Unit 7 Family Support Materials

Linear Inequalities and Systems

In this unit, your student will analyze inequalities as ways to represent constraints. For example, if you have $20 to spend at the store, you do not need to spend exactly that much. You could afford any total between $0 and $20. This might be represented by the inequalities $t \geq 0$ and $t \leq 20$.

The symbol < means that the value of the left side of the inequality must be less than the value of the right side of the inequality. Conversely, the symbol > means that the value of the right side is less. If there is a line under either of these symbols ($\leq$ or $\geq$), then the two sides of the inequality are allowed to be equal and still satisfy the constraint.

Here are some additional examples of inequalities representing constraints:

$w < 20$. An apartment building allows dogs that weigh less than 20 pounds, only.

$12.5c + 15a \geq 1{,}000$. In order for a concert to be performed, the artists need to be sure of $1,000 in ticket sales. Tickets for children under 18 are $12.50, and tickets for adults are $15.

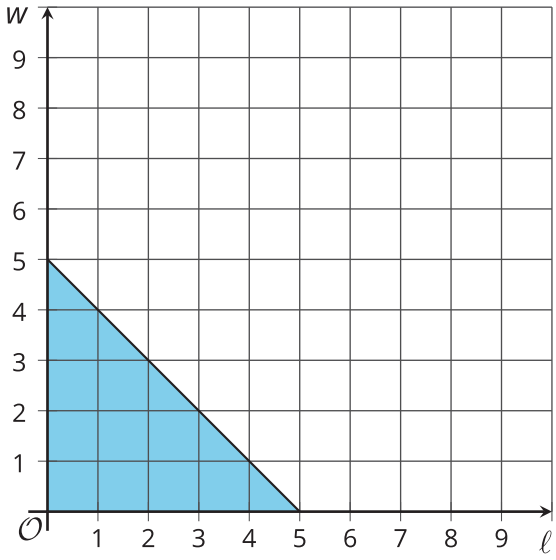
Inequalities usually have many solutions that are grouped together in a region on the number line or coordinate plane. For example, all the amounts of money you could spend at the store with your $20 might be represented on the number line like this.

total spent at the store

Here is a task for you to try with your student:

A rectangle can have a perimeter of at most 10 cm. Let ℓ represent the length of the rectangle and w represent the width.

1. Which of these represents the constraint?
   a. $2\ell + 2w < 10$
   b. $2\ell + 2w \leq 10$
   c. $2\ell + 2w > 10$
   d. $2\ell + 2w \geq 10$
2. What is an example of values for ℓ and w that satisfy the constraint?
3. Here is a graph that could represent the rectangles that fit the constraint. How can you see your example values in the graph?



4. Use the graph to find another pair of values that satisfy the constraint. Explain your reasoning.

Solution:

1. $2\ell + 2w \leq 10$. The phrase "at most" usually means that equality is allowed. If the rectangle isn't allowed to have a perimeter of 10 cm, then the problem could say "A rectangle can have a perimeter less than 10 cm."
2. Sample response: $\ell = 2$ and $w = 1$. Any pair of values that make $2\ell + 2w$ less than or equal to 10.
3. Sample response: The values I chose correspond to the point $(2, 1)$, which is in the shaded region.
4. Sample response: $(1, 3)$ is also in the shaded region.