1.7 Modeling with Functions

Target 1E: Model real world situations and use regressions with the use of functions

Review of Prior Concepts

- 1. Write as a mathematical expression: five less than twice a number
- **2.** A small company has \$1000 to distribute to its employees as a bonus. Write a mathematical expression for how much money each employee will get.

More Practice

Writing Mathematical Expressions

https://www.khanacademy.org/math/algebra-basics/core-algebra-expressions/core-algebra-variables-and-expressions/v/writing-expressions-1

http://www.learnnc.org/lp/media/uploads/2008/08/9writing_expressions.pdf

https://www.youtube.com/watch?v=CfUvzKZgPJQ

SAT Connection

Heart of Algebra

1. Create, solve, or interpret a linear expression or equation in one variable

Example:

If 16 + 4x is 10 more than 14, what is the value of 8x?

- A) 2
- B) 6
- C) 16
- D) 80

Solution

Change English Statements into Mathematical Expression

Write a mathematical expression for the quantity described verbally.
(An expression has no equal sign, and, therefore, can NOT be solved.)

Example 1:

- a) A number x decreased by six and then doubled.
- b) A salary after a 4.4% increase, if the original salary is x dollars.

Write Equations to Model Given Situations

• Write an equation for each of the following statements.

Example 2:

a) One leg of a right triangle is three times as long as the other. Write the length of the hypotenuse as a function of the length of the shorter leg.

b) The diameter of a right circular cylinder equals half its height. Write the volume of the cylinder as a function of its height. The volume of a right circular cylinder is given by $V = \pi r^2 h$.

Use Equations to Solve Percentage and Mixture Problems

- o For each statement below, do the following:
 - 1. Write an equation (be sure to define any variables used).
 - 2. Solve the equation, and answer the question.

Example 3:

a) One positive number is twice another positive number. The sum of the two numbers is 390. Find the two numbers.

b) Joe Pearlman received a 3.5% pay decrease. His salary after the decrease was \$27,985. What was his salary before the decrease?

c) Jackie has \$25,000 to invest. She invests part of the money at 5.5% annual interest and the remaining balance at 8.3% annual interest. How much is invested at each rate if Jackie receives a 1-year interest payment of \$1571?

d) The chemistry lab at the University of Ellannoy keeps two acid solutions on hand. One is 20% acid and the other is 35% acid. How much 20% acid solution and how much 35% acid solution should be used to prepare 25 liters of a 26% acid solution?

More Practice

Modeling with Functions

http://cims.nyu.edu/~kiryl/Precalculus/Section_1.6-

Modeling%20with%20Equations/Modeling%20with%20Equations.pdf

https://socratic.org/precalculus/functions-defined-and-notation/modeling-with-functions

SAT Connection

Solution

Choice C is correct. The description "16 + 4x is 10 more than 14" can be written as the equation 16 + 4x = 10 + 14, which is equivalent to 16 + 4x = 24. Subtracting 16 from each side of 16 + 4x = 24 gives 4x = 8. Since 8x is 2 times 4x, multiplying both sides of 4x = 8 by 2 gives 8x = 16. Therefore, the value of 8x is 16.

Choice A is incorrect because it is the value of x, not 8x. Choices B and D are incorrect; those choices may be a result of errors in rewriting 16 + 4x = 10 + 14. For example, choice D could be the result of subtracting 16 from the left side of the equation and adding 16 to the right side of 16 + 4x = 10 + 14, giving 4x = 40 and 8x = 80.