

3-3

Solving Inequalities Using Multiplication or Division



Vocabulary

Review

1. Circle each inequality.

$5 < x + 6$	$7 < 2y + 2$	$a + 1 < b + 5 + 12$
$m < 2 < 3 < 5$	$2 < 1 < 3 < 5 < 3 < 1 < 2$	$n < 1 < 3 < 2 < 8$

2. Draw a line from each inequality in Column A to an equivalent inequality in Column B.

Column A	Column B
$x + 1 < 7 + 11$	$11 < x + 1 + 7$
$x + 1 < 7 + 11$	$11 < x + 1 + 7$
$7 + 1 < x + 11$	$11 < x + 1 + 7$
$7 + 1 < x + 11$	$11 < x + 1 + 7$

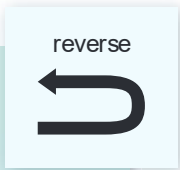
Vocabulary Builder

reverse (verb) *rih VURS*

Related Words: flip (verb), reversible (adjective), reverse (noun)

Definition: To reverse something means to turn it in an opposite direction.

Example: The Supreme Court has the power to reverse or uphold decisions made by the lower courts.



Use Your Vocabulary

3. Reverse each inequality symbol below. Write the new symbol in the box.

. , \$

4. If the inequality symbol in $x < 2$ is reversed, tell how the solutions change.

Key Concept Multiplication Property of Inequality

When you multiply each side of an inequality by a positive number, do not reverse the direction of the inequality symbol.

Let a , b , and c be real numbers with $c > 0$.

If $a < b$, then $ac < bc$.

If $a > b$, then $ac > bc$.

Write R , S , K , or L to complete each inequality.

5. $6 < 4$

$\frac{6}{2}$ $\frac{4}{2}$

3 2

6. $2 \neq 3$

$2(5)$ $3(5)$

10

7. $2 \cdot 12 > 2 \cdot 9$

$\frac{2 \cdot 12}{3}$ $\frac{2 \cdot 9}{3}$

$2 > 3$

8. If $p > q$ and $r > 0$, then pr qr .

When you multiply each side of an inequality by a negative number, reverse the direction of the inequality symbol.

Let a , b , and c be real numbers with $c < 0$.

If $a < b$, then $ac > bc$.

If $a > b$, then $ac < bc$.

Write R , S , K , or L to complete each inequality.

9. $6 < 4$

$\frac{6}{22}$ $\frac{4}{22}$

$2 \cdot 3$ $2 \cdot 2$

10. $2 \neq 3$

$2(2 \cdot 5)$ $3(2 \cdot 5)$

$2 \cdot 10$

11. $2 \cdot 12 > 2 \cdot 9$

$\frac{2 \cdot 12}{23}$ $\frac{2 \cdot 9}{23}$

3

12. If $g > h$ and $k < 0$, then $\frac{g}{k}$ $\frac{h}{k}$.



Problem 1 Multiplying by a Positive Number

Got It? What are the solutions of $\frac{c}{8} \leq \frac{1}{4}$? Graph the solutions.

13. Circle the first step in solving $\frac{c}{8} \leq \frac{1}{4}$.

Add 8 to each side.

Subtract 8 from each side.

Multiply each side by 8.

Divide each side by 8.

14. What must you do to the inequality symbol when solving $\frac{c}{8} \leq \frac{1}{4}$? Explain.

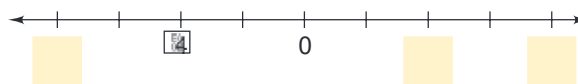
15. Solve the inequality.

$\frac{c}{8} \leq \frac{1}{4}$

$\frac{c}{8}(8) \leq \frac{1}{4} ?$

c

16. Graph the inequality on the number line.





Problem 2 Multiplying by a Negative Number

Got It? What are the solutions of $2\frac{n}{3} \geq 21$? Graph and check.

17. Circle the first step in solving $2\frac{n}{3} \geq 21$.

Add 23 to each side.

Subtract 23 from each side.

Multiply each side by 23.

Divide each side by 23.

18. What must you do to the inequality symbol when solving $2\frac{n}{3} \geq 21$? Explain.

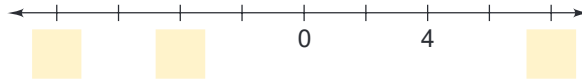
19. Solve the inequality.

$$2\frac{n}{3} \geq 21$$

$$2\frac{n}{3}(23) \geq 21(?)$$

$$n \geq \frac{21(23)}{2}$$

20. Graph the inequality.



21. Check the solution by following the steps below.

$2\frac{n}{3} \geq 21$ Write the original inequality.

$2\frac{23}{3} \geq 21$ Substitute a value that makes the simplified inequality true.

$2\frac{23}{3} \geq 21$ Simplify and check.

22. Is your solution correct?

Yes / No



Problem 3 Dividing by a Positive Number

Got It? A student club plans to buy food for a soup kitchen. A case of vegetables costs \$10.68. The club can spend at most \$50 for this project. What are the possible numbers of cases the club can buy?

23. Complete the model below.

Relate the cost of a case of vegetables times the number of cases is at most \$50

Define Let c be the number of cases the club can buy.

Write \times \leq 50

24. Now solve the inequality.

25. Circle the possible numbers of cases of vegetables the club can buy.

- 1 2 3 4 5



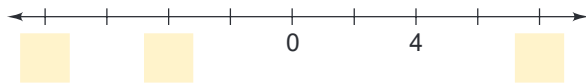
Problem 4 Dividing by a Negative Number

Got It? What are the solutions of $2.5x \leq 2.10$? Graph the solutions.

26. To solve $2.5x \leq 2.10$, will you reverse the inequality symbol? Why or why not?

27. Solve the inequality.

28. Graph the inequality on the number line.



Lesson Check • Do you UNDERSTAND?

Error Analysis Describe and correct the error in the solution.

$$\begin{array}{l} \cancel{-\frac{n}{5} > 2} \\ \cancel{-5(-\frac{n}{5}) > -5(2)} \\ \cancel{n > -10} \end{array}$$

29. Describe the student's first step.

30. What is the error in the student's solution?

31. What is the correct solution?



Math Success

Check off the vocabulary words that you understand.

inequality

Multiplication Property of Inequality

Division Property of Inequality

Rate how well you can solve inequalities by multiplying or dividing.

