Direct Proportion

Understanding of Direct Proportion

- Two quantities are said to be in direct proportion when an increase in one quantity results in a proportional increase in the other, and a decrease results in a proportional decrease.
- If x and y are two quantities, then $\frac{x}{y}$ = constant or $\frac{x_1}{y_1} = \frac{x_2}{y_2}$.
- In direct proportion, the ratio of the two quantities remains the same.

Important Points

- If $\frac{x}{y}$ = k (constant), then x and y are in direct proportion.
- More x means more y, and less x means less y.
- Graph of direct proportion is a straight line passing through the origin.
- **Formula used:** $\frac{x_1}{y_1} = \frac{x_2}{y_2}$.
- Cross multiplication can be used to find missing values.

Examples with Solutions

Example: Basic Direct Proportion Problem

➢ **If 3 pens cost ₹15, find the cost of 5 pens.**

Solution: $\frac{3}{15} = \frac{5}{x}$

Cross-multiplying: 3x = 75 → x = 25

Cost of 5 pens = ₹25

Example: Time and Work

➢ **If 8 men can build a wall in 15 days, how many days will 16 men take?**

Solution: Men and days in inverse proportion (but if keeping work constant, more men, fewer days)

Here, it's better considered under inverse proportion, so skip this — focus on direct proportion

(For direct proportion: e.g., more distance, more time at same speed.)

Example (correct):

- **If 10 m of cloth costs ₹250, find the cost of 18 m.**

Solution: $\frac{10}{250} = \frac{18}{x}$

Cross-multiplying: 10x = 250 × 18

x = 450

Cost of 18 m cloth = ₹450

Example: Fuel Consumption

- **A car consumes 12 litres of petrol to travel 180 km. How much petrol is needed to travel 300 km?**

Solution: $\frac{12}{180} = \frac{x}{300}$

Cross-multiplying: 180x = 12×300

x = 20 litres

Example: Price and Quantity

- **If 4 kg of apples cost ₹200, find the cost of 7 kg of apples.**

Solution: $\frac{4}{200} = \frac{7}{x}$

Cross-multiplying: 4x = 1400

x = 350

Cost of 7 kg apples = ₹350

Example: Distance and Time at Constant Speed

- **A train covers 120 km in 3 hours. How long will it take to cover 200 km at the same speed?**

Solution: $\frac{120}{3} = \frac{200}{x}$

Cross-multiplying: 120x = 600

x = 5 hours

Summary Points

- In direct proportion, $\frac{x}{y}$ remains constant.
- Increase in one quantity leads to increase in another.
- **Formula:** $\frac{x_1}{y_1} = \frac{x_2}{y_2}$
- Use cross multiplication to solve quickly.
- Graph between x and y is a straight line through origin.