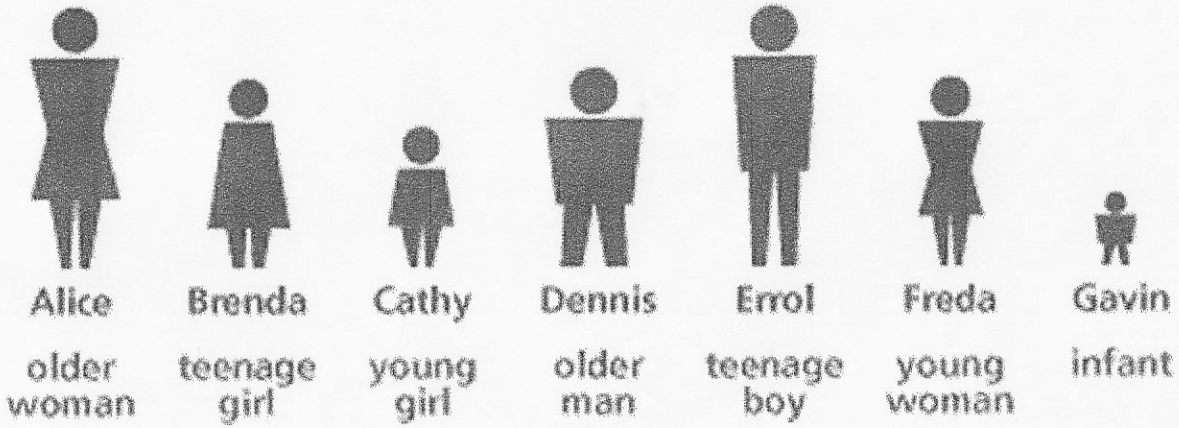
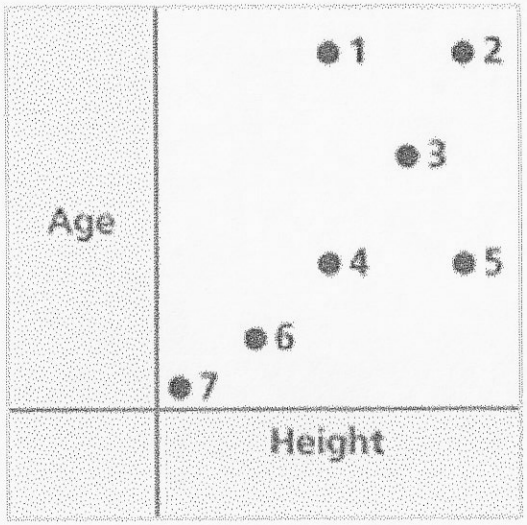
The Bus Stop

Look at the graph below. Who is represented by each point?

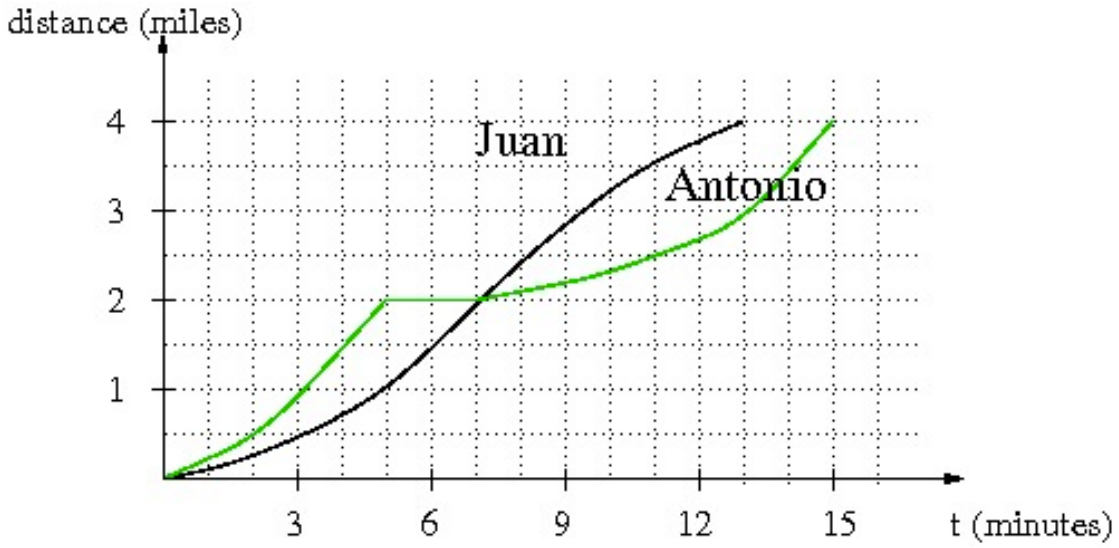




From The Language of Functions and Graphs, *by Malcolm Swan and the Shell Centre Team (Nottingham, U.K.: Shell Centre Publications, 1999).*

8.F Bike Race

Antonio and Juan are in a 4-mile bike race. The graph below shows the distance of each racer (in miles) as a function of time (in minutes).



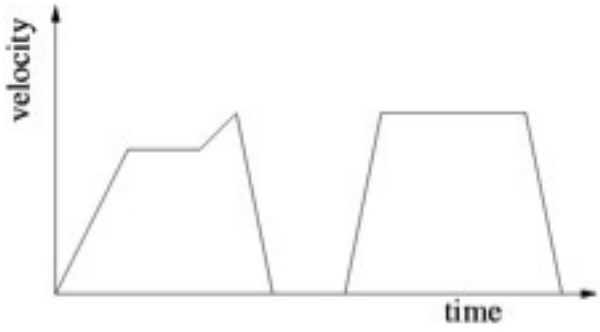
a. Who wins the race? How do you know?

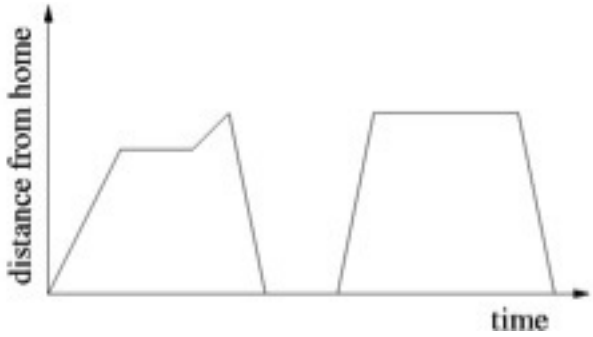
b. Imagine you were watching the race and had to announce it over the radio, write a little story describing the race.

www.illustrativemathematics.org

8.F Velocity vs. Distance

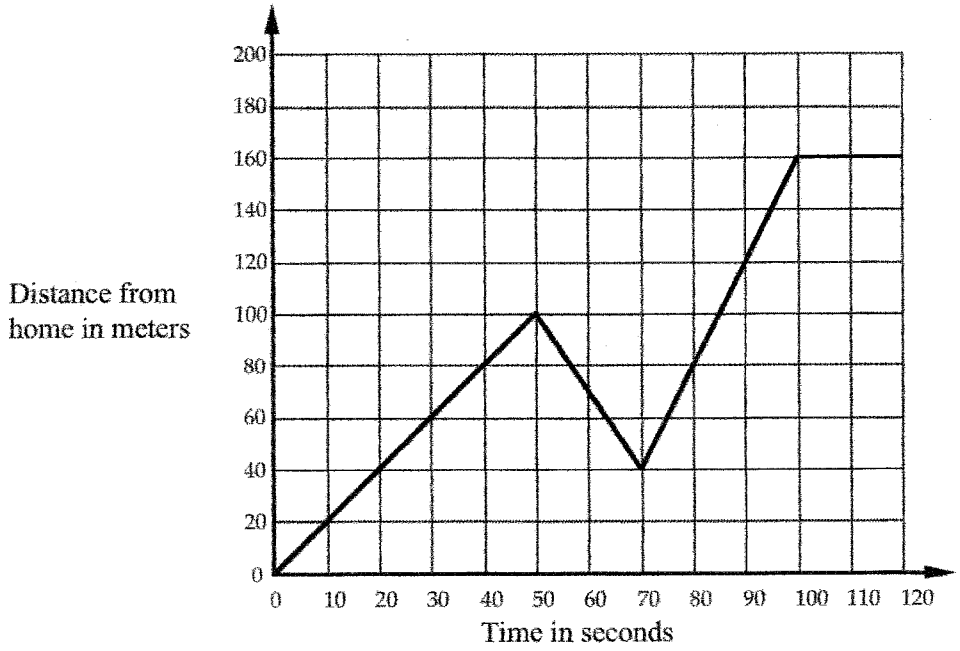
Below are two graphs that look the same. Note from the axis labels that the first graph shows the velocity of a car as a function of time and the second graph shows the distance of the car from home as a function of time. Describe what someone who observes the car's movement would see in each case.





Journey to the Bus Stop

Every morning Tom walks along a straight road from his home to a bus stop, a distance of 160 meters. The graph shows his journey on one particular day.



1. Describe what may have happened.
   You should include details like how fast he walked.

.....

.....

.....

.....

.....

.....

.....

2. Are all sections of the graph realistic? Fully explain your answer.

.....

.....

.....

.....

© 2012 MARS, Shell Center, University of Nottingham

F-IF Yam in the Oven

You put a yam in the oven. After 45 minutes, you take it out. Let $f(t)$ be the temperature of the yam t minutes after you placed it in the oven.

In (a)–(d), explain the meaning of the statement in everyday language.

a. $f(0) = 65$

b. $f(5) < f(10)$

c. $f(40) = f(45)$

d. $f(45) > f(60)$

www.illustrativemathematics.org

7.RP Walk-a-thon 2

Julianna participated in a walk-a-thon to raise money for cancer research. She recorded the total distance she walked at several different points in time, but a few of the entries got smudged and can no longer be read. The times and distances that can still be read are listed in the table below.

c. Assume Julianna walked at a constant speed. Complete the table and plot Julianna's progress in the coordinate plane.

d. What was Julianna's walking rate in miles per hour? How long did it take Julianna to walk one mile? Where do you see this information on the graph?

e. Write an equation for the distance d , in miles, that Julianna walked in n hours.

f. Next year Julianna is planning to walk for seven hours. If she walks at the same speed next year, how many miles will she walk?

Time in hrs	**Miles walked**
1	
2	6.4
	8
5	

8.F Chicken and Steak, Variation 1

You have $100 to spend on a barbeque where you want to serve chicken and steak. Chicken costs $1.29 per pound and steak costs $3.49 per pound.

a. Find a function that relates the amount of chicken and the amount of steak you can buy.

b. Graph the function. What is the meaning of each intercept in this context? What is the meaning of the slope in this context? Use this (and any other information represented by the equation or graph) to discuss what your options are for the amounts of chicken and amount of steak you can buy for the barbeque.

8.F Baseball Cards

A student has had a collection of baseball cards for several years. Suppose that B, the number of cards in the collection, can be described as a function of t, which is time in years since the collection was started. Explain what each of the following equations would tell us about the number of cards in the collection over time.

g. $B=200+100t$

h. $B=100+200t$

i. $B=2000-100t$

j. $B=100-200t$

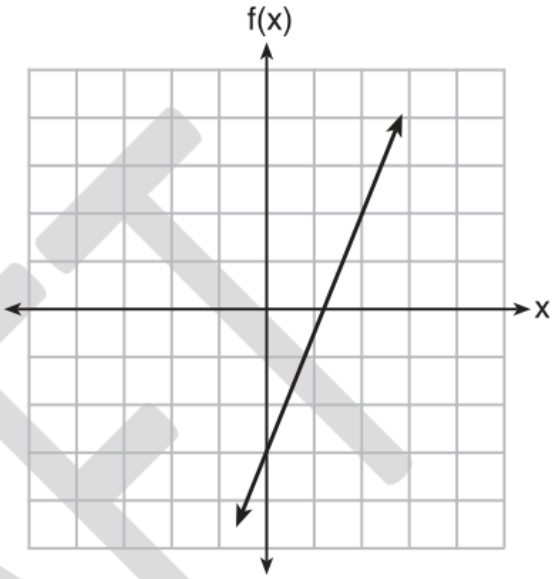
11 Of the four linear functions represented below, which has the greatest rate of change?

(A) A number, y, is two less than twice a number, x.

(B) $3y - 4x = 3$

(C)

x	h(x)
–6	–10
–3	–3
3	11



(D)

DRAFT

NY State Testing Program: Mathematics Common Core Sample Questions Grade 8
(http://www.p12.nysed.gov/assessment/common-core-sample-questions/math-grade-8.pdf)

A Lesson in Exponential Growth

If you could fold a piece of paper in half, and then in half again, continuously….how many times do you think you'd have to fold it before the thickness of the paper was as least as great as the distance to the moon???? (Assume the paper is .01 cm thick. The mean distance to the moon is 238,856 mi. There are 2.54 cm in an inch approximately.)

What's your guess? _____folds

Use your calculator to simulate this folding process. What did you find?

What equation would model this situation?

F-IF, A-REI Springboard Dive

Suppose $h(t)=-5t^2+10t+3$ is an expression giving the height of a diver above the water (in meters), t seconds after the diver leaves the springboard.

a. How high above the water is the springboard? Explain how you know.

b. When does the diver hit the water?

c. At what time on the diver's descent toward the water is the diver again at the same height as the springboard?

d. When does the diver reach the peak of the dive?

F-LE Linear or exponential?

In (a)–(e), say whether the quantity is changing in a linear or exponential fashion.

a. A savings account, which earns no interest, receives a deposit of $723 per month.

b. The value of a machine depreciates by 17% per year.

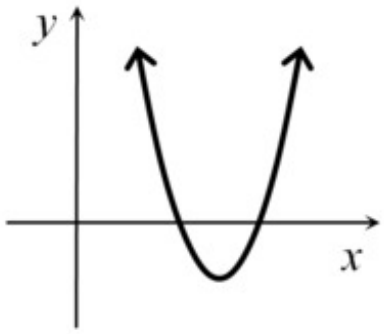
c. Every week, $9/10$ of a radioactive substance remains from the beginning of the week.

d. A liter of water evaporates from a swimming pool every day.

e. Every 124 minutes, $1/2$ of a drug dosage remains in the body.

F-IF Which Function?

Which of the following could be the function of a real variable whose graph is shown below? Explain.



$f_1(x) = (x+12)^2 + 4$

$f_2(x) = -(x-2)^2 - 1$

$f_3(x) = (x+18)^2 - 40$

$f_4(x) = (x-12)^2 - 9$

$f_5(x) = -4(x+2)(x+3)$

$f_6(x) = (x+4)(x-6)$

$f_7(x) = (x-12)(-x+18)$

$f_8(x) = (24-x)(40-x)$

F-BF Temperatures in degrees Fahrenheit and Celsius

Let f be the function that assigns to a temperature in degrees Celsius its equivalent in degrees Fahrenheit.

a. The freezing point of water in degrees Celsius is 0 while in degrees Fahrenheit it is 32. The boiling point of water is 100 degrees Celsius and 212 degrees Fahrenheit. Given that the function f is linear, use this information to find an equation for f .

b. Find the inverse of the function f and explain its meaning in terms of temperature conversions.

c. Is there a temperature which is the same in degrees Celsius and in degrees Fahrenheit? Explain how you know.

PAINTED CUBES

(Adapted from Driscoll, M. (1999). *Fostering Algebraic Thinking.* Portsmouth: Heinemann.)

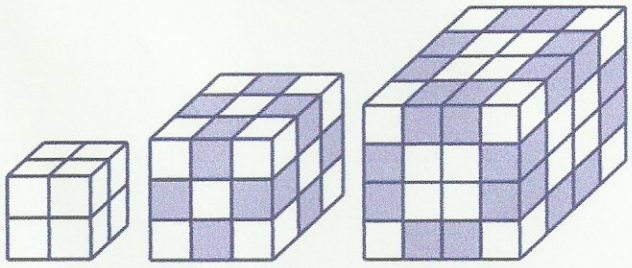
Each larger cube below is made up of smaller cubes. Someone decided to create a pattern by painting the smaller cubes that have ONLY two exposed faces in a different color. Examine the pattern and work together to complete each of the following tasks. You should use this paper to record notes and ideas; however, you will work as a group to create a poster with all of the information described below.

1. Discuss how many smaller cubes will be painted in the different color for the next larger cube.

2. Create a table relating the cube # to the total # of cubes with two faces painted in a different color.

3. Determine an equation relating the cube # to the total # of cubes with two faces painted in a different color; write your equation using function notation and explain how you arrived at your equation.

4. Create a graph showing the relationship between the cube # to the total # of cubes with two faces painted in a different color.

5. Select one coordinate pair from your table. Identify the same coordinate pair in the figures, the equation, and the graph.

6. Explain the relationship between the table, equation, and graph.