Math 1201

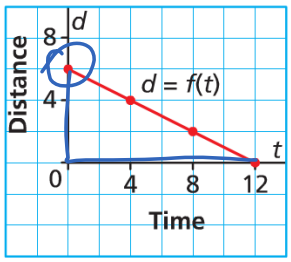
5.7 Creating Linear Equations

Matching Linear Equations with Graphs

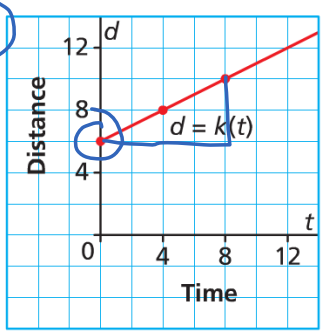
Example 1:

Which graph has a rate of change of $\frac{1}{2}$ and a vertical intercept of 6?

a)



b)



ROC = rise / run

= −6 / 12

= −1/2

ROC = rise / run

= 4 / 8

= 1/2

Writing Linear Equations

Linear equations are written in the format:

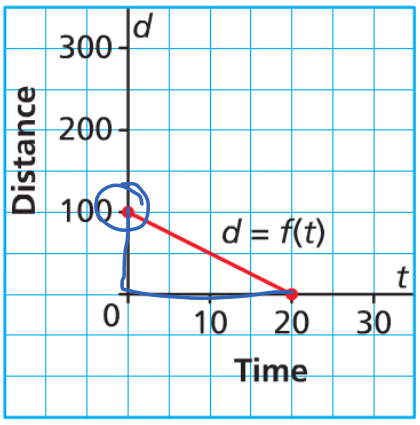
dependent variable = (rate of change) × (independent variable) + vertical intercept

or $y = mx + b$, where m = rate of change
b = y-intercept
x = independent variable
y = dependent variable

We will discuss $y = mx + b$ in greater detail in the next chapter.

Example 2:
Write equations for each of the graphs shown.

(A)



Variables: (t, d)

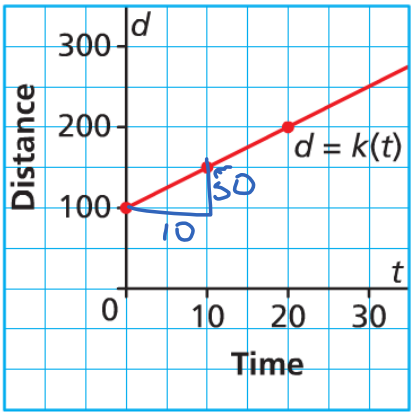
y-intercept: 100 ← b

$ROC = \frac{rise}{run} = \frac{-100}{20} = -5$ ← m

$y = mx + b$

$d = -5t + 100$

(B)



Variables: (t, d)

y-intercept: 100

$ROC = \frac{rise}{run} = \frac{50}{10} = 5$

$y = mx + b$

$d = 5t + 100$

Graphing Linear Equations

Method 1: Intercept Method
We will graph linear relations by determining the **horizontal** and **vertical intercepts**.

To find the **horizontal intercept**:

- Set $y = 0$ and solve for x.

To find the **vertical intercept**:

- Set $x = 0$ and solve for y.

Example 3:
Create a graph of $f(x) = 2x + 7$ by determining the horizontal and vertical intercepts.

$y = 2x + 7$

x-int: $y = 0$

$0 = 2x + 7$

$\frac{-7}{2} = \frac{2x}{2}$

$-3.5 = x$

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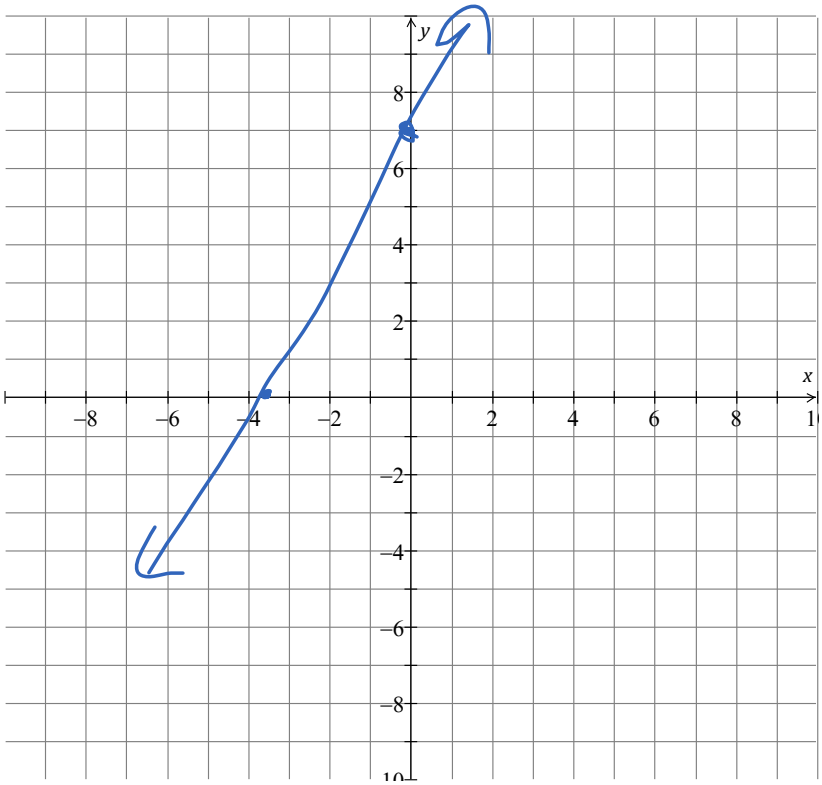
y-int: $x = 0$

$y = 2(0) + 7$

$y = 7$



Method 2: $y = mx + b$ Method

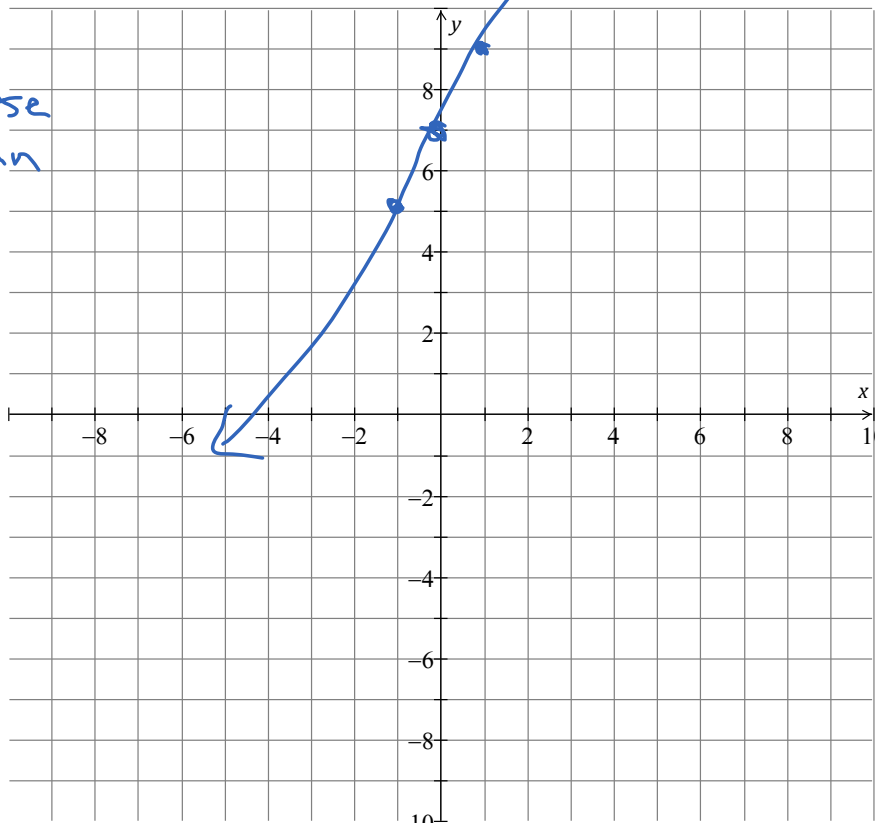
Since m = rate of change, b = y-intercept, we can use both to graph the function. Simply plot the y-intercept and then use the fact that the rate is $\frac{\text{rise}}{\text{run}}$ to plot one other point. Connect the dots and you're done.

Example 4:
Create a graph of $f(x) = 2x + 7$ using the y-intercept and the rate.

$y = 2x + 7$

$\text{ROC} = 2 = \frac{2}{1}$ rise / run

y-int: 7



Textbook Questions: page 319 - 320 #6 a, b, 7, 8, 9, 11