Unit 5 Lesson 18: Expressed in Different Ways

1 Math Talk: Equal Expressions (Warm up)

Student Task Statement

Decide if each expression is equal to $(1.21)^{100}$.

$\left((1.21)^{10}\right)^{10}$

$\left((1.21)^{50}\right)^{50}$

$\left((1.1)^{2}\right)^{100}$

$(1.1)^{200}$

2 Population Projections

Student Task Statement

1. From 1790 to 1860, the United States population, in thousands, is modeled by the equation $P = 4{,}000 \cdot (1.031)^t$ where t is the number of years since 1790.

   a. About how many people were living in the U.S. in 1790? What about in 1860? Show your reasoning.

   b. What is the approximate annual percent increase predicted by the model?

   c. What does the model predict for the population in 2017? Is it accurate? Explain.

2. a. What percent increase does the model predict each decade? Explain.

   b. Suppose d represents the number of *decades* since 1790. Write an equation for P in terms of d modeling the population in the US (in thousands).

3. a. What percent increase does the model predict each century? Explain.

   b. Suppose c represents the number of centuries since 1790. Write an equation for P in terms of c modeling the population in the United States (in thousands).

3 Interest Calculations

Student Task Statement

Here are three expressions and three descriptions. In each case, $1,000 has been put in an interest-bearing bank account. No withdrawals or other deposits (aside from the earned interest) are made for 6 years.

- $1{,}000 \cdot \left(1 + \dfrac{0.07}{12}\right)^{72}$

- $1{,}000 \cdot \left(1 + \dfrac{0.07}{2}\right)^{12}$

- $1{,}000 \cdot \left(\left(1 + \dfrac{0.07}{12}\right)^{12}\right)^{6}$

- 7% annual interest compounded semi-annually

- 7% annual interest compounded monthly

- 7% annual interest compounded every two months

Sort the expressions and descriptions that represent the same amounts of interest into groups. One group contains more than two expressions. One of the descriptions does not have a match. Write an expression that matches it.