**Section 2–2: Direct Variation**

Some quantities are in a relationship where the ratio of corresponding values is constant. You can write a formula for a **direct variation** function as , or , where . *x* represents input values, and *y* represents output values. The formula says that, except for , the ratio of all output-input pairs equals the constant *k*, the **constant of variation**.

**Example 1: Identifying Direct Variation From Tables**

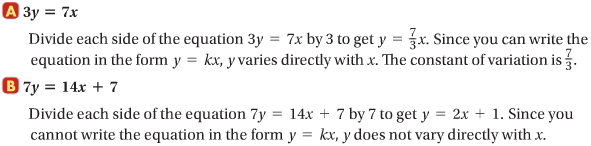
For each function, determine whether *y* varies directly with *x*. If so, what is the constant of variation and the function rule ()?



1. Since all the from the table equals to the same value, therefore, *y* varies directly with *x*. The constant of variation, *k*, is 2. The function value is .
2. Since all the from the table doesn’t equals to the same value (not constant), therefore, *y* does not vary directly with *x*.

**Example 2: Identifying Direct Variation From Equations**

For each function, determine whether *y* varies directly with *x*. If so, what is the constant of variation?



**Hint (recall):** if you rewrite the original function into form and *b* exists, then *y* does not vary directly with *x*.

In a direct variation, is the same for all pairs of data where . So, is true for the ordered pairs and , where neither nor is zero.

**direction variation: where and**

**Example 3: Using a Proportion to Solve a Direct Variation**

Suppose *y* varies directly with *x*, and when . What is *y* when ?

Write the cross products.

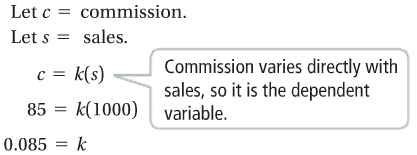
Divide each side by .

Simplify and solve.

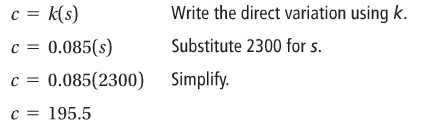
**Example 4: Using Direct Variation to Solve a Problem**

A salesperson’s commission varies directly with sales. For $1000 in sales, the commission is $85. What is the commission for $2300 in sales?

Step 1: use to find

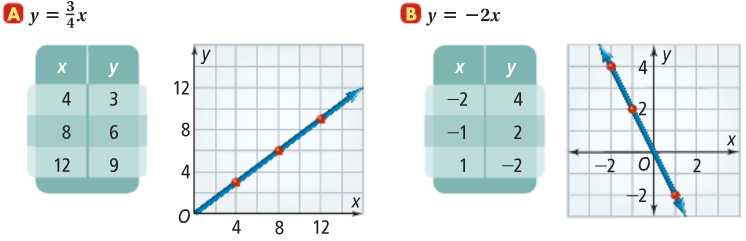


Step 2: write the direct variation for the situationa and find the commission when sales is $2300



**Example 5: Graphing Direct Variation Equations**

What is the graph of each direct variation equation?



The graph of a direct variation function is **always a line through the origin**.