NAME _____ DATE _____ PERIOD _____

1-5 Study Guide and Intervention
Solving Inequalities

Solve Inequalities The following properties can be used to solve inequalities.

Addition and Subtraction Properties for Inequalities	Multiplication and Division Properties for Inequalities
For any real numbers a, b, and c: 1. If $a < b$, then $a + c < b + c$ and $a - c < b - c$. 2. If $a > b$, then $a + c > b + c$ and $a - c > b - c$.	For any real numbers a, b, and c, with $c \neq 0$: 1. If c is positive and $a < b$, then $ac < bc$ and $\frac{a}{c} < \frac{b}{c}$. 2. If c is positive and $a > b$, then $ac > bc$ and $\frac{a}{c} > \frac{b}{c}$. 3. If c is negative and $a < b$, then $ac > bc$ and $\frac{a}{c} > \frac{b}{c}$. 4. If c is negative and $a > b$, then $ac < bc$ and $\frac{a}{c} < \frac{b}{c}$.

These properties are also true for $\leq$ and $\geq$.

Example 1 Solve $2x + 4 > 36$. Then graph the solution set on a number line.

$2x + 4 - 4 > 36 - 4$

$\qquad 2x > 32$

$\qquad\quad x > 16$

The solution set is $\{x \mid x > 16\}$.

13 14 15 16 17 18 19 20 21

Example 2 Solve $17 - 3w \geq 35$. Then graph the solution set on a number line.

$17 - 3w \geq 35$

$17 - 3w - 17 \geq 35 - 17$

$\qquad\quad -3w \geq 18$

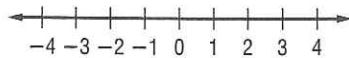$\qquad\qquad w \leq -6$

The solution set is $\{w \mid w \leq -6\}$.
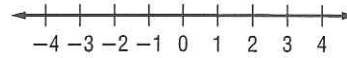
$-9\ -8\ -7\ -6\ -5\ -4\ -3\ -2\ -1$
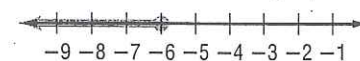
Exercises

Solve each inequality. Describe the solution set using set-builder notation. Then graph the solution set on a number line.
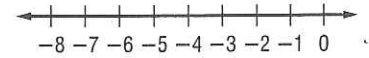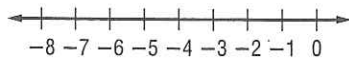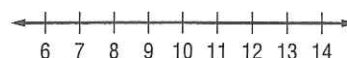
1. $7(7a - 9) \leq 84$
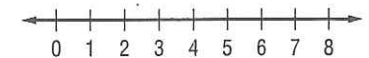
2. $3(9z + 4) > 35z - 4$

3. $5(12 - 3n) < 165$

$-4\ -3\ -2\ -1\ 0\ 1\ 2\ 3\ 4$ $-4\ -3\ -2\ -1\ 0\ 1\ 2\ 3\ 4$ $-8\ -7\ -6\ -5\ -4\ -3\ -2\ -1\ 0$

4. $18 - 4k < 2(k + 21)$

5. $4(b - 7) + 6 < 22$

6. $2 + 3(m + 5) \geq 4(m + 3)$

$-8\ -7\ -6\ -5\ -4\ -3\ -2\ -1\ 0$ $6\ 7\ 8\ 9\ 10\ 11\ 12\ 13\ 14$ $0\ 1\ 2\ 3\ 4\ 5\ 6\ 7\ 8$

7. $4x - 2 > -7(4x - 2)$

8. $\frac{1}{3}(2y - 3) > y + 2$

9. $2.5d + 15 \leq 75$

$-4\ -3\ -2\ -1\ 0\ 1\ 2\ 3\ 4$ $-14\quad -12\quad -10\quad -8\quad -6$ $19\ 20\ 21\ 22\ 23\ 24\ 25\ 26\ 27$
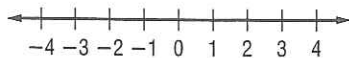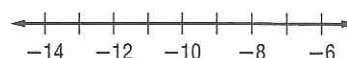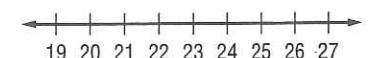
1-6 Practice

Solving Compound and Absolute Value Inequalities

Write an absolute value inequality for each of the following. Then graph the solution set on a number line.
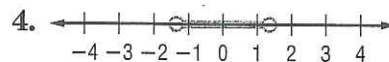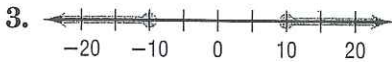
1. all numbers greater than 4 or less than -4

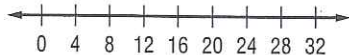2. all numbers between -1.5 and 1.5, including -1.5 and 1.5

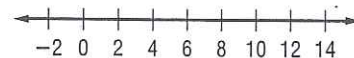**Write an absolute value inequality for each graph.**

3.

4.

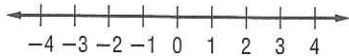**Solve each inequality. Graph the solution set on a number line.**

5. $-8 \le 3y - 20 < 52$
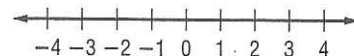
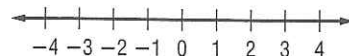6. $3(5x - 2) < 24$ or $6x - 4 > 4 + 5x$

7. $2x - 3 > 15$ or $3 - 7x < 17$

8. $15 - 5x \le 0$ and $5x + 6 \ge -14$

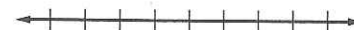9. $|2w| \ge 5$

10. $|y + 5| < 2$
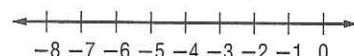
11. $|x - 8| \ge 3$
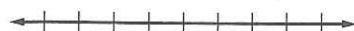
12. $|2z - 2| \le 3$

13. $|2x + 2| - 7 \le -5$

14. $|x| > x - 1$

15. $|3b + 5| \le -2$

16. $|3n - 2| - 2 < 1$

17. **RAINFALL** In 90% of the last 30 years, the rainfall at Shell Beach has varied no more than 6.5 inches from its mean value of 24 inches. Write and solve an absolute value inequality to describe the rainfall in the other 10% of the last 30 years.

18. **MANUFACTURING** A company's guidelines call for each can of soup produced not to vary from its stated volume of 14.5 fluid ounces by more than 0.08 ounces. Write and solve an absolute value inequality to describe acceptable can volumes.