

NOTES: SOLVE AND GRAPH INEQUALITIES

DAY 5

Textbook Chapter 1.6

Compound Inequality (AND):

1. a. Create a situation with a range of possibilities (for example: my commute takes between 7 to 12 minutes, depending on traffic). Then graph your inequality.



- b. Write the situation as an inequality: $7 < x < 12$

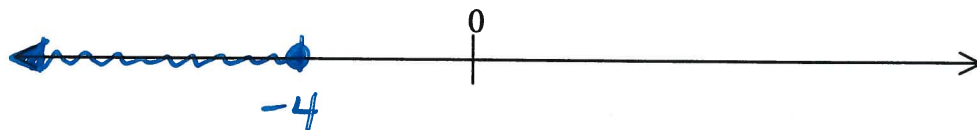
Disjoint Inequality (OR):

2. a. Graph all the values that you did not graph on the number line above.

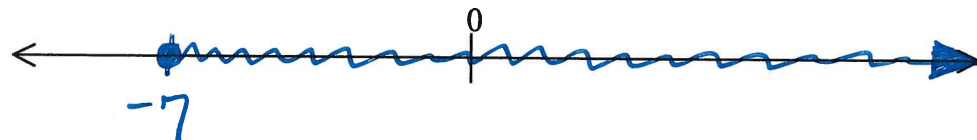


- b. Write your graph as one or more inequalities: $x \leq 7$ OR $x \geq 12$

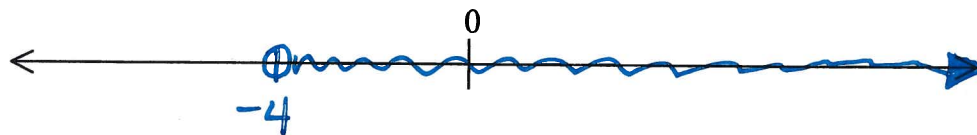
3.
$$\begin{aligned} 3x - 4 &\leq -16 \\ +4 & \quad +4 \\ \hline 3x &\leq -12 \\ \frac{3x}{3} &\leq \frac{-12}{3} \\ x &\leq -4 \end{aligned}$$



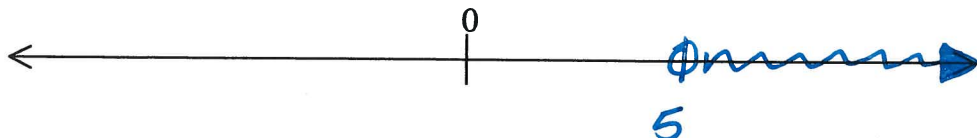
4.
$$\begin{aligned} -3(x + 2) &\leq 15 \\ -3x - 6 &\leq 15 \\ +6 & \quad +6 \\ \hline -3x &\leq 21 \\ \frac{-3x}{-3} &\leq \frac{21}{-3} \\ x &\geq -7 \end{aligned}$$



5.
$$\begin{aligned} -4 &< x \\ x &> -4 \end{aligned}$$



6.
$$\begin{aligned} 2 &< x - 3 \\ +3 & \quad +3 \\ \hline 5 &< x \\ x &> 5 \end{aligned}$$



NOTES: SOLVE ABSOLUTE VALUE EQUATIONS

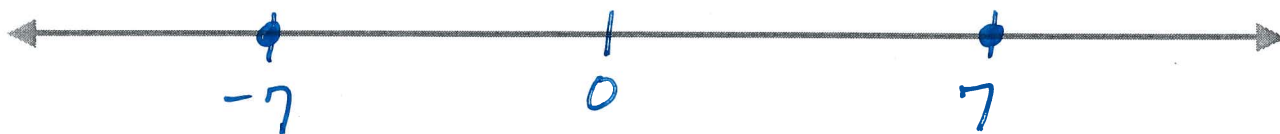
DAY 5

Textbook Chapter 1.6

OBJECTIVE: Today you will review inequalities and learn how to solve absolute value equations!

1. Absolute Value Definition: Distance from zero.

$$|x| = 7 \quad \begin{array}{l} |7| = 7 \\ |-7| = 7 \end{array} \quad x = 7, -7$$

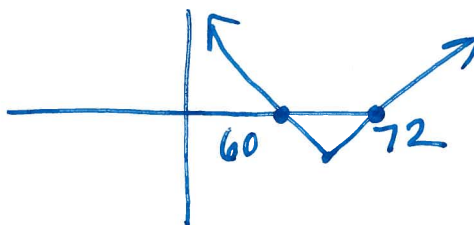


2. Minimum Height: 60"
Maximum Height: 72" > midpt = 66"

Write as absolute Value Equation: $|x - 66| = 6$

$$|x - 66| - 6 = y$$

4. Graph on Calculator.



$$|72 - 66| = 6$$

$$|6| = 6$$

$$x - 66 = 6$$

$$|60 - 66| = 6$$

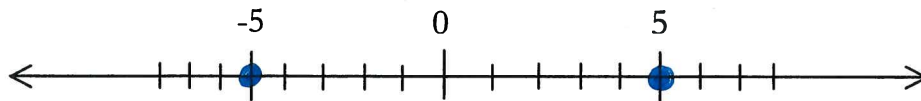
$$|-6| = 6$$

$$x - 66 = -6$$

5. Other Examples:

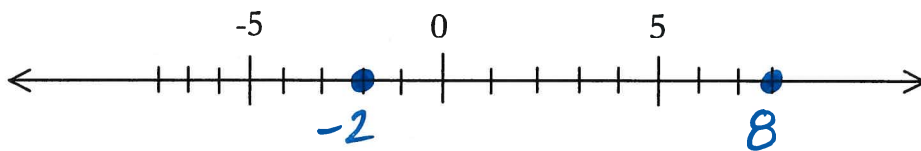
1. $|x| = 5$

Graph the solutions on this number line.



2. $|x - 3| = 5$

a. **Locate and Graph** the solutions on this number line.



b. **Write and Solve** two equations equivalent to $|x - 3| = 5$.

1.
$$\begin{array}{r} x - 3 = 5 \\ +3 \quad +3 \\ \hline x = 8 \end{array}$$

2.
$$\begin{array}{r} x - 3 = -5 \\ +3 \quad +3 \\ \hline x = -2 \end{array}$$

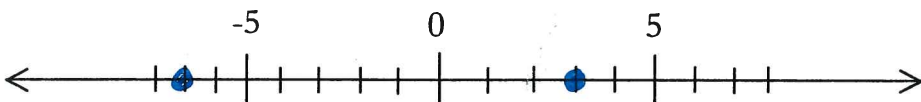
3. Graph, Solve, and Check the solutions to the following equations:

c. $|2x + 4| + 2 = 12$

$$\begin{array}{r} -2 \quad -2 \\ |2x + 4| = 10 \end{array}$$

1.
$$\begin{array}{r} 2x + 4 = 10 \\ -4 \quad -4 \\ \hline 2x = 6 \\ \frac{2x}{2} = \frac{6}{2} \\ x = 3 \end{array}$$

2.
$$\begin{array}{r} 2x + 4 = -10 \\ -4 \quad -4 \\ \hline 2x = -14 \\ \frac{2x}{2} = \frac{-14}{2} \\ x = -7 \end{array}$$



Check

$$\begin{array}{r} |2(3) + 4| + 2 \stackrel{?}{=} 12 \\ |10| + 2 = 12 \\ 12 = 12 \checkmark \end{array}$$

$$\begin{array}{r} |2(-7) + 4| + 2 \stackrel{?}{=} 12 \\ |-10| + 2 = 12 \\ 10 + 2 = 12 \\ 12 = 12 \checkmark \end{array}$$

Summarize: What does $|x - 89| = 5$ mean? How do you solve any absolute value equation?

The difference between x and 89 is 5

PRACTICE

DAY 5

SOLVING ABSOLUTE VALUE EQUATIONS

Solve the absolute value equations.

6. $|x + 3| = 4$

$$\begin{array}{r} x+3=4 \\ -3 \quad -3 \\ \hline x=1 \end{array} \quad \begin{array}{r} x+3=-4 \\ -3 \quad -3 \\ \hline x=-7 \end{array}$$

$x = 1, -7$

7. $5|x + 2| - 20 = 0$

$$\begin{array}{r} +20 \quad +20 \\ \hline 5|x+2| = 20 \\ \hline |x+2| = 4 \\ x+2=4 \quad x+2=-4 \\ x=2 \quad x=-6 \end{array}$$

$x = 2, -6$

8. $|2x - 5| = 13$

$$\begin{array}{r} 2x-5=13 \\ +5 \quad +5 \\ \hline 2x=18 \\ \frac{2x}{2} = \frac{18}{2} \\ x=9 \end{array} \quad \begin{array}{r} 2x-5=-13 \\ +5 \quad +5 \\ \hline 2x=-8 \\ \frac{2x}{2} = \frac{-8}{2} \\ x=-4 \end{array}$$

$x = 9, -4$

9. $|2x + 4| = \frac{1}{4}x + 5$

$$\begin{array}{r} 2x+4 = \frac{1}{4}x+5 \\ -\frac{1}{4}x \quad -\frac{1}{4}x \quad -4 \\ \hline 2x - \frac{1}{4}x = 1 \\ \frac{8}{4}x - \frac{1}{4}x = 1 \\ \frac{7}{4}(\frac{4}{7}x) = 1 \cdot \frac{4}{7} \\ x = \frac{4}{7} \end{array} \quad \begin{array}{r} 2x+4 = -(\frac{1}{4}x+5) \\ 2x+4 = -\frac{1}{4}x-5 \\ \frac{8}{4}x + \frac{1}{4}x = -9 \\ \frac{9}{4}(\frac{4}{9}x) = (-9) \cdot \frac{4}{9} \\ x = -4 \end{array}$$

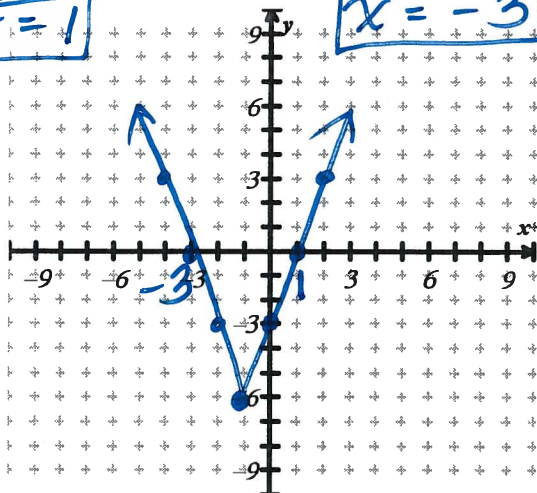
$x = -4, \frac{4}{7}$

10. Solve: $y = 3|x + 1| - 6$

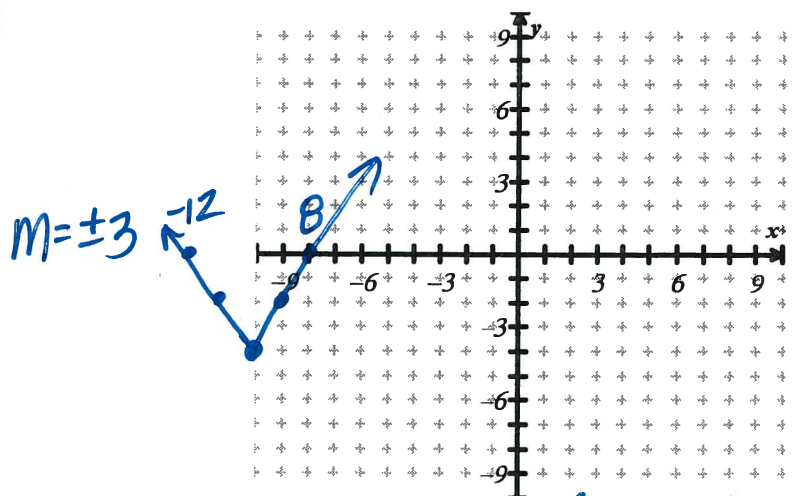
$$\begin{array}{r} 0 = 3|x+1| - 6 \\ +6 \quad +6 \\ \hline 6 = 3|x+1| \\ \frac{6}{3} = \frac{3|x+1|}{3} \\ 2 = |x+1| \\ x+1=2 \quad x+1=-2 \\ x=1 \quad x=-3 \end{array}$$

11. Solve: $y = 2|x - 10| - 4$

$$\begin{array}{r} 0 = 2|x-10| - 4 \\ \frac{4}{2} = \frac{2|x-10|}{2} \\ 2 = |x-10| \\ x-10=2 \quad x-10=-2 \\ x=12 \quad x=8 \end{array}$$



vertex: $(-1, -6)$



vertex: $(10, -4)$