

GRADE 11 STUDY GUIDE | 2025

Number Patterns and Finance Applications

Mathematical Literacy

1. Number Patterns

- Arithmetic (linear) sequence: constant DIFFERENCE between consecutive terms
- Geometric sequence: constant RATIO between consecutive terms
- The nth term (formula) allows calculation of any term without listing them all

$$\text{Arithmetic: } T_n = a + (n-1)d$$

Where a = first term, d = common difference

$$\text{Geometric: } T_n = a \times r^{(n-1)}$$

Where r = common ratio

Example: Sequence: 4, 7, 10, 13, ...

a = 4, d = 3. Formula: $T_n = 4 + (n-1) \times 3 = 3n + 1$

$$T_{10} = 3(10) + 1 = 31$$

2. Timetables and Schedules

- Bus, train and flight timetables use 24-hour time to avoid am/pm confusion
- Calculate travel time: subtract departure time from arrival time
- Plan journeys: check connections, allow layover time, calculate total trip time

Example: Train departs 08:45, arrives 13:20. How long is the journey?

$$13:20 - 08:45 = 4 \text{ hours } 35 \text{ minutes}$$

3. Taxation

Income Tax (PAYE)

South Africa uses a progressive tax system -- higher income earners pay a higher percentage. Tax is calculated using SARS tax tables.

- Tax-free threshold: income below a certain amount (tax rebate) is not taxed
- Marginal tax rate: rate applied to the next rand earned (not the rate on ALL income)
- Effective tax rate = Total tax paid / Total income x 100

VAT (Value-Added Tax)

$$\text{VAT-inclusive price} = \text{Original price} \times 1.15 \text{ (if VAT = 15\%)}$$

$$\text{VAT amount} = \text{VAT-inclusive price} / 1.15 \times 0.15$$

Zero-rated items in SA: basic foods (bread, milk, fruit, vegetables, eggs)

4. Cost, Break-Even and Profit

$$\text{Total cost} = \text{Fixed cost} + (\text{Variable cost per unit} \times \text{Number of units})$$

$$\text{Total revenue} = \text{Selling price per unit} \times \text{Number of units}$$

$$\text{Profit} = \text{Total revenue} - \text{Total cost}$$

$$\text{Break-even point: Total cost} = \text{Total revenue (no profit or loss)}$$

Example: Fixed cost = R5000. Variable cost = R12/unit. Selling price = R20/unit.

Break-even: $5000 + 12n = 20n \Rightarrow 8n = 5000 \Rightarrow n = 625$ units

Profit at 800 units: Revenue = $800 \times 20 = 16000$; Cost = $5000 + 800 \times 12 = 14600$; Profit = R1400