

Solving Absolute Value Equations (ALG.ABS.01)

Solve each equation.

1. $|m| = 3$ $m = \pm 3$

2. $|n - 4| = 7$ $n = -3, 11$

3. $-2|c| = -10$ $c = \pm 5$

4. $|w| + 5 = 2$ **No solution**

5. $\frac{|k|}{6} = 3$ $k = \pm 18$

6. $|j - 2| = 5$ $j = -3, 7$

7. $|6k + 1| = 13$ $k = -\frac{7}{3}, 2$

8. $|-2x| = -16$ **No solution**

9. $|n - 2| + 3 = 6$ $n = -1, 5$

10. $-7|n - 2| + 5 = 19$ **No solution**

11. $|5 - 4d| - 10 = 25$ $d = -\frac{15}{2}, 10$

12. $\frac{2}{3}|2c - 3| + 5 = 11$ $c = -3, 6$

13. $\left|\frac{3x}{2} - 1\right| = 5$ $x = -\frac{8}{3}, 4$

14. $2|d - 1| + 7 = 3$ **No solution**

15. $\frac{|-3x-5|}{4} = -5$ **No solution**

16. $\frac{2|5y-2|}{-3} + 5 = -7$ $y = -\frac{16}{5}, 4$

17. $\frac{|2k+5|}{3} + 6 = 21$ $k = -25, 20$

18. $-4 + |8 + 7b| = 39$ $b = -\frac{51}{7}, 5$

19. $6 + 9|7 - 4y| = 87$ $y = -\frac{1}{2}, 4$

20. $-2|4 - 3m| - 8 = -12$ $m = \frac{2}{3}, 2$

Solve each equation.

21. $|3x - 1| = |x + 7|$ $x = -\frac{3}{2}, 4$

22. $|9x + 4| = |4x + 9|$ $x = \pm 1$

23. $|2x + 7| = 12 - |5x - 2|$ $x = \pm 1$

24. $|x + 3| = 4 - |x + 1|$ $x = -4, 0$

25. $|5x + 2| = |x + 3| - 7$ **No solution**

26. $|x| - 3x = |x - 12|$ $x = -4$

27. $|2x - 1| + x = |3x + 2| - 5$ $x = -4$

28. $|5x + 8| + 2 = 2x - |3x| + 10$
 $-\frac{8}{5} \leq x \leq 0; x \in R$ (see graphically)

29. $|4 - |x - 2|| = 3$ $x = -5, 1, 3, 9$

30. $||x + 2| - 8| = \frac{1}{2}x + 6$
 $x = -\frac{32}{3}, -8, 0, 24$

31. $|4 + |6x - 1|| = 15 - 2x$
 $x = -\frac{5}{2}, \frac{3}{2}$

32. $|6 - 3|x + 1|| = |x| - 4$ **No solution**

33. Write an absolute value equation whose solutions are $x = -9, 3$.

$$|x + 3| = 6$$

34. Write an absolute value equation whose solutions are $x = \frac{5}{2}, -4$

$$\left|x + \frac{3}{4}\right| = \frac{13}{4}$$

35. Write an absolute value equation whose solutions are $x = b \pm 2a$.

$$|x - b| = 2a$$

36. Write an absolute value equation whose solutions are $x = y - 3, y + 11$.

$$|x - y - 4| = 7$$

37. Is $|x| = |-x|$ always, sometimes, or never true? Justify your answer.

Always true. x and $-x$ have the same distance from the origin.

38. Is $|x| = -|x|$ always, sometimes, or never true? Justify your answer.

Sometimes true. True only when $x = 0$.

39. Is $c|a + b| = |ac + bc|$ always, sometimes, or never true? Justify your answer.

Sometimes true. True only when x is nonnegative.

40. Which expression is equivalent to $|x - y|$? **A**

a. $|y - x|$

b. $|x + y|$

c. $y - x$

d. $x + y$