Percentage Notes (For Placements & Quick Understanding)

1. Basics of Percentage

Formula:

- Percentage = (Value / Total Value) × 100
- A percentage is a fraction where the denominator is always 100.

Example: Find 25% of 200.
Solution: (25/100) × 200 = 50.

2. Percentage Increase/Decrease

Formula:

- **Increase:** New Value = Old Value × (1 + a/100)
- **Decrease:** New Value = Old Value × (1 - a/100)

Example: If price increases by 20%, how much should consumption decrease to keep expenditure the same?
Solution: (20/120) × 100 = 16.67% decrease.

3. Population Formula

Formula:

- **Future Population (after n years):**
  $P = P_0 \times (1 + \frac{r}{100})^n$
- **Past Population (before n years):**
  $P = P_0 \times (1 - \frac{r}{100})^n$

Example: A town's population is 10,000 and increases by 5% annually. Find the population after 2 years.

Solution: 10000 × (1.05)^2 = 11025.

4. Successive Percentage Change

Formula:

- Net Change = x + y + (xy / 100)

Example: If a number increases by 10% and then decreases by 10%, what is the net effect?
Solution: (10 × 10) / 100 = 1%. Net decrease = 1%.

5. Comparing Salaries & Incomes

Formula:

- If A's income is x% more than B's, then B's income is **(x / (100 + x)) × 100%** less than A's.

Example: A's income is 10% more than B's. Find how much % B's income is less than A's?
Solution: Required Percentage = (10/110) × 100 = 9.09%.

6. Exam Marks Calculation

Formula:

- Total Marks = (Obtained Marks + Failed Marks) × 100 / Passing Percentage

Example: If **35% is passing marks**, a student gets **135 marks** and fails by **40 marks**, find total marks.
Solution: (135 + 40) × 100 / 35 = 500 marks.

7. Performance Comparison

Formula:

- Performance = (Marks Obtained / Total Marks) × 100
- % Better Performance = (Higher % - Lower %)

Example: Rohit scored **480/600**, Mohit scored **560/800**. Who performed better?
Solution:

- Rohit: (480/600) × 100 = 80%
- Mohit: (560/800) × 100 = 70%
- Rohit performed 10% better.

8. Election Votes Calculation

Formula:

- Total Votes = (Winning Margin / Difference in % Votes) × 100

Example: If the winner got 52%, the loser 48%, and the winning margin is 98 votes, find total votes.
Solution: (98/4) × 100 = 2450 valid votes. Total votes = 2450 + 65 = 2515.

9. Area Change in a Rectangle

Formula:

- Net % Change in Area = x + y + (xy / 100)

Example: If **length increases by 30%** and **breadth by 20%**, find the % change in area.
Solution: 30 + 20 + (30×20)/100 = 56%.

10. Percentage Error

Formula:

- Percentage Error = ((Actual Value - Incorrect Value) / Actual Value) × 100

Example: A number is mistakenly **divided by 10** instead of being **multiplied by 10**. Find % error.
Solution: Error = ((100 - 1)/100) × 100 = 99%.

11. Finding the Original Fraction

Formula:

- (New Numerator / Old Numerator) = (New Denominator / Old Denominator)

Example: If numerator increases by 400% and denominator by 500%, and new fraction is 15/22, find original.
Solution: Original fraction = 9/11.

12. Comparing Three Incomes

Formula:

- A’s income compared to C = (A - C) / C × 100

Example: A earns 40% more than B, B earns 20% less than C. Find % A earns more than C.
Solution: A earns 12% more than C.

13. Expenditure Calculation

Formula:

- Expenditure Before = Expenditure After

- **Expenditure = Quantity × Price**

(For grocery price, assume **1 kg as quantity**.)

Example Set

1. A number is increased by 20% and then decreased by 20%. Find the net percentage change.
   Solution: 20 - 20 + (20×20)/100 = -4% (Net decrease)
2. A's salary is 25% more than B's. How much percent is B's salary less than A's?
   Solution: (25/125) × 100 = 20%.
3. A sells a product at 20% profit. Find cost price if selling price is ₹120.
   Solution: CP = 120 × 100 / 120 = ₹100.
4. The population of a city increases by 10% annually. Find population after 2 years if current population is 5000.
   Solution: 5000 × (1.1)^2 = 6050.
5. A person spends 80% of his income. If his income increases by 25%, find the % increase in savings.
   Solution: Savings increase by 125%.
6. If the price of an article is reduced by 20%, by how much should consumption increase to keep expenditure same?
   Solution: (20 / (100 - 20)) × 100 = 25% increase.
7. A student secured 45% marks in an exam and failed by 20 marks. The pass percentage is 50%. Find total marks.
   Solution: Total marks = (20 / (50 - 45)) × 100 = 400.
8. If the length of a rectangle is increased by 25% and breadth decreased by 20%, find % change in area.
   Solution: 25 - 20 + (25 × -20)/100 = 0% (No change).