Year 8 Sequences, Functions and Graphs – Revision Notes

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Year 8 · Maths · Sequences, Functions and Straight-Line Graphs · Key ideas and worked examples

For grown-ups and learners: read each part and try the worked example. Then work through the sheets: Foundation, Developing, Challenge, then Mixed Practice to revise everything. Show your working: it earns marks in tests and helps you spot mistakes.

1. The nth term

If a sequence goes up by the same amount each time, its nth term is **an + b**. For 5, 8, 11, 14, ... the difference is 3, so the rule starts 3n. When n = 1, 3n = 3, but the first term is 5, so add 2: the nth term is **3n + 2**. A sequence that goes down by 4 has a rule starting −4n. A **term-to-term rule** says how to get from one term to the next, and works with fractions too: 1/2, 3/4, 1, 1 1/4, ... goes up by 1/4 each time. In a spatial pattern, count how many pieces each new pattern adds.

Example: The nth term of a sequence is (1/2)n − 2. Write the first four terms.
→ n = 1: −1.5; n = 2: −1
→ n = 3: −0.5; n = 4: 0
Answer: −1.5, −1, −0.5, 0

2. Functions

A **function** gives exactly one output for each input. In the machine × 3/4 then + 2, the input 8 gives 8 × 3/4 + 2 = **8**. To find an input from an output, use the **inverse** operations in reverse order: subtract 2, then multiply by 4/3.

Example: A function machine is input → × 2/3 → + 6 → output. Find the output when the input is 21.
→ 21 × 2/3 = 14
→ 14 + 6 = 20
Answer: 20

3. Straight-line graphs

Every equation y = mx + c gives a **straight line**. The number m is the **gradient**: how far the line goes up for each 1 across. Its **y-intercept** c is where the line crosses the y-axis. y = 2x − 1 has gradient 2 and crosses the y-axis at −1. Gradient = change in y ÷ change in x.

Example: Write down the gradient and the y-intercept of the line y = 4x.
→ Compare with y = mx + c: m = 4, c = 0
Answer: gradient 4, y-intercept 0

4. Real-life graphs

A taxi that charges $3 plus $2 per km has cost y = 2x + 3. When two graphs cross, both quantities are equal there: the crossing point of two cost graphs shows the distance at which both companies charge the same.

Think like a mathematician: test a few cases (**specialising**), look for the rule that always works (**generalising**), and explain why you are sure (**convincing**). When you check someone's working, say what is wrong and how to **improve** it.

Common mistakes: writing n + 3 for a sequence that goes up in 3s (it is 3n + ...). Swapping the gradient and the intercept in y = c + mx. Using inverse operations in the wrong order.