



## Lesson Check

### Do you know HOW?

1. What compound inequality represents the phrase “all real numbers that are greater than or equal to 0 and less than 8”? Graph the solutions.
2. What are the solutions of  $-4 \leq r - 5 < -1$ ? Graph the solutions.
3. Your test scores in science are 83 and 87. What possible scores can you earn on your next test to have a test average between 85 and 90, inclusive?
4. Write the interval represented on the number line below as an inequality and in interval notation.



### Do you UNDERSTAND?



5. **Vocabulary** Which of the following are compound inequalities?
  - A.  $x > 4$  or  $x < -4$
  - B.  $x \geq 6$
  - C.  $8 \leq 5x < 30$
  - D.  $7x > 42$  or  $-5x \leq 10$
6. **Error Analysis** A student writes the inequality  $x \geq 17$  in interval notation as  $[17, \infty]$ . Explain why this is incorrect.
7. **Reasoning** What are the solutions of  $3x - 7 \leq 14$  or  $4x - 8 > 20$ ? Write your solutions as a compound inequality and in interval notation.
8. **Writing** Compare the graph of a compound inequality involving *and* with the graph of a compound inequality involving *or*.



## Practice and Problem-Solving Exercises



**Practice** Write a compound inequality that represents each phrase. Graph the solutions.

See Problem 1.

9. all real numbers that are between  $-5$  and  $7$
10. The circumference of a women's basketball must be between  $28.5$  in. and  $29$  in., inclusive.

Solve each compound inequality. Graph your solutions.

See Problems 2 and 3.

11.  $-4 < k + 3 < 8$
12.  $5 \leq y + 2 \leq 11$
13.  $3 < 4p - 5 \leq 15$
14.  $15 \leq \frac{20 + 11 + k}{3} \leq 19$
15.  $\frac{1}{4} < \frac{2x - 7}{2} < 5$
16.  $-3 \leq \frac{6 - q}{9} \leq 3$

Solve each compound inequality. Graph your solutions.

See Problem 4.

17.  $6b - 1 < -7$  or  $2b + 1 > 5$
18.  $5 + m > 4$  or  $7m < -35$
19.  $4d + 5 \geq 13$  or  $7d - 2 < 12$
20.  $7 - c < 1$  or  $4c \leq 12$
21.  $5y + 7 \leq -3$  or  $3y - 2 \geq 13$
22.  $5z - 3 > 7$  or  $4z - 6 < -10$

Write each interval as an inequality. Then graph the solutions.

See Problem 5.

23.  $(-\infty, 2]$
24.  $[-4, 5]$
25.  $(-\infty, -1]$  or  $(3, \infty)$
26.  $[6, \infty)$

Write each inequality in interval notation. Then graph the interval.

27.  $x > -2$

28.  $x \leq 0$

29.  $x < -2$  or  $x \geq 1$

30.  $-3 \leq x < 4$

**B** Apply

Solve each inequality. Write each set in interval notation.

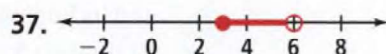
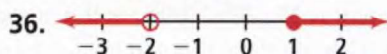
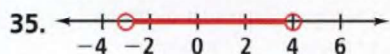
31.  $7 < x + 6 \leq 12$

32.  $-9 < 3m + 6 \leq 18$

33.  $f + 14 < 9$  or  $-9f \leq -45$

34.  $12h - 3 \geq 15h$  or  $5 > -0.2h + 10$

Write a compound inequality that each graph could represent.



Solve each compound inequality. Justify each step.

38.  $4r - 3 > 11$  or  $4r - 3 \leq -11$

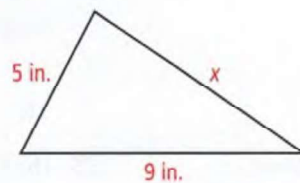
39.  $2 \leq 0.75v \leq 4.5$

40.  $\frac{4y + 2}{5} - 5 > 3$  or  $\frac{4 - 3y}{6} > 4$

41.  $-\frac{4}{3} \leq \frac{1}{7}w - \frac{3}{4} < 1$

- STEM** 42. **Chemistry** The acidity of the water in a swimming pool is considered normal if the average of three pH readings is between 7.2 and 7.8, inclusive. The first two readings for a swimming pool are 7.4 and 7.9. What possible values for the third reading  $p$  will make the average pH normal?

- ©** 43. **Think About a Plan** The Triangle Inequality Theorem states that the sum of the lengths of any two sides of a triangle is greater than the length of the third side. The lengths of two sides of a triangle are given. What are the possible lengths  $x$  of the third side of the triangle?
- Is there an upper limit on the value of  $x$ ? Is there a lower limit?
  - How can you use your answers to the previous question to write one or more inequalities involving  $x$ ?



Use your answers to Exercise 43 to answer Exercises 44–47. The lengths of two sides of a triangle are given. Find the possible lengths of the third side.

44. 3.75 in., 7 in.

45. 15 ft, 21 ft

46. 14 mm, 35 mm

47. 6 m, 17 m

- STEM** 48. **Physics** The force exerted on a spring is proportional to the distance the spring is stretched from its relaxed position. Suppose you stretch a spring a distance of  $d$  inches by applying a force of  $F$  pounds. For your spring,  $\frac{d}{F} = 0.8$ . You apply forces between 25 lb and 40 lb, inclusive. What inequality describes the distances the spring is stretched?

- ©** 49. **Reasoning** Describe the solutions of  $4x - 9 < 7$  or  $3x - 10 > 2$ .

50. **Nutrition** A sedentary 15-year-old male should consume no more than 2200 Calories per day. A moderately active 15-year-old male should consume between 2400 and 2800 Calories per day. An active 15-year-old male should consume between 2800 and 3200 Calories per day. Model these ranges on a number line. Represent each range of calories using interval notation.