

Name _____

Date _____

9.1 Generating sequences — worksheet

Generate a sequence from its first term and a term-to-term rule, and describe the rule of a given sequence. · 64 questions · Show your working.

Remember

- A **sequence** is an ordered list; each number in it is a **term**.
- A **term-to-term rule** says how to get from one term to the next.
- To generate a sequence you need the rule **and** the first term — one without the other is not enough.
- A sequence is **linear** when the gap between terms is always the same. That gap is the **common difference**.
- To find the common difference, subtract any term from the one after it — and check the gap really is constant.
- To reach the k th term from the first, take $k - 1$ steps, not k . That off-by-one is the commonest slip.
- Not every sequence is linear: 2, 6, 18, 54 multiplies by 3; 1, 4, 9, 16 squares the position.
- Learn the square, cube and triangular numbers by sight — they come up all year.

A · Fluency — Continue the sequence, name the rule.

- 1 The sequence is 3, 7, 11, 15, 19, ... What is the next term?

- 2 The sequence is 5, 8, 11, 14, 17, ... What is the next term?

- 3 The sequence is 2, 9, 16, 23, 30, ... What is the next term?

- 4 The sequence is 10, 15, 20, 25, 30, ... What is the next term?

- 5 The sequence is 1, 7, 13, 19, 25, ... What is the next term?

- 6 The sequence is 8, 10, 12, 14, 16, ... What is the next term?

- 7 The sequence is 12, 22, 32, 42, 52, ... What is the next term?

- 8 The sequence is 7, 16, 25, 34, 43, ... What is the next term?

- 9 The sequence is 4, 15, 26, 37, 48, ... What is the next term?

- 10 The sequence is 20, 35, 50, 65, 80, ... What is the next term?

- 11 The sequence is 6, 18, 30, 42, 54, ... What is the next term?

- 12 The sequence is 9, 17, 25, 33, 41, ... What is the next term?

- 13 The sequence is 30, 26, 22, 18, 14, ... What is the next term?

- 14 The sequence is 25, 22, 19, 16, 13, ... What is the next term?

- 15 The sequence is 50, 43, 36, 29, 22, ... What is the next term?

- 16 The sequence is 18, 16, 14, 12, 10, ... What is the next term?

- 17 The sequence is 40, 34, 28, 22, 16, ... What is the next term?

- 18 The sequence is 100, 88, 76, 64, 52, ... What is the next term?

- 19 The sequence is 14, 9, 4, -1 , -6 , ... What is the next term?

- 20 The sequence is 36, 27, 18, 9, 0, ... What is the next term?

- 21 The sequence is 3, 7, 11, 15, ... What is the **term-to-term rule**? Give the number you add each time.

- 22 The sequence is 5, 8, 11, 14, ... What is the **term-to-term rule**? Give the number you add each time.

- 23 The sequence is 2, 9, 16, 23, ... What is the **term-to-term rule**? Give the number you add each time.

- 24 The sequence is 10, 15, 20, 25, ... What is the **term-to-term rule**? Give the number you add each time.

- 25 The sequence is 1, 7, 13, 19, ... What is the **term-to-term rule**? Give the number you add each time.

- 26 The sequence is 8, 10, 12, 14, ... What is the **term-to-term rule**? Give the number you add each time.

- 27 The sequence is 12, 22, 32, 42, ... What is the **term-to-term rule**? Give the number you add each time.

- 28 The sequence is 7, 16, 25, 34, ... What is the **term-to-term rule**? Give the number you add each time.

- 29 The sequence is 2, 4, 8, 16, ... What is the next term?

- 30 The sequence is 3, 9, 27, 81, ... What is the next term?

- 31 The sequence is 1, 5, 25, 125, ... What is the next term?

- 32 The sequence is 4, 8, 16, 32, ... What is the next term?

- 33 The sequence is 2, 20, 200, 2000, ... What is the next term?

- 34 The sequence is 5, 10, 20, 40, ... What is the next term?

- 35 These are the square numbers: 1, 4, 9, 16, 25, ... What is the next one?

- 36 These are the cube numbers: 1, 8, 27, 64, ... What is the next one?

- 37 These are the triangular numbers: 1, 3, 6, 10, 15, ... What is the next one?

- 38 These are the even numbers: 2, 4, 6, 8, 10, ... What is the next one?

- 39 These are the odd numbers: 1, 3, 5, 7, 9, ... What is the next one?

- 40 These are the multiples of 5: 5, 10, 15, 20, ... What is the next one?

B · Reasoning — What a rule does and does not say.

- 41 What is a **term** of a sequence?
- ☐ The rule
 - ☐ One of the numbers in it
 - ☐ The first number only
 - ☐ The gap between numbers
- 42 What does a **term-to-term rule** tell you?
- ☐ Any term directly from its position
 - ☐ How to get from one term to the next
 - ☐ The first term
 - ☐ How many terms there are
- 43 To use a term-to-term rule you always need ...
- ☐ only the rule
 - ☐ the rule and the first term
 - ☐ the position
 - ☐ nothing else
- 44 In the sequence 3, 7, 11, 15, ... what is the term-to-term rule?
- ☐ add 3
 - ☐ add 4
 - ☐ multiply by 2
 - ☐ add 5

- 45** A sequence goes 2, 6, 18, 54, ... What kind of rule is it?
- ☐ add 4
 - ☐ add a growing amount
 - ☐ multiply by 3
 - ☐ subtract 4
- 46** How can you tell a sequence is **linear**?
- ☐ It starts at 1
 - ☐ The gap between terms is always the same
 - ☐ It grows quickly
 - ☐ The terms are all whole numbers
- 47** Is 1, 4, 9, 16, 25 a linear sequence?
- ☐ Yes
 - ☐ No
- 48** Is 5, 9, 13, 17 a linear sequence?
- ☐ Yes
 - ☐ No
- 49** The first term of a sequence is 6 and the rule is “subtract 2”. What is the 4th term?
- ☐ 0
 - ☐ 2
 - ☐ 4
 - ☐ -2
- 50** Why is “add 4” not enough to describe a sequence?
- ☐ It is enough
 - ☐ Different starting numbers give different sequences
 - ☐ 4 is too small
 - ☐ You also need the last term

C · Challenge — Jumping ahead and working back.

- 51** A sequence starts at 4 and the rule is “add 6”. What is the 10th term?
- _____
- 52** A sequence starts at 100 and the rule is “subtract 7”. What is the 8th term?
- _____
- 53** The 3rd term of a linear sequence is 11 and the 4th is 15. What is the 1st term?
- _____
- 54** The 2nd term of a linear sequence is 9 and the 5th is 21. What is the term-to-term rule? Give the number added each time.
- _____
- 55** A sequence starts at 2 and doubles each time. What is the 7th term?
- _____
- 56** The 1st term is 5 and the 6th term is 30. If the sequence is linear, what is the common difference?
- _____

D · Word problems — Growth, costs and patterns.

- 57** A plant is 8 cm tall and grows 3 cm a week. How tall is it after 5 weeks, in cm?

- 58** A tank holds 200 litres and loses 15 litres a day. How much is left after 6 days, in litres?

- 59** A taxi charges \$3 to start and \$2 a kilometre. What is the cost of a 7 km trip, in dollars?

- 60** Chairs are set out in rows: 6 in row 1, 9 in row 2, 12 in row 3. How many in row 6?

- 61** A savings account starts with \$40 and \$12 is added each month. How much after 9 months, in dollars?

- 62** A pattern uses 4 sticks for 1 square, 7 for 2 squares, 10 for 3. How many sticks for 8 squares?

- 63** A bacteria colony doubles every hour, starting at 3. How many after 5 hours?

- 64** A ladder has rungs 25 cm apart, the first 30 cm off the ground. How high is the 6th rung, in cm?
