

## UNIT 3 • LINEAR AND EXPONENTIAL FUNCTIONS

### Lesson 1: Graphs As Solution Sets and Function Notation

#### Instruction

#### Guided Practice 3.1.4

##### Example 1

Evaluate  $f(x) = 4x - 7$  over the domain  $\{1, 2, 3, 4\}$ . What is the range?

1. To evaluate  $f(x) = 4x - 7$  over the domain  $\{1, 2, 3, 4\}$ , substitute the values from the domain into  $f(x) = 4x - 7$ .

2. Evaluate  $f(1)$ .

$$f(x) = 4x - 7 \quad \text{Original function}$$

$$f(1) = 4(1) - 7 \quad \text{Substitute 1 for } x.$$

$$f(1) = 4 - 7 = -3 \quad \text{Simplify.}$$

3. Evaluate  $f(2)$ .

$$f(x) = 4x - 7 \quad \text{Original function}$$

$$f(2) = 4(2) - 7 \quad \text{Substitute 2 for } x.$$

$$f(2) = 8 - 7 = 1 \quad \text{Simplify.}$$

4. Evaluate  $f(3)$ .

$$f(x) = 4x - 7 \quad \text{Original function}$$

$$f(3) = 4(3) - 7 \quad \text{Substitute 3 for } x.$$

$$f(3) = 12 - 7 = 5 \quad \text{Simplify.}$$

5. Evaluate  $f(4)$ .

$$f(x) = 4x - 7 \quad \text{Original function}$$

$$f(4) = 4(4) - 7 \quad \text{Substitute 4 for } x.$$

$$f(4) = 16 - 7 = 9 \quad \text{Simplify.}$$

6. Collect the set of outputs from the inputs.

The range is  $\{-3, 1, 5, 9\}$ .



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#### Example 2

Evaluate  $g(x) = 3^x + 1$  over the domain  $\{0, 1, 2, 3\}$ . What is the range?

1. To evaluate  $g(x) = 3^x + 1$  over the domain  $\{0, 1, 2, 3\}$ , substitute the values from the domain into  $g(x) = 3^x + 1$ .

2. Evaluate  $g(0)$ .

$$g(x) = 3^x + 1 \quad \text{Original function}$$

$$g(0) = 3^0 + 1 \quad \text{Substitute 0 for } x.$$

$$g(0) = 1 + 1 = 2 \quad \text{Simplify.}$$

3. Evaluate  $g(1)$ .

$$g(x) = 3^x + 1 \quad \text{Original function}$$

$$g(1) = 3^1 + 1 \quad \text{Substitute 1 for } x.$$

$$g(1) = 3 + 1 = 4 \quad \text{Simplify.}$$

4. Evaluate  $g(2)$ .

$$g(x) = 3^x + 1 \quad \text{Original function}$$

$$g(2) = 3^2 + 1 \quad \text{Substitute 2 for } x.$$

$$g(2) = 9 + 1 = 10 \quad \text{Simplify.}$$

5. Evaluate  $g(3)$ .

$$g(x) = 3^x + 1 \quad \text{Original function}$$

$$g(3) = 3^3 + 1 \quad \text{Substitute 3 for } x.$$

$$g(3) = 27 + 1 = 28 \quad \text{Simplify.}$$

6. Collect the set of outputs from the inputs.

The range is  $\{2, 4, 10, 28\}$ .



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#### Example 3

Raven started an online petition calling for more vegan options in the school cafeteria. So far, the number of signatures has doubled every day. She started with 32 signatures on the first day. Raven's petition can be modeled by the function  $f(x) = 32(2)^x$ . Evaluate  $f(3)$  and interpret the results in terms of the petition.

1. Evaluate the function.

$$f(x) = 32(2)^x \quad \text{Original function}$$

$$f(3) = 32(2)^3 \quad \text{Substitute 3 for } x.$$

$$f(3) = 32(8) \quad \text{Simplify as needed.}$$

$$f(3) = 256$$



2. Interpret the results.

On day 3, the petition has 256 signatures. This is a point on the graph,  $(3, 256)$ , of the function  $f(x) = 32(2)^x$ .

