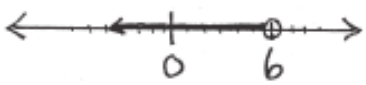
Solution Guide for Chapter 14

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

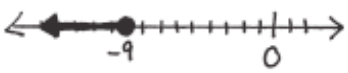
DTM from p.214

2. $6 > w$



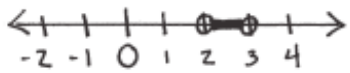
Notice that I used an empty circle for the endpoint 6, because the > means we can't include it in the solution set for *w*. Done!

3. $-9 \geq x$



Notice that I used a filled-in circle for the endpoint –9, because the ≥ means that we need to include it – it's one of the values that *x* can be. Done!

4. $2 < n < 3$



Notice that I used an empty circle for the endpoint $n = 2$, because the < means we can't include it, and an empty circle for the $n = 3$. Also, notice that even though this inequality's solution set has two endpoints, there are still an infinite number of values inside of that little segment – there's an infinite number fractions and decimals in between there, that all satisfy n's requirements!

DTM from p.223-4

2. $8 + x < 16$

First, we subtract 8 from both sides, and we'll get:

$$8 + x < 16$$

$$\rightarrow \ 8 - \mathbf{8} + x < 16 - \mathbf{8}$$

$$\rightarrow \ \underline{x < 8}$$

Now, to check our answer, first we'll plug in $x = 8$ into the original inequality, to check the endpoint of $x = 8$:

$8 + x < 16$

$\rightarrow 8 + 8 < 16$?

$\rightarrow 16 < 16$?

Of course, it's not true that $16 < 16$, but we got the same number on both sides, which is all we need when checking an endpoint.

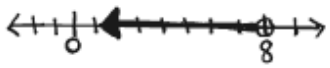
Now let's check the direction of the inequality symbol of our solution, $x < 8$

Picking a random point less than 8, let's pick $x = 0$, since it's easy to work with:

$8 + 0 < 16$?

$8 < 16$, yep! It's a true statement, which is what we want when checking the direction of the inequality symbol.

Answer: $\boldsymbol{x < 8}$



3. $8 - x < 16$

To isolate x, first, we subtract 8 from both sides, and we'll get:

$$8 - x < 16$$

$$\rightarrow 8 \mathbf{- 8} - x < 16 \mathbf{- 8}$$

$$\rightarrow -x < 8$$

To completely isolate x, we must get rid of the negative sign. So, using the mirror rule, we'll multiply both sides by –1, and also reverse the inequality symbol:

$$\rightarrow \underline{x > -8}$$

To check the endpoint of $x = -8$, let's plug it into the original equation:

$8 - x < 16$

$\rightarrow 8 - (-8) < 16$?

$\rightarrow 8 + 8 < 16$?

$\rightarrow 16 < 16$? Of course, it's not true that $16 < 16$, but we got the same number on both sides, which is all we need when checking an endpoint.

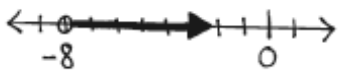
Now let's check the direction of the inequality symbol of our solution, $x > -8$.

Picking a random point greater than –8, let's pick $x = 0$, since it's easy to work with:

$8 - 0 < 16$?

$8 < 16$, yep! It's a true statement which is what we want when checking the direction of the inequality symbol.

Answer: $\boldsymbol{x > -8}$



4. $-3x - 1 \geq 5$

Hm, too many negative signs for my taste.

Right off the bat, let's multiply both sides by –1, and of course also reverse the direction of the inequality symbol:

$$-3x - 1 \geq 5$$

$$\rightarrow (-1)(-3x - 1) \leq (-1)(5)$$

$$\rightarrow 3x + 1 \leq -5$$

subtract 1 from both sides:

$$\rightarrow 3x + 1 - 1 \leq -5 - 1$$

$$\rightarrow 3x \leq -6$$

$$\rightarrow \frac{3x}{\mathbf{3}} \leq -\frac{6}{\mathbf{3}}$$

$$\rightarrow \boldsymbol{x \leq -2}$$

To check the endpoint of $x = 2$, let's plug it into the original equation:

$-3x - 1 \geq 5$

$\rightarrow -3(\mathbf{-2}) - 1 \geq 5$?

the two negatives will cancel

→ $3(2) - 1 \geq 5$?

→ $6 - 1 \geq 5$?

→ $5 \geq 5$

Since both sides are equal, we know the endpoint of $x = -2$ is correct. Now let's check the direction of the inequality symbol, by picking a random value in the solution set $x \leq -2$. Hm, 0 isn't less than –2, so let's try something else easy to work with, like $x = -10$.

Testing that value in the original inequality, we get:

$-3x - 1 \geq 5$

→ $-3(-10) - 1 \geq 5$

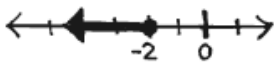
→ $3(10) - 1 \geq 5$

→ $30 - 1 \geq 5$

→ $29 \geq 5$

A true statement! Which is all we need when checking the direction of the inequality sign.

Answer: $\boldsymbol{x \leq -2}$



5. $2x - 1 > x + 3$ (Hint: start by subtracting x from both sides!)

Let's use the hint, and subtract x from both sides to begin with:

$$2x - 1 > x + 3$$

→ $2x \boldsymbol{- x} - 1 > x \boldsymbol{- x} + 3$

→ $x - 1 > 3$

To keep isolating x, let's add 1 to both sides:

→ $x - 1 + \mathbf{1} > 3 + \mathbf{1}$

→ $\underline{x > 4}$

To check our solution set, first we'll check the endpoint $x = 4$, by plugging that into the original inequality and hope that we get the same number on both sides:

$2x - 1 > x + 3$

→ $2(\mathbf{4}) - 1 > (\mathbf{4}) + 3$?

→ $8 - 1 > 7$?

→ $7 > 7$?

Of course, it's not true that $7 > 7$, but we got the same number on both sides, which is all we need when checking an endpoint.

Now let's check the direction of the inequality symbol of our solution, $x > 4$.

Picking a random point greater than 7 let's pick $x = 10$, since it's easy to work with, and hope that we get a true statement:

$2x - 1 > x + 3$

→ $2(10) - 1 > (10) + 3$

→ $20 - 1 > 13$

→ $19 > 13$, yep, we got a true statement! This means we got the right direction for the inequality symbol for our solution set, $x > 4$.

Answer: $\boldsymbol{x > 4}$