Unit 8 · Unitary Method

STUDY NOTES

Key terms

Unit cost (**rate**): the price of **one** thing, or one unit of it: 1 kg, 1 liter, 1 piece, 1 dozen.

Total cost: the price of all the things together.

Unitary method: from the value of some, find the value of **one**, then of any number (unit = "one").

Formulas

Total cost = Unit cost × Number of items	one → many **Use:** multiply
Unit cost = Total cost ÷ Number of items	many → one **Use:** divide
Number of items = Total cost ÷ Unit cost	how many for the money **Use:** divide

The method

1. **divide** to find the value of **one**
2. **multiply** to find the value of the number wanted

- 3 copies Rs 270 → 1 copy 270 ÷ 3 = Rs 90 → 5 copies 90 × 5 = **Rs 450**
- the price of one never changes; only the number it is multiplied by
- to **one** (fewer): price smaller → **divide**; to **many** (more): bigger → **multiply**
- check: is the answer bigger or smaller than the price you started with?

From the unit

Known	Through one	Wanted
1 book Rs 50		6 books: 50 × 6 = **Rs 300**
20 kg rice Rs 2,500	2500 ÷ 20 = Rs 125 a kg	
3 kg sugar, rate Rs 80		80 × 3 = **Rs 240**
5 kg flour Rs 225	225 ÷ 5 = Rs 45 a kg	
2 dozen bananas Rs 360	Rs 180 a dozen	5 dozen: **Rs 900**
7 notebooks Rs 420	Rs 60 each	3: **Rs 180**
6 balls Rs 900	Rs 150 each	10: **Rs 1,500**

- a bill
  - quantity
  - rate (unit cost)
  - amount = rate × quantity
- the unit can be a dozen, a liter, a kilogram, not only one piece
- **1 dozen = 12**: a dozen copies at Rs 45 each = 12 × 45 = Rs 540
- how many: 6 pens Rs 450 → Rs 75 each → Rs 675 buys 675 ÷ 75 = **9 pens**; 170 l in cans of 8.5 l → 20 cans
- a rate for a wanted profit: (C.P. + profit) ÷ number sold: eggs C.P. Rs 4,300 (transport too), Rs 600 profit, 350 sold → 4,900 ÷ 350 = **Rs 14** each

The better buy

- compare the price of **one**
- balls: 4 for Rs 580 → Rs 145 each, cheaper than Rs 150
- 10 balls: 2 boxes (Rs 1,160) + 2 singles (Rs 300) = Rs 1,460, Rs 40 less than Rs 1,500; 3 boxes Rs 1,740 for 12 balls
- oil: 1 liter Rs 280; 5 liters Rs 1,300 → Rs 260 a liter: cheaper a liter, but only better if all of it is used before it goes stale
- shelf labels: the pack's price and its unit price (1 kg, 1 liter, 100 g)

When it works

- only when doubling one thing really doubles the other: price and number at a fixed rate
- 1 shirt in 2 hours → 30 shirts in about 60 hours (same speed all the time)
- 3 planes flying together don't take 3 × 25 minutes: still about 25 minutes
- Grade 7: more workers → **fewer** days

Where it is used

- shop bills
- petrol pumps (price of 1 liter × liters)
- wages (daily wage × days; monthly salary × 12)

COMMON MISTAKES

✗ 3 copies Rs 270, so 1 copy = 270 × 3 = Rs 810
✓ one costs less than three: 270 ÷ 3 = Rs 90.

✗ 7 notebooks Rs 420; 3 cost 420 ÷ 3 × 7
✓ through one: 420 ÷ 7 × 3 = Rs 180.

✗ 4 kg Rs 1,000, so 1 kg = 1,000 − 4
✓ divide: Rs 250.

✗ the bigger pack is always the better buy
✓ compare unit costs, and what you need.

✗ every problem goes through one
✓ only when doubling one doubles the other.