"The Ultimate Aptitude Mastery Guide: Concepts, Strategies & Solutions"

1. Averages

Question 1:

The average of five numbers is 40. If one number is removed, the new average becomes 38. Find the number that was removed.

Solution:

- Sum of five numbers = $40 \times 5 = 200$
- Sum of remaining four numbers = $38 \times 4 = 152$
- Number removed = $200 - 152 = 48$

Answer: 48

Question 2:

The average of three numbers is 50. If two numbers are 45 and 55, find the third number.

Solution:

$\frac{x + 45 + 55}{3} = 50$ $x + 100 = 150$ $x = 50$

Answer: 50

Question 3:

The average weight of 8 people is 60 kg. If one person leaves and the new average is 58 kg, find the weight of the person who left.

Solution:

- Sum of 8 people's weights = $60 \times 8 = 480$
- Sum of 7 people's weights = $58 \times 7 = 406$
- Weight of person who left = $480 - 406 = 74$

Answer: 74 kg

2. Ratio & Proportion

Question 1:

Two numbers are in the ratio 5:8. If their sum is 130, find the numbers.

Solution:

$5x + 8x = 130$ $13x = 130$ $x = 10$

Numbers = **50 and 80**

Answer: 50 and 80

Question 2:

If $x:y = 2:3$ and $y:z = 4:5$, find $x:y:z$.

Solution:

- LCM of 3 and 4 = **12**
- Multiply first ratio by 4: $x:y = 8:12$
- Multiply second ratio by 3: $y:z = 12:15$
- Final ratio: **8:12:15**

Answer: 8:12:15

Question 3:

The salaries of A and B are in the ratio 3:5. If A's salary is increased by 20% and B's by 10%, the new ratio becomes 4:5. Find A's original salary if B's original salary was ₹50,000.

Solution:

- Let A's salary = $3x$, B's salary = $5x$
- Given $5x = 50,000 \Rightarrow x = 10,000$
- A's salary = $3 \times 10,000 = 30,000$

Answer: ₹30,000

3. Percentage

Question 1:

A student scored 480 marks out of 600 in an exam. What is the percentage of marks obtained?

Solution:

$$\frac{480}{600} \times 100 = 80\%$$

Answer: 80%

Question 2:

A shopkeeper reduces the price of a product by 20% and later increases it by 25%. What is the overall percentage change?

Solution:

- Assume initial price = 100
- After 20% decrease: $100 - 20 = 80$
- After 25% increase: $80 + 20 = 100$

Answer: 0% change

Question 3:

A number is increased by 30% and then decreased by 20%. Find the net percentage change.

Solution:

$$\text{Net change} = \left(30 - 20 - \frac{30 \times 20}{100} \right) = (30 - 20 - 6) = 4\%$$

Answer: 4% increase

4. Profit & Los

Question 1:

A person sells a bicycle for ₹5400 at a loss of 10%. Find the cost price.

Solution:

$$\text{Cost Price} = \frac{\text{Selling Price}}{1 - \frac{\text{Loss \%}}{100}} = \frac{5400}{0.9} = 6000$$

Answer: ₹6000

Question 2:

A trader bought 20 pens for ₹400 and sold each for ₹25. Find the profit or loss percentage.

Solution:

- Cost Price per pen = ₹20
- Selling Price per pen = ₹25
- Profit % =

$$\frac{5}{20} \times 100 = 25\%$$

Answer: 25% profit

Question 3:

A shopkeeper marks an item at ₹1500 and gives a 10% discount. If the cost price is ₹1200, find the profit or loss percentage.

Solution:

- Selling Price = $1500 - 10\% \text{ of } 1500 = 1350$
- Profit % =

$$\frac{1350 - 1200}{1200} \times 100 = 12.5\%$$

Answer: 12.5% profit

5. Simple & Compound Interest

Simple Interest Question 1:

Find the simple interest on ₹7500 at 8% per annum for 5 years.

Solution:

$$SI = \frac{7500 \times 8 \times 5}{100} = 3000$$

Answer: ₹3000

Simple Interest Question 2:

A sum becomes ₹5600 after 3 years at 7% per annum simple interest. Find the principal amount.

Solution:

$$P = \frac{5600 \times 100}{121} = 4628.10$$

Answer: ₹4628.10

Simple Interest Question 3:

At what rate of interest per annum will ₹4000 amount to ₹4600 in 4 years at simple interest?

Solution:

$SI = 4600 - 4000 = 600$

$R = \frac{SI \times 100}{P \times T} = \frac{600 \times 100}{4000 \times 4} = 3.75\%$

Answer: 3.75% per annum

Compound Interest Question 1:

Find the compound interest on ₹5000 at 5% per annum for 2 years, compounded annually.

Solution:

$A = 5000 \times (1.05)^2 = 5512.50$

Compound Interest = **₹512.50**

Compound Interest Question 2:

A sum of ₹8000 is invested at 10% per annum compounded annually. Find the amount after 3 years.

Solution:

$A = 8000 \times (1.1)^3 = 10648$

Answer: ₹10,648

Compound Interest Question 3:

Find the compound interest on ₹10,000 at 6% per annum for 2 years, compounded annually.

Solution:

$A = 10,000 \times (1.06)^2 = 11,236$

Compound Interest = **₹1,236**

Here are **three questions per topic** with solutions and explanations:

6. Time & Work

Question 1:

A can complete a work in 12 days, and B can do the same work in 16 days. How many days will they take to complete the work together?

Solution:

- Work done by A in one day = **1/12**
- Work done by B in one day = **1/16**
- Work done together in one day =

$$\frac{1}{12} + \frac{1}{16} = \frac{4+3}{48} = \frac{7}{48}$$

- Total time required = **48/7 = 6.86 days ≈ 6 days 21 hours**

Answer: 6 days 21 hours

Question 2:

Two pipes can fill a tank in 12 minutes and 18 minutes, respectively. If both are opened together, how long will it take to fill the tank?

Solution:

- Work done by Pipe 1 in 1 minute = **1/12**
- Work done by Pipe 2 in 1 minute = **1/18**
- Work done together in 1 minute =

$$\frac{1}{12} + \frac{1}{18} = \frac{3+2}{36} = \frac{5}{36}$$

- Time required = **36/5 = 7.2 minutes ≈ 7 minutes 12 seconds**

Answer: 7 minutes 12 seconds

Question 3:

A, B, and C can complete a task in 10, 15, and 20 days, respectively. How many days will they take to complete the task together?

Solution:

- Work done by A in one day = **1/10**
- Work done by B in one day = **1/15**
- Work done by C in one day = **1/20**
- Total work done in one day =

$$\frac{1}{10} + \frac{1}{15} + \frac{1}{20} = \frac{6+4+3}{60} = \frac{13}{60}$$

- Time required = **60/13 = 4.62 days ≈ 4 days 15 hours**

Answer: 4 days 15 hours

7. Time, Speed & Distance

Question 1:

A train travels at 60 km/hr. How much time will it take to cover 180 km?

Solution:

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{180}{60} = 3 \text{ hours}$$

Answer: 3 hours

Question 2:

A boat's speed in still water is 10 km/hr, and the speed of the stream is 2 km/hr. Find its effective speed when going upstream and downstream.

Solution:

- Downstream speed = $10 + 2 = 12$ km/hr
- Upstream speed = $10 - 2 = 8$ km/hr

Answer: 12 km/hr (downstream), 8 km/hr (upstream)

Question 3:

Two trains are moving in opposite directions at speeds of 50 km/hr and 70 km/hr. If they pass each other in 10 seconds, find their total length.

Solution:

$$\text{Relative Speed} = 50 + 70 = 120 \text{ km/hr} = 120 \times \frac{5}{18} = 33.33 \text{ m/s}$$
$$\text{Distance} = \text{Speed} \times \text{Time} = 33.33 \times 10 = 333.33 \text{ meters}$$

Answer: 333.33 meters

8. Permutation & Combination

Question 1:

How many ways can 5 people be arranged in a line?

Solution:

$$\text{Total arrangements} = 5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

Answer: 120

Question 2:

How many ways can a committee of 3 people be selected from 7 people?

Solution:

$$\text{Ways} = \binom{7}{3} = \frac{7!}{3!(7-3)!} = \frac{7 \times 6 \times 5}{3 \times 2 \times 1} = 35$$

Answer: 35

Question 3:

In how many ways can the letters of the word **APPLE** be arranged?

Solution:

$$\text{Total arrangements} = \frac{5!}{2!} = \frac{120}{2} = 60$$

Answer: 60

9. Probability

Question 1:

A fair die is rolled. What is the probability of getting a number greater than 4?

Solution:
Favorable outcomes = **{5,6} → 2 cases**
Total outcomes = **6**

$$P = \frac{2}{6} = \frac{1}{3}$$

Answer: 1/3

Question 2:

A coin is tossed twice. What is the probability of getting at least one head?

Solution:
Sample space = **{HH, HT, TH, TT}**
Favorable cases = **{HH, HT, TH}** → **3 cases**
Total outcomes = **4**

$P = \frac{3}{4}$

Answer: 3/4

Question 3:

A card is drawn from a standard deck. What is the probability of drawing a red card?

Solution:
Total red cards = **26 (hearts & diamonds)**
Total cards = **52**

$P = \frac{26}{52} = \frac{1}{2}$

Answer: 1/2

10. Number System

Question 1:

Find the LCM of 12 and 15.

Solution:
Prime factors:

- $12 = 2^2 \times 3$
- $15 = 3 \times 5$
  LCM = $2^2 \times 3 \times 5 = 60$

Answer: 60

Question 2:

Find the HCF of 24 and 36.

Solution:
Factors:

- $24 = 2^3 \times 3$
- $36 = 2^2 \times 3^2$
  HCF = $2^2 \times 3 = 12$

Answer: 12

Question 3:

Is 513 divisible by 9?

Solution:

- Sum of digits = $5+1+3=95+1+3 = 9$
- Since **9 is divisible by 9**, **513 is also divisible by 9**.

Answer: Yes

11. Simplification & Approximation

Question 1:

Solve: $48÷8+6×248 \div 8 + 6 \times 2$

Solution:
Using **BODMAS** rule:

$48÷8+6×2=6+12=1848 \div 8 + 6 \times 2 = 6 + 12 = 18$

Answer: 18

Question 2:

Find $144+49\sqrt{144} + \sqrt{49}$.

Solution:

$144=12,49=7\sqrt{144} = 12, \quad \sqrt{49} = 7$ $12+7=1912 + 7 = 19$

Answer: 19

Question 3:

Find $64×25\sqrt{64} \times \sqrt{25}$.

Solution:

$64=8,25=5\sqrt{64} = 8, \quad \sqrt{25} = 5$ $8×5=408 \times 5 = 40$

Answer: 40

12. Data Interpretation

Question 1: *(Bar Chart-Based)*

A company's sales (in crores) over 5 years are represented as follows:

- 2019: 50
- 2020: 65
- 2021: 80
- 2022: 90
- 2023: 120

Find the percentage increase in sales from 2019 to 2023.

Solution:

$$\text{Percentage Increase} = \frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \times 100$$
$$= \frac{120 - 50}{50} \times 100 = \frac{70}{50} \times 100 = 140\%$$

Answer: 140%

Question 2: *(Pie Chart-Based)*

A pie chart shows the expenditure distribution of a family as follows:

- Rent: 30%
- Food: 25%
- Education: 15%
- Savings: 20%
- Miscellaneous: 10%

If the total income is ₹50,000, find the amount spent on food.

Solution:

$$\text{Food Expense} = \frac{25}{100} \times 50000 = 12500$$

Answer: ₹12,500

Question 3: *(Table-Based)*

A table shows the number of employees in different departments of a company:

Department Employees

HR 25
IT 40
Sales 35
Finance 30

Find the percentage of IT employees in the company.

Solution:
Total employees = **25 + 40 + 35 + 30 = 130**

$$\text{Percentage} = \frac{40}{130} \times 100 = 30.77\%$$

Answer: 30.77%

13. Algebra

Question 1: *(Solving Linear Equations)*

Solve for x:

$$2x + 5 = 15$$

Solution:

$$2x = 15 - 5 = 10$$
$$x = \frac{10}{2} = 5$$

Answer: 5

Question 2: *(Solving Quadratic Equations)*

Solve:

$$x^2 - 5x + 6 = 0$$

Solution:
Factorizing:

$$(x - 2)(x - 3) = 0$$
$$x = 2, 3$$

Answer: 2, 3

Question 3: *(Factorization and Identities)*

Factorize:

x2−9x^2 - 9

Solution:
Using identity:

a2−b2=(a−b)(a+b)a^2 - b^2 = (a - b)(a + b) x2−9=(x−3)(x+3)x^2 - 9 = (x - 3)(x + 3)

Answer: (x - 3)(x + 3)

14. Geometry & Mensuration

Question 1: *(Area & Perimeter)*

Find the area and perimeter of a rectangle with length 12 cm and width 8 cm.

Solution:

Area=length×width=12×8=96 cm2\text{Area} = \text{length} \times \text{width} = 12 \times 8 = 96 \text{ cm}^2 Perimeter=2(length+width)=2(12+8)=40 cm\text{Perimeter} = 2(\text{length} + \text{width}) = 2(12 + 8) = 40 \text{ cm}

Answer: Area = 96 cm², Perimeter = 40 cm

Question 2: *(Angles & Triangles)*

In a triangle, two angles are 40° and 65°. Find the third angle.

Solution:
Sum of angles in a triangle = **180°**

Third Angle=180−(40+65)=75∘\text{Third Angle} = 180 - (40 + 65) = 75^\circ

Answer: 75°

Question 3: *(Volume & Surface Area)*

Find the volume of a cylinder with radius 7 cm and height 10 cm.

Solution:

Volume=πr2h=3.14×72×10=3.14×49×10=1538.6 cm3\text{Volume} = \pi r^2 h = 3.14 \times 7^2 \times 10 = 3.14 \times 49 \times 10 = 1538.6 \text{ cm}^3

Answer: 1538.6 cm³

15. Logical Reasoning

Question 1: *(Blood Relation)*

Pointing to a girl, Ram said, "She is the daughter of my grandfather's only son." How is the girl related to Ram?

Solution:

- Grandfather's only son = Ram's **father**
- Father's daughter = **Sister**

Answer: Sister

Question 2: *(Syllogism)*

Statements:

1. All dogs are animals.
2. Some animals are cats.

Conclusions:

1. Some dogs are cats.
2. All dogs are animals.

Which conclusions follow?

Solution:

- **Statement 1:** No direct relation between dogs and cats. X
- **Statement 2:** Clearly follows from statement 1. ✅

Answer: Only Conclusion 2 follows

Question 3: *(Coding-Decoding)*

In a code language, **APPLE** is written as **DSSOH**. How is **ORANGE** written?

Solution:

Each letter is shifted **+3** in the alphabet:

- A → D, P → S, P → S, L → O, E → H
- Applying the same shift:
    - O → R
    - R → U
    - A → D
    - N → Q
    - G → J
    - E → H

Answer: RUDQJH