

LESSON 5-5 Inequalities Involving Absolute Value

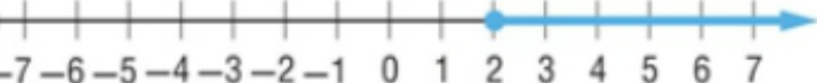
✓ 5-Minute Check


Over Lesson 5-4

- 2** Solve the compound inequality $3x \leq -6$ or $2x - 6 \geq 4$. Graph the solution set.

A. $\{x \mid x \leq -2 \text{ or } x \geq 5\}$; 

B. $\{x \mid x \leq 2 \text{ or } x \leq -5\}$; 

C. $\{x \mid x \geq 2 \text{ or } x \geq 5\}$; 

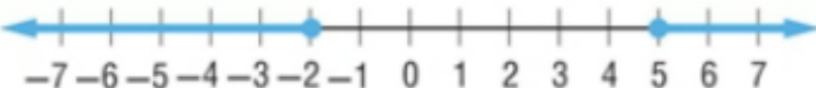
D. $\{x \mid x \geq -2 \text{ or } x \leq 5\}$; 

LESSON 5-5 Inequalities Involving Absolute Value

✓ 5-Minute Check

Over Lesson 5-4

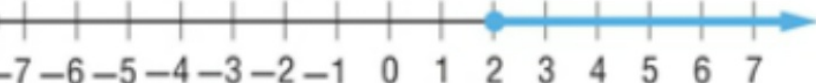
- 2** Solve the compound inequality $3x \leq -6$ or $2x - 6 \geq 4$. Graph the solution set.

→ A. $\{x \mid x \leq -2 \text{ or } x \geq 5\}$; 


The number line ranges from -7 to 7. There are blue dots at -2 and 5. Blue rays extend to the left from -2 and to the right from 5.

B. $\{x \mid x \leq 2 \text{ or } x \leq -5\}$; 

The number line ranges from -7 to 7. There are blue dots at -5 and 2. Blue rays extend to the left from both -5 and 2.

C. $\{x \mid x \geq 2 \text{ or } x \geq 5\}$; 

The number line ranges from -7 to 7. There are blue dots at 2 and 5. Blue rays extend to the right from both 2 and 5.

D. $\{x \mid x \geq -2 \text{ or } x \leq 5\}$; 

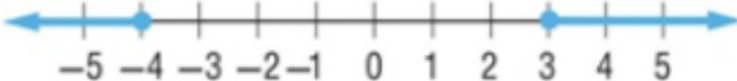
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LESSON **5-5** Inequalities Involving Absolute Value


 **5-Minute Check**


Over Lesson 5-4

- 3** Solve the compound inequality
 $-5 \leq x - 1 \leq 2$.

A. $\{x \mid x \leq -4 \text{ or } x \geq 3\}$; 

B. $\{x \mid -4 \leq x \leq 3\}$; 

C. $\{x \mid x \geq 3\}$; 

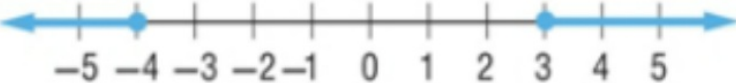
D. $\{x \mid x \leq 4 \text{ or } x \geq 3\}$; 

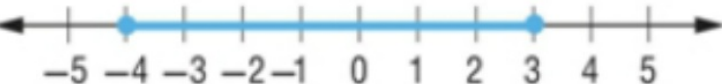
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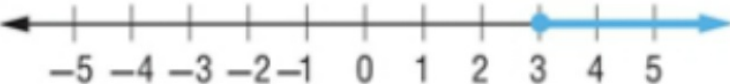
✓ 5-Minute Check


Over Lesson 5-4

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 $-5 \leq x - 1 \leq 2$.

A. $\{x \mid x \leq -4 \text{ or } x \geq 3\}$; 

➔ B. $\{x \mid -4 \leq x \leq 3\}$; 

C. $\{x \mid x \geq 3\}$; 

D. $\{x \mid x \leq 4 \text{ or } x \geq 3\}$; 

EXAMPLE 1 Solve Absolute Value Inequalities (<)

A. Solve $|s - 3| \leq 12$. Then graph the solution set.

Write $|s - 3| \leq 12$ as $s - 3 \leq 12$ and $s - 3 \geq -12$.

Case 1

$$s - 3 \leq 12$$

Original
inequality

$$s - 3 + 3 \leq 12 + 3$$

Add 3 to
each side.

$$s \leq 15$$

Simplify.

Case 2

$$s - 3 \geq -12$$

$$s - 3 + 3 \geq -12 + 3$$

$$s \geq -9$$

Answer: The solution set is $\{s \mid -9 \leq s \leq 15\}$.



EXAMPLE 1

Solve Absolute Value Inequalities (<)

B. Solve $|x + 6| < -8$.

a distance less than
 $-8 \dots$

Since $|x + 6|$ cannot be negative, $|x + 6|$ cannot be less than -8 . So, the solution is the empty set \emptyset .

Answer: \emptyset

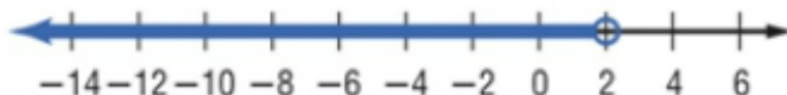
LESSON 5-5 Inequalities Involving Absolute Value

EXAMPLE 1

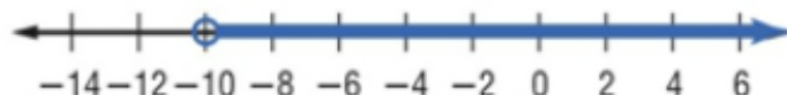
✓ Check Your Progress

A. Solve $|p + 4| < 6$. Then graph the solution set.

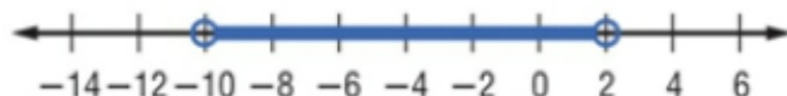
A. $\{p \mid p < 2\}$



B. $\{p \mid p > -10\}$



C. $\{p \mid -10 < p < 2\}$



D. $\{p \mid -2 < p < 10\}$



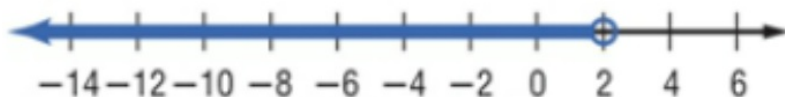
LESSON **5-5** Inequalities Involving Absolute Value

EXAMPLE 1

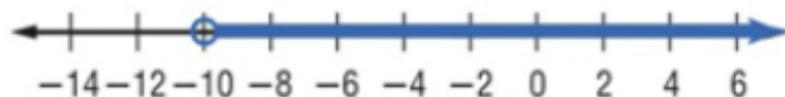
 **Check Your Progress**

A. Solve $|p + 4| < 6$. Then graph the solution set.

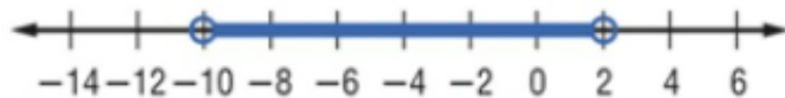
A. $\{p \mid p < 2\}$



B. $\{p \mid p > -10\}$



C. $\{p \mid -10 < p < 2\}$



D. $\{p \mid -2 < p < 10\}$



EXAMPLE 1



Check Your Progress

B. Solve $|p - 5| < -2$.

A. $\{p \mid p \leq -2\}$

B. $\{p \mid p < -2\}$

C. $\{p \mid p < 3\}$

D. \emptyset

LESSON 5-5 Inequalities Involving Absolute Value

EXAMPLE 1

 Check Your Progress

B. Solve $|p - 5| < -2$.

A. $\{p \mid p \leq -2\}$

B. $\{p \mid p < -2\}$

C. $\{p \mid p < 3\}$

D. \emptyset

EXAMPLE 3

Solve Absolute Value Inequalities (>)

A. Solve $|3y - 3| > 9$. Then graph the solution set.

Case 1 $3y - 3$ is positive.

Case 2 $3y - 3$ is negative.

$$3y - 3 > 9$$

Original inequality

$$3y - 3 < -9$$

$$3y - 3 + 3 > 9 + 3 \quad \text{Add 3 to each side.} \quad 3y - 3 + 3 < -9 + 3$$

$$3y > 12$$

Simplify.

$$3y < -6$$

$$\frac{3y}{3} > \frac{12}{3}$$

Divide each side by 3.

$$\frac{3y}{3} < \frac{-6}{3}$$

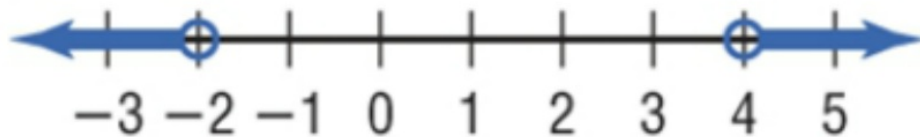
$$y > 4$$

Simplify.

$$y < -2$$

EXAMPLE 3**Solve Absolute Value Inequalities (>)**

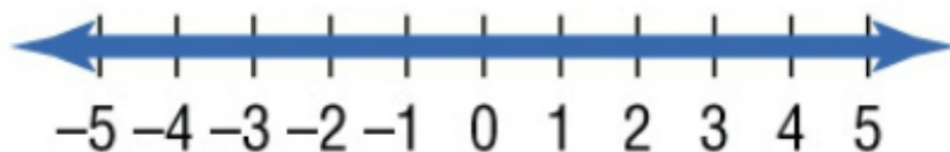
Answer: The solution set is $\{y \mid y < -2 \text{ or } y > 4\}$.



EXAMPLE 3**Solve Absolute Value Inequalities (>)**

B. Solve $|2x + 7| \geq -11$.

Answer: Since $|2x + 7|$ is always greater than or equal to 0, the solution set is $\{x \mid x \text{ is a real number.}\}$.



EXAMPLE 3



Check Your Progress

A. Solve $|2m - 2| > 6$. Then graph the solution set.

A. $\{m \mid m > -2 \text{ or } m < 4\}$.



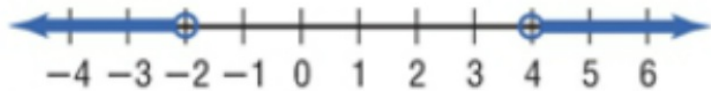
B. $\{m \mid m > -2 \text{ or } m > 4\}$.



C. $\{m \mid -2 < m < 4\}$.



D. $\{m \mid m < -2 \text{ or } m > 4\}$.



EXAMPLE 3



Check Your Progress

A. Solve $|2m - 2| > 6$. Then graph the solution set.

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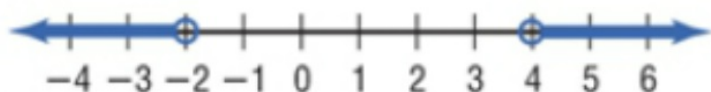
B. $\{m \mid m > -2 \text{ or } m > 4\}$.



C. $\{m \mid -2 < m < 4\}$.



D. $\{m \mid m < -2 \text{ or } m > 4\}$.



Examples 1-3 Solve each inequality. Then graph the solution set. **1-6.** See Ch. 5 Answer Appendix.

1. $|a - 5| < 3$

2. $|u + 3| < 7$

3. $|t + 4| \leq -2$

4. $|c + 2| > -2$

5. $|n + 5| \geq 3$

6. $|p - 2| \geq 8$

Example 2 7. **FINANCIAL LITERACY** Jerome bought stock in his favorite fast-food restaurant chain at \$70.85. However, it has fluctuated up to \$0.75 in a day. Find the range of prices for which the stock could trade in a day. $\{m \mid 70.10 \leq m \leq 71.60\}$

Handwritten work for problem 1:

③ \emptyset ④ \mathbb{R}

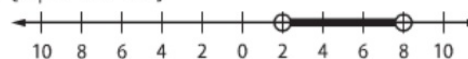
① $a - 5 < 3$
 $\quad +5 \quad +5$
 $\hline a < 8$

$a - 5 > -3$
 $\quad +5 \quad +5$
 $\hline a > 2$

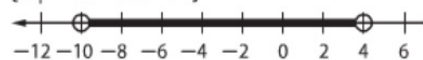
⑥ $p \leq -6$ or $p \geq 10$

Lesson 5-5

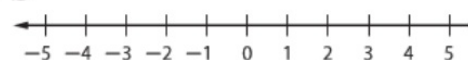
1. $\{a \mid 2 < a < 8\}$



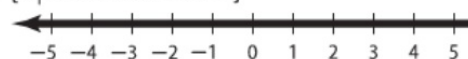
2. $\{u \mid -10 < u < 4\}$



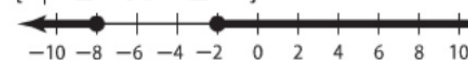
3. \emptyset



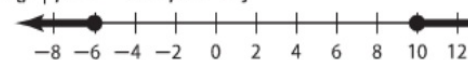
4. $\{c \mid c \text{ is a real number.}\}$



5. $\{n \mid n \leq -8 \text{ or } n \geq -2\}$



6. $\{p \mid p \leq -6 \text{ or } p \geq 10\}$



Practice and Problem Solving

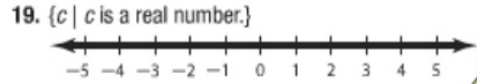
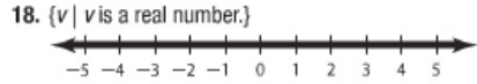
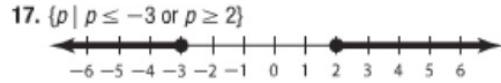
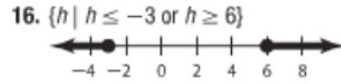
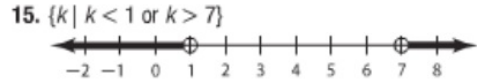
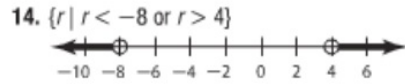
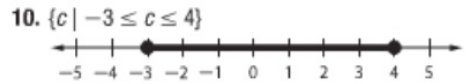
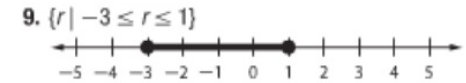
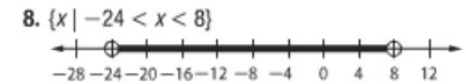
Extra Practice is on page R5.

Examples 1–3 Solve each inequality. Then graph the solution set. **8–19.** See Ch. 5 Answer Appendix.

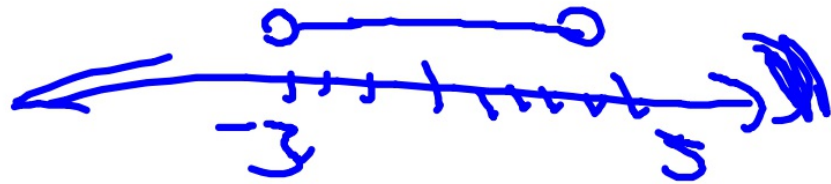
- | | | |
|------------------------|---------------------|-----------------------|
| 8. $ x + 8 < 16$ | 9. $ r + 1 \leq 2$ | 10. $ 2c - 1 \leq 7$ |
| 11. $ 3h - 3 < 12$ | 12. $ m + 4 < -2$ | 13. $ w + 5 < -8$ |
| 14. $ r + 2 > 6$ | 15. $ k - 4 > 3$ | 16. $ 2h - 3 \geq 9$ |
| 17. $ 4p + 2 \geq 10$ | 18. $ 5v + 3 > -9$ | 19. $ -2c - 3 > -4$ |

Example 2 20. **SCUBA DIVING** The pressure of a scuba tank should be within 500 pounds per square inch (psi) of 2500 psi. Write the range of optimum pressures. ($p \mid 2000 \leq p \leq 3000$)

?
 Fluctuates
 0.75
 70.85
 subtract... add...
 79.10 and 71.60



$$(3h - 3) \leq 12$$



$$\begin{array}{r} 3h - 3 < 12 \\ +3 \quad +3 \\ \hline 3h < 15 \\ \div 3 \quad \div 3 \\ \hline h < 5 \end{array}$$

$$\begin{array}{r} 3h - 3 > 12 \\ +3 \quad +3 \\ \hline 3h > 15 \\ \div 3 \quad \div 3 \\ \hline h > 5 \end{array}$$

Examples 1-3 Solve each inequality. Then graph the solution set. 8-19. See Ch. 5 Answer Appendix.

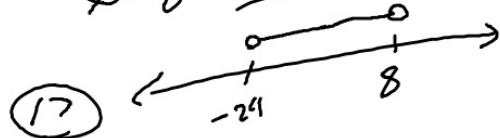
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- 11. $|3k - 3| < 12$
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- 14. $|r + 2| > 6$
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18 \mathbb{R} 12 \emptyset
 all real #'s

8 $|x + 8| < 16$

1 $x + 8 < 16$ 2 $x + 8 > -16$
 $\frac{x + 8}{-8} < \frac{16}{-8}$ $\frac{x + 8}{-8} > \frac{-16}{-8}$
 $x < 8$ and $x > -24$



$|4p + 2| \geq 10$

$4p + 2 \leq -10$
 $\frac{4p + 2}{-2} \leq \frac{-10}{-2}$

$4p \leq -12$
 $\frac{4p}{4} \leq \frac{-12}{4}$
 $p \leq -3$

$4p + 2 \geq 10$
 $\frac{4p + 2}{-2} \geq \frac{10}{-2}$

$4p \geq 8$
 $\frac{4p}{4} \geq \frac{8}{4}$
 $p \geq 2$

