Warm Up $8/\left(\sqrt[3]{25}\right)^3$

1. **Martha has gotten a 79 and a 90 on her two math quizzes so far. She also took one test, which counts triple, and got an 85. Martha has another quiz coming up. What does she need to get on this quiz if she wants to average at least an 87?**

$$\frac{79 + 90 + 85 + 85 + 85 + q}{6} \geq 87$$

$$\cdot 6 \, \frac{424 + q}{6} \geq 87 \cdot 6$$

$$424 + q \geq 522$$

$$q \geq 98$$

QUIZ TOMORROW!

Whiteboards again!

- Can you break a minute this time?

- We are not going to start a brand new notes page, but a lot of today's stuff will be new; you should write down everything you feel would be helpful for you on your **inequalities notes page**

- **Rob and Bob both plant a tree on Arbor Day. Rob's tree was originally 5 feet tall when it was planted and grew 2 feet per year. Bob's tree was originally 1 foot tall and grew 2.5 feet per year.**

1. Write an inequality to represent the years that Rob's tree is taller than Bob's tree.
2. Solve the inequality and write a sentence explaining what the solution means.
3. Which tree will be taller after 6 years?
4. Which tree will be taller after 8 years?
5. Which tree will be taller after 10 years?

Sergio needs to buy gifts for 8 friends. He wants to give the same gift to all his friends and he plans to have the gifts wrapped for an additional charge of $1.50 each. If Sergio spends at least $70, he will receive free shipping on his order. Write and solve an inequality to determine how much Sergio needs to spend on each gift in order to receive free shipping.

$$\mathbf{8}\left(g + \mathbf{1.5}\right) \geq 70$$

$$\mathbf{8}\, g + \mathbf{12} \geq 70$$

$$\mathbf{8}\, g + 12 - \mathbf{12} \geq 70 - \mathbf{12}$$

$$8g \geq \mathbf{58}$$

$$\frac{8g}{\mathbf{8}} \geq \frac{58}{\mathbf{8}}$$

$$g \geq \mathbf{7.25}$$

- The citizens of Mathville have noticed that on a particular highway, the traffic cop will pull you over if you are going more than 75 miles per hour. They will also pull you over if you are going less than 50 miles per hour, since going too slow on the highway could be a hazard. Write an inequality where **S** represents the acceptable speeds on the highway.

Today's Objective:

- Solve compound inequalities
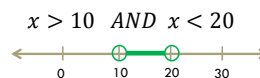 - (A compound inequality is basically 2 inequalities put together)

Compound Inequality: 2 inequalities put together
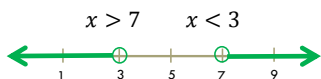

What would happen if you put these inequalities together???

$$x > 10 \text{ AND } x < 20$$
$$x > 7 \qquad x < 3$$
$$x < -6 \text{ AND } x > -7$$
$$x < 0 \qquad x > 500$$

$$x > 50 \qquad x > 60$$

In which of these inequalities would the word "and" make sense?

$$x > 10 \quad AND \quad x < 20$$

A more common way to write this compound inequality is

$$10 < x < 20$$

$$x > 7 \qquad x < 3$$

It is impossible to be greater than 7 and less than 3 at the same time. We put the word "OR" between these two inequalities.

$$x > 7 \ OR \ x < 3$$

There is no way to write it "together" as one inequality. It wouldn't make sense:

$$3 > x > 7$$

When two simple inequalities are combined into one statement by the words AND or OR, the result is called a **compound inequality**.

Math as Another Language!

- Translate these phrases into "math language." Graph the solution.

- All real numbers greater than 2 AND less than 6 $2 < x < 6$
- All real numbers greater than or equal to 2 AND less than or equal to 6 $2 \leq x \leq 6$
- All real numbers less than 2 OR greater than 6 $x < 2$ OR $x > 6$
- All real numbers less than OR equal 2 or greater than 6 $x \leq 2$ OR $x \geq 6$
- All numbers between 8 and 16 $8 < x < 16$
- All numbers between 8 and 16 inclusive $8 \leq x \leq 16$

Write the compound inequality shown by each graph.

$x \leq -8$ OR $x > 0$

$-2 \leq x < 4$
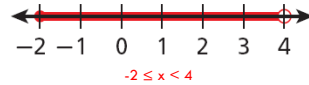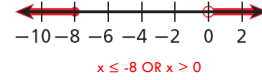
Solve the compound inequality and graph the solutions.

$$4 \leq x + 2 \leq 8$$

$$\begin{array}{ccccc} 4 & \leq & x + 2 & \leq & 8 \\ -2 & & -2 & & -2 \\ \hline 2 & < & x & < & 6 \end{array}$$
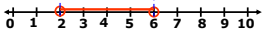

Graph $2 < x$.
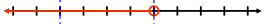
Graph $x < 6$.

Graph the intersection by finding where the two graphs overlap.

Solve the compound inequality and graph the solutions.

$$-5 \leq 2x + 3 < 9$$

$$\begin{array}{ccccc} -5 & \leq & 2x + 3 & < & 9 \\ -3 & & -3 & & -3 \\ \hline -8 & \leq & 2x & < & 6 \end{array}$$

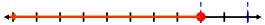$$\frac{-8}{2} \leq \frac{2x}{2} < \frac{6}{2}$$

$$-4 \leq x < 3$$

Solve the inequality and graph the solutions.
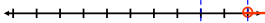**$2x \leq 6$ OR $3x > 12$**

$$2x \leq 6 \text{ OR } 3x > 12$$
$$\frac{2x}{2} \leq \frac{6}{2} \text{ OR } \frac{3x}{3} > \frac{12}{3}$$
$$x \leq 3 \text{ OR } x > 4$$

Graph $x \leq 3$.

Graph $x > 4$.

Graph the union by combining the regions.

Solve the compound inequality and graph the solutions.
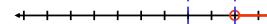
$2 + r < 12$ OR $r + 5 > 19$

$$\begin{array}{cccc} 2 + r < 12 & \text{OR} & r + 5 > 19 \\ -2 \quad -2 & & -5 \quad -5 \\ \hline r < 10 & \text{OR} & r > 14 \end{array}$$

Solve each simple inequality.

Graph $r < 10$.

Graph $r > 14$.

Graph the union by combining the regions.

Word Problem Time!

The target heart rate during exercise for a 15 year-old is between 154 and 174 beats per minute inclusive. Write a compound inequality to show the heart rates that are within the target range. Graph the solutions.

$154 \le h \le 174$

144 154 164 174 184

The pH level of a popular shampoo is between 6.0 and 6.5 inclusive. Write a compound inequality to show the pH levels of this shampoo. Graph the solutions.

$6.0 \le p \le 6.5$

5.9 6.0 6.1 6.2 6.3 6.4 6.5
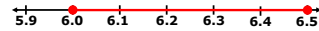
□ Mr. Lischwe's classroom is ridiculous! The students wish it would be between 60 and 80 degrees, but it never is. Write & graph a compound inequality representing the temperatures that occur in Mr. Lischwe's classroom. (In this fake scenario)

50 60 70 80 90

t ≤ 60 OR t ≥ 80

Homework

□ p. 89 (11 – 23)