

Lesson 2: Equations Containing Absolute Values

CC attribute: *Beginning and Intermediate Algebra* by T. Wallace.



Objective: Solve an equation that contains one or more absolute value(s).

Students will be able to:

- Solve and check the solutions to an equation that contains an absolute value.

Prerequisite Knowledge:

- Evaluating absolute value expressions.
- Applying the distributive property.
- Checking solutions to equations.

Lesson:

I - Motivating Example(s):

$$\begin{array}{ll} |x| = 7 & \text{Absolute value can be positive or negative} \\ x = \pm 7 & \text{Our solution} \end{array}$$

Notice that we have considered two possibilities, both the positive and negative. Either way, the absolute value of our number will be positive 7. When we have absolute values in our problem it is important to first isolate the absolute value, then remove the absolute value by considering both the positive and negative solutions.

II - Demo/Discussion Problems:

Solve each of the following equations containing absolute values.

1. $5|x| - 4 = 26$

2. $2 - 4|2x + 3| = -18$

3. $7 + |2x - 5| = 4$

4. $|2x - 7| = |4x + 6|$

III - Practice Problems:

Solve each equation.

1) $|x| = 8$

2) $|n| = 7$

3) $|b| = 1$

4) $|x| = 2$

5) $|5 + 8a| = 53$

6) $|9n + 8| = 46$

7) $|3k + 8| = 2$

8) $|3 - x| = 6$

9) $|9 + 7x| = 30$

10) $|5n + 7| = 23$

11) $|8 + 6m| = 50$

12) $|9p + 6| = 3$

13) $|6 - 2x| = 24$

14) $|3n - 2| = 7$

15) $-7| - 3 - 3r| = -21$

16) $|2 + 2b| + 1 = 3$

17) $7| - 7x - 3| = 21$

18) $\frac{|-4 - 3n|}{4} = 2$

19) $\frac{|-4b - 10|}{8} = 3$

20) $8|5p + 8| - 5 = 11$

21) $8|x + 7| - 3 = 5$

22) $3 - |6n + 7| = -40$

23) $5|3 + 7m| + 1 = 51$

24) $4|r + 7| + 3 = 59$

25) $3 + 5|8 - 2x| = 63$

26) $5 + 8| - 10n - 2| = 101$

27) $|6b - 2| + 10 = 44$

28) $7|10v - 2| - 9 = 5$

29) $-7 + 8| - 7x - 3| = 73$

30) $8|3 - 3n| - 5 = 91$

31) $|5x + 3| = |2x - 1|$

32) $|2 + 3x| = |4 - 2x|$

33) $|3x - 4| = |2x + 3|$

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

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

36) $\left| \frac{3x + 2}{2} \right| = \left| \frac{2x - 3}{3} \right|$