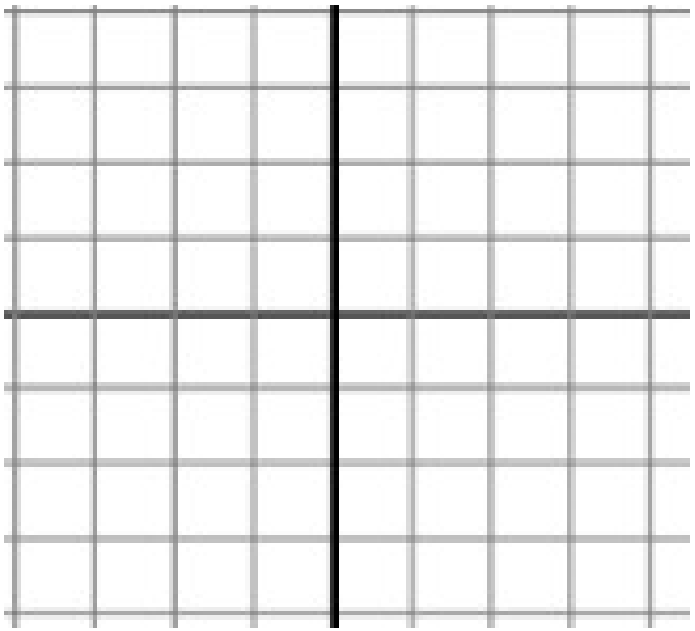
Chapter 1: Linear Equations

revised 2018

Cartesian Plane or Coordinate Plane



You can locate any point on the Cartesian plane by an ordered pair of numbers (__,___) called the

_____

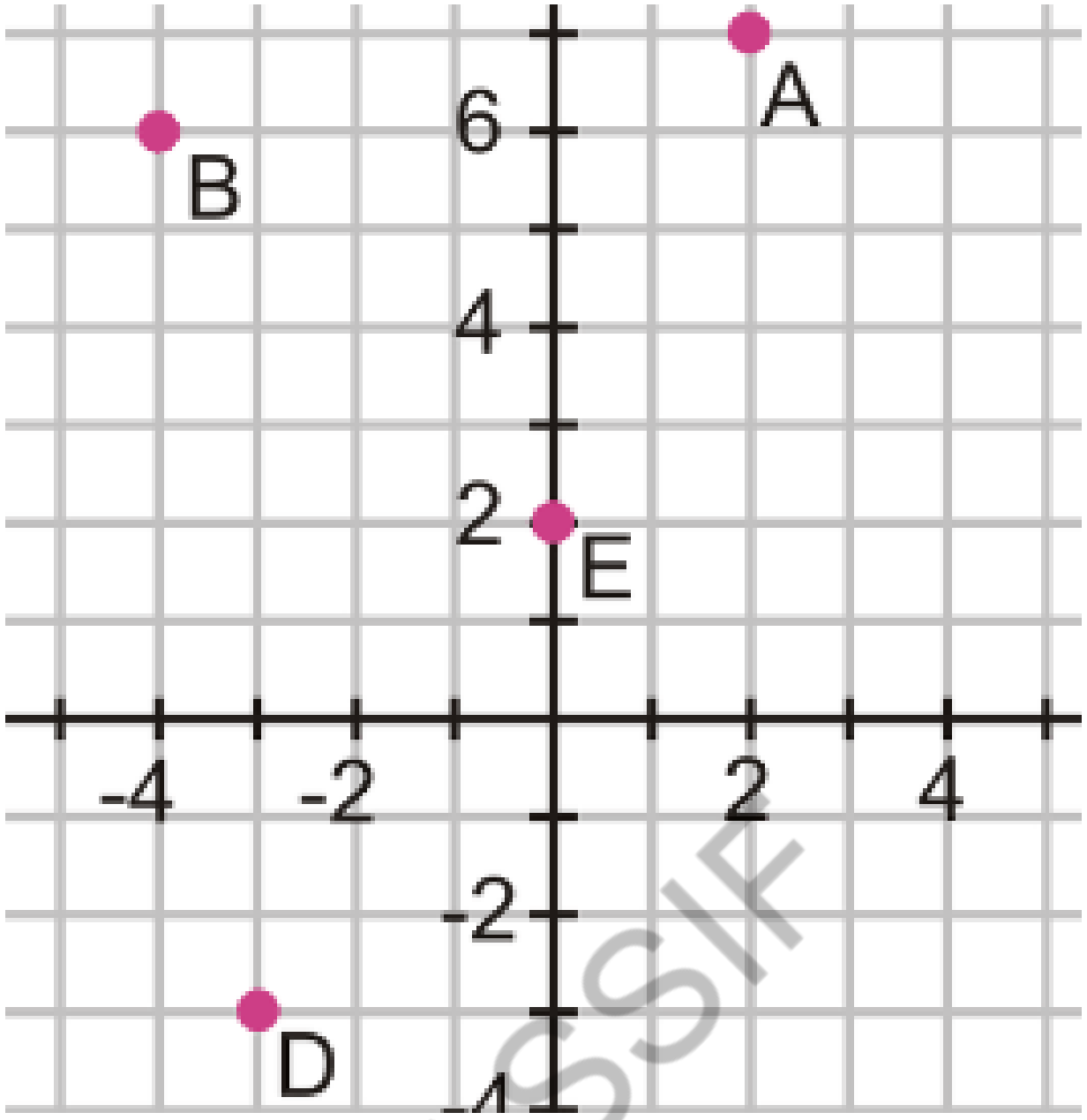
_____of a point.

Note: We draw arrows to indicate that the plane goes on forever.

The first number in the pair is the ____ coordinate. It describes the number of units to the _____or_____ of the origin.

The second number is the ____ coordinate. It describes the number of units _____or _____of the origin.

Ex: Write the coordinates of each point.



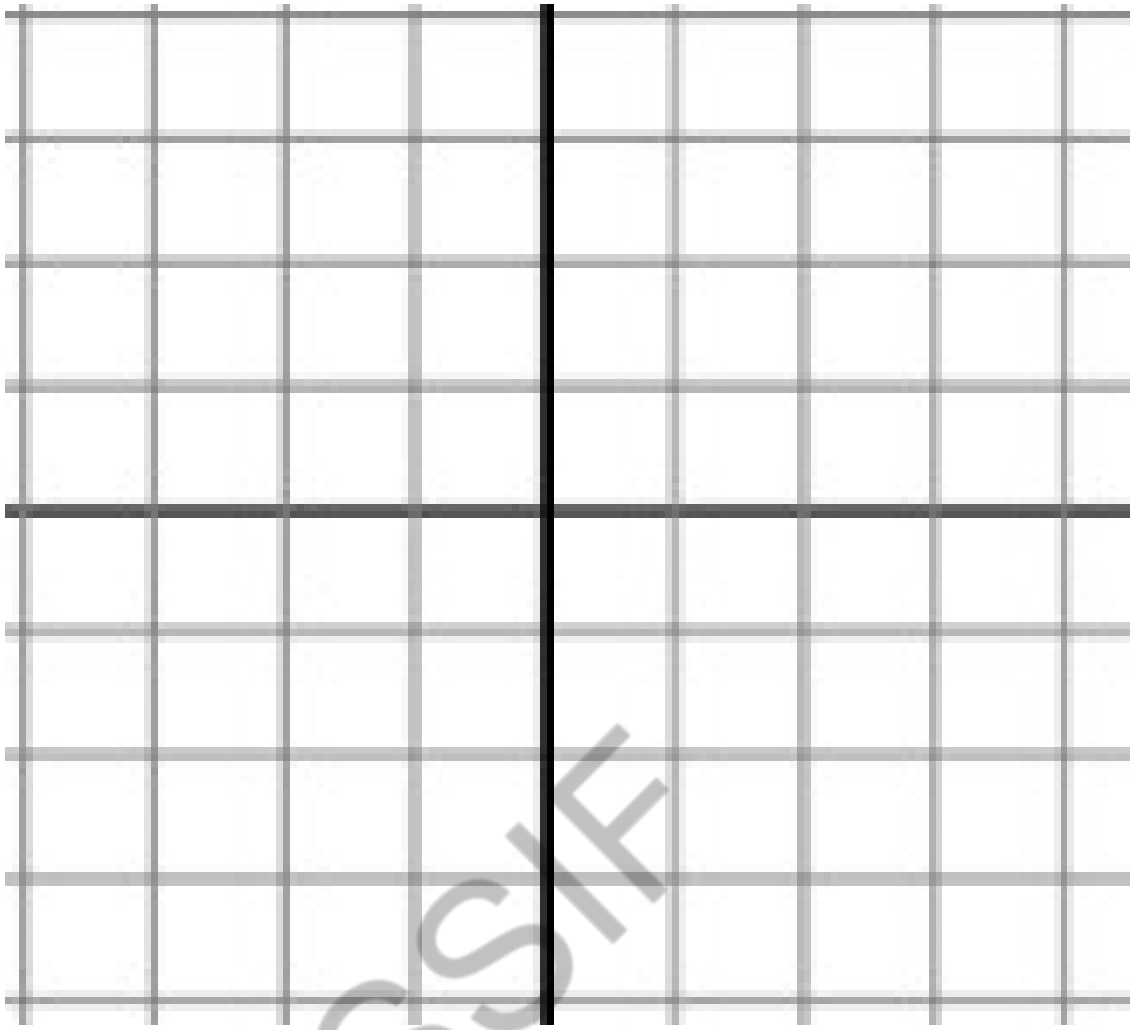
Ex: Write the coordinates below on the Cartesian plane.

$A(0,-4)$

$B(2,0)$

$C(5,3)$

$D(-3,-2)$

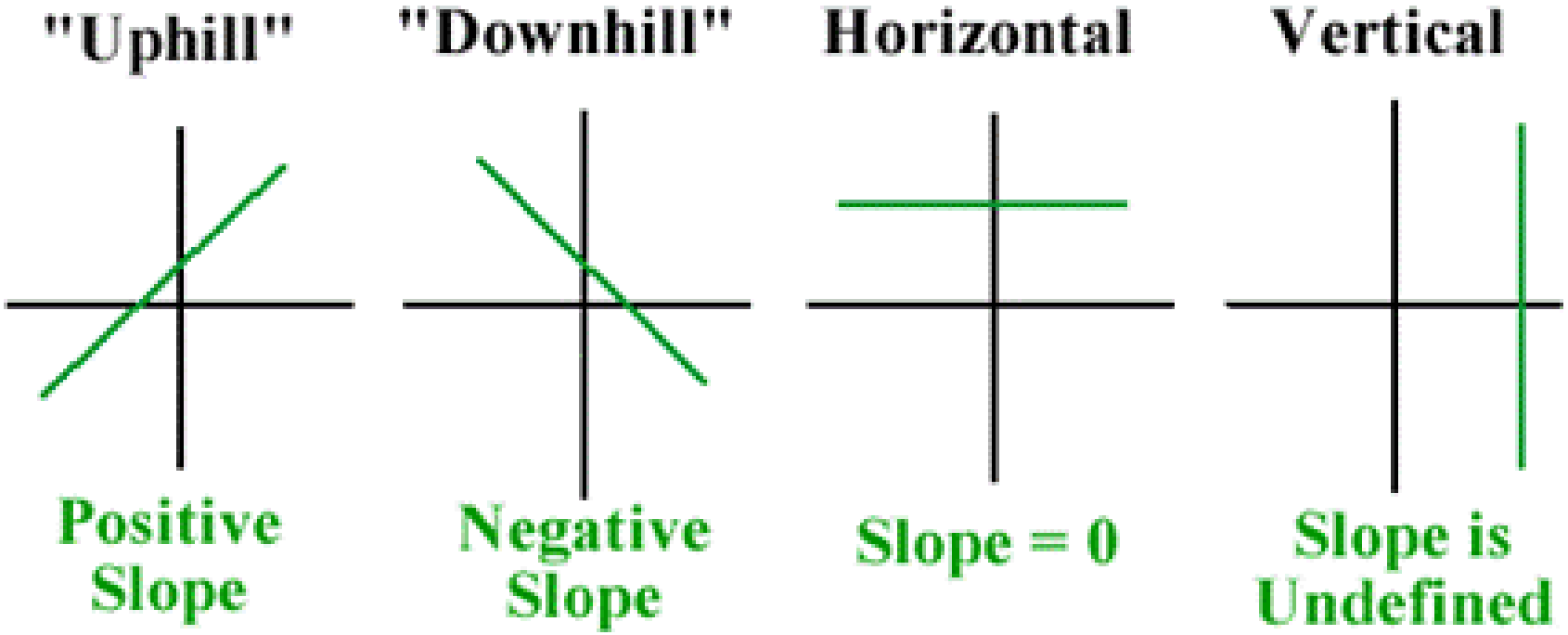


Slope and y-intercept

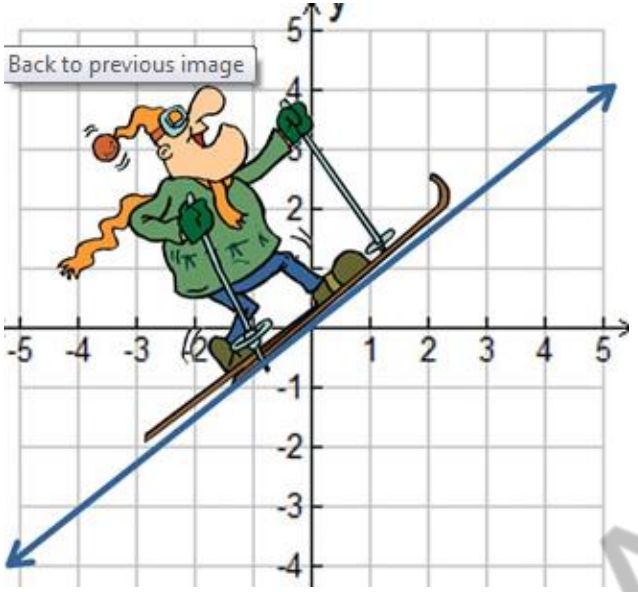
Every line can be represented by the equation: _____

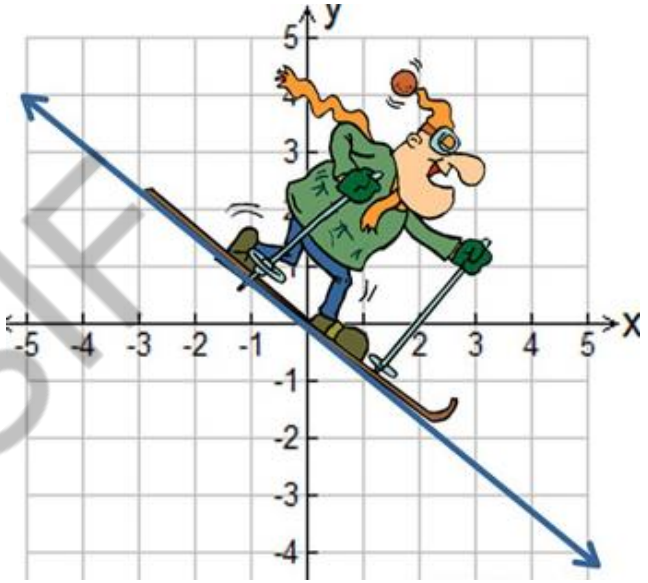
The variable ‘a’ represents the steepness or slant of the line. The name given to ‘a’ is _____or _____. It is calculated by the formula:

‘a’ = _____



Which slope is positive?



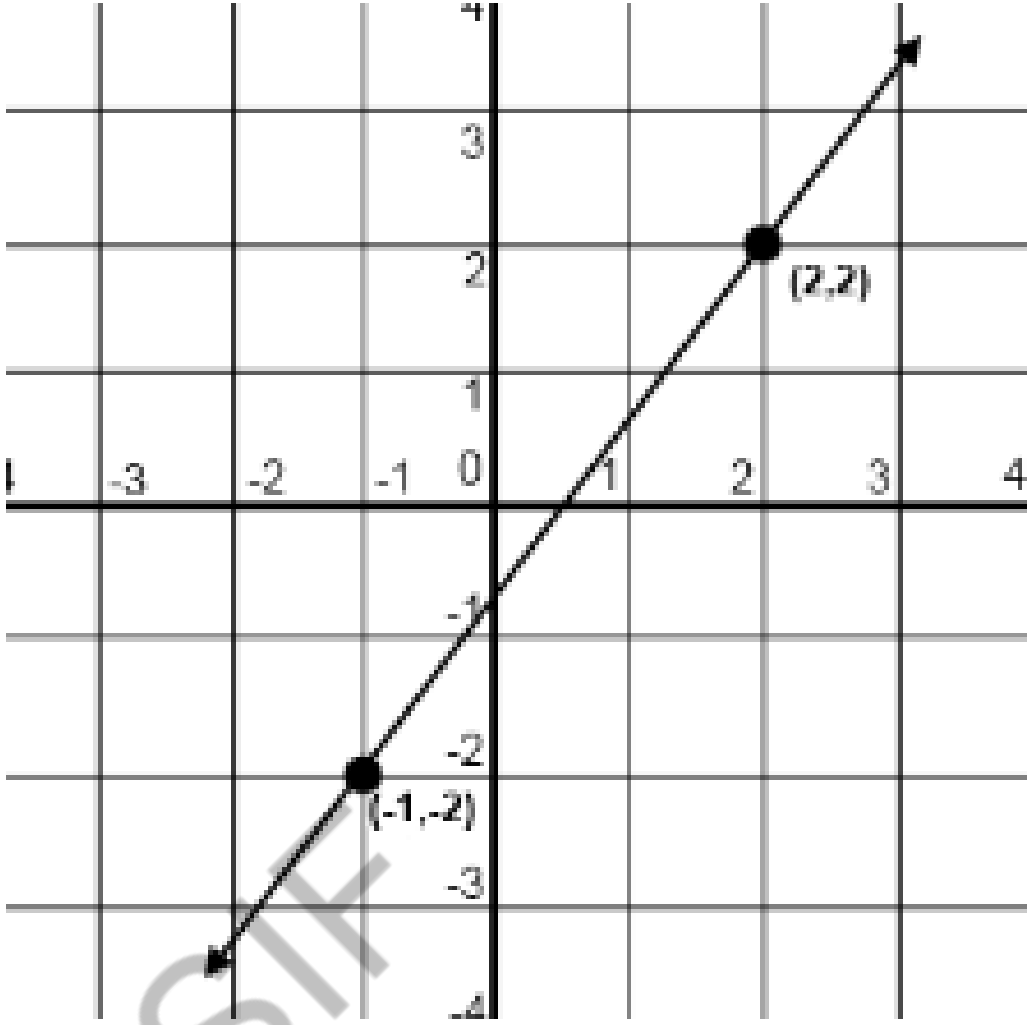


How to calculate the slope ‘a’

Steps:

1. Label the points (x_1, y_1) (x_2, y_2)

2. Plug numbers in formula for ‘a’

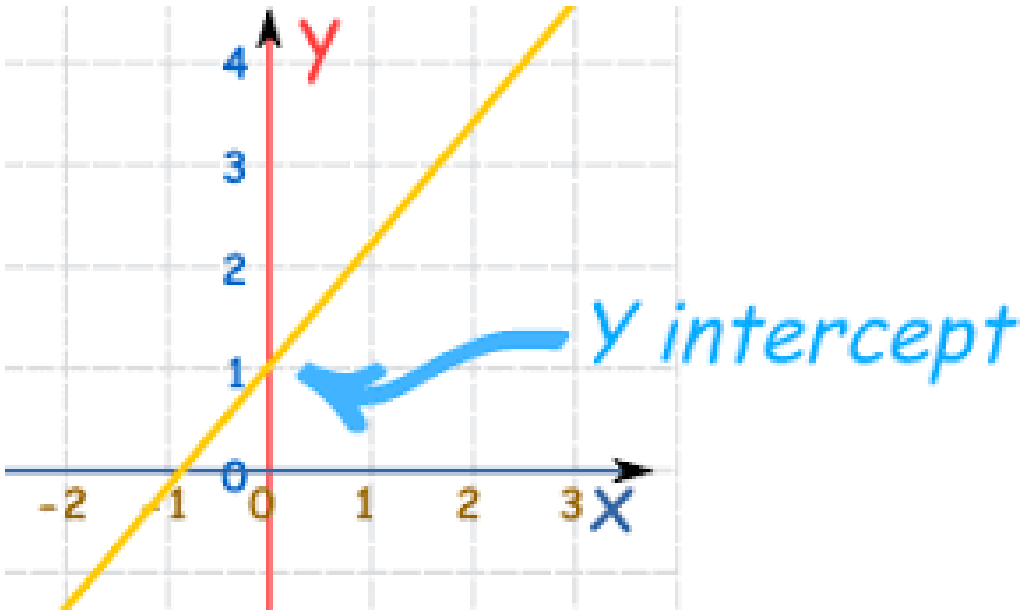


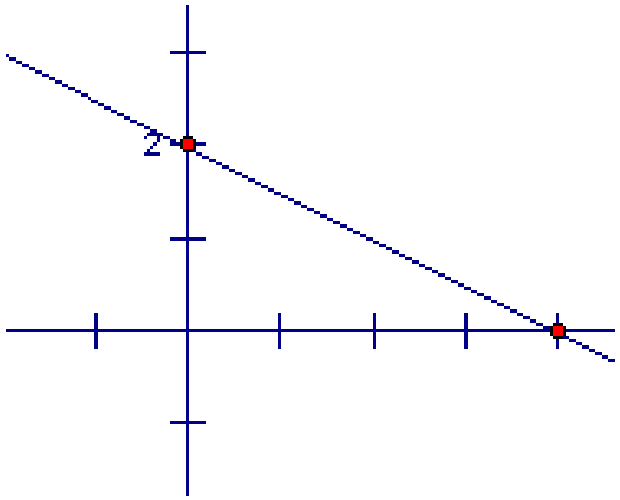
The variable ‘b’ represents the point where the line crosses the y-axis. The name given to ‘b’ is _____or _____.

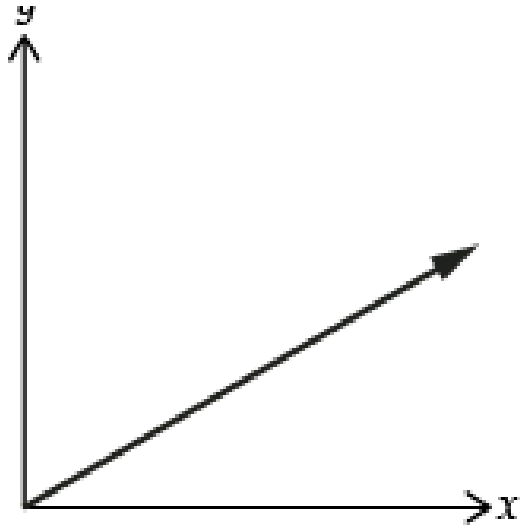
How to find y-intercept “b” on a graph

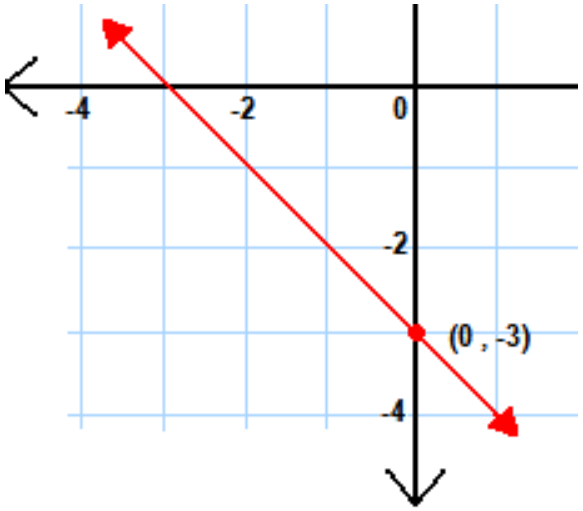
We find the y intercept by looking at where the line crosses on the y axis.

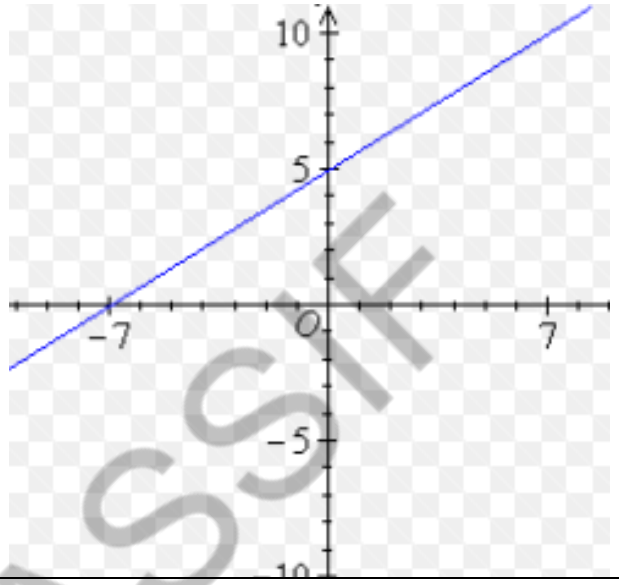
Use Highlighters











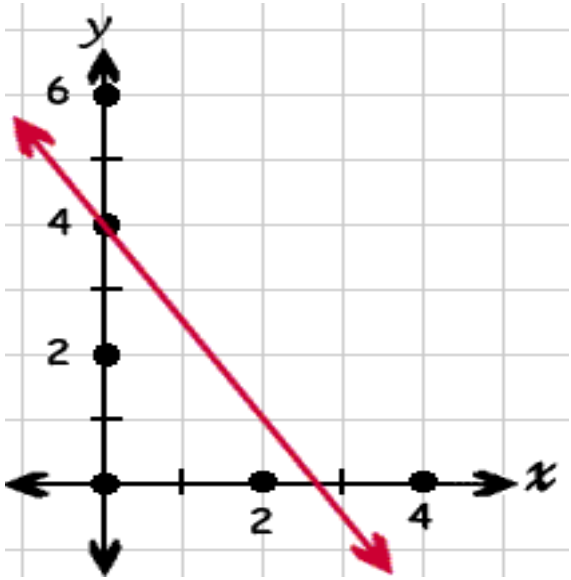
How to find the equation of a line when “b” is clear

Steps

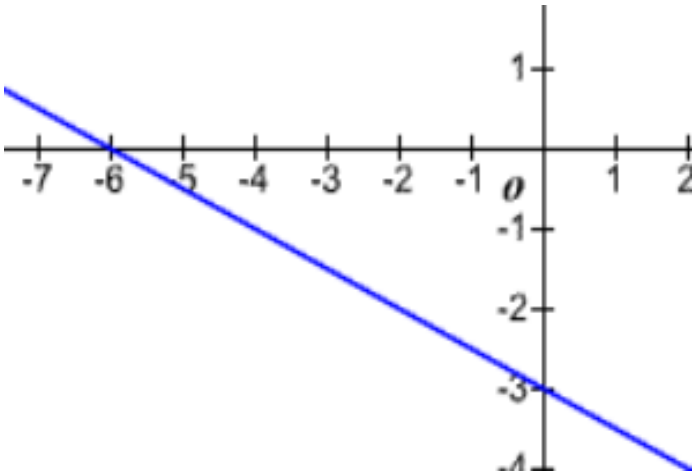
1) Calculate ‘a’
2) Find ‘b’ by looking on the graph.
3) Write y=ax+b

Ex: Find the equation for each case.

1)

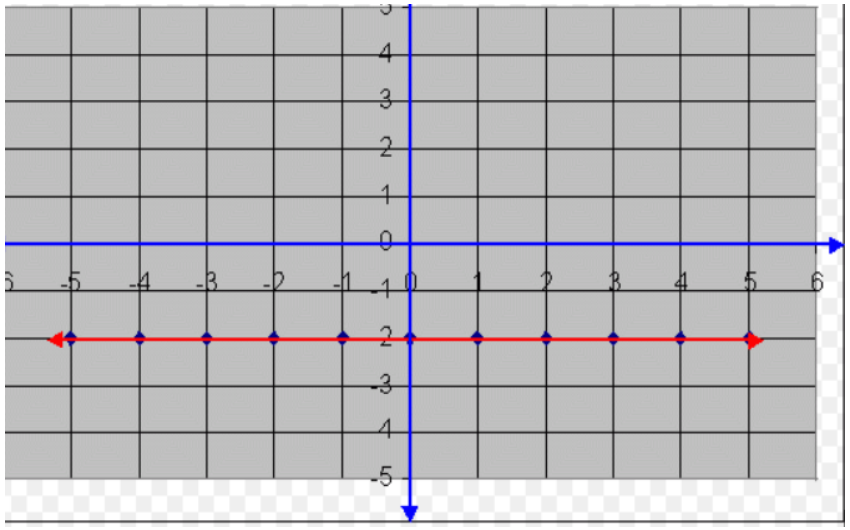


2)

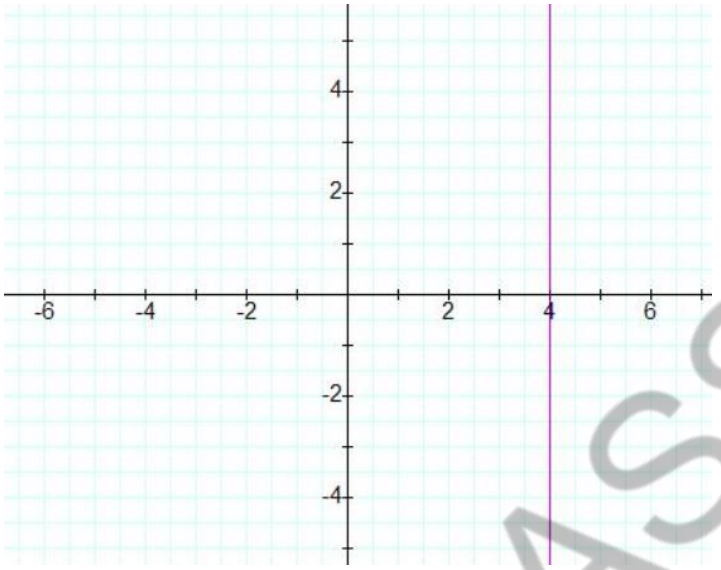


Exceptions

3)



4)



Finding the equation of a line ("b" is unknown)

Steps

1) Calculate 'a' and place it in

$$y = ax + b$$

2) Find 'b' by plugging in a point (x, y) and solve for 'b'
3) Write final answer in format

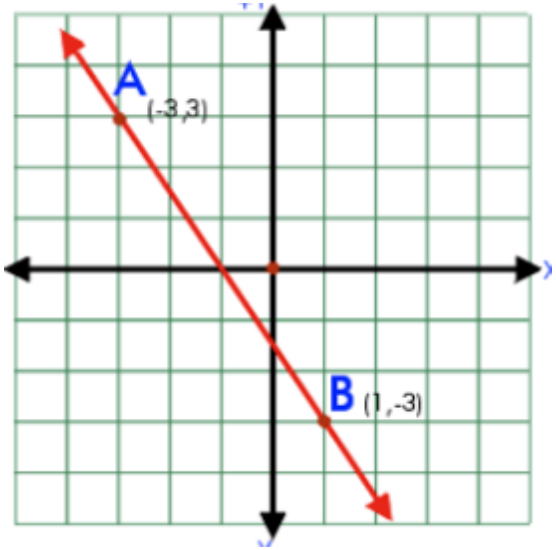
$$y = ax + b$$

Write the equation

1)

x	1	2	3
y	25	35	45

2)



Functional form of an equation

$$y = ax + b$$

General form of an equation

$$ax + by = c$$

Convert from general to functional form:

Steps

1) Bring everything to the other side except 'y'
2) Divide by # in front of 'y'

Convert $2x + 3y + 9 = 0$ to functional form and find slope and y intercept

Ex: Convert to functional form and find slope and y intercept

1) $3x + 2y - 10 = 6$

2) $40x = 20y - 100$

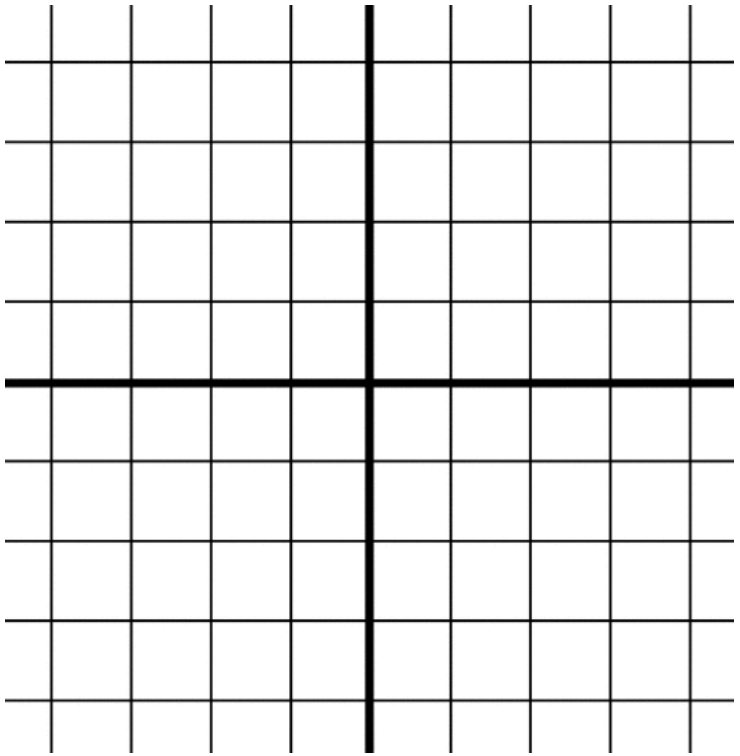
How to graph a linear equation

Steps:

1. Make a TOV
2. Pick points for x
3. Plug points in equation to get results for y
4. Plot the points and join the points to form a line. Extend

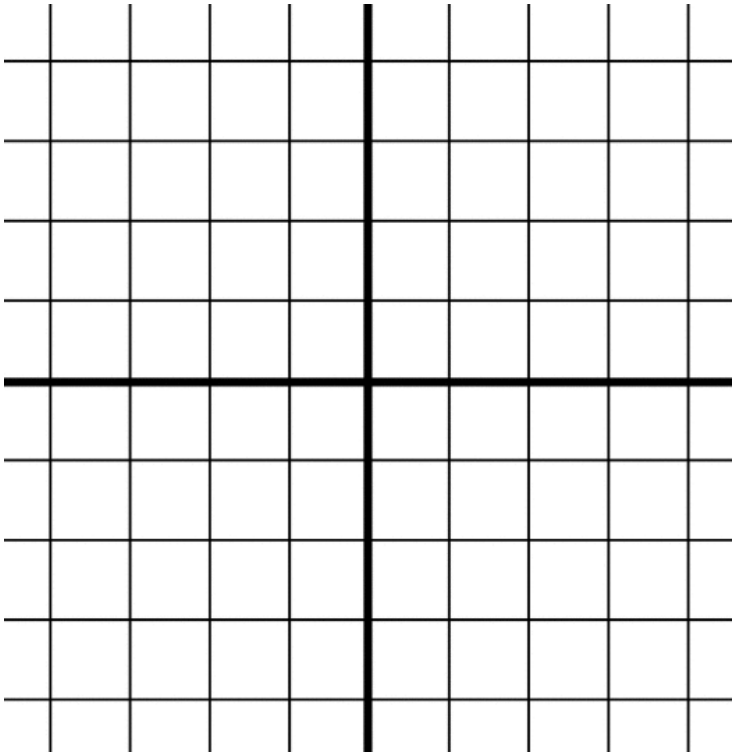
Ex 1: Graph

$y = 2x + 4$



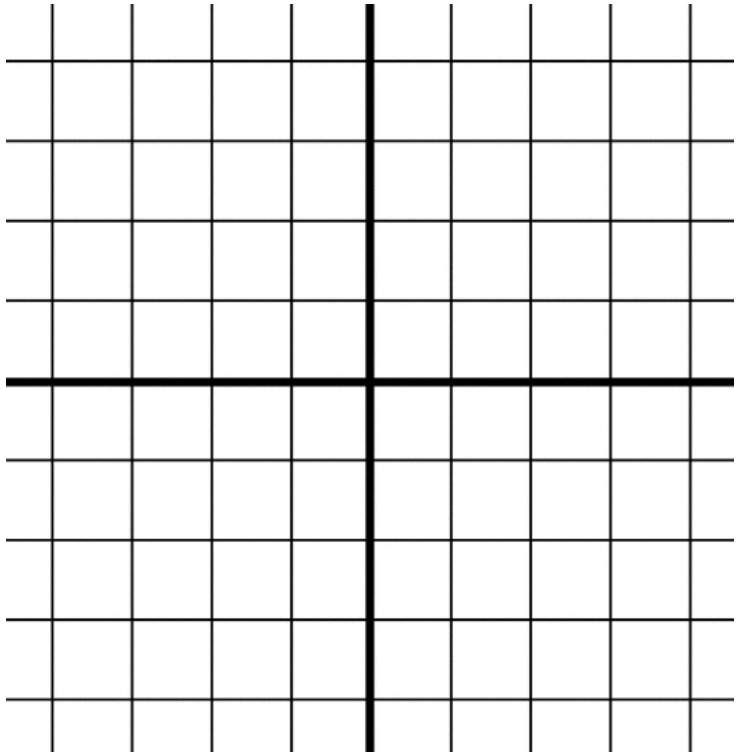
Ex 2: Graph

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

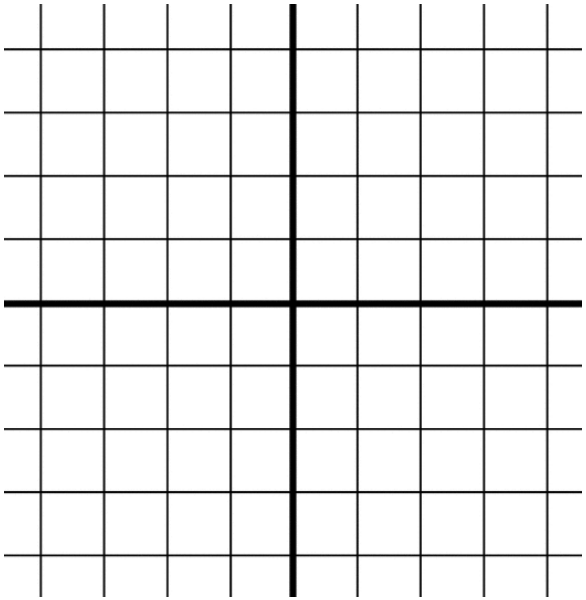


Ex 3: Graph

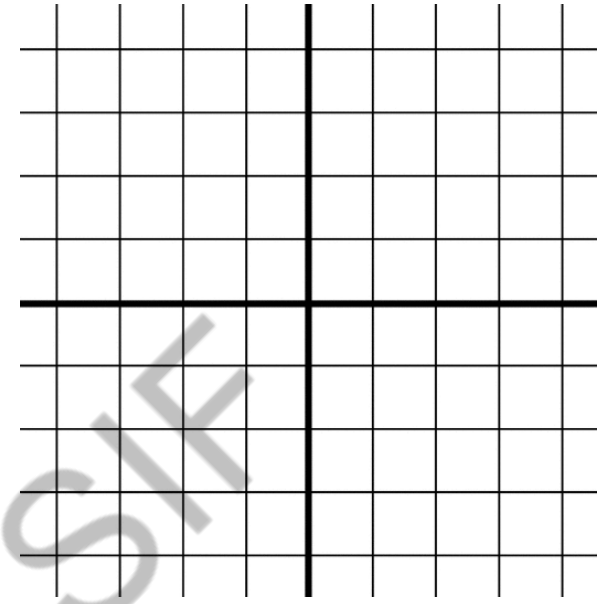
$4 - y - 8 = 0$



Ex 4: Graph $y = 5$



Ex 5: Graph $x = -2$



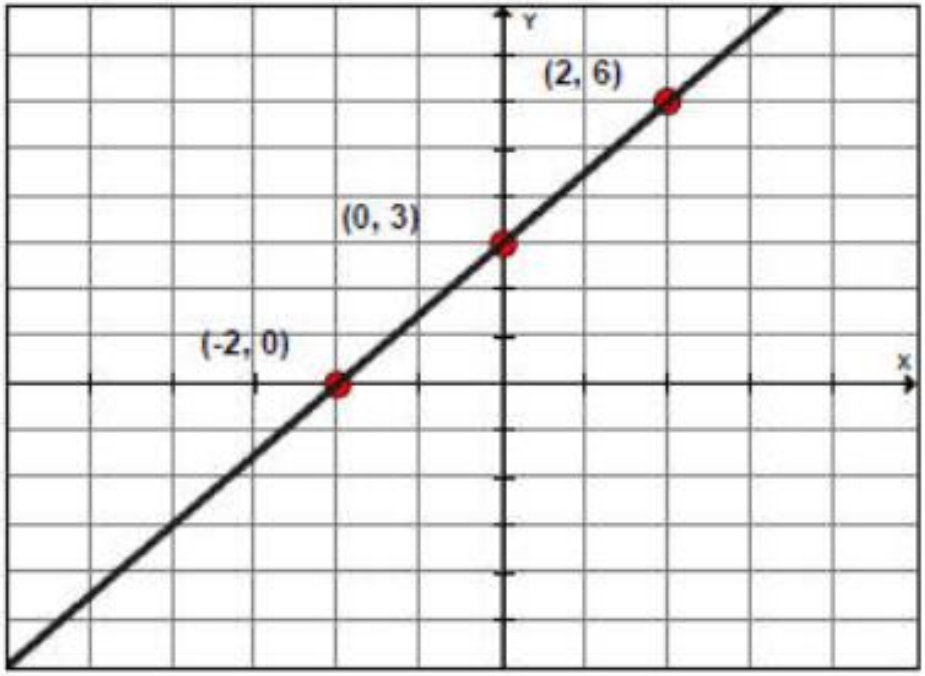
Intercepts of a line

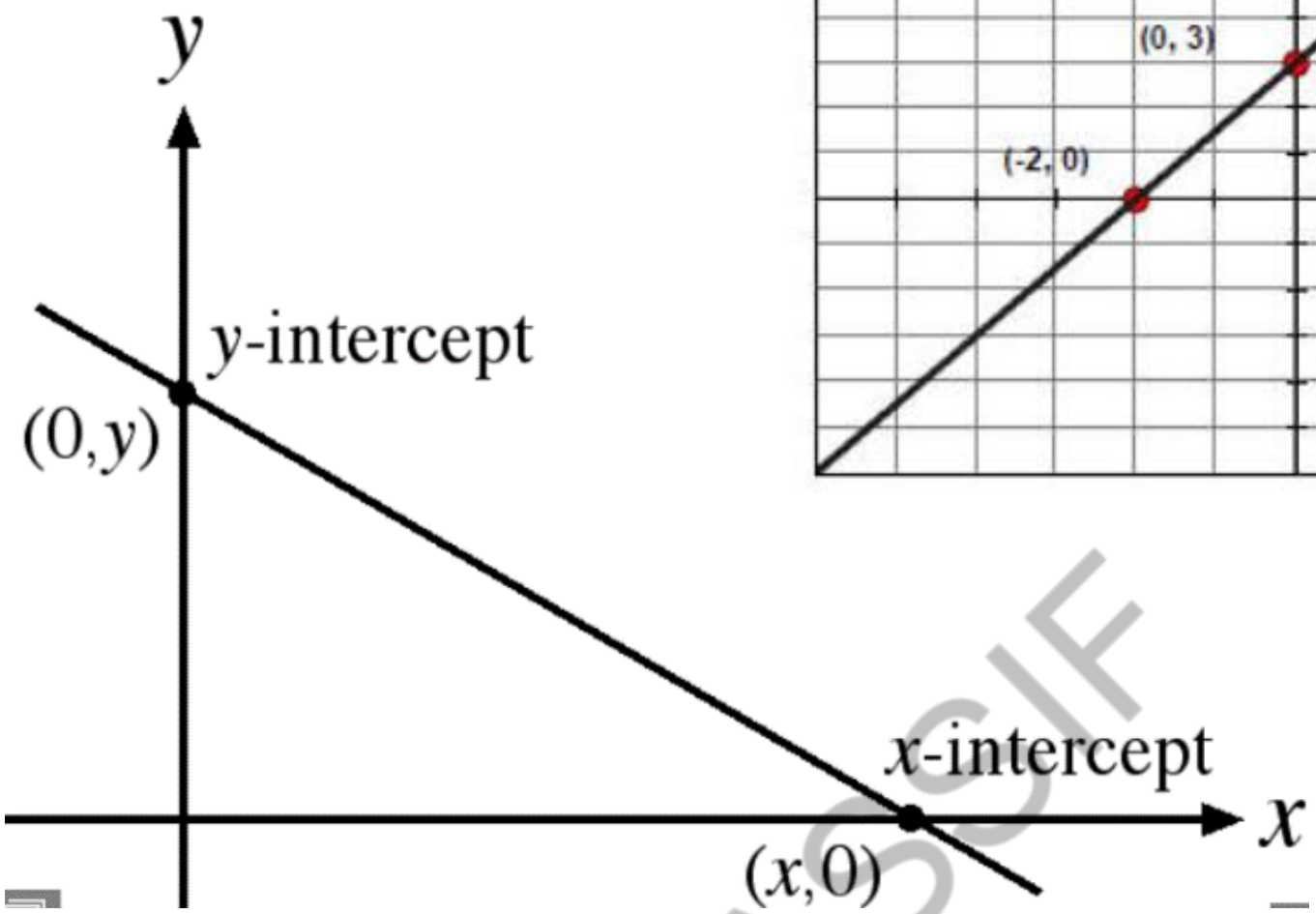
Definition

x-intercept:

y-intercept:

Given a graph





Given a table of values

x	y
–2	0
–1	–2
0	–4

Given an equation

To find the x-intercept, we _____

To find the y-intercept, we _____

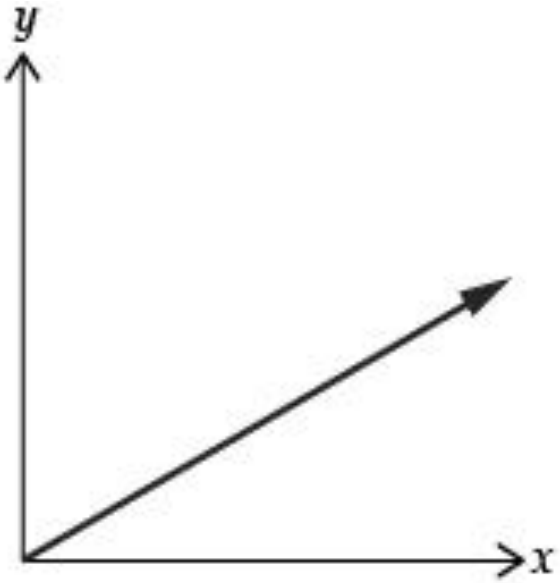
Example 1: $2x + 3y + 9 = 0$

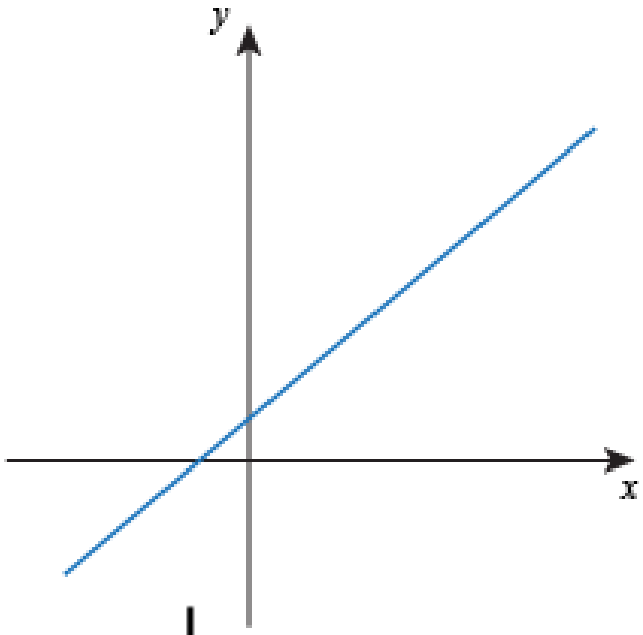
Find x-intercept	Find y-intercept

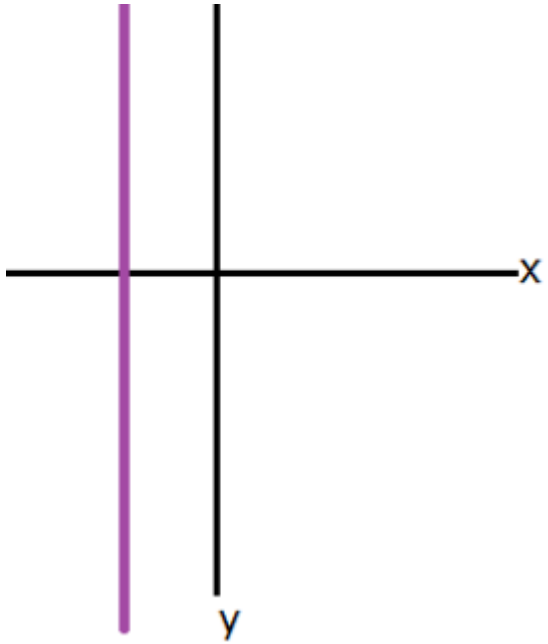
Example 2: $y = \frac{2}{3}x + 9$

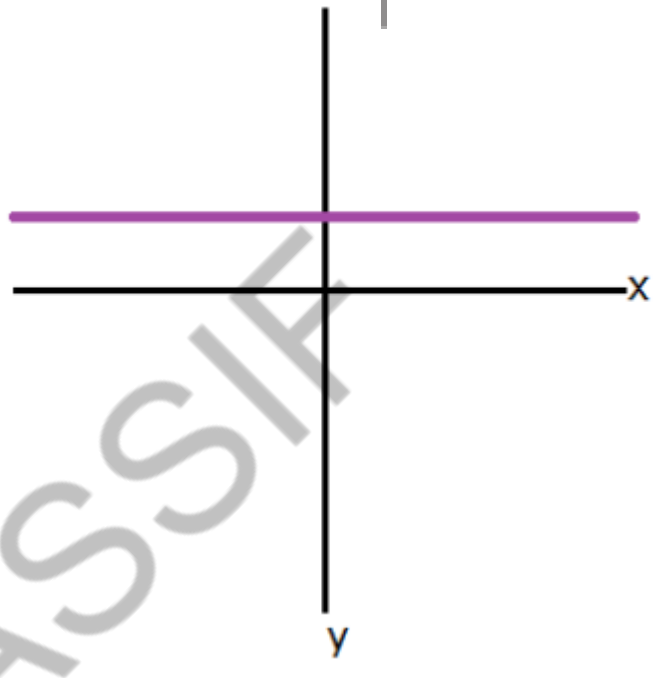
Find x-intercept	Find y-intercept

Name the graph and write the equation









Sketch the graph according to the rule.

1. $y = 2x + 1$

2. $y = -2x + 1$

3. $y = 2x - 1$

4. $y = -2x - 1$

Conclusion:

If the ‘a’ is ___, then the line goes ___.

If the ‘a’ is ___, then the line goes ___.

If the ‘b’ is ___, then the initial value is

_____ the x-axis.

If the ‘b’ is ___, then the initial value is

_____ the x-axis.

Write the equation given a line that has:

1. Slope = 2, y-int = 3

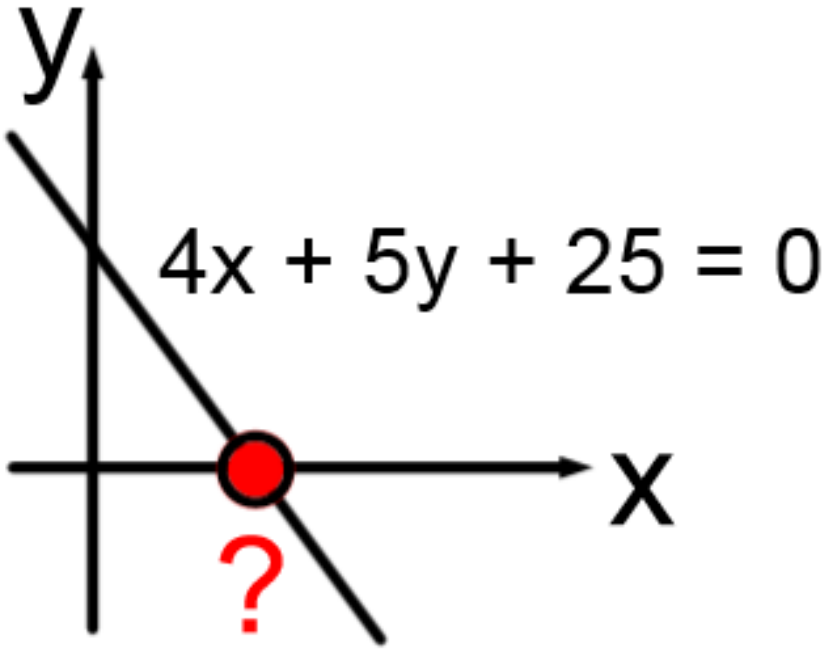
2. Slope = $\frac{2}{3}$, x-int = 6

3. x-int = 3, y-int =1

4. What is the x-intercept of a line passing thru (4, -4) and (3, -1)?

Visual Representations

Find the missing coordinate.

1. 

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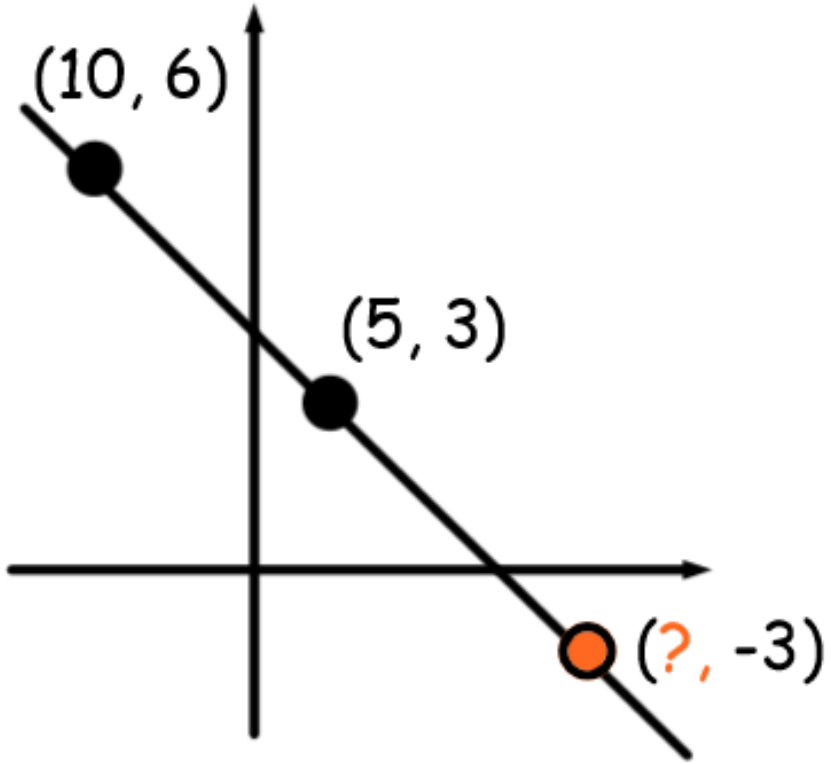

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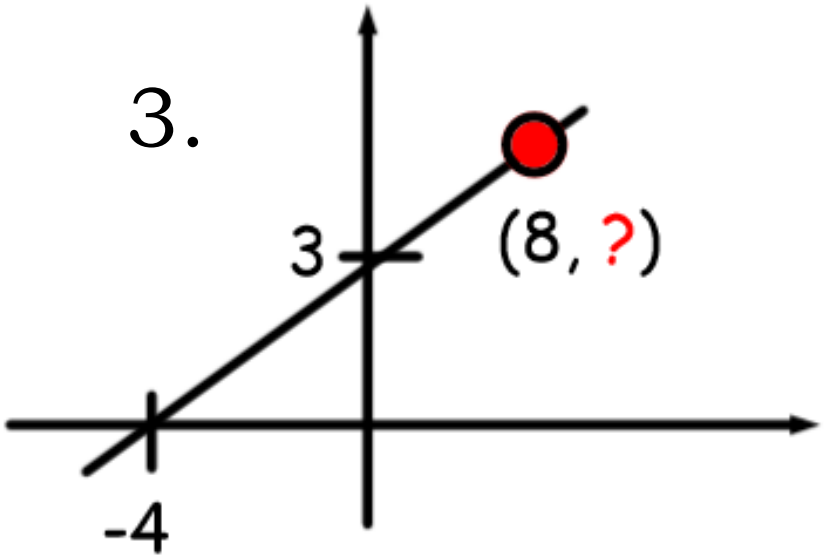

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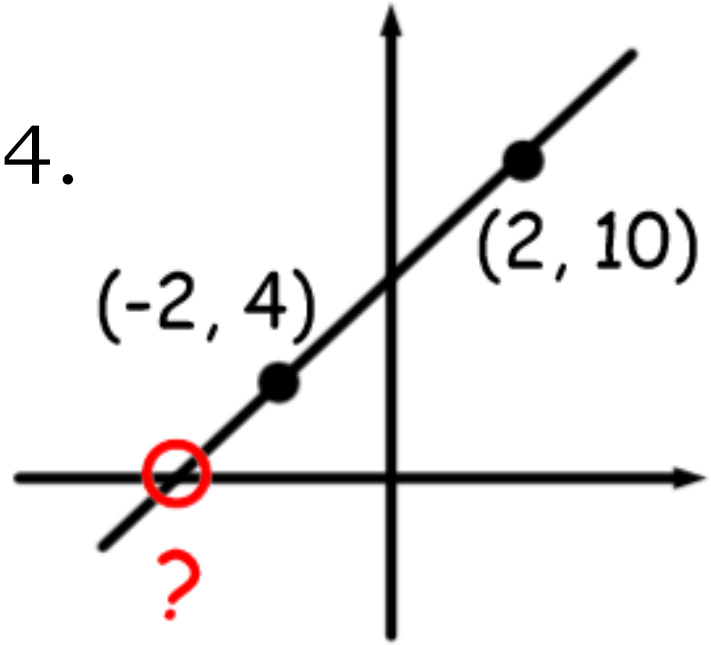

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