Algebra 2 · Unit 1 Worksheet

Sequences and Functions

Name: _____ Date: _____

This unit revisits functions through sequences. You will see arithmetic and geometric sequences as linear and exponential functions restricted to integer inputs, and you will write both recursive and explicit definitions.

Part A · Identify the Sequence Type

For each, identify whether the sequence is arithmetic, geometric, or neither. Then state the common difference or common ratio.

1. Classify each sequence and find the relevant constant.

a. 5, 8, 11, 14, 17, … Type: _____ d or r = _____

b. 2, 6, 18, 54, … Type: _____ d or r = _____

c. 1, 4, 9, 16, 25, … Type: _____ d or r = _____

d. 100, 50, 25, 12.5, … Type: _____ d or r = _____

e. Explain how you can decide quickly whether a sequence is arithmetic or geometric.

Part B · Recursive vs. Explicit

2. A sequence is defined by $f(1) = 3$ and $f(n) = f(n-1) + 4$ for $n \geq 2$.

a. List the first five terms.

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b. Write an EXPLICIT formula $f(n)$ for this sequence.

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c. Find $f(50)$ using your explicit formula. Show work.

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d. WHICH form (recursive or explicit) is easier to use to find $f(50)$? Why?

3. A geometric sequence has g(1) = 16 and a common ratio of 1/2.

a. Write a recursive definition for g(n) (including the domain).

b. Write an explicit definition for g(n).

c. Find g(8). Express as a fraction.

Part C · Modeling from a Pattern

4. A pattern of square tiles grows so that Step 1 has 4 tiles, Step 2 has 7 tiles, Step 3 has 10 tiles.

a. How many tiles will Step n have? Write an explicit formula.

b. What is the DOMAIN of this function? Should you include n = 0? Should you include n = 1.5? Explain.

c. Could this pattern continue forever? What does that say about whether the function is a sequence or a continuous function?

Part D · Error Analysis

5. Han wrote: "The sequence 3, 6, 12, 24 is arithmetic because each term is bigger than the last." Is Han correct?

☐ Yes ☐ No — Explain Han's misconception.

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6. Lin says the explicit formula for 5, 8, 11, 14, … is f(n) = 5 + 3n. Diego says it is f(n) = 2 + 3n.

a. Test each formula at n = 1. Which is correct?

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b. What did the OTHER student get wrong?

Part E · Representations

7. A sequence h has the table below. Complete it and represent the sequence two more ways.

a. If this is geometric with ratio 2/3, fill in the table (round to 2 decimal places).

b. Recursive definition of h:

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c. Explicit definition of h:

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n	h(n)
1	20.25
2	
3	
4	

5	

Part F · Sum of a Finite Sequence

8. On Day 1, you save $1. Each day after, you save twice the previous day's amount. How much have you saved AFTER 10 days?

a. Write the first few terms of the daily savings sequence.

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b. Set up the sum you need to compute.

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c. Compute the total. (Hint: the answer is a power of 2 minus 1.)

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d. If the savings doubled each day for a MONTH (30 days), would you trust your intuition about the total? Explain.

Part G · Open-Ended Reflection

9. Compare arithmetic and geometric sequences. Which one grows faster eventually? Give a numerical example showing one overtaking the other.

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10. Create your OWN problem situation that is best modeled by a sequence (not a continuous function). Explain why a sequence is the right model.

a. Your situation:

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b. Sequence (first 4 terms):

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c. Why a sequence and not a continuous function?
