Unit 5 (Part 2) Proportion Functions

1. Since light travels much faster than sound, during a thunderstorm you see lightning before you hear the corresponding thunder. The distance d between you and the center of a storm is directly proportional to the amount of time t that goes by between seeing the lightning and hearing the thunder. Suppose it takes 5 seconds to hear the thunder from a storm that is $5,400$ feet away.

a. If it takes less than 5 seconds to hear the thunder from a storm, should you expect the storm to be more than $5,400$ feet away, or less than $5,400$ feet away ?

b. If it takes more than 5 seconds to hear the thunder from a storm, should you expect the storm to be more than $5,400$ feet away, or less than $5,400$ feet away ?

c. Find the constant of proportionality k.

d. Write the symbol rule for the function that relates the distance d between you and the center of a storm to the amount of time t that goes by between seeing the lightning and hearing the thunder.

e. Evaluate $d(7)$ and interpret this value using a complete sentence.

f. Sketch a good graph of the function d.

2. The number of ounces of chocolate chips called for in a cookie recipe is directly proportional to the number of cookies the recipe makes. The recipe calls for 16 oz of chips to make 36 cookies. Assume N is the number of ounces of chocolate chips needed to make c cookies.

a. Find the constant of proportionality k.

b. Write the symbol rule for the function N.

c. Find the number of ounces of chips needed to make 100 cookies.
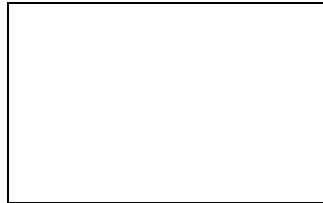
d. Sketch a good graph of the function N.

3. The number of professors at Buffalo Bayou University is required by university policy to be directly proportional to the number of students enrolled. This policy currently states that there should be at least one professor for every 22 students. Let P be the number of professors required if there are s students enrolled.

a. Find the constant of proportionality k.

b. Write the symbol rule for the function P.

c. At least how many professors are needed to accommodate the current enrollment of $8,790$ students at BBU?

d. Sketch a good graph of the function P.

4 Show that if the quantity y is directly proportional to the quantity x, then the quotient of the two quantities (either y/x or x/y) is always a constant value.

5 Show that if the quantity y is inversely proportional to the quantity x, then the product of the two quantities xy is always a constant value.