

Direct Variation

"y varies directly as x"

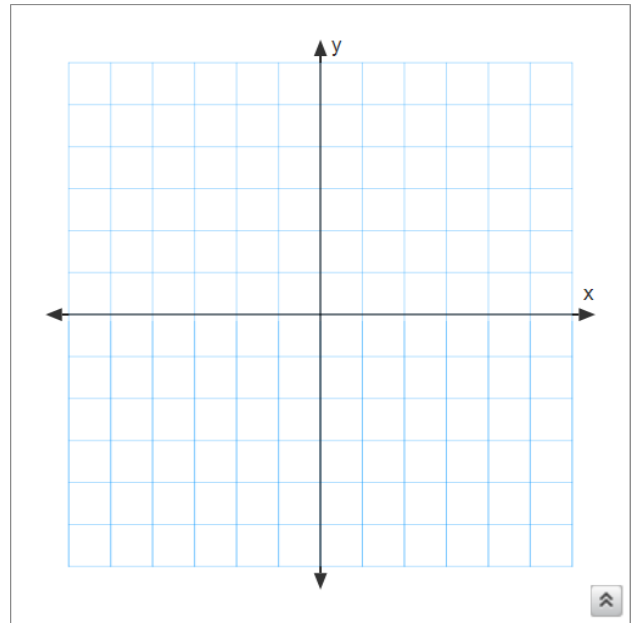
A direct variation is a situation in which two quantities increase or decrease at the same rate.

A mechanic who is paid hourly knows that working longer means making more money. That's because his pay varies directly as the number of hours worked. As his hours increase, so does the amount of his paycheck.

As one quantity **INCREASES** constantly,
the other quantity **INCREASES** constantly.

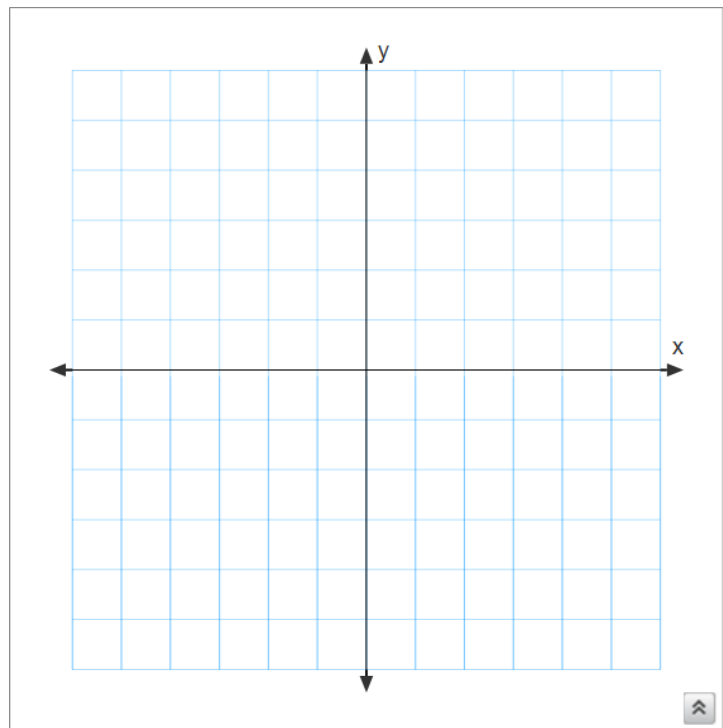
Examples:

1) working a job



More examples:

2) pizza party



Direct Variation describes a specific type of linear equation.

$y = kx$ (k will be a number that does not equal zero)

Examples:

$$y = x$$

$$y = \frac{1}{2}x$$

$$y = 5x$$

$$y = -\frac{3}{4}x$$

$$y = -2x$$

$$y = kx$$

k is called the
"constant of variation"

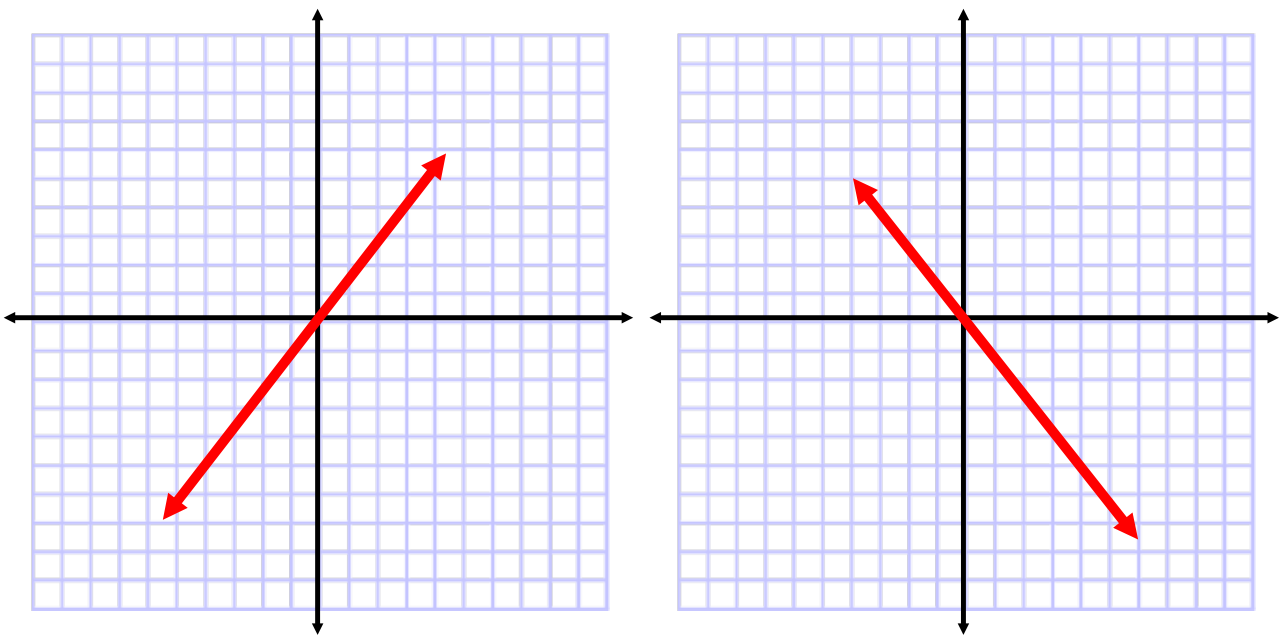
We have been calling **k** the
_____ .

The y-intercept is _____ .

k is found by dividing a
y-value by its x-value

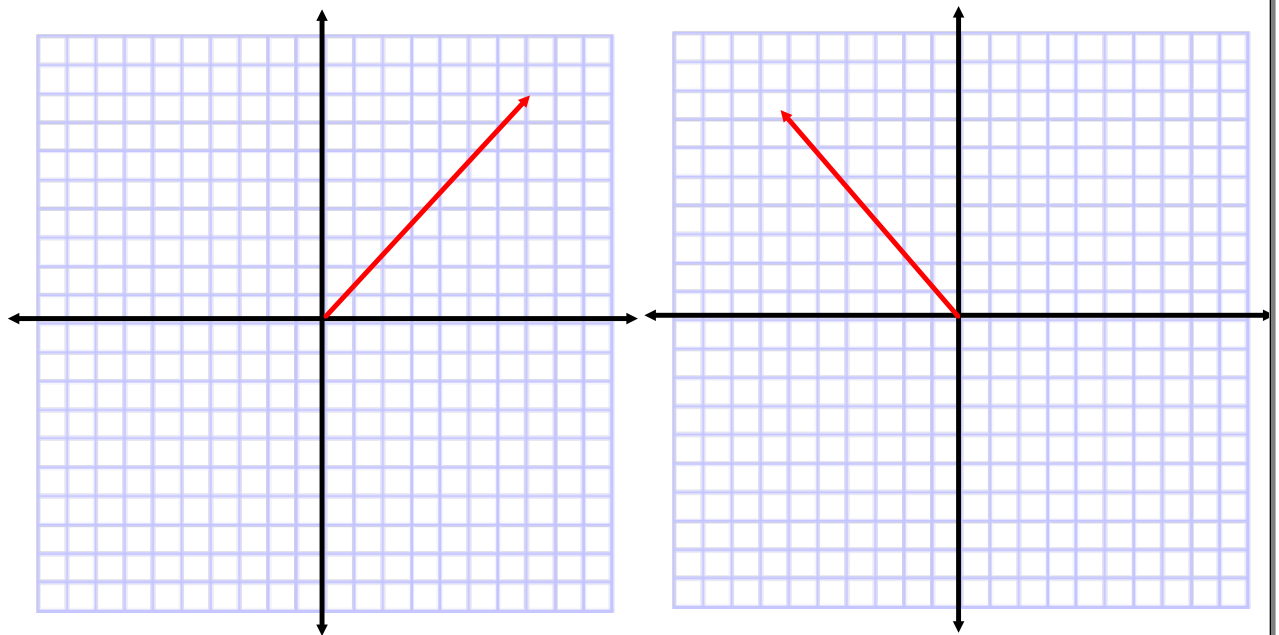
$$k = \frac{y}{x}$$

Graphs of Direct Variation



- 1) Must be a straight line**
- 2) Must include the origin**

Graphs of Direct Variation



- 1) Must be a straight line**
- 2) Must include the origin**

Proportion for Direct Variation

$$\frac{y_1}{x_1} = \frac{y_2}{x_2}$$

Direct Variation OR **NOT**
Direct Variation

$$y = 3x \quad x = 6 \quad y = \frac{3}{4}x$$

$$y = x - 4 \quad y = -4x$$

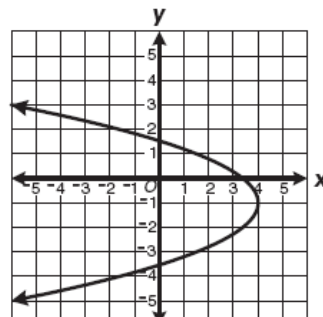
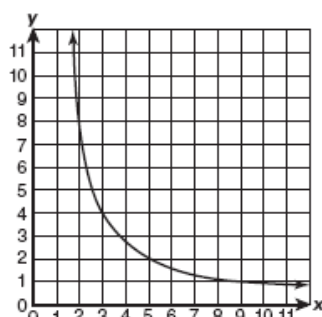
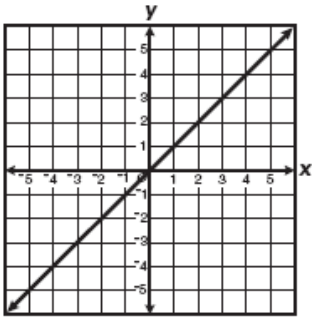
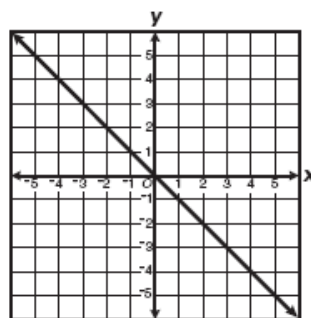
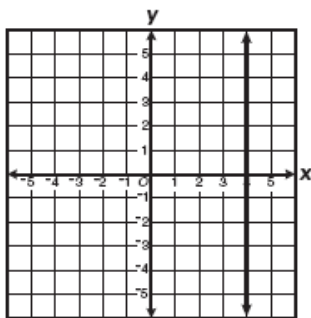
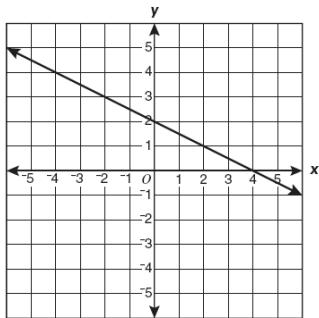
$$y = 3x + 8 \quad y = -x \quad xy = 2$$

$$y = \frac{-2}{3}x \quad y = 5 \quad y = -3x - 7$$

Direct Variation

OR

NOT
Direct Variation



Determining which is "y" and which is "x"

"y" varies directly as "x"

- 1) The distance you travel at a constant speed varies directly with the time spent traveling.
- 2) The money you earn varies directly with the number of lawns you mow.
- 3) a varies directly as b
- 4) The grade on a quiz varies directly with the number of problems answered correctly.

Determining which is "y" and which is "x"

"y" varies directly as "x"

5) The number of miles a person walks varies directly with the speed that person walks.

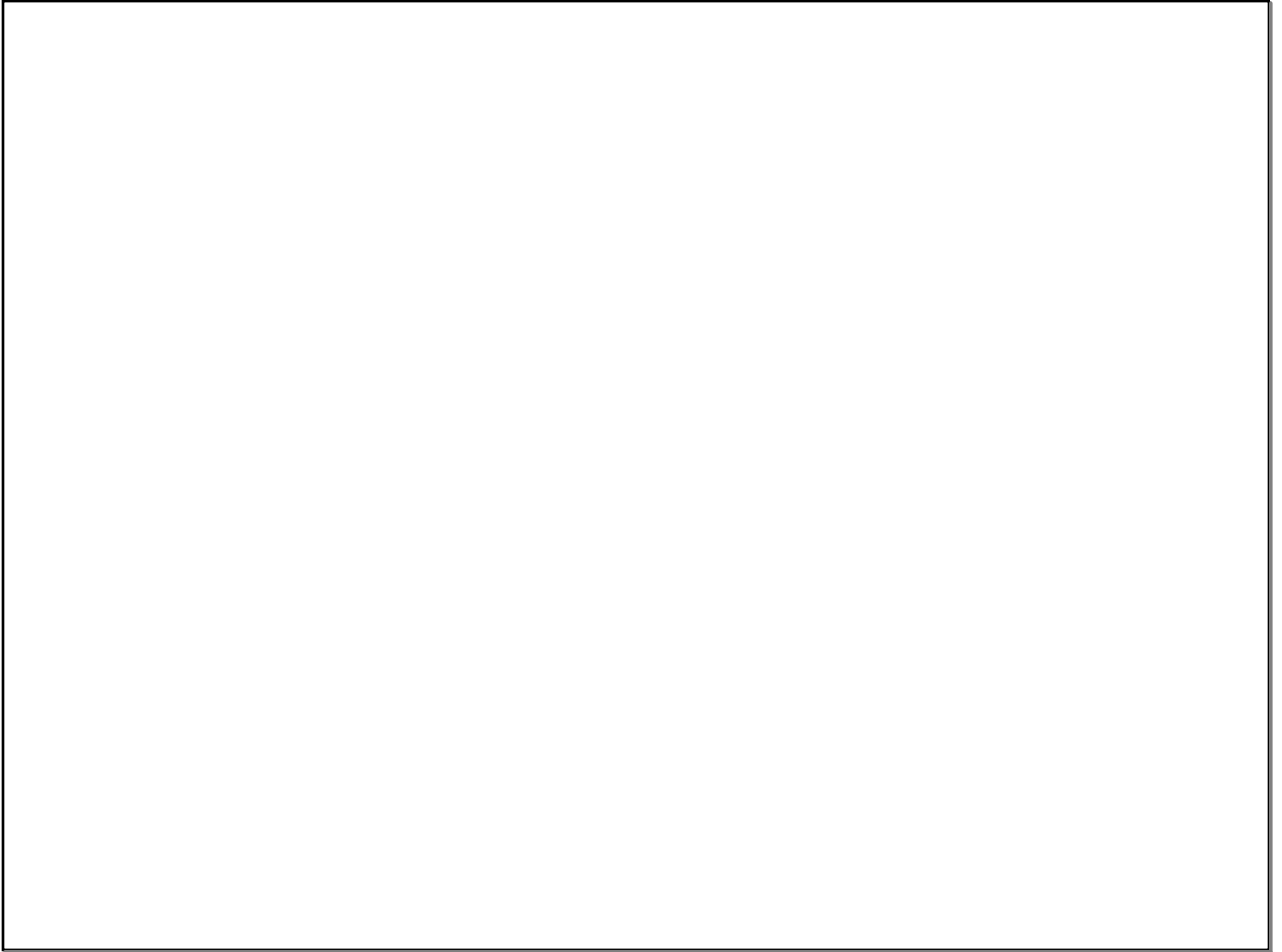
6) The gas pressure in a chamber varies directly with the temperature in the chamber.

7) The weight of a person on the moon varies directly as the weight of that person on the earth.

Find the Constant of Variation

$$k = \frac{y}{x}$$

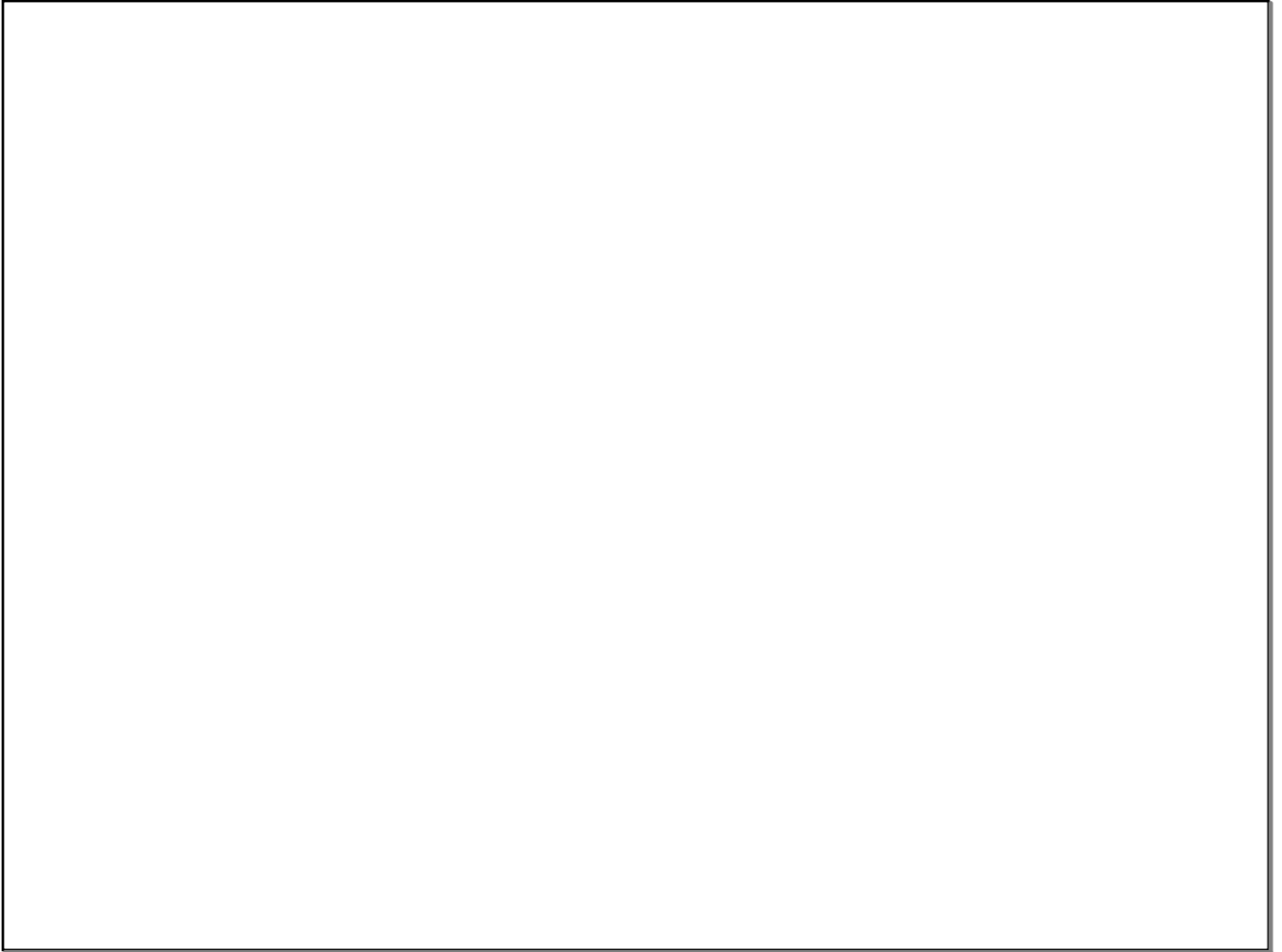
- 1) If y varies directly as x and $y = 44$ when $x = 11$, what is the constant of variation?
- 2) The total pay a person earns varies directly with the hours worked. If a person works 8 hours and the total pay is \$72.00, what is the constant of variation?
- 3) The temperature inside an oven varies directly with the number of minutes it has been on. If after 15 minutes, the temperature inside the oven is 240, what is the constant of variation?



Writing the Equation

$$y = kx$$

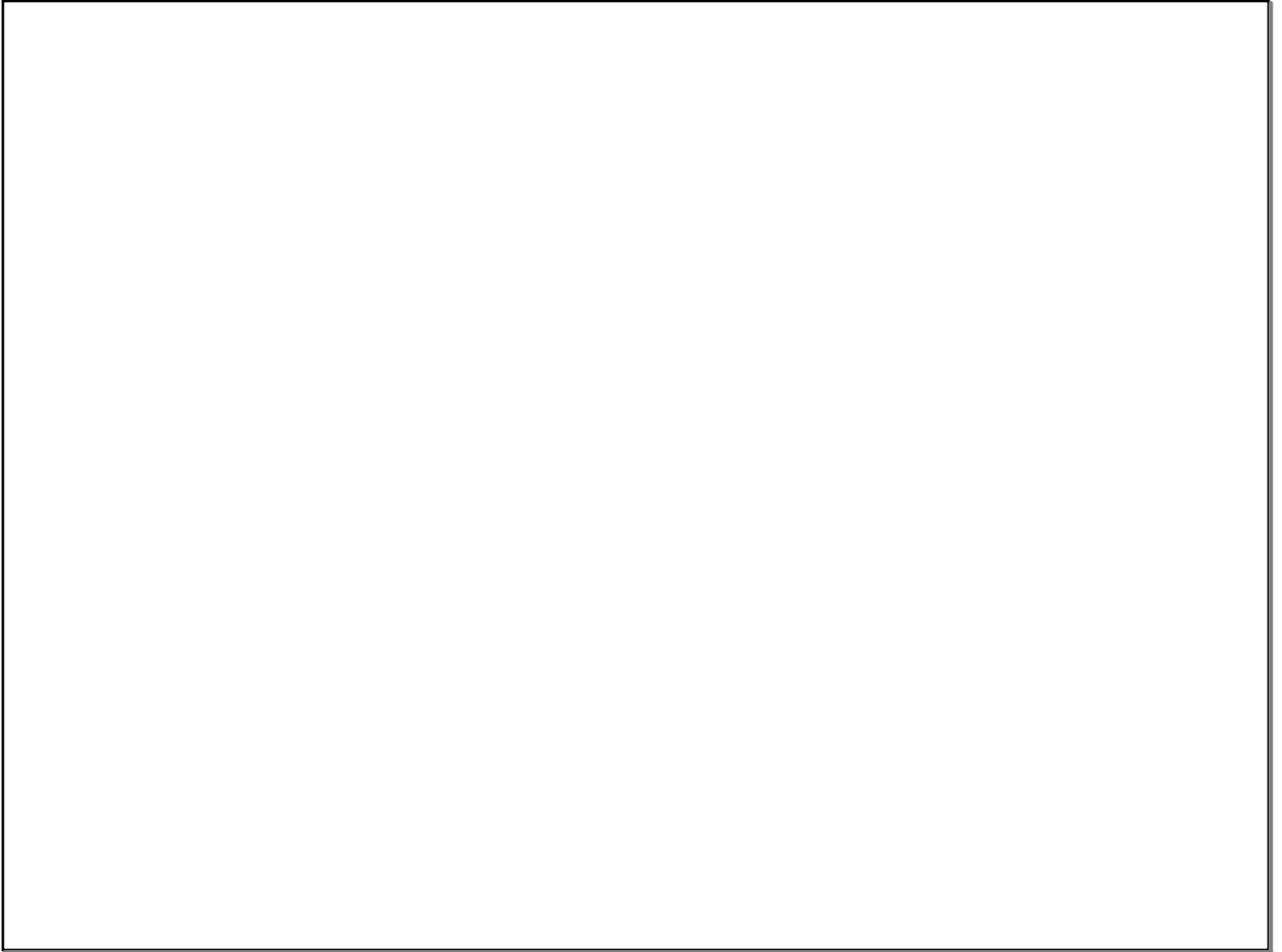
- 1) If y varies directly as x and the constant of variation is 9, write the equation.
- 2) If y varies directly as x and the constant of variation is -2, write the equation.
- 3) The distance you travel at a constant speed varies directly with the time spent traveling. It takes you 6 hours to travel 360 miles. Write the equation to represent this situation.



Writing the Equation

$$y = kx$$

4) The money you make mowing yards varies directly with the number of yards that you mow. You mow 6 yards and make \$250. Write the equation for this situation.



Proportion Questions

1) If you get 40 problems on a test correct and make an 80, what would you have made if you had gotten 43 problems correct?

2) If y varies directly as x and $y = 20$ when $x = 6$, what does x equal when $y = 30$?

3) If William earns \$165.00 in 5 hours, how much will he earn in 12 hours?