

You have studied a lot of different linear equations. Listed below are some examples.

$y = x$

$y = 2x$

$y = 5 + 0.5x$

$y = 4 + x$

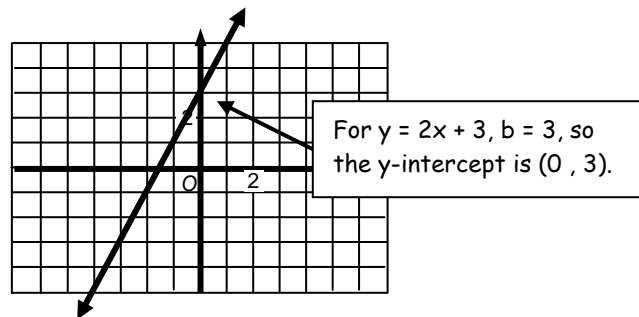
$y = -3x + 6$

All the linear equations you have studied can be written in the form of $y = mx + b$ or $y = b + mx$

Identify the m and b in each linear equation.

- $y = x$ $m =$ _____ $b =$ _____
- $y = 2x$ $m =$ _____ $b =$ _____
- $y = 5 + 0.5x$ $m =$ _____ $b =$ _____
- $y = 4 + x$ $m =$ _____ $b =$ _____
- $y = -3x + 6$ $m =$ _____ $b =$ _____

When we substitute 0 for x in $y = mx + b$, we get $y = b$. This means that the point $(0, b)$ lies on the line. The point $(0, b)$ is called the **y-intercept**, this is the value of y when $x = 0$. It is the point where the line crosses the y -axis. To save time, we sometimes refer to the number b , rather than the point $(0, b)$, as the y -intercept.



If the b in $y = mx + b$ is 0 (in other words, if the equation is of the form $y = mx$) then the y -intercept is $(0, 0)$, or the origin.

The m in $y = mx + b$ is called the **coefficient**, which represents the rate of change, of x . Previously we found that the value of m also indicates the steepness of a line. As the value of m increases, the line becomes steeper. It also determines the direction of the line. Positive values will make the line slant upward while negative values will make the line slant downward.

Often when you graph two lines on the same coordinate axis it is helpful to know where the lines cross. This point is called the **point of intersection**.

Suppose the Freshman Class is planning a skating party to celebrate the beginning of football season. Your committee is in charge of finding a place to rent in-line skates for a reasonable price. You get quotes from two companies:

- Roll-Away Skates charges \$5 per person
- Wheelie's Skates and Stuff charges \$100 plus \$3 per person

From this information, we will be able to determine which company to choose to keep the cost at a minimum. This problem can be solved by writing and graphing equations for each rental company.

6. Define each for the situation

Independent Variable _____

Dependent Variable _____

7. Write an equation for each company.

Roll-Away _____

Wheelie's Skates _____

Now, graph both equations on your graphing calculator.

8. What reasonable values for the domain did you use?

9. In what situation is Roll-Away Skates a better deal?

10. In what situation is Wheelie's Skates and Stuff a better deal?

11. On which graph is the point (8, 40)? Describe what this point means in terms of the cost to rent skates?

12. On which graph is the point (8, 124)? Describe what this point means in terms of the cost to rent skates?

13. Find the point of intersection of the two graphs. Describe what this point means in terms of the cost to rent skates?

14. Find the y-intercepts for the equations you graphed. Describe what the y-intercepts mean in terms of the cost to rent skates?

15. What are the coefficients of x in the equations you graphed? Describe what the coefficients mean?

16. Which company would you choose if fewer than 100 students are planning to attend the party?

17. What if your budget for skate rental is \$250, predict how many pairs of skates can you rent from each company?