Solution Guide for Chapter 18

Here are the solutions for the “Doing the Math” exercises in *Kiss My Math*!

DTM from p. 282-3

2. (3, 4), (–5, –6), (–1, 0) (–4, 5)

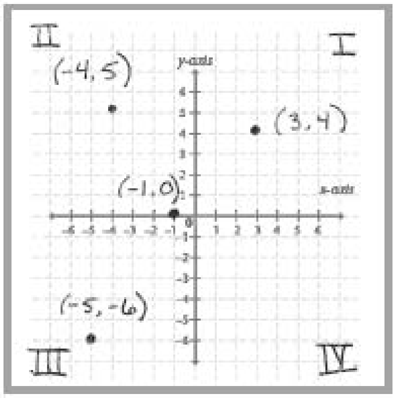
The point (3, 4) will be in the first quadrant, since both numbers are positive. The *x*-coordinate always comes first, so we go to the right 3 units, then up 4 units!

For (–5, –6), we’ll head to the left 5 units, and then to down 6 units – traveling in the negative *x* and *y* directions both times. That will land us in Quadrant III.

To plot (–1, 0), we start by moving in the negative *x* direction 1 unit, and then we don’t get to move up or down, since the *y*-coordinate is zero.

Finally, for (–4, 5), we first move in the negative *x*-direction (to the left) 4 units, and then up 5 units. Label the quadrants, and we’re done!

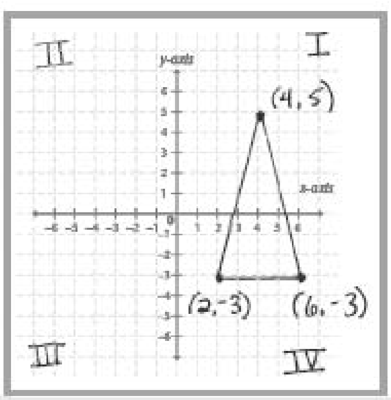
Answer:



3. (2, –3), (6, –3), (4, 5) *(Connect the dots for a triangle!)*

To plot the point (2, –3), first we move to the right 2 units, and then down 3 units. Similarly, to plot the point (6, –3), first we move to the right 6 units, and then down 3 units. The point (4, 5) will be in the first quadrant, since both numbers are positive. The *x*-coordinate always comes first, so we go to the right 4 units, then up 5 units. Now we can connect the dots to make a triangle!

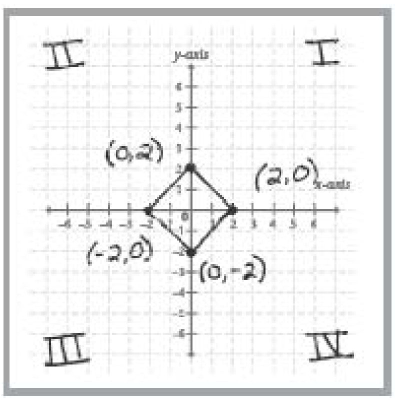
Answer:



4. (2, 0), (0, 2), (–2, 0), (0, –2) *(Connect the dots for a diamond!)*

Okay, to plot (2, 0), first we'll move to the right 2 units, and then we can't go up or down, since the *y*-coordinate is zero. Next, to plot (0, 2), we don't get to move to the left or right, since the *x*-coordinate is zero, but then we can move up 2 units. For (–2, 0), first we'll move in the negative direction (to the left) 2 units, and then we can't go up or down, since the *y*-coordinate is zero. To plot (0, –2), we don't get to move to the left or right, since the *x*-coordinate is zero, but then we can move down 2 units. Finally, we can connect the dots to make a diamond shape!

Answer:



DTM from p.284-5

2. $y = x + 3$, where $x = -3$, 0, and 3

For part a, let's collect our points to graph, by plugging in these *x* values into the function. Then for part b, we'll graph the points we found!

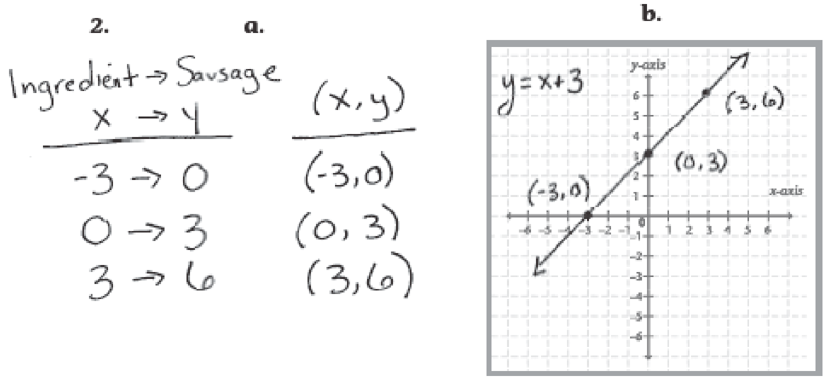
$y = x + 3$

For $x = \mathbf{-3}$, we get: $y = (\mathbf{-3}) + 3$ → → $y = 0$. So our first pair is: **<u>(–3, 0)</u>**.

For $x = \mathbf{0}$, we get: $y = (\mathbf{0}) + 3$ → $y = 3$. Our next ordered pair is: **<u>(0, 3)</u>**.

For x = **3**, y = (**3**) + 3 → y = 6. And our last pair is **<u>(3, 6)</u>**.

Answer:



3. $y = 3x – 2$, where x = –1, 0, and 1

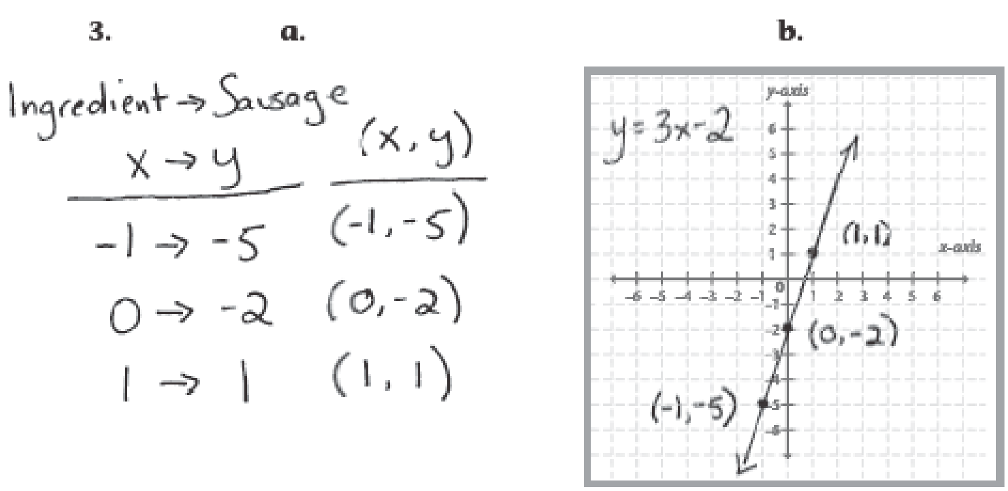
For x = **–1**, we get: y = 3(**–1**) – 2 → y = –3 – 2 → y = –3 + (–2) → y = –5. So our first pair is: **<u>(–1, –5)</u>**.

For x = **0**, we get: y = 3(**0**) – 2 → y = 0 – 2 → y = –2. Our next ordered pair is: **<u>(0, –2).</u>**

For x = **1**, y = 3(**1**) – 2 → y = 3 – 2 → y = 1. And our last pair is **<u>(1, 1)</u>**.

Now let's arrange these into tables, and graph them!

Answer:



4. $y = 1 - x$, where $x = -2, 0, 1,$ and 4

For $x = \mathbf{-2}$, we get: $y = 1 - (\mathbf{-2}) \rightarrow y = 1 + 2 \rightarrow y = 3$. So our first pair is:: **<u>(–2, 3)</u>**.

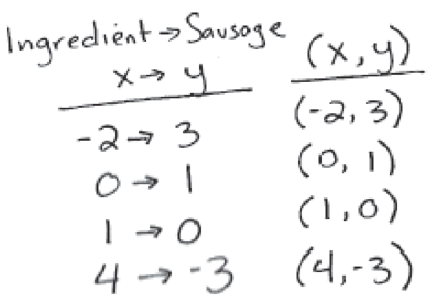
For $x = \mathbf{0}$, we get: $y = 1 - (\mathbf{0}) \rightarrow y = 1$, so our next pair is **<u>(0, 1)</u>.**

For $x = \mathbf{1}$, we get: $y = 1 - (\mathbf{1}) \rightarrow y = 0$. Next whispering pair! **<u>(1, 0)</u>**

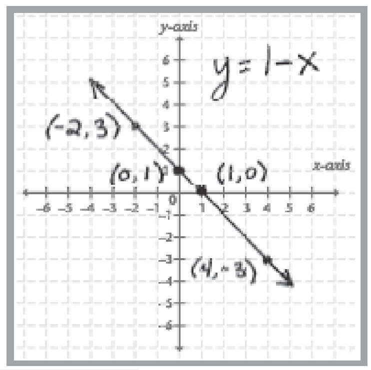
For $x = \mathbf{4}$, we get: $y = 1 - (\mathbf{4}) \rightarrow y = 1 - 4 \rightarrow y = 1 + (-4) \rightarrow y = -3$.

Our final pair is **<u>(4, –3)</u>**, and we're ready to make our tables and graph our points!

4. **a.**



b.



5. $y = x + 3$, where x = three random numbers that YOU choose.

Hm, 3 random numbers? How about $x = -5$, $x = -1$, and $x = 1$. Okay, let's plug 'em in and make some points!

$y = x + 3$

For $x = \mathbf{-5}$, we get: $y = (\mathbf{-5}) + 3 \rightarrow \rightarrow y = -2$. So our first pair is: **<u>(–5, –2)</u>.**

For $x = \mathbf{-1}$, we get: $y = (\mathbf{-1}) + 3 \rightarrow y = 2$. Our next ordered pair is: **<u>(–1, 2)</u>**.

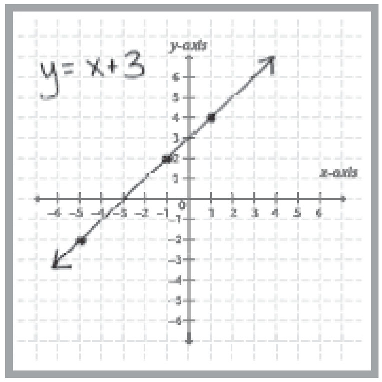
For $x = \mathbf{1}$, $y = (\mathbf{1}) + 3 \rightarrow y = 4$. And our last pair is **<u>(1, 4)</u>**.

Answer:

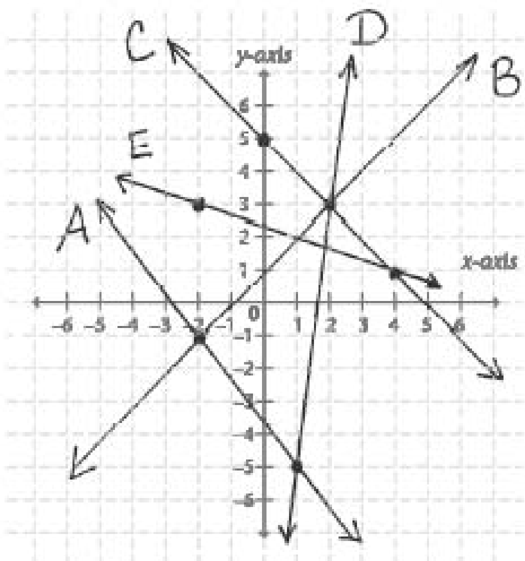
a.

Regardless of the points you pick, the *line* you draw should be this same line. I've marked the points (−5, −2), (−1, 2), and (1, 4), but your points will probably be different.

b.



DTM from p.294-5



2. Line “B”

There are two points marked for line “B” – the one on the left must be (-2, -1), because first you go to the left 2 units, and then down one unit. The other point marked for line “B” must be (2, 3), because you go to the right 2 units and then up 3 units. To find the slope, we need to find the rise and run from one point to the other. Starting with the point

(-2, -1), in order to get to the point (2, 3), we count that we need to rise 4 units, and run to the right 4 units. So slope = $\frac{rise}{run} = \frac{4}{4} = 1$.

Answer: **The points are (-2, -1) and (2, 3), and the slope of the line is 1.**

3. Line “C”

Finding line “C,” there are 3 marked points on it. We see one point actually on the *y*-axis. That point would be (0, 5), since the x-coordinate must be zero (we didn’t get to move to the right or left at all). For the other marked point on line “C”, we have (2, 3), and also (4, 1). To determine the slope, we only need to use two of the points. Let’s pick the first two. To get from (0, 5) and (2, 3), we’d need a rise of -2, and a run to the right of 2. So the slope = $\frac{rise}{run} = \frac{-2}{2} = -1$. And that negative slope makes sense, because it’s slanted in the opposite direction as line “B.”

Answer: **The marked points are (0, 5), (2, 3), and (4, 1). The slope of the line is –1.**

4. Line “D”

Ooh, line “D” is that really steep looking one. What are those points? Starting with the bottom marked point, we’d move in the positive x-direction 1 unit, and then down 5 units: (1, –5). For the second point, both coordinates will be positive. In the x-direction, we’d move 2 units, and then up 3 units: (2, 3).

For the slope, moving between (1, –5) and (2, 3), the rise would be (count it out!) 8 units up, and the run would be 1 unit to the right. So, rise = 8, run = 1. Slope = $\frac{rise}{run} = \frac{8}{1} = 8$.

Answer: **The marked points are (1, –5) and (2, 3), and the slope of the line is 8.**

5. Line "E"

Okay, there two marked points on line "E." The first one, in the 2nd quadrant, looks to be (–2, 3), since the *x*-direction is negative 2 units, and then we move up 3 units. For the other point, we have (4, 1). To find their slope, let's go from (–2, 3) to (4, 1), and in order to do that, we'd need to move down (negative *y*-direction) 2 units, and to the right (positive *x*-direction) 6 units. So rise = –2, and the run = 6. Slope = $\frac{rise}{run} = \frac{-2}{6} = -\frac{1}{3}$.

Answer: **The marked points are (–2, 3) and (4, 1), and the slope of the line is $-\frac{1}{3}$.**

DTM from p.298-9

2. $m = 2$, $b = 1$

a. Plugging these values into "$y = mx + b$," we get the linear equation: **<u>$y = 2x + 1$</u>**. So far so good? **b.** Now, to find points, let's pick some random values of *x* and find their *y* partners:

If $x = \mathbf{0}$, then $y = (2)(\mathbf{0}) + 1 \rightarrow y = 1$. First pair: **<u>(0, 1)</u>**.

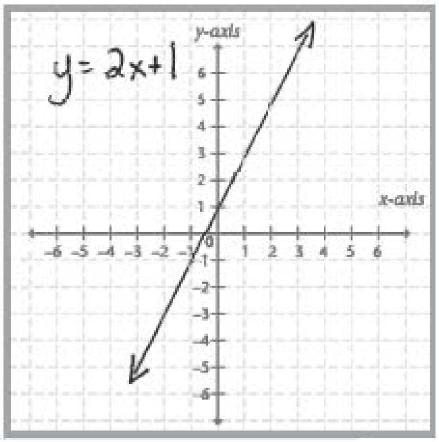
Next, how about $x = \mathbf{2}$, so: $y = (2)(\mathbf{2}) + 1 \rightarrow y = 4 + 1 \rightarrow y = 5$. Next pair: **<u>(2, 5)</u>**.

Hm. Let's use $x = \mathbf{-1}$, and we'll get: $y = (2)(\mathbf{-1}) + 1 \rightarrow y = -2 + 1 \rightarrow y = -1$. Our third pair is: **<u>(–1, –1)</u>.**

Time to graph! Lookie there, sure enough, the *y*-intercept is at 1 on the *y*-axis, just like *b* said it would be. And if you count the rise and run, you'll find that it equals $\frac{2}{1}$; in other words: 2.

Answer: a. ***y* = 2*x* +1**

b.



3. *m* = –2, *b* = –1

a. Plugging these values into "*y* = *mx* + *b*," we get the linear equation: *y* = –2*x* + (–1), in other words: <u>***y* = –2*x* – 1**</u>. So far so good?

b. Now, to find points, let's pick some random values of *x* and find their *y* partners:

If *x* = **0**, then *y* = (–2)(**0**) – 1 → *y* = –1. First pair: <u>**(0, –1)**</u>.

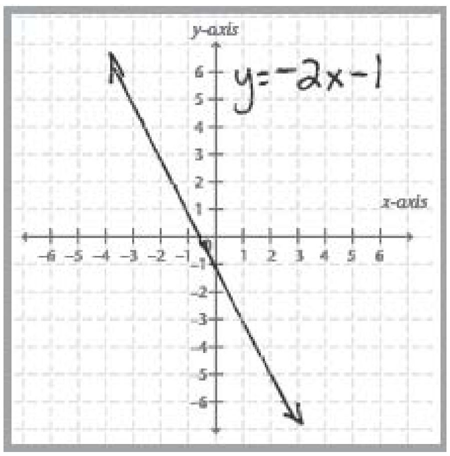
Next, how about *x* = **2**, so: *y* = (–2)(**2**) – 1 → *y* = –4 – 1 → *y* = – 5. Next pair: <u>**(2, – 5)**</u>.

Hm. Let's use *x* = **–1**, and we'll get: *y* = (–2)(**–1**) – 1 → *y* = 2 – 1 → *y* = 1. Our third pair is: <u>**(–1, 1)**</u>.

Time to graph! Lookie there, sure enough, the *y*-intercept is at –1 on the *y*-axis, just like *b* said it would be. And if you count the rise and run, you'll find that it equals $\frac{-2}{1}$ or $\frac{2}{-1}$; in other words: –2.

Answer: a. ***y* = –2*x* – 1**

b.



4. *m* = 0, *b* = 4

a. Plugging these values into "*y* = *mx* + *b*," we get the linear equation: *y* = 0*x* + 4, in other words: <u>***y* = 4** </u>. So far so good?

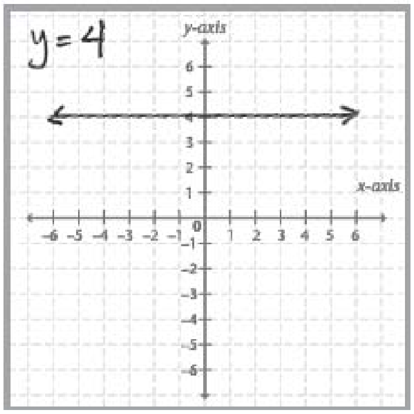
b. Now, to find points, let's pick some random values of *x* and find their *y* partners:

If *x* = **0**, then, um, well – it doesn't matter what x is, does it? Because y has decided to always be 4. So, we could name these points: (0, 4), (2, 4), (-1000, 4) it doesn't matter!

Time to graph! Lookie there, sure enough, the *y*-intercept is at 4 on the *y*-axis, just like *b* said it would be. And if you count the rise and run, you'll find that no matter how much you *run* to the left or right, the *rise* will always be zero. In other words: slope = 0.

Answer: a. $\boldsymbol{y = 4}$

b.



5. $m = \frac{2}{3}$, $b = 0$ *(Hint: pick values of x that are divisible by 3 to make it easier!)*

a. Plugging these values into "$y = mx + b$," we get the linear equation: $y = \frac{2}{3}x + 0$, in

other words: $\boldsymbol{y = \frac{2}{3}x}$.

So far so good? **b.** Now, to find points, let's pick some random values of *x* and find their *y* partners – but let's make sure we take the "hint" and pick values of x that are divisible by 3. How about: –3, 0, and 3:

For $x = \mathbf{-3}$, and we'll get: $y = (\frac{2}{3})(\mathbf{-3})$ → $y = \frac{-6}{3}$ → $y = -2$. Our first pair is: **(–3, –2).**

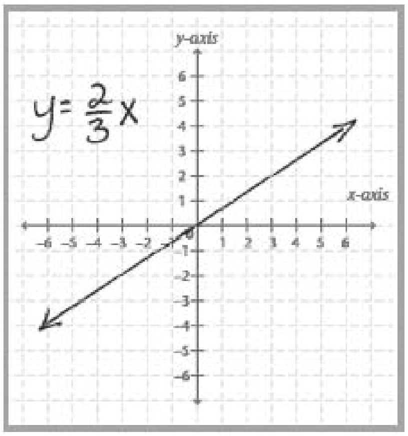
If $x = \mathbf{0}$, then $y = (\frac{2}{3})(\mathbf{0})$ → $y = 0$. Second pair: **(0, 0)**.

Next, if $x = \mathbf{3}$, then: $y = (\frac{2}{3})(\mathbf{3})$ → $y = \frac{6}{3}$ → $y = 2$. Third pair: **(3, 2)**.

Time to graph! Sure enough, the *y*-intercept is at 0 on the *y*-axis, just like *b* said it would be. And if you count the rise and run, you'll find that it equals $\frac{2}{3}$.

Answer: a. $\boldsymbol{y = \frac{2}{3}x}$

b.



6. $m = -0.25$, $b = -1$ *(Hint: write the decimal as a fraction & pick x values divisible by 4)*

The hint tells us to rewrite –0.25 as a fraction, so that it will be easier to multiply with, when we're plugging in *x*-values and finding points. You may already know that $-0.25 = -\frac{1}{4}$, but if you don't, then here's how you could convert it. (For another method, see p.150 in *Math Doesn't Suck*.) First, write –0.25 as the fraction $\frac{-0.25}{1}$, and then multiply it by the copycat fraction $\frac{100}{100}$, which of course doesn't change the value of our number:

$$\frac{-0.25}{1} \times \frac{100}{100} = \frac{-0.25 \times 100}{1 \times 100} = \frac{-25}{100} \text{ (reducing)} = -\frac{1}{4}.$$

Phew! Okay, let's continue: $m = -\frac{1}{4}$, $b = -1$

a. Plugging these values into "$y = mx + b$," we get the linear equation: $y = -\frac{1}{4}x + (-1)$, in other words: $\boldsymbol{y = -\frac{1}{4}x - 1}$. So far so good?

b. Now, to find points, let's pick some random values of x (which are divisible by 4) and find their y partners. How about $x = -4$, $x = 0$, and $x = 4$:

If $x = \mathbf{-4}$, and we'll get: $y = (-\frac{1}{4})(\mathbf{-4}) - 1 \rightarrow y = \frac{-4}{-4} - 1 \rightarrow y = 1 - 1 \rightarrow y = 0$. Our first pair is: **(–4, 0).**

If $x = \mathbf{0}$, then $y = (-\frac{1}{4})(\mathbf{0}) - 1 \rightarrow y = -1$. Next pair: **(0, –1)**.

Next, $x = \mathbf{4}$, so: $y = (-\frac{1}{4})(\mathbf{4}) - 1 \rightarrow y = -1 - 1 \rightarrow y = -2$. Next pair: **(4, – 2)**.

Time to graph! Yep, sure enough, the y-intercept is at –1 on the y-axis, just like b said it would be. And if you count the rise and run, you'll find that it equals $\frac{-1}{4}$ or $\frac{1}{-4}$; in other words: $-\frac{1}{4}$.

Answer: a. $\boldsymbol{y = -\frac{1}{4}x - 1}$ or $\boldsymbol{y = -0.25x - 1}$

b.