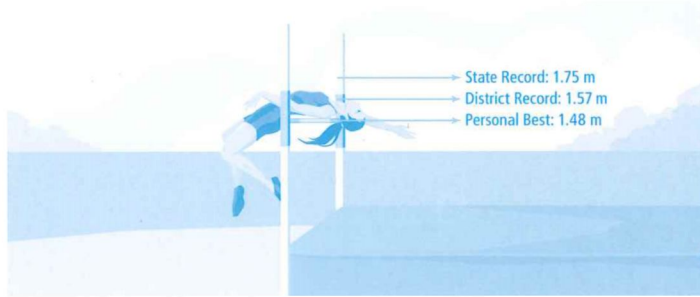


Inequalities

$<$ less than
 \leq less than or equal
 $>$ greater than
 \geq greater than or equal

MODEL & DISCUSS

Skyler competes in the high jump event at her school. She hopes to tie or break some records at the next meet.



1-5
Solving Inequalities in One Variable

PearsonRealize.com

PE
MD
AS

SOLVE

A. Write and solve an equation to find x , the number of meters Skyler must add to her personal best to tie the district record.

$$\begin{array}{r}
 1.48 + x = 1.57 \\
 -1.48 \quad -1.48 \\
 \hline
 x = 0.09 \text{ meters}
 \end{array}$$

B. Look for Relationships Rewrite your equation as an inequality to represent the situation where Skyler breaks the district record. How is the value of x in the inequality related to the value of x in the equation? © MP.7

$$\begin{array}{r}
 1.48 + x \geq 1.57 \\
 \vdots \\
 x > 0.09
 \end{array}$$

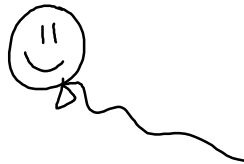
greater than or equal

C. How many meters does Skyler need to add to her personal best to break the state record?

$$\begin{array}{r}
 1.48 + x \geq 1.75 \\
 -1.48 \quad -1.48 \\
 \hline
 x \geq 0.27
 \end{array}$$

HABITS OF MIND

Make Sense and Persevere What strategy did you use to answer the questions? What other strategy might you have used? © MP.1



PE
MD
AS

SOLVE

* If you mult/div by a negative #, then switch the inequality...

EXAMPLE 1 Try It! Solve Inequalities

1. Solve each inequality and graph the solution.

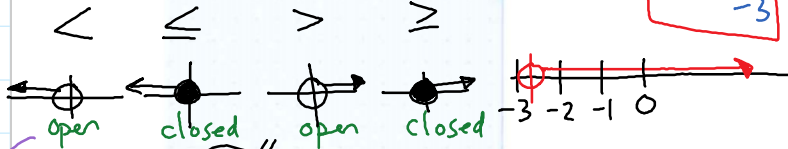
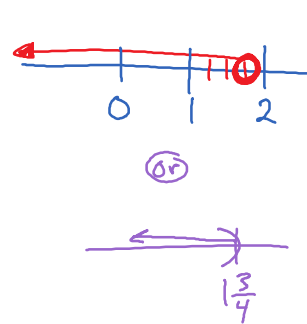
a. $-3(2x + 2) < 10$

$$\begin{array}{r} -6x - 6 < 10 \\ +6 \quad +6 \\ \hline -6x < 16 \\ * -6 \quad -6 \\ \hline x > \frac{16}{-6} \end{array}$$

or $x > \frac{8}{-3}$ $\sim 2\frac{2}{3}$

b. $2(4 - 2x) > 1$

$$\begin{array}{r} 8 - 4x > 1 \\ -8 \quad -8 \\ \hline -4x > -7 \\ * -4 \quad -4 \\ \hline x < \frac{7}{4} \end{array}$$



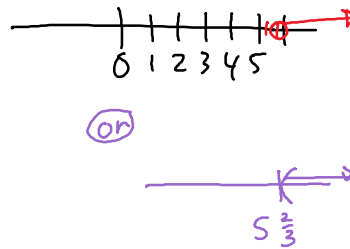
ex) $2 < x$ $x > 2$
swap quantities
change direction

EXAMPLE 2 Try It! Solve an Inequality With Variables on Both Sides

2. Solve $2x - 5 < 5x - 22$. Then graph the solution.

$$\begin{array}{r} -2x \quad +2x \\ -5 < 3x - 22 \\ +22 \quad +22 \\ \hline 17 < \frac{3x}{3} \end{array}$$

$\frac{17}{3} < x$ $x > \frac{17}{3}$ $\sim 5\frac{2}{3}$
swap



parentheses bracket parentheses bracket

variables disappears--

$$0 < 3$$

True
→ ∞ solutions

EXAMPLE 3

$$0 < -5$$

False
→ no solution

Try It! Understand Inequalities With Infinitely Many or No Solutions

3. Solve each inequality.

a. $-2(4x - 2) < -8x + 4$

$$\cancel{-8x} + 4 < \cancel{-8x} + 4$$

$$0 < 0$$

False
→ no solution

b. $-6x - 5 < -3(2x + 1)$

$$\cancel{-6x} - 5 < \cancel{-6x} - 3$$

$$-5 < -3$$

True
→ ∞ solutions

EXAMPLE 4 **Try It!** Use Inequalities to Solve Problems

4. If Florist B increases the cost per rose to \$5.20, for what number of roses is it less expensive to order from Florist A? From Florist B?

HABITS OF MIND

Look for Structure How is solving an inequality with variables on one side similar to and different from solving an equality with variables on both sides? © MP.7

Do You UNDERSTAND?

1. **ESSENTIAL QUESTION** How are the solutions of an inequality different from the solution of an equation?

2. **Reason** How is dividing each side of $x > 0$ by a negative value different from dividing each side by a positive value? © MP.2

3. **Vocabulary** Give an example of two inequalities that are *equivalent inequalities*. Explain your reasoning.

4. **Error Analysis** Rachel multiplied each side of $x \geq 2$ by 3. She wrote the result as $3x \leq 6$. Explain the error Rachel made. © MP.3

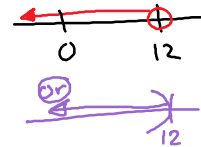
Variables disappear

$0 < -2$ & $0 \geq 0$
 False... True...
 → No solution... → ∞ solutions...

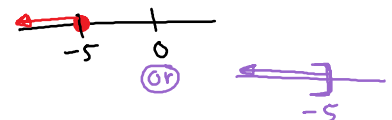
Do You KNOW HOW?

Solve each inequality and graph the solution.

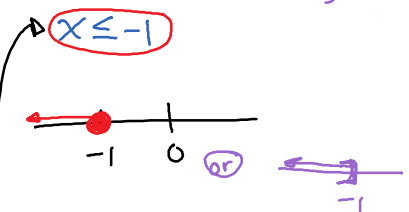
5. $\frac{1}{2}x < 6$
 $\frac{2}{1} \cdot \frac{1}{2}x < \frac{2}{1} \cdot 6$
 $x < 12$



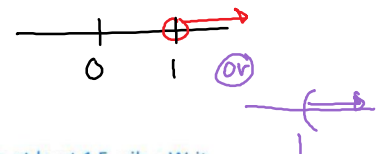
6. $-4x \geq 20$
 $* \frac{-1}{-4} \frac{-1}{-4} *$
 $x \leq -5$



7. $8 \leq -4(x-1)$
 $-4 \leq -4$
 $-2 \geq x-1$
 $+1 \quad +1$
 $-1 \geq x$



8. $3x - 2 > 4 - 3x$
 $+3x \quad +3x$
 $6x - 2 > 4$
 $+2 \quad +2$
 $6x > 6$
 $x > 1$



9. Lourdes plans to jog at least 1.5 miles. Write and solve an inequality to find x , the number of hours that Lourdes will have to jog.

