Chapter 6 Notes

Solving and Graphing Linear Inequalities
6.1 Solving Inequalities Using Addition and Subtraction

Graph of a linear inequality in one variable: _______________________________________
____________________________________________________________________________

Equivalent Inequalities: _____________________________________________________
____________________________________________________________________________

Writing and Graphing an Inequality

1. Food Drive  Your school wants to collect at least 5000 pounds of food for a food drive. Write and graph an inequality to describe the amount of food that your school hopes to collect.

   \[0] \]

2. You must be 16 years old or older to get your driver’s license. Write and graph an inequality to describe the ages of people who may get their driver’s license.

   \[0] \]

Addition Property of Inequality

Words: Adding the same number to each side of an inequality produces an equivalent inequality.

Algebra: if \( a > b \), then \( a + c > \) ________________

if \( a < b \), then \( a + c < \) ________________

if \( a \geq b \), then \( a + c \geq \) ________________

if \( a \leq b \), then \( a + c \leq \) ________________
Solve an inequality using addition

1.
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

2.
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

3.
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

4.
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

Subtraction Property of Inequality

Words: Subtracting the same number from each side of an inequality produces an equivalent inequality.

Algebra: if \(a > b\), then \(a - c > \_\_\_\_\_\_\_\_\_\_

if \(a < b\), then \(a - c < \_\_\_\_\_\_\_\_\_

if \(a \geq b\), then \(a - c \geq \_\_\_\_\_\_\_\_\_

if \(a \leq b\), then \(a - c \leq \_\_\_\_\_\_\_\_\_

Solve an inequality using subtraction

1.

Write the Inequality

a. __________________

b. __________________

c. temperature $t$ is fewer than 8°

______________________
d. date \( d \) is greater than 4

\[ -10 \quad -9 \quad -8 \quad -7 \quad -6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \]

e. Melissa's height \( h \) is more than 5 feet

\[ -10 \quad -9 \quad -8 \quad -7 \quad -6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \]

f. their score \( s \) was at least 10 points

\[ -10 \quad -9 \quad -8 \quad -7 \quad -6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \]

g. his shoe size \( s \) was no more than a size 9

\[ -10 \quad -9 \quad -8 \quad -7 \quad -6 \quad -5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \]
6.2 Solving Inequalities Using Multiplication and Division

Multiplication Property of Inequality

Words: Multiplying each side of an inequality by a ___________ number produces an equivalent inequality.

Multiplying each side of an inequality by a ___________ number and reversing the direction of the inequality symbol produces an equivalent inequality.

Algebra:

if $a < b$ and $c > 0$, then ______________

if $a < b$ and $c < 0$, then ______________

if $a > b$ and $c > 0$, then ______________

if $a > b$ and $c < 0$, then ______________

This property is also true for inequalities involving $\geq$ and $\leq$.

Solve an inequality using multiplication

1.

```
-10 -9  -8  -7  -6  -5  -4  -3  -2  -1  0  1  2  3  4  5  6  7  8  9  10
```

2.

```
-10  -9  -8  -7  -6  -5  -4  -3  -2  -1  0  1  2  3  4  5  6  7  8  9  10
```

3.

```
-10  -9  -8  -7  -6  -5  -4  -3  -2  -1  0  1  2  3  4  5  6  7  8  9  10
```
Multiplication Property of Inequality

Words: Dividing each side of an inequality by a ___________ number produces an equivalent inequality.

Dividing each side of an inequality by a ____________ number and reversing the direction of the inequality symbol produces an equivalent inequality.

Algebra:

if $a < b$ and $c > 0$, then _____________

if $a < b$ and $c < 0$, then _____________

if $a > b$ and $c > 0$, then _____________

if $a > b$ and $c < 0$, then _____________

This property is also true for inequalities involving $\geq$ and $\leq$. 
Solve an inequality using multiplication

1.

2.

3.

4.

5.

6.
Real World Problem

a. You have a budget of $45 to buy pizza for a student council meeting. Pizza's cost $7.50 each. Write and solve an inequality to find the possible numbers of pizzas that you can buy.

b. In problem a, suppose you had a budget of $50 and each pizza costs $8. Write and solve an inequality to find the possible numbers of pizzas that you can buy.
6.3 Solve Multi-Step Inequalities

Solve a two-step inequality

1. 

2. 

3. 

4. 

5. 
Solve a multi-step inequality

1.

2.

3.

4.

Identify the number of solutions of an inequality.

a.  

b.  

c.  

d.
6.4 Solve Compound Inequalities

Write and Graph Compound Inequalities

a. All real numbers that are greater than or equal to -2 and less than 2.

b. All real numbers that are less than or equal to 3 or greater than 6.

c. All real numbers that are greater than -8 and less than or equal to -3.

Solve a compound Inequality with and.

d. \(15 \leq 3x - 3 < 24\)

e. \(15 < -7x + 1 < 50\)
Solve a compound Inequality with or.

f. \(5x + 6 \leq -9\) or \(2x - 8 > 12\)

g. \(9x + 1 < -17\) or \(7x - 12 > 9\)

Additional Practice:

6. \(-3 \leq -2x + 1 < 11\)
6.5 Solve Absolute Value Equations

Absolute value equation: __________________________________________________________________________
________________________________________________________________________

Absolute deviation: __________________________________________________________________________
________________________________________________________________________

Solve an Absolute Value Equation

Rewrite an Absolute Value Equation
Decide if an Equation has No Solution

Use Absolute Deviation
6.6 Solve Absolute Value Inequalities

Solve an Absolute Value Inequality

a. 

b. 

Solve an Absolute Value Inequality

c. 

d. 
6.7 Graph Linear Inequalities in Two Variables

Linear inequality in two variables: A linear inequality in two variables is the result of replacing the = sign in a linear equation with <, ≤, >, or ≥.

Graph of an inequality in two variables: The set of points that represent all solutions of the inequality.

Check Solutions of a Linear Inequality

Tell whether the ordered pair is a solution of $3x - 4y > 9$

a. Test: $(2, 0)$

b. Test: $(2, -1)$

Graph a Linear Inequality in two variables:

Step 1: Graph the boundary line. Use a __________ line for < or >, and use a __________ line for ≤ or ≥.

Step 2: Test a point not on the __________ line by checking whether the ordered pair is a solution of the inequality. (Often you will use ________.)

Step 3: Shade the half that makes the inequality _________.

Graph a Linear Inequality in Two Variables

c. Graph the inequality \( y < \frac{-1}{2}x + 4 \)

d. Graph the inequality \( y \geq 5x - 3 \)

e. Graph the inequality \( 2y + 4x \leq 8 \)
Graph a Linear Inequality in One Variable

f. Graph the inequality $y < 2$

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g. Graph the inequality $x \geq -3$

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h. Graph the inequality $y \leq 8$