

Honors Algebra 1

Absolute Value Equations

Solve absolute value equations.

Vocabulary

An **absolute value equation**, such as $|x| = 3$, is an equation that contains an absolute value expression.

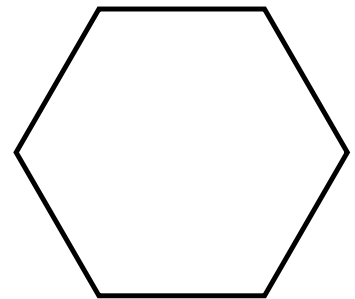
The **absolute deviation** of a number x from a given value is the absolute value of the difference of x and the given value:

absolute deviation = $|x - \text{given value}|$.

Always positive

November 14

Five times the quantity of a number increased by 3 is no more than 7 less than twice the number. What is the largest possible number?



$$|x| = 7$$

$$\begin{array}{l} x = 7 \\ x = -7 \end{array}$$



$$|x + 2| = 9$$

$$x + 2 = 9$$

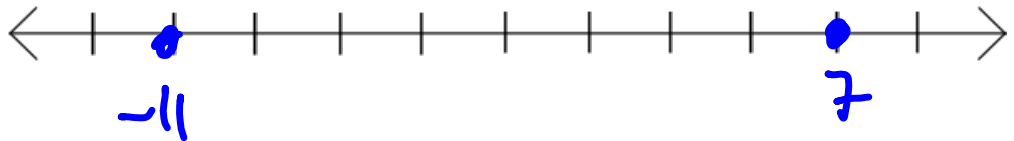
-2 -2

$$x = 7$$

$$x + 2 = -9$$

-2 -2

$$x = -11$$



$$|3x - 4| = 5$$

98.1%
of the time,
Absolut. valu.
Equatio. giv.
Yo. to. Solutio.

$$3x - 4 = 5$$

$$3x = 9$$

$$x = 3$$

$$3x - 4 = -5$$

$$+4 \quad +4$$

$$3x = -1$$

$$x = -\frac{1}{3}$$

$$4|5x - 1| = 36$$

$$\sqrt{4} \quad |5x - 1| = 9 \quad \sqrt{4}$$

$$5x - 1 = 9$$

$$5x - 1 = -9$$

$$5x = 10$$

$$x = 2$$

$$5x = -8$$

$$x = -\frac{8}{5}$$

$$|x + 3| - 4 = -1$$

$$|x + 3| = 3$$

$$x + 3 = 3$$

$$x = 0$$

$$x + 3 = -3$$

$$x = -6$$

$$\frac{-6}{-6} |10 - 2x| = \frac{24}{-6}$$

$$|10 - 2x| = -4$$

~~○~~ no. solutio.
bab.

$$-12|15 - x| - 3 = -9$$

$$-8|3x + 2| - 9 = -41$$

$$-4 \left| \frac{2}{3}x - 6 \right| + 5 = 11$$

$$|2x + 3| = x$$

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Homework.

Homework

LESSON
5.5

Practice C

For use with the lesson "Solve Absolute Value Equations"

Solve the equation.

1. $|x - 15| = 26$

2. $|10 - x| = 9$

3. $|4x + 1| = 17$

4. $|3x - 4| = 18$

5. $|8 - 2x| = 22$

6. $5|6x - 3| = 30$

7. $\frac{1}{4}|2x - 10| + 1 = 5$

8. $8|2x + 7| - 1 = 23$

9. $-5|3x + 1| - 3 = -7$

Solve the equation, if possible.

10. $|x - 6| + 8 = 6$

11. $|x + 7| + 10 = 6$

12. $-4|1 - \frac{7}{2}x| = -8$

13. $-8|10 - 3x| = 24$

14. $-3|1 - \frac{3}{4}x| = -18$

15. $-12|15 - x| - 3 = -9$

16. $\frac{5}{3}|4x + 1| + 4 = 24$

17. $-4|\frac{2}{3}x - 6| + 5 = 11$

18. $-8|3x + 2| - 9 = -41$

Practice Level C

1. $x = -11, 41$ **2.** $x = 1, 19$ **3.** $x = -4.5, 4$

4. $x = -\frac{14}{3}, \frac{22}{3}$ **5.** $x = -7, 15$ **6.** $x = -\frac{1}{2}, \frac{3}{2}$

7. $x = -3, 13$ **8.** $x = -5, -2$ **9.** $x = -\frac{3}{5}, -\frac{1}{15}$

10. no solution **11.** no solution **12.** $x = -\frac{2}{7}, \frac{6}{7}$

13. no solution **14.** $x = -\frac{20}{3}, \frac{28}{3}$

15. $x = 14.5, 15.5$ **16.** $x = -\frac{13}{4}, \frac{11}{4}$

17. no solution **18.** $x = -2, \frac{2}{3}$ **19.** $x = -2, 7$

20. $x = -0.5, 14.1$ **21.** $x = -9.4, -6.8$

22. $x = -11.6, -7.2$ **23.** If $a < 0$ and $c = d$, then there is one solution because you are solving the equation $|x + b| = 0$. If $a < 0$ and $c < d$ and $d > 0$, then there are no solutions to $|x + b| = \frac{d - c}{a}$ because $\frac{d - c}{a} < 0$.

24. **a.** 31,500 lb; 38,500 lb **b.** 41,400 lb; 50,600 lb **c.** 57,150 lb; 69,850 lb

25. $|t - 32.5| = 12.5$