5.3 Solve Multi-Step Inequalities

The same steps used for solving multi-step equations can be applied to linear inequalities.
JUST REMEMBER that you have to FLIP the inequality sign if you MULTIPLY or DIVIDE by a NEGATIVE value!

Solve and graph.

1. $-6y + 5 \leq -16$

$$\frac{-5 \qquad -5}{}$$

$$\frac{-6y}{-6} \leq \frac{-21}{-6}$$
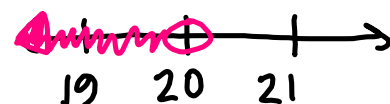
$$y \geq \frac{7}{2}$$

$$y = 3.5$$

2. $-\frac{1}{4}(p - 12) > -2$

$$-\frac{1}{4}p + 3 > -2$$

$$\frac{-3 \qquad -3}{}$$

$$-\frac{4}{1} \cdot -\frac{1}{4}p > -5 \cdot -\frac{4}{1}$$
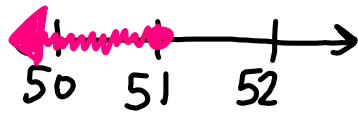
$$p < 20$$

Solve and graph.

3. $6x + 6 \leq 9x + 21$

$\underline{-6x \qquad\qquad -6x}$

$6 \leq 3x + 21$

$\underline{-21 \qquad\quad -21}$

$\dfrac{-15}{3} \leq \dfrac{3x}{3}$

$-5 \leq x$

$x \geq -5$

4. $12k - 1 > 6(2k - 1)$

$12k - 1 > 12k - 6$

$\underline{-12k \qquad\quad -12k}$

$-1 > -6$

true
↓

ℝ   all real numbers

Solve and graph.

5. $-\dfrac{2}{3}w - 2 < \dfrac{4}{3}w + 8$

$\underline{+\dfrac{2}{3}w \qquad\quad +\dfrac{2}{3}w}$

$-2 < 2w + 8$

$\underline{-8 \qquad\quad -8}$

$\dfrac{-10}{2} < \dfrac{2w}{2}$

$-5 < w$

$w > -5$

Solve and graph.

6. $0.7(n - 3) \leq 0.6(n + 5)$

$0.7n - 2.1 \leq 0.6n + 3$

$\underline{-0.6n \qquad\qquad -0.6n}$

$0.1n - 2.1 \leq \qquad 3.0$

$\underline{\quad +2.1 \qquad\qquad +2.1}$

$\dfrac{0.1n}{0.1} \qquad \leq \dfrac{5.1}{0.1}$

$n \leq 51$

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 ←mmmmm●————+——→
  50    51    52
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Solve and graph.

7. $8g + 10 > 2(4g + 7) - 3$

$8g + 10 > 8g + 14 - 3$

$8g + 10 > 8g + 11$

$\underline{-8g \qquad\quad -8g}$

$10 > \qquad 11$

false

$\varnothing$ no solution

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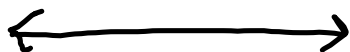
Solve.

8. The difference of 4x and 7 is at most 41.

(Subtraction) *(≤)*

$$4x - 7 \leq 41$$
$$\underline{\quad +7 \qquad +7}$$
$$\frac{4x}{4} \leq \frac{48}{4}$$
$$x \leq 12$$

Solve.

9. Three times the sum of d and 2 is greater than -2.

(addition)

$$3(d + 2) > -2$$
$$3d + 6 > -2$$
$$\underline{\quad -6 \qquad -6}$$
$$\frac{3d}{3} > \frac{-8}{3}$$
$$d > -\frac{8}{3}$$