

Lesson 18 Practice Problems

1. For each growth rate, find the associated growth factor.
 - a. 30% increase
 - b. 30% decrease
 - c. 2% increase
 - d. 2% decrease
 - e. 0.04% increase
 - f. 0.04% decrease
 - g. 100% increase

2. In 1990, the population p of India was about 870.5 million people. By 1995, there were about 960.9 million people. The equation $p = 870.5 \cdot (1.021)^t$ approximates the number of people, in millions, in terms of the number of years t since 1990.
 - a. By what factor does the number of people grow in one year?
 - b. If d is time in decades, write an equation expressing the number of people in millions, p , in terms of decades, d , since 1990.
 - c. Use the model $p = 870.5 \cdot (1.021)^t$ to predict the number of people in India in 2015.
 - d. The 2015, the population of India was 1,311 million. How does this compare with the predicted number?

3. An investor paid \$156,000 for a condominium in Texas in 2008. The value of the homes in the neighborhood have been appreciating by about 12% annually.

Select **all** the expressions that could be used to calculate the value of the house, in dollars, after t years.

- A. $156,000 \cdot (0.12)^t$
- B. $156,000 \cdot (1.12)^t$
- C. $156,000 \cdot (1 + 0.12)^t$
- D. $156,000 \cdot (1 - 0.12)^t$
- E. $156,000 \cdot \left(1 + \frac{0.12}{12}\right)^t$

4. A credit card has a nominal annual interest rate of 18%, and interest is compounded monthly. The cardholder uses the card to make a \$30 purchase.

Which expression represents the balance on the card after 5 years, in dollars, assuming no further charges or payments are made?

- A. $30(1 + 18)^5$
- B. $30(1 + 0.18)^5$
- C. $30\left(1 + \frac{0.18}{12}\right)^5$
- D. $30\left(1 + \frac{0.18}{12}\right)^{5 \cdot 12}$

5. The expression $1,500 \cdot (1.085)^3$ represents an account balance in dollars after three years with an initial deposit of \$1,500. The account pays 8.5% interest, compounded annually for three years.

- a. Explain how the expression would change if the bank had compounded the interest quarterly for the three years.
- b. Write a new expression to represent the account balance, in dollars, if interest is compounded quarterly.

6. The function, f , defined by $f(t) = 1,000 \cdot (1.07)^t$, represents the amount of money in a bank account t years after it was opened.

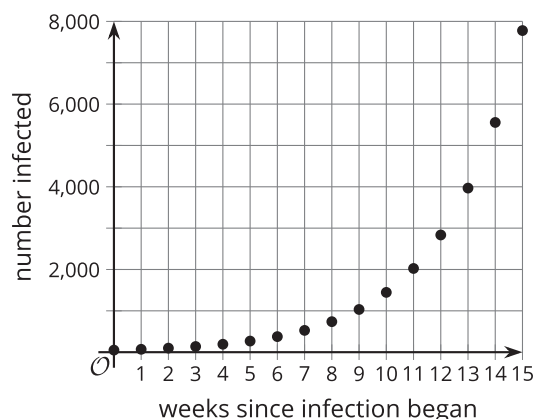
- a. How much money was in the account when it was opened?
- b. Sketch a graph of f .

c. When does the account value reach \$2,000?

(From Unit 5, Lesson 9.)

7. The graph shows the number of patients with an infectious disease over a period of 15 weeks.

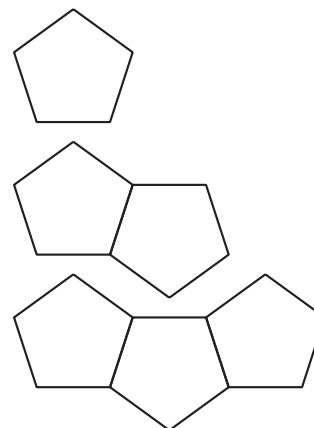
- a. Give an example of a domain for which the average rate of change is a good measure of how the function changes.
- b. Give an example of a domain for which the average rate of change is not a good measure of how the function changes.



(From Unit 5, Lesson 10.)

8. A party will have pentagonal tables placed together. The number of people, P , who can sit at the tables is a function of the number of tables, n .

- a. Explain why the equation $P = 3n + 2$ defines this function.
- b. How many tables are needed if 47 people come to the party?
- c. How many tables are needed if 99 people come to the party?
- d. Write the inverse of this function and explain what the inverse function tells us.



(From Unit 4, Lesson 16.)