

**1.6 Modeling with Functions**

Target 1F: 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](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**

- 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) Investment returns Jackie invests \$25,000 part at 5.5% annual interest and the 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 Ellanoy keeps two acid solutions on hand. One is 20% acid and the other is 35% acid. How much 20% 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-](http://cims.nyu.edu/~kiryl/Precalculus/Section_1.6-)

[Modeling%20with%20Equations/Modeling%20with%20Equations.pdf](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>

**Homework Assignment**

p.152 #5,6,15,16,18,19,33,37

**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  $8x = 80$ .