

## Assignment

**Complete pgs. 389-390**  
**Questions 4, 5ade, and 11**

# Solutions

4. Solve each absolute value equation algebraically. Verify your solutions.

a)  $|x+7|=12$        $\begin{cases} x+7=0 \\ x=-7 \end{cases}$        $|x+7| = \begin{cases} x+7, x \geq -7 \\ -(x+7), x < -7 \end{cases}$

Case 1

$$\begin{aligned} x+7 &= 12 \\ x &= 12-7 \\ x &= 5 \end{aligned}$$

\*  $x=5$  satisfies the condition  $x \geq -7$ .

Case 2

$$\begin{aligned} -(x+7) &= 12 \\ x+7 &= -12 \\ x &= -12-7 \\ x &= -19 \end{aligned}$$

\*  $x=-19$  satisfies the condition  $x < -7$ .

b)  $|3x-4|+5=7$        $\begin{cases} 3x-4=0 \\ 3x=4 \\ x=\frac{4}{3} \end{cases}$        $|3x-4| = \begin{cases} 3x-4, x \geq \frac{4}{3} \\ -(3x-4), x < \frac{4}{3} \end{cases}$

$$\begin{aligned} |3x-4| &= 7-5 \\ |3x-4| &= 2 \end{aligned}$$

Case 1

$$\begin{aligned} 3x-4 &= 2 \\ 3x &= 2+4 \\ 3x &= 6 \\ \frac{3x}{3} &= \frac{6}{3} \\ x &= 2 \end{aligned}$$

\*  $x=2$  satisfies the condition  $x \geq \frac{4}{3}$ .

Case 2

$$\begin{aligned} -(3x-4) &= 2 \\ 3x-4 &= -2 \\ 3x &= -2+4 \\ 3x &= 2 \\ \frac{3x}{3} &= \frac{2}{3} \\ x &= \frac{2}{3} \end{aligned}$$

\*  $x=\frac{2}{3}$  satisfies the condition  $x < \frac{4}{3}$ .

## Solutions

$$c) 2|x+6|+12=-4$$

$$2|x+6|=-4-12$$

$$\frac{2|x+6|}{2} = \frac{-16}{2}$$

$$|x+6| = -8 \quad * \text{We can stop here } \text{😊}$$

↳ Since the absolute value of a number is always greater than or equal to 0, this equation has no solution.

$$d) \frac{-6|2x-14|}{-6} = \frac{-42}{-6}$$

$$|2x-14| = 7$$

$$\begin{aligned} 2x-14 &= 0 \\ 2x &= 14 \\ x &= 7 \end{aligned}$$

$$|2x-14| = \begin{cases} 2x-14, & x \geq 7 \\ -(2x-14), & x < 7 \end{cases}$$

Case 1

$$2x-14=7$$

$$2x = 7+14$$

$$\frac{2x}{2} = \frac{21}{2}$$

$$x = \frac{21}{2}$$

\*  $x = 21/2$  satisfies the condition  $x \geq 7$

Case 2

$$-(2x-14)=7$$

$$2x-14=-7$$

$$2x = -7+14$$

$$\frac{2x}{2} = \frac{7}{2}$$

$$x = \frac{7}{2}$$

\*  $x = 7/2$  satisfies the condition  $x < 7$ .

## Solutions

5. Solve each equation.

$$a) |2a+7| = a-4$$

$$\begin{aligned} 2a+7 &= 0 \\ \frac{2a}{2} &= \frac{-7}{2} \\ a &= \frac{-7}{2} \end{aligned}$$

$$|2a+7| = \begin{cases} 2a+7, & a \geq -7/2 \\ -(2a+7), & a < -7/2 \end{cases}$$

Case 1

$$2a+7 = a-4$$

$$2a-a = -4-7$$

$$a = -11$$

\*  $a = -11$  does not satisfy  $a \geq -7/2$  (Extraneous)

Case 2

$$-(2a+7) = a-4$$

$$-2a-7 = a-4$$

$$-2a-a = -4+7$$

$$\frac{-3a}{-3} = \frac{3}{-3}$$

$$a = -1$$

\*  $a = -1$  does not satisfy  $a < -7/2$  (Extraneous)

NO SOLUTION!

## Solutions

$$d) |3x+3|=2x-5$$

$$3x+3=0$$

$$\cancel{3}x = -3$$

$$\cancel{3} \quad 3$$

$$x = -1$$

$$|3x+3| = \begin{cases} 3x+3, & x \geq -1 \\ -(3x+3), & x < -1 \end{cases}$$

Case 1

$$3x+3=2x-5$$

$$3x-2x=-5-3$$

$$x=-8$$

\*  $x=-8$  does not satisfy  $x \geq -1$  (Extraneous)

Case 2

$$-(3x+3)=2x-5$$

$$-3x-3=2x-5$$

$$-3x-2x=-5+3$$

$$\frac{-5}{-5}x = \frac{-2}{-5}$$

$$x = \frac{2}{5}$$

\*  $x = \frac{2}{5}$  does not satisfy  $x < -1$  (Extraneous)

NO SOLUTION!

## Solutions

$$e) 3|2a+7|=3a+12$$

$$\frac{3|2a+7|}{3} = \frac{3(a+4)}{3}$$

$$|2a+7| = a+4$$

$$2a+7=0$$

$$\frac{2a}{2} = \frac{-7}{2}$$

$$a = \frac{-7}{2}$$

$$|2a+7| = \begin{cases} 2a+7, a \geq -7/2 \\ -(2a+7), a < -7/2 \end{cases}$$

Case 1

$$2a+7 = a+4$$

$$2a - a = 4 - 7$$

$$a = -3$$

\*  $a = -3$ , Satisfies the condition  $a \geq -7/2$

Case 2

$$-(2a+7) = a+4$$

$$-2a-7 = a+4$$

$$-2a - a = 4 + 7$$

$$\frac{-3a}{-3} = \frac{11}{-3}$$

$$a = \frac{-11}{3}$$

\*  $a = -11/3$  satisfies the condition  $a < -7/2$ .

## Solutions

11. When measurements are made in science, there is always a degree of error possible. Absolute error is the uncertainty of a measurement. For example, if the mass of an object is known to be 125g, but the absolute error is said to be  $\pm 4g$ , then the measurement could be as high as 129g and as low as 121g.

a) If the mass of a substance is measured once as 64g and once as 69g, and the absolute error is  $\pm 2.5g$ , what is the actual mass of the substance?

The actual mass of the substance is 66.5g.  $\{64 + 2.5 \text{ or } 69 - 2.5\}$

b) If the volume of a liquid is measured to be 258ml with an absolute error of  $\pm 7ml$ , what are the least and greatest possible measures of the volume?

$\Rightarrow$  The least possible measure for the volume is 251ml  $\{258 - 7\}$ .

$\Rightarrow$  The greatest measure for the volume is 265ml  $\{258 + 7\}$ .