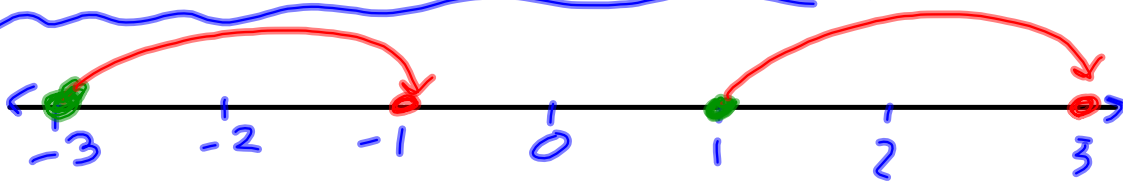


## Section 6.4: Solving Inequalities by Using Addition and Subtraction



$$-3 < 1 \quad * \text{ Add } \underline{2} \text{ to both numbers}$$

Is  $-1 < 3$ ? Yes!

NOTE: If you add or subtract the same amount from both sides of an inequality, the inequality is still true.

(ex)  $-3 < 1$       Add 2 to both sides

$$-3 + 2 < 1 + 2$$

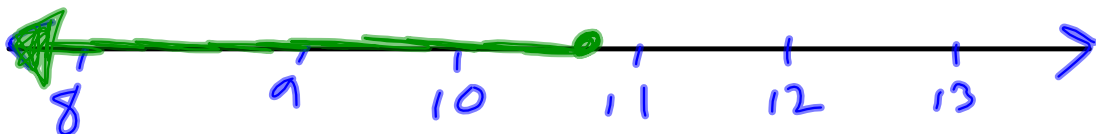
$$-1 < 3$$

Note:  $x + 3 = 9$   
 $x + \cancel{3} - 3 = 9 - 3$   
 $x = 6$

Solve:  $x + 3 \leq 9$   
 $x + \cancel{3} - 3 \leq 9 - 3$   
 $x \leq 6$

(Ex #1) Solve:  $6.2 \geq x - 4.5$   
 and graph.

(Ans)  $6.2 \geq x - 4.5$   
 $6.2 + 4.5 \geq x - 4.5 + 4.5$   
 $10.7 \geq x$  or  $x \leq 10.7$



(Ex 2) Jake plans to board his dog while away on vacation.

- Boarding House A: charges \$90 plus \$5 per day

- Boarding House B: charges \$100 plus \$4 per day

Question: How many days must Jake board his dog so that boarding house A is less expensive than boarding house B?

Answer) Let  $d =$  # of day Jake boards his dog.

charges: A  $\rightarrow 90 + 5d$   
 B  $\rightarrow 100 + 4d$

$$90 + 5d < 100 + 4d$$

$$90 + 5d - 4d < 100 + 4d - 4d$$

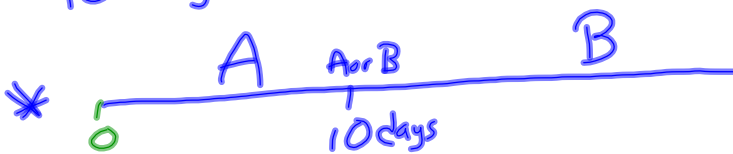
$$90 + d < 100$$

$$90 + d - 90 < 100 - 90$$

$$d < 10$$

\* Keep the variable on the side with the greatest coefficient  
 $\therefore$  Since  $5 > 4$ , put the variable terms on the LHS.

Board House A is less expensive if Jake boards the dog for less than 10 days.



$\rightarrow$  When one boarding house is less expensive than the other

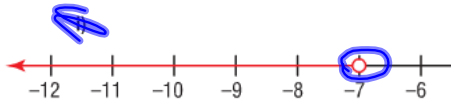
Practice: Jill boards her cat in a boarding house that offers two payment plans. Plan A costs \$40 plus \$8 a day and plan B costs \$120 plus \$6 a day.

Question: How many days can Jill board her cat so than plan A is less expensive?

Homework:  
pg 298-299  
# 7, 8, 9, 14

7. Match each inequality with the graph of its solution below. Is 3 a possible solution of each inequality? How can you find out?

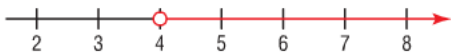
- a)  $c - 2 > 2$       b)  $8 \geq -5 + w$   
 c)  $1 > r + 8$       d)  $7 + m \leq -2$



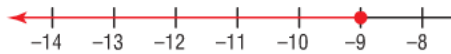
i)



iii)



iv)



$$\begin{aligned} (a) \quad c - 2 &> 2 \\ c - 2 + 2 &> 2 + 2 \\ c &> 4 \quad \therefore (iii) \end{aligned}$$

$$\begin{aligned} (b) \quad 8 &\geq -5 + w \\ +5 \quad 8 &\geq -5 + 5w \\ 13 &\geq w \quad ii \end{aligned}$$

$$c - 1 > r + 8$$

$$\begin{aligned} 1 - 8 &> r + 8 - 8 \\ -7 &> r \end{aligned}$$

$$\begin{aligned} 7 + m &\leq -2 - 7 \\ -7 \quad m &\leq -9 \end{aligned}$$

8. Solve each inequality. Graph the solution.

Verify the solution.

- a)  $x + 5 > 2$
- c)  $4 + a \leq 8$
- e)  $k + 8 < -13$

- b)  $-9 \geq y - 3$
- d)  $2 > x + 7$
- f)  $q - 2.5 < 3.9$

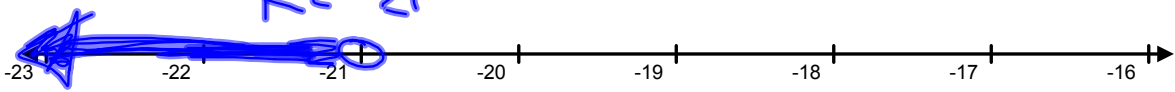
(a)  $x + 5 > 2$   
 $x + 5 - 5 > 2 - 5$   
 $x > -3$



(c)  $4 + a \leq 8$      $4 - 4 + a \leq 8 - 4$   
 $a \leq 4$



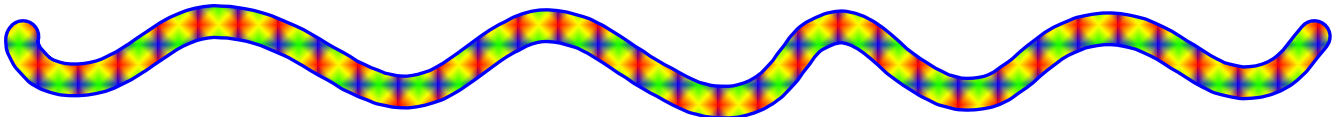
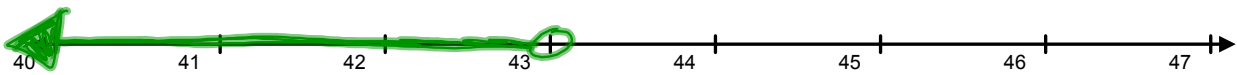
(e)  $k + 8 < -13$   
 $k + 8 - 8 < -13 - 8$   
 $k < -21$



9. Solve each inequality. Graph the solution.  
 Show the steps in the solution.  
 Verify the solution by substituting 3 different numbers in each inequality.

- a)  $4t - 19 < 24 + 3t$
- b)  $3x < 2x - 11$
- c)  $5x - 7 < 4x + 4$
- d)  $2 + 3a \leq 2a - 5$
- e)  $1.7p + 2.8 \geq 0.7p - 7.6$
- f)  $2y + 13.3 \geq y - 24.1$

$$\begin{aligned}
 (A) \quad & 4t - 19 < 24 + 3t \\
 & 4t - 19 - 3t < 24 + 3t - 3t \\
 & t - 19 < 24 \\
 & t - 19 + 19 < 24 + 19 \\
 & t < 43
 \end{aligned}$$

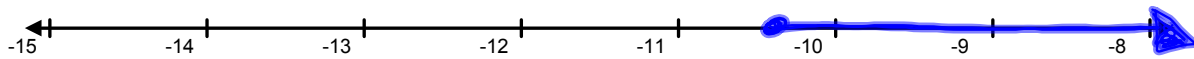


$$\begin{aligned}
 (c) \quad & 5x - 7 < 4x + 4 \\
 & 5x - 4x - 7 < 4x - 4x + 4 \\
 & x - 7 < 4 \\
 & x - 7 + 7 < 4 + 7 \\
 & x < 11
 \end{aligned}$$



$$e) 1.7p + 2.8 \geq 0.7p - 7.6$$

$$\begin{aligned} 1.7p + 2.8 &\geq 0.7p - 7.6 \\ 1.7p + 2.8 - 0.7p &\geq \cancel{0.7p} - 7.6 - \cancel{0.7p} \\ p + 2.8 &\geq -7.6 \\ p + \cancel{2.8} - \cancel{2.8} &\geq -7.6 - 2.8 \\ p &\geq -10.4 \end{aligned}$$





14. **Assessment Focus** Marie has \$4.85. She wants to buy a muffin and a cake at a bake sale. The cake is on sale for \$3.45. How much can Marie spend on a muffin?

- Choose a variable, then write an inequality to solve the problem.
- Use the inequality to solve the problem.
- Graph the solution on a number line.
- A deluxe muffin costs \$1.45.

Can Marie afford to buy this muffin?  
Justify your answer.

Show your work

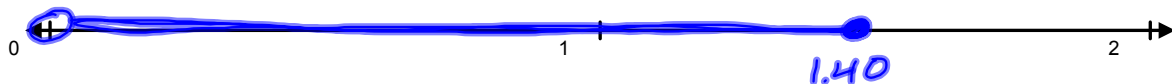
(a) Let  $m =$  cost of a muffin.

$$m + 3.45 \leq 4.85$$

$$m + \cancel{3.45} - 3.45 \leq 4.85 - 3.45$$

$$m \leq 1.40$$

oo Cost is \$1.40





$$\begin{aligned}40 + 8d &< 120 + 6d \\40 + 8d - 6d &< 120 + \cancel{6d} - \cancel{6d} \\40 + 2d &< 120 \\ \cancel{40} + 2d - \cancel{40} &< 120 - 40 \\ \frac{2d}{2} &< \frac{80}{2} \\ d &< 40\end{aligned}$$