

5-3 Skills Practice

Solving Multi-Step Inequalities

Justify each indicated step.

1. $\frac{3}{4}t - 3 \geq -15$

$$\frac{3}{4}t - 3 + 3 \geq -15 + 3$$

$$\frac{3}{4}t \geq -12$$

$$\frac{4}{3} \left(\frac{3}{4}t \right) \geq \frac{4}{3}(-12)$$

$$t \geq -16$$

a. ? Add 3 to each side

b. ? Multiply both sides by $\frac{4}{3}$

2. $5(k + 8) - 7 \leq 23$

$$5k + 40 - 7 \leq 23$$

$$5k + 33 \leq 23$$

$$5k + 33 - 33 \leq 23 - 33$$

$$5k \leq -10$$

$$\frac{5k}{5} \leq \frac{-10}{5}$$

$$k \leq -2$$

a. ? Distributive Property

b. ? Subtract 33 from both sides

Solve each inequality. Check your solution.

3. $-2b + 4 > -6$

$$b < 5$$

4. $3x + 15 \leq 21$

$$x \leq 2$$

5. $\frac{d}{2} - 1 \geq 3$

$$d \geq 8$$

6. $\frac{5}{5}a - 4 < 2$

$$a < 6$$

7. $-\frac{t}{5} + 7 > -4$

$$t < 55$$

8. $\frac{3}{4}j - 10 \geq 5$

$$j \geq 20$$

9. $-\frac{2}{3}f + 3 < -9$

$$f > 18$$

10. $2p + 5 \geq 3p - 10$

$$p \leq 15$$

11. $4k + 15 > -2k + 3$

$$k > -2$$

12. $2(-3m - 5) \geq -28$

$$m \leq 3$$

13. $-6(w + 1) < 2(w + 5)$

$$w > -2$$

14. $2(q - 3) + 6 \leq -10$

$$q \leq -5$$

Define a variable, write an inequality, and solve each problem. Check your solution.

15. Four more than the quotient of a number and three is at least nine.

$$4 + \frac{x}{3} \geq 9$$

16. The sum of a number and fourteen is less than or equal to three times the number.

$$x + 14 \leq 3x$$

17. Negative three times a number increased by seven is less than negative eleven.

$$-3x + 7 < -11$$

18. Five times a number decreased by eight is at most ten more than twice the number.

$$5x - 8 \leq 10 + 2x$$

19. Seven more than five sixths of a number is more than negative three.

$$7 + \frac{5}{6}x > -3$$

20. Four times the sum of a number and two increased by three is at least twenty-seven.

$$4(x + 2) + 3 \geq 27$$

$$3.) -2b + 4 > -6$$

$$\begin{array}{r} -4 \quad -4 \\ \hline -2b > -10 \\ \hline -2 \quad -2 \\ \hline b < 5 \end{array}$$

$$4.) 3x + 15 \leq 21$$

$$\begin{array}{r} -15 \quad -15 \\ \hline 3x \leq 6 \\ \hline 3 \quad 3 \\ \hline x \leq 2 \end{array}$$

$$5.) \frac{d}{2} - 1 \geq 3$$

$$\begin{array}{r} +1 \quad +1 \\ \hline 2(\frac{d}{2}) \geq (4)2 \\ \hline d \geq 8 \end{array}$$

$$6.) \frac{5}{5}a - 4 < 2$$

$$\begin{array}{r} a - 4 < 2 \\ +4 \quad +4 \\ \hline a < 6 \end{array}$$

$$7.) -\frac{t}{5} + 7 > -4$$

$$\begin{array}{r} -7 \quad -7 \\ \hline -5(-\frac{t}{5}) > (-11) - 5 \\ \hline t < 55 \end{array}$$

$$8.) \frac{3}{4}j - 10 \geq 5$$

$$\begin{array}{r} +10 \quad +10 \\ \hline \frac{4}{3}(\frac{3}{4}j) \geq (15) \frac{4}{3} \\ \hline j \geq 20 \end{array}$$

$$9.) -\frac{2}{3}f + 3 < -9$$

$$\begin{array}{r} -3 \quad -3 \\ \hline -\frac{3}{2}(-\frac{2}{3}f) < (-12) - \frac{3}{2} \\ \hline f > 18 \end{array}$$

$$10.) 2p + 5 \geq 3p - 10$$

$$\begin{array}{r} -2p \quad -2p \\ \hline 5 \geq p - 10 \\ +10 \quad +10 \\ \hline 15 \geq p \\ \hline p \leq 15 \end{array}$$

$$11.) 4k + 15 > -2k + 3$$

$$\begin{array}{r} +2k \quad +2k \\ \hline 6k + 15 > 3 \\ -15 \quad -15 \\ \hline 6k > -12 \\ \hline 6 \quad 6 \\ \hline k > -2 \end{array}$$

$$12.) 2(-3m - 5) \geq -28$$

$$\begin{array}{r} -6m - 10 \geq -28 \\ +10 \quad +10 \\ \hline -6m \geq -18 \\ \hline -6 \quad -6 \\ \hline m \leq 3 \end{array}$$

$$13.) -6(w + 1) < 2(w + 5)$$

$$\begin{array}{r} -6w - 6 < 2w + 10 \\ +6w \quad +6w \\ \hline -6 < 8w + 10 \\ -10 \quad -10 \\ \hline -16 < 8w \\ \hline 8 \quad 8 \\ \hline -2 < w \\ \hline w > -2 \end{array}$$

$$14.) 2(q - 3) + 6 \leq -10$$

$$\begin{array}{r} 2q - 6 + 6 \leq -10 \\ \hline 2q \leq -10 \\ \hline 2 \quad 2 \\ \hline q \leq -5 \end{array}$$