Absolute Value

In 135, you saw that absolute value can be used to talk about distances. For example, you can think of $|a - b|$ as the distance between a and b. Furthermore, you can think of $|x|$ as referring to the distance that x is from 0. Becoming comfortable with this way of thinking about absolute values will be critical to understanding limits later in the course.

1. (Warm Up) Solve the inequality $|x - 5| \geq 2$. Represent your answer both on a number line and in interval notation.

2. Write an equation or an inequality using absolute values and draw a number line to represent each of the following (you might have to create variables for some quantities).

   (a) The distance between a and b is 5.

   (b) x is at least 10 units away from -3.

   (c) r is within 4 units of 17.

   (d) The distance between y and -1 is no more than 2 units.

   (e) x is more than 8 away from 2.

   (f) y is within a range of $\pm.5$ units from 451.

   (g) The scientist found that her sample weighed 17.2 grams with an error of less than .1 grams.

   (h) y is closer to 5 than y is to -2.

3. Describe each inequality in terms of the distance interpretation of absolute value. Use that description to represent the inequality on a number line.

   (a) $|x + 3| < 2$

   (b) $2 < |x + 1| \leq 4$

   (c) $|x - 4| < |x - 2|$

4. Review your work in solving #1. Keeping in mind the distance interpretation of absolute value, describe each step you took in terms of the number line.

5. Without using any algebra whatsoever, use the distance interpretation of absolute value to solve $|2x - 10| \geq -1$. What is the solution to $|2x - 10| < -1$?