

# Assignment

## Write

Describe the similarities and differences between solving a linear absolute value equation and a linear absolute value inequality.

## Remember

You can rewrite any absolute value equation as two equations to solve. If  $|x| = c$ , where  $c$  is any real number, then  $+(x) = c$  or  $-(x) = c$ .

Absolute value inequalities can take four different forms. To solve a linear absolute value inequality, you can first write it as an equivalent compound inequality.

Absolute Value Inequality	Equivalent Compound Inequality
$ ax + b  < c$	$-c < ax + b < c$
$ ax + b  \leq c$	$-c \leq ax + b \leq c$
$ ax + b  > c$	$ax + b < -c$ or $ax + b > c$
$ ax + b  \geq c$	$ax + b \leq -c$ or $ax + b \geq c$

## Practice

- The Billingsly Cookie Company is trying to come up with a cookie that is low in fat but still has good taste. The company decides on a target fat content of 5 grams per cookie. In order to be labeled low-fat, a difference of 1.8 grams per cookie is acceptable.
  - Write an expression that represents the difference between the fat in a cookie from the new recipe and the target fat content. Use  $f$  to represent the amount of fat in a cookie from the new recipe.
  - Write an absolute value inequality to represent the restrictions on the difference in the amount of fat.
  - One of the bakers creates a cookie recipe that has 6.5 grams of fat per cookie. Is this recipe acceptable? Explain your reasoning.
  - Another baker comes up with a cookie recipe that has 2.9 grams of fat per cookie. Is this recipe acceptable? Explain your reasoning.
  - Algebraically determine the greatest and least number of grams of fat a cookie can contain and still fall within the required specifications. Write your answer as an inequality.
  - Sketch the graph of the absolute value inequality from part (b).
- Solve each absolute value equation or inequality.
  - $|x| + 8 = 15$
  - $|x + 5| = -15$
  - $|x + 4| \leq 9$
  - $|3x - 1| > 14$
  - $|x - 9| > -1$

## Stretch

John, Rasheed, and George are different ages. Rasheed is six less than twice John's age. George's age is nine more than half of John's age. The difference between Rasheed and George's ages is no more than nine years.

1. Write an expression that represents the difference between Rasheed and George's ages.
2. Write an absolute value inequality to represent the maximum difference in their ages.
3. Determine whether it is possible for John to be twenty years old. Explain your reasoning.
4. Algebraically determine the greatest and least age John can be so that the difference between Rasheed and George's ages is no more than nine years.

## Review

1. Given the function  $f(x) = |x|$ . Sketch a graph of each new function.
  - a.  $g(x) = -|x + 1| - 3$
  - b.  $h(x) = \frac{3}{4}|x - 2| + 1$
2. The tower on Philadelphia City Hall has 4 clocks. Each clock face measures 26 feet in diameter. Determine the area of the sector formed by the minute hand and the hour hand on one of the clocks when the time is 8:00.
3. Solve for  $a$  in the equation  $\frac{a-b}{12} = 11 - 6a$ .