Warm-up: Solve:

1) $|x-5|=23$

2) $|x+12|=-8$

You determined the linear absolute value equation $|w - 145.045| = 3.295$ to identify the most and least a baseball could weigh and still be within the specifications. The manufacturer wants to determine all of the acceptable weights that the baseball could be and still fit within the specifications. You can write a **linear absolute value inequality** to represent this problem situation.

1. **Write a linear absolute value inequality to represent all baseball weights that are within the specifications.**

2. **Use the graph to determine whether the weight of each given baseball is acceptable. Substitute each value in the inequality to verify your answer.**

a. **147 grams**

yes

b. **140.8 grams**

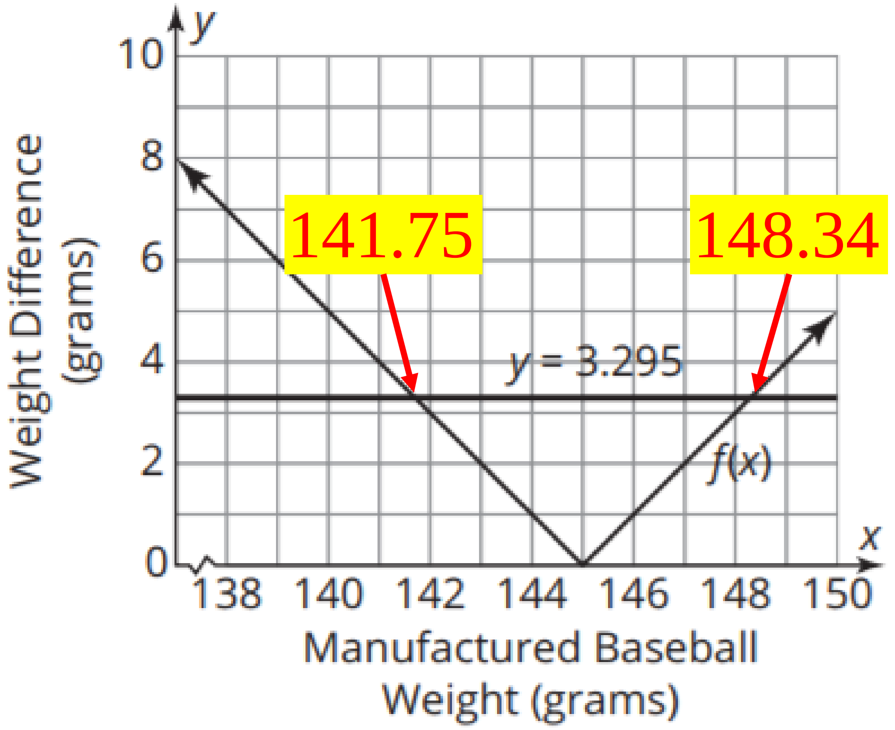
no

c. **148.34 grams**

yes

d. **141.75 grams**

yes



3. **Use the graph on the coordinate plane to graph the inequality on the number line showing all the acceptable weights. Explain the process you used.**

4. **Complete the inequality to describe all the acceptable weights, where *w* is the baseball's weight.**

$141.75 \leq w \leq 148.34$

This is a Conjuntion

5. Raymond has the job of disposing of all baseballs that are not within the acceptable weight limits.

a. Write an absolute value inequality to represent the weights of baseballs that Raymond can dispose of.

$$w < 141.75 \qquad \text{or} \qquad w > 148.34$$

b. Graph the inequality on the number line. Explain the process you used.

This is a Disjuntion

Notice that the equivalent compound inequalities do not contain absolute values.

Absolute value inequalities can take four different forms, as shown in the table. To solve a linear absolute value inequality, you can first write it as an **equivalent compound inequality**.

Absolute Value Inequality	Equivalent Compound Inequality
$\lvert ax + b \rvert < c$	$-c < ax + b < c$
$\lvert ax + b \rvert \leq c$	$-c \leq ax + b \leq c$
$\lvert ax + b \rvert > c$	$ax + b < -c$ or $ax + b > c$
$\lvert ax + b \rvert \geq c$	$ax + b \leq -c$ or $ax + b \geq c$

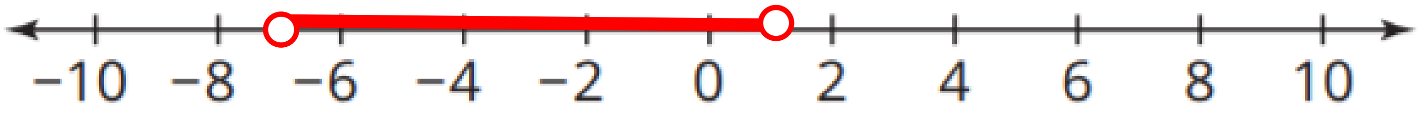
1. **Solve the linear absolute value inequality by rewriting it as an equivalent compound inequality. Then graph your solution on the number line.**

This is a Conjuntion

a. $|x + 3| < 4$

$$-4 < x + 3 < 4$$

$$-7 < x < 1$$



b. $6 \le |2x - 4|$

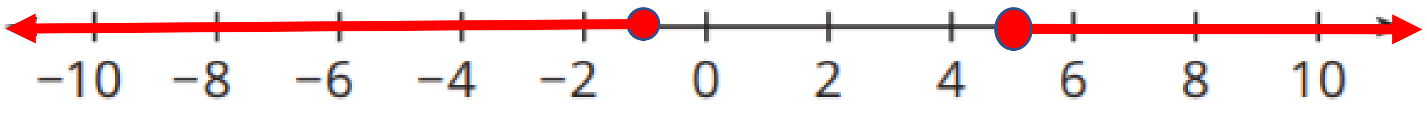
This is a Disjuntion

rewrite $|2x-4| \ge 6$

$$2x-4 \ge 6 \quad \text{or} \quad 2x-4 \le -6$$

$$2x \ge 10 \qquad\qquad 2x \le -2$$

$$x \ge 5 \qquad\qquad x \le -1$$



c. $|-5x + 8| + 2 < 25$

isolate $|-5x+8| < 23$

This is a Conjuntion

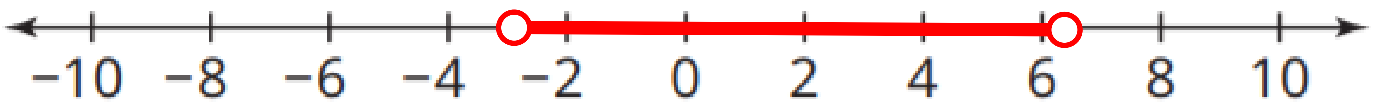
$$-23 < -5x + 8 < 23$$

$$-31 < -5x < 15$$

$$\frac{-31}{-5} > x > \frac{15}{-5}$$

$$\frac{31}{5} > x > -3$$

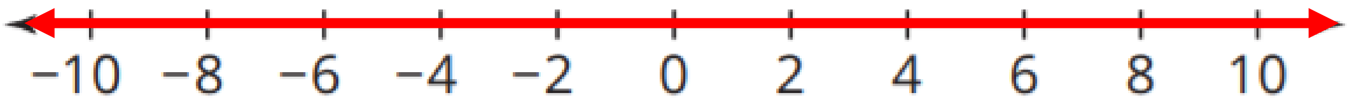
$$-3 < x < \frac{31}{5}$$



d. $|x + 5| > -1$

This will always be true!

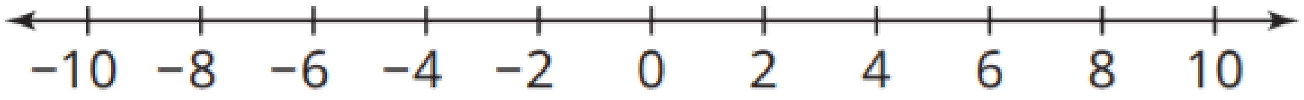
All Real Numbers



e. $|x + 5| < -1$

This will *never* be true!

No Solution



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