

## EXAMPLE 4 Write and solve a system of linear inequalities

**BASEBALL** The National Collegiate Athletic Association (NCAA) regulates the lengths of aluminum baseball bats used by college baseball teams. The NCAA states that the length (in inches) of the bat minus the weight (in ounces) of the bat cannot exceed 3. Bats can be purchased at lengths from 26 to 34 inches.



- Write and graph a system of linear inequalities that describes the information given above.
- A sporting goods store sells an aluminum bat that is 31 inches long and weighs 25 ounces. Use the graph to determine if this bat can be used by a player on an NCAA team.

### Solution

- Let  $x$  be the length (in inches) of the bat, and let  $y$  be the weight (in ounces) of the bat. From the given information, you can write the following inequalities:

$$x - y \leq 3 \quad \text{The difference of the bat's length and weight can be at most 3.}$$

$$x \geq 26 \quad \text{The length of the bat must be at least 26 inches.}$$

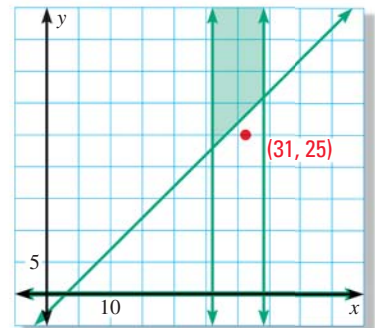
$$x \leq 34 \quad \text{The length of the bat can be at most 34 inches.}$$

$$y \geq 0 \quad \text{The weight of the bat cannot be a negative number.}$$

Graph each inequality in the system. Then identify the region that is common to all of the graphs of the inequalities. This region is shaded in the graph shown.

- Graph the point that represents a bat that is 31 inches long and weighs 25 ounces.

► Because the point falls outside the solution region, the bat cannot be used by a player on an NCAA team.

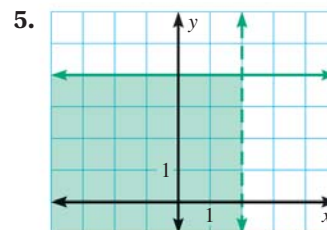
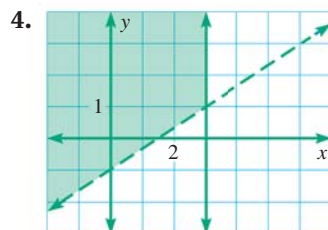


### WRITING SYSTEMS OF INEQUALITIES

Consider the values of the variables when writing a system of inequalities. In many real-world problems, the values cannot be negative.

### GUIDED PRACTICE for Examples 3 and 4

Write a system of inequalities that defines the shaded region.



- WHAT IF?** In Example 4, suppose a Senior League (ages 10–14) player wants to buy the bat described in part (b). In Senior League, the length (in inches) of the bat minus the weight (in ounces) of the bat cannot exceed 8. Write and graph a system of inequalities to determine whether the described bat can be used by the Senior League player.