Lesson 3.1.6: Exponential Growth vs Linear Growth

Targets:

1. I understand when a situation should be represented with a linear or exponential function.

Warm Up:

What are some differences between exponential functions and linear functions?

Practice 1: The World of Oz

The population of the country of Oz was 600,000 in the year 2010. The population is expected to grow by a factor of 5% annually. The annual food supply of Oz is currently sufficient for a population of 700,000 people and is increasing at a rate which will supply food for an additional 10,000 people per year.

1. Write a formula to model the population of Oz. Is your formula linear or exponential?

2. Write a formula to model the food supply. Is the formula linear or exponential?

3. At what point does the population exceed the food supply? Justify your response.

4. If Oz doubled its current food supply (to 1.4 million), would shortages still take place? Explain.

5. If Oz doubles both its beginning food supply and doubles the rate at which the food supply increases, would food shortages still take place? Explain.

Practice 2

Do the examples below require a linear or exponential growth model? State whether each example is linear or exponential, and write an explicit formula for the sequence that models the growth for each case. Include a description of the variables you use.

1. A savings account accumulates no interest but receives a deposit of $825 per month.
    a. Linear or Exponential?

    b. Explicit Formula:

    c. Description of Variables:

2. The value of a house increases by 1.5% per year.
    a. Linear or Exponential?

    b. Explicit Formula:

    c. Description of Variables:

Exit Ticket

Do the examples below require a linear or exponential growth model? State whether each example is linear or exponential, and write an explicit formula for the sequence that models the growth for each case. Include a description of the variables you use.

1. Every year, the alligator population is $\frac{9}{7}$ of the previous year's population.
    a. Linear or Exponential?

    b. Explicit Formula:

    c. Description of Variables:

2. The temperature increases by 2° every 30 minutes from 8: 00 a.m. to 3: 30 p.m. each day for the month of July.
    a. Linear or Exponential?

    b. Explicit Formula:

    c. Description of Variables:

3. Every 240 minutes, $\frac{1}{3}$ of the rodent population dies.
    a. Linear or Exponential?

    b. Explicit Formula:

    c. Description of Variables: