Lesson 3: Sections 1.4 & 1.6

By the end of this lesson, you will be able to:

- Write verbal expressions
  algebraically
- Write algebraic expressions verbally
- Solve equations for one variable
- Solve inequalities for one variable

$$< \quad >$$

$$\leq \quad \geq$$

Verbal and Algebraic Expressions:

Algebraic Expression:
ex: How would you say $x+2$ verbally?

Verbal Expression:
a number x added to two.
(increased by)
the sum of a number x and two.

Verbal Expression:
ex: How would you write x less than 2 algebraically?

Algebraic Expression: ~~x-2~~ $2-x$

Mathematical operations in verbal expressions

Addition	Subtraction
plus	minus
more than	★ less than
the sum of	the difference of
increased by	decreased by
added to	★ subtracted from

Multiplication	Division
the product of	the quotient of
multiplied by	divided by
times	the ratio of
twice	half

Exponents
squared
cubed
to the ____ power

1. Write an algebraic expression or equation for each verbal expression.

   a. Four times the sum of a number and two

   x

   $$4(x+2)$$

   b. Five increased by three times a number

   $$5 + 3x$$

2. Write a verbal expression for each algebraic expression

   a. 20-y 20 decreased by a number y.

   y subtracted from 20.

   e. 5x five times a number x

Solving Equations

1. $3(2a + 25) - 2(a - 1) = 78$

$$6a + 75 - 2a + 2 = 78$$

$$4a + 77 = 78$$
$$-77 \qquad -77$$
$$\frac{4a}{4} = \frac{1}{4}$$

$$\boxed{a = \frac{1}{4}}$$

Solving Equations - clear fractions

2. $\left(\dfrac{5}{7}x - 4 = \dfrac{3}{7}x + 1 \right) 7$

$$5x - 28 = 3x + 7$$
$$-3x + 28 \quad -3x + 28$$

$$\frac{2x}{2} = \frac{35}{2}$$

$$\boxed{X = \frac{35}{2}}$$

Solving Equations - clear fractions

3. $\left(\dfrac{3}{4} - \dfrac{1}{2}(n) = \dfrac{4}{5} \right) 20$

$\dfrac{\overset{5}{\cancel{20}}}{1} \cdot \dfrac{3}{\cancel{4}_{1}} - \dfrac{\overset{10}{\cancel{20}}}{1} \cdot \dfrac{1}{\cancel{2}_{1}}(n) = \dfrac{\overset{4}{\cancel{20}}}{1} \cdot \dfrac{4}{\cancel{5}}$

$\begin{array}{r} 15 - 10n = 16 \\ -15 \qquad\quad -15 \\ \hline \end{array}$

$\dfrac{-10n}{-10} = \dfrac{1}{-10}$

$\boxed{n = -\dfrac{1}{10}}$

Solving Equations

4. $-1.6w + 5 = -7.8$

$\ \ -5\ \ \ -5.0$

$-1.6w = -12.8$

$-1.6-1.6$

$\boxed{w = 8}$

$$\begin{array}{r} 7.8 \\ 5.0 \\ \hline 12.8 \end{array}$$

$1.6\overline{)12.8}$

$\begin{array}{r} 8 \\ 16\overline{)128.} \\ -128 \\ \hline 0 \end{array}$

Solving Equations

5. $-4(6y - 5) = 23 - 3(8y + 1)$

$-24y + 20 = 23 - 24y - 3$

$-24y + 20 = 20 - 24y$ Same

$+24y - 20 \quad -20 + 24y$

$0 = 0 \checkmark$

$\boxed{\mathbb{R}}$ or all real numbers

Solving Equations - clear fractions

6. $-1\frac{3}{4}p = \frac{-5}{8}$

$$\left(-\frac{7}{4}p = \frac{-5}{8}\right)8$$

$$\frac{2\cancel{8}}{1} \cdot \frac{-7}{\cancel{4}}p = \frac{\cancel{8}}{1} \cdot \frac{-5}{\cancel{8}}$$

$$\frac{-14p}{-14} = \frac{-5}{-14}$$

$$\boxed{p = \frac{5}{14}}$$

An **Inequality** has a greater than ($>$), greater than or equal to ($\geq$), less than ($<$), or less than or equal to ($\leq$) sign instead of an equal ($=$) sign.

For example:

An Equation is $3x - 4 = 14$
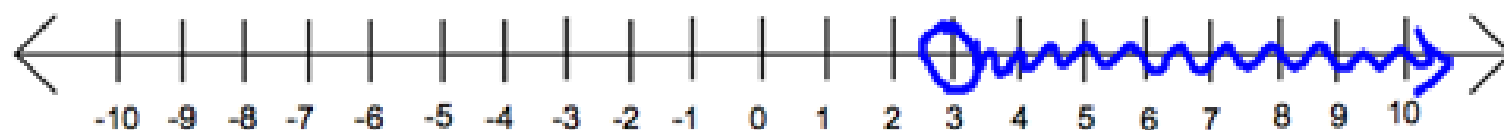
An Inequality is $3x - 4 < 14$

We will be solving for x to find where we can make this sentence be true, and then we will graph the solution.
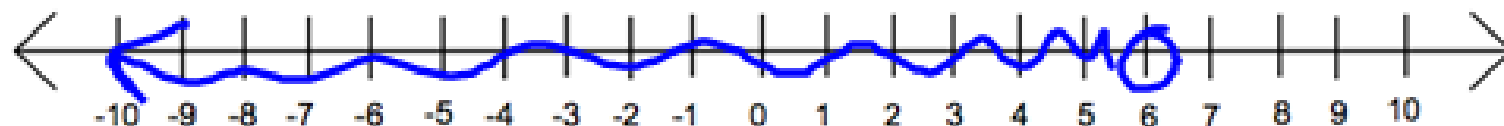
Let's start with graphing on a number line.

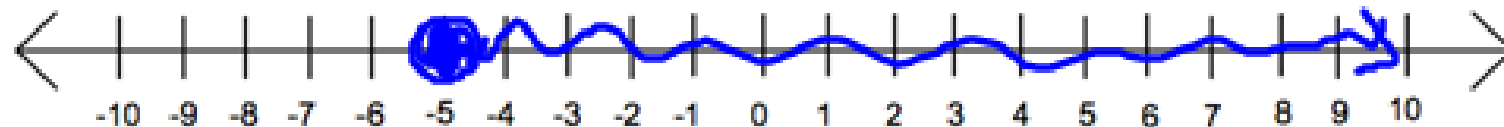1. $x > 3$

2. $x < 6$

3. $x \geq -5$

$<, >$ ◯

Solving Inequalities

$\leq, \geq$ ⬤

You solve inequalities just like you would solve an equation.

You only have to watch for one thing: **Dividing or Multiplying by a negative number.** **If you do do this, you need to switch the inequality sign.**

For example: -3x > 12   You need to divide by a -3.

$$\frac{-3x}{-3} > \frac{12}{-3}$$

This means you need to switch the inequality. It will end up being: x < -4

x < - 4

Lesson 3: Section 1.4 & 1.6

Let's solve some examples and then graph them.(Watch out for those negatives! *What should you do if to the </> if you divide or multiply by a negative?)*

1. $6x + 3 > 5x - 2$

$$\frac{-5x \quad -5x}{}$$

$$x + 3 > -2$$
$$-3 \quad -3$$

$$\boxed{x > -5}$$

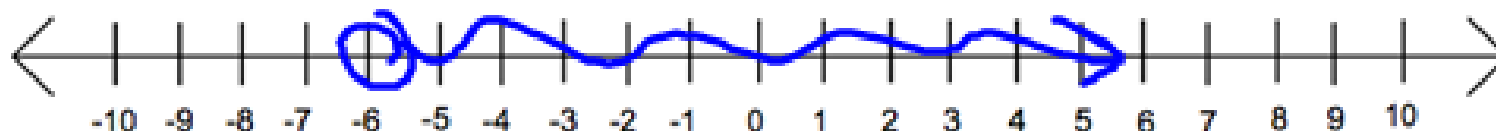Let's solve some examples and then graph them.(Watch out for those negatives! *What should you do if to the </> if you divide or multiply by a negative?)*

2. $-3x - 4 < 14$

$$\underline{\quad +4 \quad +4 \quad}$$

$$\frac{-3x}{-3} < \frac{18}{-3}$$

$$x > -6$$

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Let's solve some examples and then graph them.(Watch out for those negatives! *What should you do if to the </> if you divide or multiply by a negative?*)
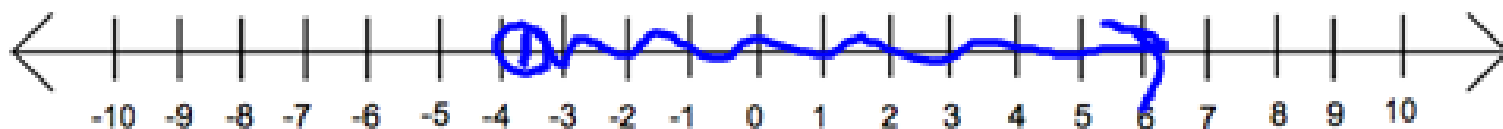
3. $-3(4x + 7) < 21$

$$\frac{42}{12} = \frac{6 \cdot 7}{6 \cdot 2}$$

$$-12x - 21 < 21$$
$$\underline{\quad +21 \quad +21}$$
$$\frac{-12x}{-12} < \frac{42}{-12}$$

$$\frac{-7}{2} \rightarrow -3\frac{1}{2}$$

$$x > \frac{42}{-12}$$

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

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- Solve inequalities for one variable

Can you?

Homework:

Assignment #3: