LESSON 12-6

Reteach

Solving Inequalities by Multiplying or Dividing

When you multiply or divide both sides of an inequality by the same *positive* number, the direction of the inequality symbol remains the same.

$3p < -18$

Divide both sides by *positive* 3.

$\frac{3p}{3} < \frac{-18}{3}$

$p < -6$

$\frac{x}{5} \geq -4$

Multiply both sides by *positive* 5.

$5 \cdot \frac{x}{5} \geq 5 \cdot -4$

$x \geq -20$

When you multiply or divide both sides of an inequality by the same *negative* number, the direction of the inequality symbol is reversed.

$-6y > -42$

Divide both sides by *negative* 6.

$\frac{-6y}{-6} < \frac{-42}{-6}$

$y < 7$

$\frac{m}{-2} \leq 15$

Multiply both sides by *negative* 2.

$-2 \cdot \frac{m}{-2} \geq -2 \cdot 15$

$m \geq -30$

Solve.

1. $\frac{a}{8} < -3$

Multiply by 8. The direction of the inequality symbol remains the same.

$8 \cdot \frac{a}{8} < 8 \cdot -3$

$a < -24$

2. $-4s \geq -36$

Divide by -4. The direction of the inequality symbol is reversed.

$\frac{-4s}{-4} \leq \frac{-36}{-4}$

$s \leq 9$

Solve. Check each answer.

3. $\frac{-r}{-7} \geq 2$ $r \leq -14$

4. $9b < -54$ $b < -6$

5. $-3n > -36$ $n < 12$

6. $\frac{c}{6} < -8$ $c < -48$

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Challenge

Absolute Value Inequalities

Use the definition of absolute value to solve absolute value inequalities.

Remember: $|x| = x$ if $x > 0$ and $|x| = -x$ if $x < 0$

Example 1: $|10 - 2x| > 6$

Case 1: $10 - 2x > 6$
$-2x > -4$
$x < 2$

Case 2: $-(10 - 2x) > 6$
$-10 + 2x > 6$
$2x > 16$
$x > 8$

Solution: $x < 2$ or $x > 8$

Example 2: $|2y - 3| \leq 7$

Case 1: $2y - 3 \leq 7$
$2y \leq 10$
$y \leq 5$

Case 2: $-(2y - 3) \leq 7$
$-2y + 3 \leq 7$
$-2y \leq 4$
$y \geq -2$

Solution: $-2 \leq y \leq 5$

Solve.

1. $|m - 6| \leq 8$ $-2 \leq m \leq 14$

2. $|x + 4| < 10$ $-14 < x < 6$

3. $|6 - y| \leq 2$ $4 \leq y \leq 8$

4. $|b + 5| > 8$ $b < -13$ or $b > 3$

5. $|4 - k| \geq 5$ $k \leq -1$ or $k \geq 9$

6. $|2 - p| - 3 < 1$ $-2 < p < 6$

7. $4 - 3|e| < 1$ $e < -1$ or $e > 1$

8. $\left|\frac{h}{6}\right| \geq 1$ $h \leq -6$ or $h \geq 6$

9. $\left|\frac{n}{4}\right| \leq 2$ $-8 \leq n \leq 8$

10. $|2a + 1| \geq 1$ $a \leq -1$ or $a \geq 0$

11. $|z - 2| < 5$ $-3 < z < 7$

12. $\left|\frac{c}{2} - 3\right| \leq 2$ $2 \leq c \leq 10$

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Problem Solving

Solving Inequalities by Multiplying or Dividing

Write the correct answer.

1. U.S. Postal Service regulations state that a package can be mailed using Parcel Post rates if it weighs no more than 70 pounds. What is the maximum number of books weighing 12 pounds each that can be mailed in one box using Parcel Post rates?

at most 5 books

2. Marc wants to buy a set of at least 6 antique chairs for his dining room. He has decided to spend no more than $390. What is the most he can spend per chair?

no more than $65

3. Alfonso earns $9.00 per hour working part-time as a lab technician. He wants to earn more than $144 this week. At least how many hours does Alfonso have to work?

more than 16 hours

4. Mrs. Menendez invited 8 children to her son's birthday party. She wants to make sure that each child gets at least 4 small prizes. At least how many prizes should she buy?

at least 32 prizes

Choose the letter for the best answer.

5. The Computer Club spent $2,565 on mouse pads. The members plan to sell the mouse pads during the book fair. If they charge $9.50 for each mouse pad, how many must they sell in order to make a profit?

A $n \leq 271$ **C** $n \geq 271$
B $n \leq 270$ **D** $n \geq 270$

6. The Parents Organization bought 1,000 bumper stickers at $1.25 each to sell at football games. They want to make at least $750 profit. What should be the selling price of the bumper stickers?

F $p \geq \$1.25$ **H** $p \geq \$1.75$
G $p \geq \$1.50$ **J** $p \geq \$2.00$

7. In 2000, the national ratio of students to computers with Internet access in public schools was 7:1. Winston School had 623 students. If the school had a lower ratio, how many computers with Internet access did Winston School have?

A $c \geq 90$ **C** $c \geq 91$
B $c \leq 90$ **D** $c \leq 91$

8. A new theme park averaged fewer than 2,000 visitors per week during the winter months. What was the average daily attendance?

F $a \geq 290$ **H** $a > 385$
G $a \leq 186$ **J** $a < 286$

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Reading Strategies

Analyze Information

Look at the steps for solving multiplication and division inequalities.

Steps for Solving an Inequality	Division Inequality	Multiplication Inequality
Step 1: Isolate the variable.	$\frac{x}{8} < 5$	$4y > 12$
Step 2: Multiply both sides of a division equation by the same number. Divide both sides of a multiplication equation by the same number.	$\frac{x}{8} \cdot 8 < 5 \cdot 8$	$\frac{4y}{4} > \frac{12}{4}$
Step 3: Compute to solve.	$x < 40$	$y > 3$

Use the chart to answer the following questions.

1. What do you do to get the variable by itself in a division inequality?

multiply

2. What was $\frac{x}{8}$ multiplied by in the example?

8

3. What is the solution of the division inequality?

$x < 40$

4. What are three numbers that make the division inequality true?

Possible answers: 37, 38, 39

5. What do you do to get the variable by itself in a multiplication inequality?

divide

6. What was $4y$ divided by in the multiplication inequality?

4

7. What is the solution to the multiplication inequality?

$y > 3$

8. What are three numbers that are part of the solution?

Possible answers: 4, 5, 6

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