Date: _____

Use Symbols to Describe Relationships

Mathematicians use symbols for operations and to show relationships between quantities. For example,

× represents multiplication   > represents is greater than
÷ represents division   = represents is equal to
< represents is less than   ≠ represents is *not* equal to

1. Write each word statement using symbols.

   a) 5 is greater than 2.

   b) 7 is less than 20.

   c) 5 multiplied by 3.

   d) 9 is equal to $\frac{18}{2}$.

2. Write each mathematical statement in words.

   a) 4 < 8

   b) 8 > 2

   **c)** 14 ÷ 2

   d) $4 \neq \frac{8}{3}$

Use *Between*

Between can be used to describe a physical relationship or location. For example, "Paul is *between* Sue and Shasta in line." Similarly, *between* can be used in mathematics. For example, "What are all of the integers *between* −2 and 3?"

The answer is −1, 0, 1, and 2. Note that the word *between* does not include the −2 and 3.

3. List all of the whole numbers that satisfy the following. Use the number line to help you.
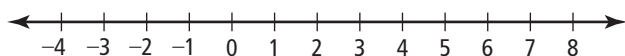
   a) between 6 and 3

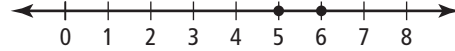   **b)** between −2 and 2

   c) between 4.6 and 7.1

   d) less than 4

Use Inequality Symbols

An *inequality* expresses a relationship between numbers or quantities. Two inequality symbols are $<$ and $>$.

$5 < 6$ means 5 is less than 6. This same information can also be shown as $6 > 5$, which means 6 is greater than 5.

$$\begin{array}{ccccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{array}$$

4. Use both the less than, $<$, and greater than, $>$, symbols to write two expressions showing the relationship between the given numbers.

a) 1 and 7

b) 4 and -1

c) 3 and 3.5

d) 0 and 1

5. List the whole numbers that satisfy each statement.

a) $x < 4$

b) between 4 and 8

c) $t > 11$

d) $a < 15$

Solve Equalities

When you are asked to solve an equation, you are being asked to find all values for an unknown that make a true statement.
Solve $2x - 1 = 7$.

Solution
$2x - 1 + 1 = 7 + 1$
$\qquad\quad 2x = 8$
$\qquad\qquad x = 4$

Check:
$2(4) - 1 = 7$
$\quad\, 8 - 1 = 7$
$\qquad\quad 7 = 7$

6. Solve each equation and then verify your answer.

a) $x + 4 = 6$

b) $-2x + 1 = 9$

c) $-5x - 3 = -8$

d) $4x + 9 = 21$

9.1 Representing Inequalities

MathLinks 9, pages 6–15

Key Ideas Review

Choose from the following terms to complete the statements in #1 to 6.

|					
algebraically	boundary	closed	conditions	double	equal
graphically	greater	left less	open	right	verbally

1. Inequalities can be represented _____, _____,

   and _____.

2. A _____ point separates values greater than from values less than
   a specified value.

3. On a number line, the inequality $x \leq -7.2$ has a(n) _____ circle at

   -7.2 and an arrow to the _____.

4. The inequality $x > 5$ has a(n) _____ circle at 5 and an arrow

   pointing to the _____ when shown graphically.

5. The inequality $13 \geq x$ means that all values of the variable are _____

   than or _____ to 13. Values _____ than 13 are
   not possible for x.

6. A _____ inequality can be used to represent a situation involving
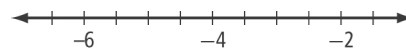
   two _____.

Check Your Understanding

7. For each list of numbers, circle the
   values that are possible for x in the
   corresponding inequality.

   a) $\{2, 4, 6, 8, 10\}$, $x \leq 6$

   b) $\{-17, -16, -15, -14, -13\}$,
      $x > -15$

   c) $\{-6, -2, 1, 4, 5\}$, $3 \geq x$
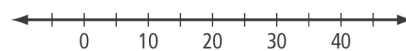
8. Show each inequality on the
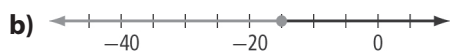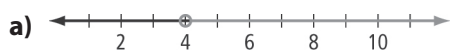   number line.

   a) $x \geq 5$
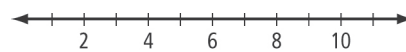
   b) $x < -3.5$

   c) $25 < x$

9. Express each inequality shown on the number line algebraically and verbally.
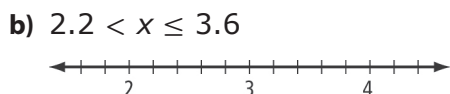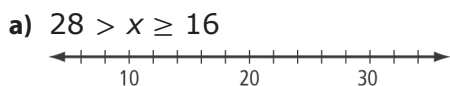
a)

b)

c)

10. For each list of numbers, circle the values that are possible for x in the corresponding inequality.

a) $\{-9.1, -5.6, 1.7, 3.2, 7.8\}$,
$-7 < x < 5$

b) $\{-26, -14.5, -12, -4.3, 0\}$,
$0 \geq x > -14$

11. Sketch each inequality.

a) $28 > x \geq 16$

b) $2.2 < x \leq 3.6$

12. Write an inequality for each.

a)

b)
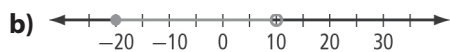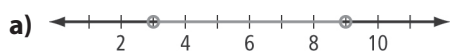
13. Represent each with an inequality.

a) The time spent on the activity can be at most 13 minutes.

b) The volume of the container must be a minimum of 1.8 L and a maximum of 2.5 L.

14. Label the number line and sketch the inequalities from #13.

a)

b)

15. In Canada, by law, any product sold as a *nutritional supplement* or *meal replacement* must provide a minimum of 225 kcal of energy per serving.

a) If c represents the energy content of one serving, write an inequality to represent this regulation.

b) Use the number line below to show the possible energy content values according to the regulation.

16. Danielle's track coach tells the team that to be considered for the 100 m race, a runner has to be able to run 100 m in less than 13 s. Draw and label a number line to represent this situation.

17. On Saltspring Island in British Columbia, the height of the tide varies one day from a low of 0.8 m to a high of 3.2 m.

a) What type of inequality do you need to use for showing the range of tide heights? Explain.

b) Express the situation algebraically, and then represent it using a number line.