LESSON 12-5

Reteach

Solving Inequalities by Adding or Subtracting

Inequalities with variables may have more than one solution. All the solutions of an inequality are called the **solution set.**

You can solve an inequality involving addition or subtraction just as you would solve an equation.

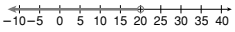
Complete the steps to solve, graph, and check the inequality.

1. $n - 13 < 7$

$n - 13 +$ 13 $<$ 7 $+$ 13

$n <$ 20

Graph the inequality.



Check:

Pick any number in the solution set of $n < 20$.
$19 < 20$

Substitute 19 into the inequality.

$n - 13 < 7$

$19 - 13 \overset{?}{<} 7$

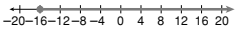
$6 \overset{?}{<} 7$ ✓

2. $x + 18 \geq 2$

$x + 18 -$ 18 $\geq 2 -$ 18

$x \geq$ −16

Graph the inequality.



Check:

Pick any number in the solution set of $x \geq -16$.
$0 \geq -16$

Substitute 0 into the inequality.

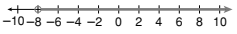
$x + 18 \geq -2$

$0 + 18 \overset{?}{\geq} -2$

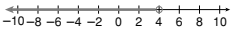
$18 \overset{?}{\geq} -2$ ✓

Solve. Then graph each solution set.

3. $d + 3 > -5$ $d > -8$



4. $s - 10 < -6$ $s < 4$



Solve. Check each answer.

5. $y + 9 > 20$ $y > 11$

6. $h + 17 \leq -6$ $h \leq -23$

7. $a - 4 \geq -18$ $a \geq -14$

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LESSON 12-5

Challenge

Absolute Value Equations

The absolute value of a number x is:

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

When you solve an absolute value equation, you must consider both of these cases.

Example: Solve $|n + 8| = 20$.

Case 1: $n + 8 = 20$
$n = 12$

Case 2: $-(n + 8) = 20$
$-n - 8 = 20$
$-n = 28$
$n = -28$

The equation has two solutions: $n = 12, -28$

Solve.

1. $|t - 4| = 9$ $t = -5, 13$

2. $|6s| = 72$ $s = -12, 12$

3. $|y| + 3 = 7$ $y = -4, 4$

4. $|g + 6| = 3$ $g = -9, -3$

5. $|2m - 7| = 29$ $m = -11, 18$

6. $|4p - 1| = 15$ $p = -\frac{7}{2}, 4$

7. $|c + 7| = 13$ $c = -20, 6$

8. $|3n - 4| = 11$ $n = -\frac{7}{3}, 5$

9. $|2e| - 8 = 24$ $e = -16, 16$

10. $|5x| - 8 = 32$ $x = -8, 8$

11. $|9k| + 3 = 48$ $k = -5, 5$

12. $|2s - 6| = 20$ $s = -7, 13$

13. $|3w - 5| = 4$ $w = \frac{1}{3}, 3$

14. $|4b - 7| = 1$ $b = \frac{3}{2}, 2$

15. $|6r - 1| = 17$ $r = -\frac{8}{3}, 3$

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LESSON 12-5

Problem Solving

Solving Inequalities by Adding or Subtracting

Write the correct answer.

1. A small car averages up to 29 more miles per gallon of gas than an SUV. If a small car averages 44 miles per gallon, what is the average miles per gallon for an SUV?

at least 15 mi per gal

2. Carlos is taking a car trip that is more than 240 miles, depending on the route he chooses. He has already driven 135 miles. How much farther does he have to go?

more than 105 miles

3. Driving into the city usually takes 25 minutes. If there is a lot of traffic, the trip can take up to 45 minutes. How much additional time should you allow during a heavy traffic period?

no more than 20 min

4. To qualify for the heavyweight wrestling division, Kobe must weigh at least 180 pounds. If Kobe weighs 168 pounds now, how much weight should he gain?

at least 12 lb

Choose the letter for the best answer.

5. On one day, the range of temperatures in one state was at most 27°. If the lowest temperature in the state was 59°, what was the highest temperature?

A $t > 86°$ **C** $t = 86°$
B $t \leq 86°$ **D** $t \geq 86°$

6. The highest possible score on the Scholastic Aptitude Test is 2,400. Rebecca scored 1780. She needs a score of at least 1,950 to qualify for a scholarship. How much higher must her score be?

F $s \leq 170$ **H** $s \geq 170$
G $s \leq 450$ **J** $s \geq 450$

7. Romero is saving to buy an Apex Model 12 Computer. The lowest price that Romero can find for the computer is $1,250. Romero now has $825. His grandmother is going to give him another $200. How much more money does Romero need?

A $x < \$225$ **C** $x \geq \$225$
B $x < \$425$ **D** $x \geq \$425$

8. The seating capacity of the school gym is 550. So far, there are 210 fans at a basketball game. How many more fans could attend the game?

F $f \geq 340$
G $f > 210$
H $f \leq 340$
J $f < 340$

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LESSON 12-5

Reading Strategies

Use a Graphic Organizer

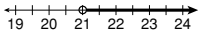
You can use this chart to help you understand solving two-step inequalities.

Solution of the Inequality
Any value of the variable that makes the inequality true.

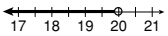
Solution Set
All possible solutions of an inequality.

Solving Inequalities by Adding or Subtracting

Addition Inequality
$x + 4 > 25$
$x + 4 - \mathbf{4} > 25 - \mathbf{4}$
$x > 21$



Subtraction Inequality
$y - 8 < 12$
$y - 8 + \mathbf{8} < 12 + \mathbf{8}$
$y < 20$



Use the graphic organizer to answer the following questions.

1. What is a solution of an inequality?

any value for the variable that makes the inequality true

2. What is the solution set?

all the possible solutions of an inequality

3. What are 3 solutions for $x > 21$?

possible answers: 22, 23, 24

4. What are 3 solutions for $y < 20$?

possible answers: 19, 18, 17

5. Why is $x + 4 > 25$ called an Addition Inequality?

4 is added to the variable *x* in the inequality.

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