

## The Constant of Proportionality or Unit Rate

Two varying quantities  $A$  and  $B$  are in a proportional relationship when their ratio  $A/B$  is constant. When this happens, we also say that  $A$  is proportional to  $B$ . Work in pairs:

1. Ivette has two siblings and Kathy has five siblings. Does it make sense to say that the number of siblings Ivette has is proportional to the number of siblings Kathy has?
2. If a quantity  $A$  is proportional to a quantity  $B$ , is  $B$  also proportional to  $A$ ? If so, the ratio of  $B$  to  $A$  is also constant. How is this ratio related to the ratio of  $A$  to  $B$ ?

When  $A$  is proportional to  $B$ , the constant ratio  $k = A/B$  is called the constant of proportionality. If the units of quantity  $A$  are different from the units of quantity  $B$ , then it can also be called the unit rate.

3. Why do you think it is called unit rate?
4. For each of the following pairs of quantities, decide whether or not they are in a proportional relationship. If they are, write down the meaning of the constant of proportionality or unit rate.
  - a. The number of sheets in a stack of a certain type of paper and the height of the stack.
  - b. The hours that Ben works at Burger King and the money he makes from that work.
  - c. Your age and your partner's age.
  - d. The price of a watermelon and its weight.
  - e. The distance between cities in a given map and the actual distance in the real world.
  - f. The measurement of a length in centimeters, and the same measurement in inches.