LESSON 3.4

Solving Inequalities Using Addition *or* Subtraction

Vocabulary

inequality, p. 140
solution of an inequality, p. 140

BEFORE	*Now*	WHY?
You solved one-step equations.	You'll solve inequalities using addition or subtraction.	So you can find the weight a truck can tow, as in Ex. 14.

24

$3 1.50

$-1.5x + 1.50x + 24 = 3x - 1.5x$

$\frac{1}{1.5}24 = 1.5x \frac{1}{1.5}$

$\frac{24}{1.5} = x$

$16 = x$

$15\overline{)240}$

15

90

700 $60^{m}/_{hr}$

400

$700 - 60x$

$400 + 60x$

$60x + 700 + -60x = 400 + 60x + 60x$

$-400 \quad -400$

$700 = 400 + 120x - 400$

$\frac{1}{120}300 = 120x \frac{1}{120}$

$\frac{30}{12} = x$

$\frac{15}{6}$

$\frac{5}{2}$

$2.5 = x$

$$5t - 24 = 8t$$

$$5t - 24 - 5t = 8t - 5t$$

$$-24 = 3t$$

$$\frac{1}{3} \cdot -24 = 3t \cdot \frac{1}{3}$$

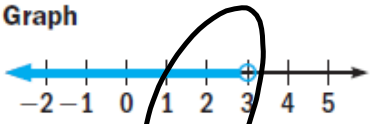
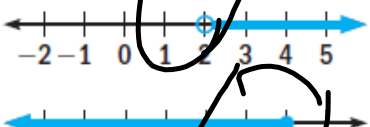
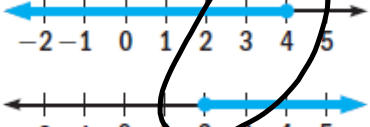
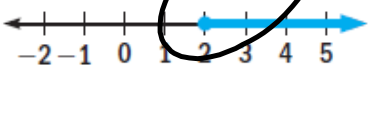
$$-8 = t$$

700

45 m/hr

An **inequality** is a statement formed by placing an inequality symbol between two expressions. For example, $y + 5 \leq -6$ is an inequality.

The **solution of an inequality** with a variable is the set of all numbers that produce true statements when substituted for the variable. You can show the solution of an inequality by graphing the inequality on a number line. When you graph an inequality of the form $x > a$ or $x < a$, use an open circle at a. When you graph an inequality of the form $x \geq a$ or $x \leq a$, use a closed circle at a.

Inequality	Words	Graph
$x < 3$	All numbers less than 3	
$y > 2$	All numbers greater than 2	
$z \leq 4$	All numbers less than or equal to 4	
$n \geq 2$	All numbers greater than or equal to 2	


2 steps
2 steps
1 step
1 step

Solving Inequalities You can use the following properties to find the solutions of inequalities involving addition and subtraction. Using these properties, you can write *equivalent inequalities*. **Equivalent inequalities** are inequalities that have the same solution.

Addition and Subtraction Properties of Inequality

Words Adding or subtracting the same number on each side of an inequality produces an equivalent inequality.

Algebra If $a < b$, then $a + c < b + c$ and $a - c < b - c$.

If $a > b$, then $a + c > b + c$ and $a - c > b - c$.

$-13 + 3x + 13 \leq 49 - 13$

LESSON 3.4

Name _____ Date _____

Practice A

For use with pages 140–144

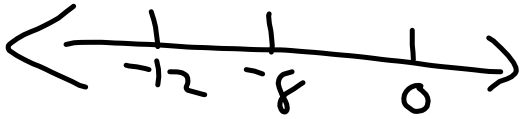
Tell whether the given number is a solution of $-8 \geq x$.

1. -8 **2.** 4 **3.** -12 **4.** 0

YES NO

$-8 \geq x$

$x \leq -8$



Write an inequality to represent the situation.

5. A boat must be at least 24 feet long. $x \geq 24$

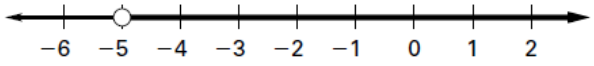
6. A golfer's longest drive is 325 yards.

7. The maximum speed of a race car is 180 miles per hour. $x \leq 180$

8. The lowest attendance for a concert is 580.

Write an inequality represented by the graph.

9.



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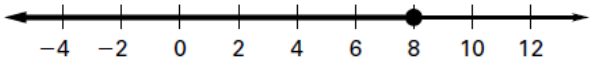
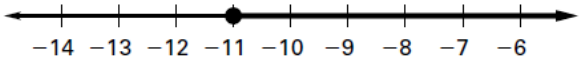


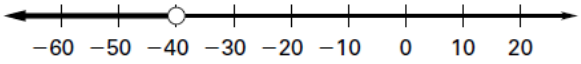
$x > -5$

11.



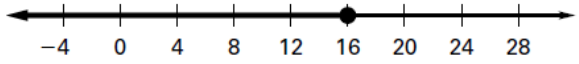
$x \geq -11$

12.

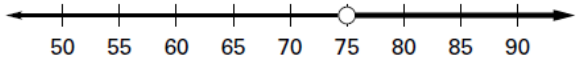


$x < -40$

13.



14.



Solve the inequality. Graph your solution.

15. $x + 2 > 9$

16. $-4 + x \leq 13$

$+4 \quad -4 + x \leq 13 + 4$

$x \leq 17$

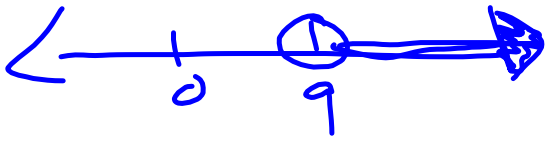
17. $-15 \geq x + 7$

18. $-1 < x - 10$

$10 \quad -1 < x - 10 + 10$

$9 < x$

$x > 9$



19. $x - 18 < 35$

20. $x + 24 \geq 21$

21. $x + 12 \leq -1$

22. $x - 11 > -11$

$-12 + x + 12 \leq -1 + -12$

$x \leq -13$

23. $30 + x < 16$

24. $-19 + x \geq -6$

25. $15 \leq x + 9$

26. $-8 > x + 8$

$-9 \quad -9$

$6 \leq x$

$x \geq 6$

27. $x - 4 \geq 7.6$

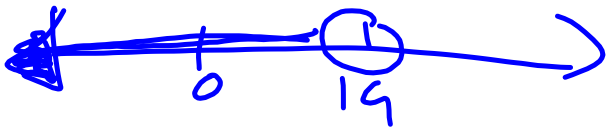
28. $x + 7.1 \leq 10.3$

29. $x - 9.5 < 9.5$

30. $14.3 > x + 12.7$

$9.5 + x + -9.5 < 9.5 + 9.5$

$x < 19$



31. You have $78 in your savings account. You are buying a computer and the minimum down payment you can make is $120. Write and solve an inequality to represent the amount of money you need to reach or exceed the minimum down payment for the computer.

$-78 \quad -78 + x \geq 120 - 78$

$x \geq 42$