**Write and Graph Inequalities**

**Main Idea**
Write and graph inequalities.

**Lesson 7**

**Write and Graph Inequalities**

**FAIR** Jessica is trying to decide which fair she should go to.

1. Which fair’s entrance fee costs less?
2. Which fair’s ride pass costs less?

You can write an inequality to represent a situation.

**EXAMPLES**

**Write Inequalities with < or >**

Write an inequality for each sentence.

1. You must be over 12 years old to ride the go-karts.
   
   **Words**
   Your age is over 12.
   
   **Variable**
   Let $a = \text{your age}$.
   
   **Inequality**
   $a > 12$

   The inequality is $a > 12$.

2. A pony is less than 14.2 hands tall.
   
   **Words**
   A pony is less than 14.2.
   
   **Variable**
   Let $p = \text{the height of the pony}$
   
   **Inequality**
   $p < 14.2$

   The inequality is $p < 14.2$.

**CHECK Your Progress**

Write an inequality for each sentence.

a. You must be older than 13 to play in the basketball league.
   
   **Inequality**
   $a > 13$

b. To use one stamp, your domestic letter must be under 3.5 ounces.
   
   **Inequality**
   $m < 3.5$

c. You must be over 48 inches tall to ride the roller coaster.
   
   **Inequality**
   $h > 48$
**REAL-WORLD EXAMPLE**

**DRIVING** You must be at least 16 years old to have a driver’s license. Write an inequality to describe this situation.

<table>
<thead>
<tr>
<th>Words</th>
<th>Your age is at least 16 years.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Let $a = \text{your age.}$</td>
</tr>
<tr>
<td>Inequality</td>
<td>$a \geq 16$</td>
</tr>
</tbody>
</table>

The inequality is $a \geq 16$.

**CHECK Your Progress**

d. **CIVICS** You must be at least 18 years old to vote. Write an inequality to describe this situation.

Inequalities can be graphed on a number line. Sometimes, it is impossible to show all the values that make an inequality true. The graph helps you see the values that make the inequality true.

**EXAMPLES** **Graph an Inequality**

Graph each inequality on a number line.

4. $n > 9$
   - Place an open dot at 9. Then draw a line and an arrow to the right.
   - The open dot means the number 9 is not included ($<\text{ or }>\text{)}$ and a closed dot means it is included ($\leq \text{ or } \geq \text{)}$.
   - The values that lie on the line make the sentence true. All numbers greater than 9 make the sentence true.

5. $n \leq 10$
   - Place a closed dot at 10. Then draw a line and an arrow to the left.
   - All numbers 10 and less make the sentence true.

**CHECK Your Progress**

e. $a < 15$

f. $b \geq 7$
Write an inequality for each sentence.

Examples 1–3
1. The movie will be no more than 90 minutes in length.
2. The mountain is at least 985 feet tall.

Graph each inequality on a number line.

Examples 4 and 5
3. $a \leq 6$  
4. $b > 4$  
5. $c \geq 7$  
6. $d < 8$

Write an inequality for each sentence.

Examples 1–3
7. Swim practice will be no more than 35 laps.
8. Kevin ran for less than 5 miles.
9. You cannot spend more than 50 dollars.
10. The occupancy of the room must be less than 437 people.
11. More than 800 fans attended the opening soccer game.
12. The heavyweight division is greater than 200 pounds.

Graph each inequality on a number line.

Examples 4 and 5
13. $f > 1$  
14. $g \leq 6$  
15. $h \geq 3$
16. $x \leq 5$  
17. $y \geq 4$  
18. $z > 18$

19. **MUSIC** A rewritable compact disc must have less than 20 songs on it. Write and graph an inequality to describe how many songs can be on the disc.

20. **HORSES** A colt is a male horse that is younger than four years old. Write and graph an inequality to describe the possible ages of a colt.

21. **ACTIVITIES** The graph shows the number of students who participate in some of the activities offered at Crestview Middle School.
   a. Which activities have more than 20 participants? at least 20? fewer than 19?
   b. Write an inequality comparing the number of orchestra participants and the number of tennis participants.
22. **FIND THE ERROR** Mei is writing an inequality for the expression at least 10 hours of community service. Find her mistake and correct it.

23. **CHALLENGE** Name three solutions of the inequality $w \leq \frac{4}{3}$. Then justify your response using a number line.

24. **WRITE MATH** Explain the difference between graphing an inequality with a closed dot and one with an open dot. Use examples to support your reasoning.

25. **SHORT RESPONSE** The table below shows the number of different kinds of sports equipment sold in the City Sports Store.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number Sold in Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football</td>
<td>8</td>
</tr>
<tr>
<td>Basketball</td>
<td>n</td>
</tr>
<tr>
<td>Baseball</td>
<td>33</td>
</tr>
<tr>
<td>Hockey puck</td>
<td>3</td>
</tr>
<tr>
<td>Softball</td>
<td>21</td>
</tr>
</tbody>
</table>

The number of basketballs sold is greater than the total number of softballs sold. Write and graph an inequality to describe the number of basketballs that could have been sold.

26. Which of the following graphs represents the inequality $x \geq 5$?