Grade 7 Mathematics: Algebra and Coding

Free sample lesson

Ontario curriculum: Mathematics (2020), Strand C: Algebra. 18 days.

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This is Lesson 1 of 12 from the full unit, exactly as it appears in the Teacher Guide, followed by the student worksheet. The full unit is at unitplans.ca.

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Lesson 1: Repeating, growing and shrinking patterns

1 day · about 60 minutes · C1.1

Learning goal

- We are learning to tell repeating, growing and shrinking patterns apart, and to compare growing patterns by how fast they grow and where they start.

Success criteria

- I can name the core of a repeating pattern and use it to find a far-away term.
- I can tell a growing or shrinking pattern from a repeating one.
- I can find the constant rate and the initial value of a linear pattern.
- I can compare two linear patterns using their rates and initial values.

Materials

- Counters or square tiles
- Chart paper
- Worksheet 1

Minds On (10 min)

1. Show 2, 5, 5, 2, 5, 5 and a tile pattern that gets bigger. Ask: "What is the same and what is different about these two patterns?"
2. Collect words on the board: repeat, grow, shrink, rule.

Action (35 min)

1. Teach the three kinds: repeating (a core repeats), growing (values go up), shrinking (values go down). Build a tile pattern with counters.
2. Define constant rate (the amount that changes each step) and initial value (what the pattern would be at figure 0). Use the tile pattern to find both.
3. Compare two gym-plan patterns: which starts higher, which grows faster, and when are they equal? Students then complete Worksheet 1.

Consolidation (15 min)

1. Discuss question 5: how do the starting value and the rate each change the story?
2. Exit: "Pattern A starts at 3 and adds 2 each step. Pattern B starts at 1 and adds 4. Which is bigger after 10 steps?"

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Questions to ask

- How do you know this is a repeating pattern and not a growing one?
- Where is the initial value in the table? What would figure 0 look like?
- Does a bigger rate always mean a bigger value?

Watch for

- Students call the first term the initial value. Show that the initial value belongs to figure 0, one step before figure 1.
- Students think a pattern that doubles has a constant rate. Compare the differences: they are not equal.

Differentiation

Support	Extend
Give tile figures and a table so students can count the change each step before writing a rule.	Ask students to invent two patterns that are equal at exactly figure 6.

Answer key: Worksheet 1: Kinds of patterns

1. A repeating pattern has the core 2, 5, 5. What is the 25th term?

   > **Answer:** 2
   > The core has 3 terms. 24 ÷ 3 leaves remainder 0, so term 25 is core term 1.

2. The tile pattern is growing. How many tiles are in Figure 6?

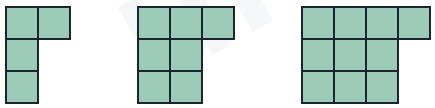


Figure 1 Figure 2 Figure 3

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   > **Answer:** 19
   > Figures 1, 2, 3 have 4, 7, 10 tiles, so the rate is 3 and figure 0 has 1. Tiles = 3n + 1, so figure 6 has 19.

3. Tell whether each pattern is repeating, growing or shrinking. For the growing or shrinking ones, say if the rate is constant. A: 4, 8, 12, 16 B: 50, 45, 40, 35 C: red, blue, red, blue, red, blue D: 2, 4, 8, 16

   > **Answer:** A: growing, adds 4 each time. B: shrinking, subtracts 5 each time. C: repeating, core is red, blue. D: growing, but not a pattern with a constant rate (the change is different each time).

4. A tank holds 120 L of water. It drains 8 L every minute. How many litres are left after 7 minutes?

> **Answer:** 64 L
> 120 − 8 × 7 = 64

5. Plan A costs $15 to join plus $4 per class. Plan B costs $5 to join plus $6 per class (made-up prices). Which plan has the greater initial value? Which grows faster? After how many classes do the plans cost the same, and what is that cost?

> **Answer:** Plan A starts higher ($15 vs $5). Plan B grows faster ($6 vs $4 per class). They are equal after 5 classes at $35 each.

6. Is the pattern 3, 6, 12, 24 a linear growing pattern? Explain.

> **Answer:** No. The differences are 3, 6, 12, so the rate is not constant.

7. A snail is 40 cm up a wall and climbs 6 cm each hour. A beetle is 10 cm up the wall and climbs 9 cm each hour (made-up). After how many hours are they at the same height?

> **Answer:** 10 hours
> Make two tables. Snail: 40, 46, 52, 58… Beetle: 10, 19, 28, 37… They meet at 10 hours, at 100 cm.

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Student worksheet: Worksheet 1: Kinds of patterns

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- I can find the constant rate and the initial value of a linear pattern.
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Show your work. Use the tile pictures to help.

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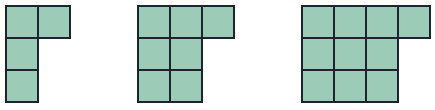


Figure 1 Figure 2 Figure 3

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