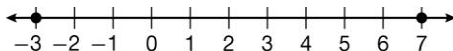


LESSON
2-6

Challenge

Writing an Absolute-Value Equation Given the Solutions

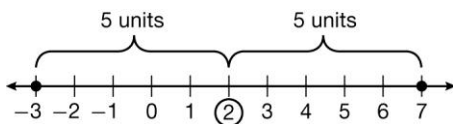
It is sometimes useful to construct an equation from given solutions. For example, consider the solutions -3 and 7 . To write an absolute-value equation with these solutions, first plot the points on a number line.



Find the value that is midway between -3 and 7 . One way to do this is to find the mean:

$$\frac{-3 + 7}{2} = \frac{4}{2} = 2$$

Now find the distance of -3 and 7 from this midpoint. The distance is 5 units.



The required absolute-value equation will be in the form $|x - m| = d$, where m is the midpoint and d is the distance of each solution from the midpoint.

Therefore, the absolute-value equation with the solutions -3 and 7 is

$$|x - 2| = 5.$$

1. Show how to check that -3 and 7 are solutions of $|x - 2| = 5$.

2. Are there other absolute-value equations with the same solutions? If so, give an example of such an equation. (*Hint:* Consider performing the same operation on each side of the equation $|x - 2| = 5$.)

Write an absolute-value equation with the given solutions.

3. 1, 9

4. $-4, 8$

5. $-5, 11$

6. $-9, -1$

7. $-\frac{1}{3}, \frac{1}{3}$

8. 5, 6

9. $-4.5, 9.5$

10. $-\frac{1}{2}, \frac{5}{2}$

11. {1}
 12. {3}
 13. two
 15. none
 $|x - 68| = 3.5$

14. one
 16.

14. $64.5^\circ; 71.5^\circ$

Practice C

1. $\left\{-\frac{3}{5}, \frac{3}{5}\right\}$
 3. $\{-10.5, 10.5\}$
 5. $\{-7, 7\}$
 7. $\left\{-\frac{3}{2}, \frac{5}{2}\right\}$
 9. $\{-6.6, 8.6\}$
 11. \emptyset
 13. $|x - 3| = 0.005; 2.995 \text{ m}; 3.005 \text{ m}$
 14. $|x + 5| = 1.5; -6.5^\circ\text{C}; -3.5^\circ\text{C}$

2. {0}
 4. \emptyset
 6. $\{-11\}$
 8. \emptyset
 10. $\{-8, 3\}$
 12. \emptyset

Review for Mastery

1. $\{-6, 10\}$
 3. $\{0, 10\}$
 5. $\{2\}$
 7. \emptyset

2. $\{-15, 1\}$
 4. $\{-3, 3\}$
 6. \emptyset
 8. $\{-10\}$

Challenge

1. $|(-3) - 2| = |-5| = 5; |7 - 2| = |5| = 5$
 2. yes; possible answer:
 $|x - 2| + 1 = 6$
 3. $|x - 5| = 4$
 4. $|x - 2| = 6$
 5. $|x - 3| = 8$
 6. $|x + 5| = 4$
 7. $|x| = \frac{1}{3}$
 8. $|x - 5.5| = 0.5$
 9. $|x - 2.5| = 7$

10. $|x - 1| = \frac{3}{2}$

Problem Solving

1. $|x - 70| = 0.02; 69.98 \text{ cm}; 70.02 \text{ cm}$
 2. $|x - 53| = 0.021; 52.979 \text{ m}; 53.021 \text{ m}$
 3. -1 and 11
 4. 11.9 cm
 5. B
 6. G
 7. C

Reading Strategies

1. one
 2. two
 3. none
 4. one
 5. none
 6. two

LESSON 2-7

Practice A

1. 20
 3. \$1.05/lb
 pages/min
 5. $y = 4$
 7. $m = 2$
 9. $b = -4$
 11. 150 in.
2. 58 ft/s
 4. 2.5
 6. $x = 18$
 8. $t = 75$
 10. $x = 1$
 12. 160 mi

Practice B

1. 15
 3. 0.1 cars/min
 5. $y = 5$
 7. $m = -96$
 9. $b = 20$
 11. 185 in.
2. \$0.49/lb
 4. 46.9 ft/s
 6. $x = -0.4$
 8. $t = \frac{5}{3}$
 10. $x = 3.5$
 12. 3.7 cm