SECONDARY MATH 2

**CORE STANDARDS**

II.2.F.IF.5

II.3.A.SSE.3

II.3.A.SSE.1

LESSON

**2-5**

OBJECTIVE **1. SWBAT use properties of functions to solve real-world problems.**

**2. SWBAT identify and create equivalent forms of expressions.**

Modeling with Functions

Functions can be useful models of real-world phenomena. Here are a few examples.

* Linear Functions
  + Use to model things with constant or fixed rates of change.
* Quadratic Functions
  + Use to model the height of falling objects.
  + Use to model area of shapes.
* Exponential Functions
  + Use to model population growth.
  + Use to model financial growth with compound interest.

Can you think of more examples?

NOTES

EXAMPLES

1. The height of a football for a certain throw to a receiver can be modeled by , where *t* is time in seconds and  is the ball’s height in feet.
   1. What is the height of the ball at the moment it is thrown (*t* = 0 sec.)?
   2. Identify the vertex of the model. What does each coordinate of the vertex represent in context?
2. For home repair service, a plumber charges a flat fee of $50 for a visit plus $80 per hour for labor.
   1. Write a function to model the total cost of a repair for *h* hours spent on labor.
   2. If your bill was $610, how long was the plumber working on your repair?
3. The model  is used to calculate the amount of money in account *t* years after an initial deposit of $2000 is made. The account pays 3% interest, compounded annually.
   1. What is the account balance at the end of year 5?
   2. Create a similar model for an account with an initial deposit of $350 that pays 6.5%, compounded annually.
4. Equivalent Forms Show algebraically why each pair of expressions is equivalent.
   1.  B.  C.  D. 

PRACTICE **2-5** NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. John wants to order some golf balls. A certain website will sell slightly used golf balls for $0.79 each. There is a flat fee of $10 for shipping for any quantity up to 500 golf balls.
   1. Write a model for the total cost of ordering *n* used golf balls.
   2. What is the maximum number of golf balls John can buy with $100? (He cannot buy fractions of balls.)

h

2h

1. Write a function to model the area of a triangle whose base is twice its height.

(Area formula for a triangle: )

1. Based on recent data, the U.S. population can be approximately modeled by , where *t* is the number of years since 2000 (i.e., *t* = 0 corresponds to 2000), and  is the population in millions of people.
   1. According to the model, what should the U.S. population have been in 2012?
   2. How does your answer in part A compare to the actual U.S. population in 2012? (Try an online search for “US population 2012”).
   3. What is the model’s prediction for this year’s population?
2. Super-spy J.B. is on the roof of a 500-ft-tall building where a bomb will explode in 3 seconds. Luckily he is wearing a parachute. As he leaps off the edge, his height above the ground in feet for *t* seconds after he jumps is modeled by . (That is, while he free-falls, before he opens the parachute.)
   1. Identify the vertex and interpret its meaning in context.
   2. How far below the blast will J.B. have fallen when the bomb explodes (@ *t* = 3 seconds)?
3. Which of the following is an equivalent form of ? (Circle ALL that are equivalent.)
   1.  B.  C.  D.  E. 
4. Which of the following is an equivalent form of ? (Circle ALL that are equivalent.)
   1.  B.  C.  D.  E. 
5. Write a function that models the volume of a rectangular prism (box) whose height is 3 times the width and whose length is 10 units more than the width. (Use )