2.3 Start Thinking

Choose any two numbers and compare them with an inequality symbol $(< \text{ or } >)$. Multiply each number by -1. Is the new inequality still true? Continue this exercise by dividing the original inequality by -1. Is this new inequality still true? Choose another negative number to multiply and divide by, using your original inequality again.

Write a hypothesis to explain what you must do to the inequality symbol when you multiply or divide by a negative number.

2.3 Warm Up

Solve the equation.

1. $6g = 18$

2. $p \div 6 = 2$

3. $-7r = 63$

4. $\frac{x}{7} = 9$

5. $-56 = 8s$

6. $5q = 50$

2.3 Cumulative Review Warm Up

Simplify the expression.

1. $|-8|$

2. $|13| + |-13|$

3. $|-6 \div (-6)|$

4. $\left|\frac{26}{-2}\right|$

5. $|14|$

6. $2 - |2|$

7. $|-7.7 \div 11|$

8. $-\left|\frac{-10}{5}\right|$

Name_____ Date _____

2.3 Practice A

In Exercises 1–6, solve the inequality. Graph the solution.

1. $3x \leq 9$

2. $2m < -6$

3. $-18 < 6t$

4. $40 \leq 8p$

5. $\frac{b}{3} \geq -1$

6. $\frac{x}{3} \leq 8.7$

In Exercises 7–12, solve the inequality. Graph the solution.

7. $-5j \leq 10$

8. $-4t \geq 4$

9. $-14 > -7y$

10. $-24 < -6a$

11. $\frac{k}{-2} > 2$

12. $\frac{h}{-1} < 7$

13. You have \$25 to buy 6 fishing lures. Write and solve an inequality that represents the prices you can pay per fishing lure.

In Exercises 14–16, solve the inequality. Use a graphing calculator to verify your answer.

14. $54 \leq 9g$

15. $13m > 65$

16. $3 < -\frac{3}{7}d$

17. Describe and correct the error in solving the inequality.

✗

$$5 < \frac{w}{-3}$$

$$-3 \bullet (5) > -3 \bullet \left(\frac{w}{-3}\right)$$

$$-15 > w$$

The solution is $w > -15$.

18. You bike for 2 hours at a speed no faster than 17.6 miles per hour.

a. Write and solve an inequality that represents the possible numbers of miles you bike.

b. The bike portion of an Ironman competition is 112 miles. Your friend says that if you continue to bike at this pace, you will be able to complete the bike portion of the Ironman in less than 6.5 hours. Is your friend correct? Explain.

Name _____ Date _____

2.3 Practice B

In Exercises 1–6, solve the inequality. Graph the solution.

1. $56 \leq 8b$

2. $-14 < 7t$

3. $\frac{x}{2} \leq 1.7$

4. $\frac{p}{2} \geq -3$

5. $15 > \frac{2}{3}w$

6. $-22 \leq \frac{11}{2}h$

In Exercises 7–12, solve the inequality. Graph the solution.

7. $-21 < -7a$

8. $-18 > -6u$

9. $\frac{n}{-2} < 3$

10. $\frac{w}{-3} > 3$

11. $-7 \leq -\frac{1}{3}c$

12. $-15 > -\frac{3}{5}a$

13. You are taking tickets at a concert. You have determined that you are taking 16 tickets each minute. Write and solve an inequality to determine how many minutes it will take for you to take at least 136 tickets.

In Exercises 14–16, solve the inequality. Use a graphing calculator to verify your answer.

14. $3 < \frac{t}{-3}$

15. $3g \leq \frac{2}{5}$

16. $1.2v > 7.2$

17. You have \$850 to buy new carpet for the game room. The dimensions of the game room are 20 feet by 12 feet. Write and solve an inequality that represents the costs per square foot that you can pay for the new carpet. Specify the units of measure in each step.

18. You run for 3 hours at a speed no faster than 8.2 miles per hour.

a. Write and solve an inequality that represents the possible numbers of miles you run.

b. A marathon is approximately 26.2 miles. Your friend says that if you continue to run at this speed, you will not be able to complete a marathon in less than 4 hours. Is your friend correct? Explain.

19. The base of a triangle with a height of 7 units is represented by the formula $b = \frac{2}{7}A$. The base of the triangle is less than 10 units. Write and solve an inequality that represents the possible area A of the triangle.

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2.3 Enrichment and Extension

Explore Absolute Value

In Exercises 1–5, simplify the expression if $a = 2$, $b = -1$, and $c = 3$.

1. $\left|\frac{|a - 5| + |bc|}{-2}\right|$
2. $|a|b - c| - ac|$
3. $|-a - b - c| - |a + b + c|$
4. $|a - b + 2| \bullet b - (3 - |b|)$
5. $b\left|\frac{c|-ab|}{ac - bc}\right|$

In Exercises 6–13, determine if the statement is *always true*, *sometimes true*, or *never true*. If sometimes true, find the values of x and y that make the statement true and the values of x and y that make the statement false. Explain your reasoning.

6. $|x| + |y| - (x + y) = 0$
7. $|x| + |y| \leq |x + y|$
8. $|x|^{|y|} = x^y$
9. $|x| - |y| = |x - y|$
10. $|x^y| = |x|^{|y|}$
11. $|x| + |y| \geq |x + y|$
12. $|xy| = xy$
13. $x^2 + |x||y| + y^2 = (x + y)^2$

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2.3 Puzzle Time

Did You Hear About The Two Punsters Who Told A Lot Of Jokes About Cats?

A	**B**	**C**	**D**	**E**	**F**
G	**H**	**I**	**J**	**K**	**L**
M	**N**				

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

$x \leq -25$ **PLAY**	$x \geq -48$ **ANY**
$x < -8$ **KITTEN**	$x \leq 21$ **TREATS**
$x \geq 11$ **SAID**	$x \geq 48$ **EITHER**
$x \leq 4$ **THAT**	$x < -48$ **NOT**
$x > -13$ **YARN**	$x \geq -12$ **MORE**
$x > 3$ **WE'RE**	$x < -\frac{2}{7}$ **ABOUT**
$x < -\frac{7}{2}$ **THEY**	$x < 3$ **WE**
$x \leq 5$ **WON'T**	$x \geq -84$ **TWO**
$x > -8$ **TELL**	$x > 12$ **AND**

Solve the inequality.

A. $3x < 9$

B. $-25 \leq -5x$

C. $\frac{x}{4} > -2$

D. $36 \geq -\frac{3}{4}x$

E. $-14 \leq \frac{7}{6}x$

F. $-10x > 35$

G. $-88 \geq -8x$

H. $-\frac{x}{2} < -6$

I. $-27 > -9x$

J. $\frac{5}{8}x < -30$

K. $-2x > 16$

L. $\frac{x}{2} < -\frac{1}{7}$

M. You have saved some money to purchase five different songs to download to your portable music device. Solve an inequality that represents the prices you can pay for each song if you have saved no more than $20.

N. You are able to type 24 words in one minute. Solve an inequality that represents the number of minutes that you will need to type an essay that consists of at least 1152 words.