

Lesson 3: Analyzing a Verbal Description

Classwork

Read the example problems below and discuss a problem-solving strategy with a partner or small group.

Example 1

Gregory plans to purchase a video game player. He has \$500 in his savings account and plans to save \$20 per week from his allowance until he has enough money to buy the player. He needs to figure out how long it will take. What type of function should he use to model this problem? Justify your answer mathematically.

Example 2

One of the highlights in a car show event is a car driving up a ramp and flying over approximately five cars placed end-to-end. The ramp is 8 ft at its highest point, and there is an upward speed of 88 ft/sec before it leaves the top of the ramp. What type of function can best model the height, h , in feet, of the car t seconds after leaving the end of the ramp? Justify your answer mathematically.

Example 3

Margie got \$1,000 from her grandmother to start her college fund. She is opening a new savings account and finds out that her bank offers a 2% annual interest rate, compounded monthly. What type of function would best represent the amount of money in Margie's account? Justify your answer mathematically.

- a. What type of function models the height (h , in feet) of the ball after t seconds?
- b. Explain what is happening to the height of the ball as it travels over a period of time (in t seconds).
- c. What function models the height, h (in feet), of the ball over a period of time (in t seconds)?
4. A population of insects is known to triple in size every month. At the beginning of a scientific research project, there were 200 insects.
- a. What type of function models the population of the insects after t years?
- b. Write a function that models the population growth of the insects after t years.

Lesson Summary

The following methods can be used to recognize a function type from a word problem:

1. If a problem requires repeated addition or subtraction of a constant value, then it is represented by a linear function.
2. If a problem involves free-falling motion of an object or an area, then it is represented by a quadratic function.
3. If a problem is about population growth or compound interest, then it is represented by an exponential function.

Problem Set

1. The costs to purchase school spirit posters are as follows: two posters for \$5, four posters for \$9, six posters for \$13, eight posters for \$17, and so on.
 - a. What type of function would best represent the cost of the total number of posters purchased?
 - b. What function represents the cost of the total number of posters purchased? How did you know? Justify your reasoning.
 - c. If you have \$40 to spend, write an inequality to find the maximum number of posters you could buy.
2. NYC Sports Gym had 425 members in 2011. Based on statistics, the total number of memberships increases by 2% annually.
 - a. What type of function models the total number of memberships in this situation?
 - b. If the trend continues, what function represents the total number of memberships in n years? How did you know? Justify your reasoning.
3. Derek throws a baseball upward from an initial height of 3 ft. The baseball hits the ground after 2 seconds.
 - a. What was the initial velocity of the baseball?
 - b. What is the function that models the height, h (in feet), of the baseball over a period of time t (in seconds)?
 - c. At what time did the baseball reach its maximum height? What was the maximum height of the baseball?