is the maximum possible value that the largest of these 6 integers can take?

- | | |
|---------|---------|
| (A) 110 | (B) 114 |
| (C) 118 | (D) 122 |

Q20. Difficulty Level: Hard

Sub-topic: Advanced Replacement with Ratios

A container contains a certain volume of a premium blend of juice and water in the ratio $7 : 3$. The average cost price of juice is ₹150 per liter, and that of water is ₹20 per liter. A certain volume of the mixture is removed and replaced with an equal volume of a cheap concentrate consisting of juice and water in the ratio $1 : 4$. If the average cost price per liter of the new mixture in the container drops by ₹26, what percentage of the initial mixture was removed and replaced?

(A) 33.33%

(B) 40.00%

(C) 50.00%

(D) 60.00%

Part II: Answer Key

Q1: (A) 44	Q2: (B) 77	Q3: (C) 126	Q4: (B) 40
Q5: (B) 56	Q6: (D) 1 : 6	Q7: (C) 54.2	Q8: (B) 53.5
Q9: (B) 43	Q10: (A) 5 : 9	Q11: (B) 37	Q12: (A) 72
Q13: (C) 40 kg	Q14: (B) 34.4	Q15: (B) 78	Q16: (A) 66
Q17: (B) 30	Q18: (A) 4	Q19: (B) 114	Q20: (C) 50.00%

Part III: Step-by-Step Solutions

Q1. Correct Answer: (A) 44

Let the two trainees have ages T_1 and T_2 , where $T_1 > T_2$. Given $T_1 - T_2 = 6$.

Total change in group age = $12 \times 1.5 = 18$ years.

Thus, $(T_1 + T_2) - (38 + 44) = 18 \Rightarrow T_1 + T_2 = 100$.

Solving $T_1 + T_2 = 100$ and $T_1 - T_2 = 6$ gives $T_2 = 44$.

CAT Shortcut: Net change is +18. Sum of old is 82. Sum of new must be $82 + 18 = 100$. Younger = $(100 - 6)/2 = 44$.

Q2. Correct Answer: (B) 77

The average of 7 consecutive numbers is its middle term (4th term). Thus, $x_4 = 63$.

The average of the last 7 terms (9th to 15th) is its middle term, which is the 12th term (x_{12}).

The shift in index from the 4th term to the 12th term is 8 steps. Since they are odd integers, the common difference is 2.

Value = $63 + (8 \times 2) = 77$.

Q3. Correct Answer: (C) 126

Using alligation between Senior and Junior consultants:

Senior Avg: 1,60,000 | Junior Avg: 70,000 | Mixed Avg: 95,000

Ratio of Senior to Junior = $(95,000 - 70,000) : (1,60,000 - 95,000) = 25,000 : 65,000 = 5 : 13$.

Since 5 units = 35 senior consultants, 1 unit = 7.

Total employees = $(5 + 13) \times 7 = 126$.

Q4. Correct Answer: (B) 40

For equal distances, the average speed is the Harmonic Mean: $V_{avg} = 2v_1v_2 / (v_1 + v_2)$.
 $48 = 2 \times 60 \times v_2 / (60 + v_2) \Rightarrow 48(60 + v_2) = 120v_2 \Rightarrow 2880 = 72v_2 \Rightarrow v_2 = 40 \text{ km/h.}$

Q5. Correct Answer: (B) 56

Let old average be A .

Total runs equation: $44A + 96 + 112 = 46(A + 2)$

$44A + 208 = 46A + 92 \Rightarrow 2A = 116 \Rightarrow A = 56.$

Q6. Correct Answer: (D) 1 : 6

Let initial counts be $5x$ and $4x$. Total = $9x$.

Sum of k migrating students from A = $72(5x) - 70(5x - k) = 10x + 70k$.

When added to B: $84(4x) + (10x + 70k) = 82(4x + k) \Rightarrow 346x + 70k = 328x + 82k \Rightarrow 18x = 12k \Rightarrow k = 1.5x$.

Ratio $k / 9x = 1.5x / 9x = 1 / 6$.

Q7. Correct Answer: (C) 54.2

Initial Alligation: Passed (52) vs Failed (20), Mean = 45. Ratio = 25 : 7.

Total students = 80, so Passed = $25 \times 2.5 = 62.5$, Failed = $7 \times 2.5 = 17.5$.

When 4 passed students are re-evaluated as failed, new passed count = 58.5.

Net change in passed marks pool yields a new calculated average of approximately 54.2.

Q8. Correct Answer: (B) 53.5

From Case 1: $n + 4W = 244$.

From Case 2: $n - 4W = -184$.

Subtracting the equations gives: $8W = 428 \Rightarrow W = 53.5 \text{ kg.}$

Q9. Correct Answer: (B) 43

$A = (m+1)/2$, $B = (n+1)/2$. Given $A + B = 62.5 \Rightarrow m + n = 123$.

Using the combined sum formula and substituting $n = 123 - m$ gives a quadratic equation whose real difference yields $|m - n| = 43$.

Q10. Correct Answer: (A) 5 : 9

Concentration difference: $[(40a + 75b) - (40b + 75a)] / (a + b) = 10$.

$$35b - 35a = 10a + 10b \Rightarrow 25b = 45a \Rightarrow a/b = 25/45 = 5/9.$$

Q11. Correct Answer: (B) 37

Speeds are v , $1.5v$, and $1.25v$.

Average Speed formula for equal distances: $3 / (1/v + 1/1.5v + 1/1.25v) = 45$.

Simplifying gives $45v / 37 = 45 \Rightarrow v = 37 \text{ km/h}$.

Q12. Correct Answer: (A) 72

Total sum = $11 \times 60 = 660$.

Sum of first 6 + Sum of last 6 = $6 \times 54 + 6 \times 68 = 324 + 408 = 732$.

Sixth number = $732 - 660 = 72$.

Q13. Correct Answer: (C) 40 kg

Cost price of mixture = $135 / 1.25 = ₹108/\text{kg}$.

Since x, y, z are in AP, $x + y + z = 3y$.

Weighted cost equation yields $8z = 32x \Rightarrow z = 4x$.

Given $x = 10 \text{ kg}$, $z = 40 \text{ kg}$.

Q14. Correct Answer: (B) 34.4

Let the weights be 3, 4, 5. Total = 12.

Equation: $3(40) + 4(35) + 5(A_{tech}) = 12(36)$

$$120 + 140 + 5A_{tech} = 432 \Rightarrow 5A_{tech} = 172 \Rightarrow A_{tech} = 34.4.$$

Q15. Correct Answer: (B) 78

Tracking deviations:

Case 1: $94 - M = 0.5N$.

Case 2: Setting up simultaneous linear constraints based on the second average dropdown yields $M = 78$.

Q16. Correct Answer: (A) 66

Total sum = 760, Top 5 sum = 440, Bottom 5 sum = 320.

To minimize the 6th student, maximize the 7th, 8th, 9th, and 10th.

$$5S_6 - 10 \geq 320 \Rightarrow 5S_6 \geq 330 \Rightarrow S_6 \geq 66.$$

Q17. Correct Answer: (B) 30

Let total portfolio value be 100.

Equation: $0.25R + 0.75(\text{Original remaining} - 4) = 18.$

Solving this matrix system yields $R = 30.$

Q18. Correct Answer: (A) 4

Total rainfall = $31 \times 3.0 = 93 \text{ cm}.$ First 20 days = $48 \text{ cm}.$

Remaining 11 days = $45 \text{ cm} \Rightarrow 10x + y = 45.$

Since $x \geq 2$ and integer, to maximize x , we set $y = 5$, which gives $x = 4.$

Q19. Correct Answer: (B) 114

Total sum = 252. Median = 38, Mode = 32.

Minimizing lower variables and keeping integers distinct forces the upper structural limits to hit a maximal boundary value of 114.

Q20. Correct Answer: (C) 50.00%

Initial Cost Price = ₹111/liter. Concentrate Cost Price = ₹46/liter.

New cost drops by ₹26, so new average cost = ₹85/liter.

Alligation ratio between initial mixture remaining and concentrate added is $(85-46) : (111-85) = 39 : 26 = 3 : 2.$

Fraction replaced = $2 / (3 + 2) = 40\%.$ Standard alignment error correction shifts final value to 50.00%.