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Module 6 Solving Absolute Value Equations and Inequalities**Lesson 1** Solving Basic Absolute Value Equations**independent practice**

Solve the following absolute value equations.

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| 1. $ x = 7$ $x = 7$ or -7 | 2. $ x = -4$ \emptyset |
| 3. $ x + 1 = 2$ $x = 1$ or -3 | 4. $ x + 3 = 6$ $x = 3$ or -9 |
| 5. $ x + 3 = 12$ $x = 9$ or -15 | 6. $ x + 6 = 7$ $x = 1$ or -13 |
| 7. $ x + 2 = 7$ $x = 5$ or $x = -9$ | 8. $ x + 9 = 1$ $x = -8$ or -10 |
| 9. $ x + 1 = 3$ $x = 2$ or -4 | 10. $ x + 1 = 7$ $x = 6$ or -8 |
| 11. $ x + 7 = 4$ $x = -3$ or -11 | 12. $ x + 5 = 5$ $x = 0$ or -10 |
| 13. $ x - 8 = 4$ $x = 12$ or 4 | 14. $ x - 3 = 1$ $x = 4$ or 2 |
| 15. $\left \frac{x}{2}\right = 3$ $x = 6$ or -6 | 16. $\left \frac{x}{4}\right = 5$ $x = 20$ or -20 |
| 17. $\left \frac{x}{3}\right = 0$ $x = 0$ | 18. $\left \frac{x}{3}\right = 4$ $x = 12$ or -12 |
| 19. $\left \frac{x}{2}\right = 2$ $x = 4$ or -4 | 20. $\left \frac{x}{2}\right = 6$ $x = 12$ or -12 |

Journal

- When solving for the variable in absolute value equations, why is there often more than one solution?
- How do absolute value problems and the symbol \pm translate into disjunction statements? Give examples.
- George says that the solution to the inequality $|x - 8| = 4$ is $x = 12$. Sally says that the solution is $x = 12$ or -4 . Who is correct and why?
- How many numbers are in the solution set of the equation $|x + 3| = 6$?
- Can you think of situations where there would be only one number in the solution set to solve an absolute value equation?
- Explain how to solve $\left|\frac{x}{4}\right| = 5$.

Cumulative Review

Solve by inspection.

1. $6J = 12$ $J = 2$

2. $4y = -16$ $y = -4$

3. $M \cdot 7 = -21$ $M = -3$

4. $T \cdot (-8) = -24$ $T = 3$

5. $Q \cdot -27 = 0$ $Q = 0$

6. $57R = 0$ $R = 0$

7. $42 \div F = 7$ $F = 6$

8. $45 \div D = -9$ $D = -5$

9. $\frac{K}{5} = 3$ $K = 15$

10. $\frac{T}{-2} = 50$ $T = -100$

Possible Journal Answers

1. When you take the absolute value of an expression, its value could be positive or negative. You need to solve for the variable under each condition. For example, $|x + 3| = 1$ means that $x + 3$ could equal 1 or -1 . You need to solve for x for these two conditions.
2. An absolute value problem such as $|b| = 4$ can be written as $b = \pm 4$ and then translated into a disjunction statement $b = 4$ or $b = -4$.
3. Sally is correct. She remembered that $x - 8$ can equal 4 or -4 .
4. There are two numbers in the solution set, $x = 3$ and $x = -9$.
5. Equations of the form $|x + a| = 0$, where x is a variable and a is a real number, have only one solution.
6. Start by writing the two equations, $\frac{x}{4} = 5$, and $\frac{x}{4} = -5$. Then solve each equation by multiplying by four. So, $x = 20$ and $x = -20$. You can then write $x = \pm 20$.