

Date:

Section 2.6
Intermediate Algebra
Digital Notes

Absolute Value Equations and Inequalities

Definition - The **absolute value**

Notation - $|x|$ = "the absolute value of x"

Examples

$$|4| =$$

$$|-2| =$$

Solving Absolute Value Equations

Example - Consider: $|x| = 3$.

Example - Solve: $|x - 3| = 1$

Example - Solve: $|3x - 4| = 12$

Example - Solve: $|\frac{2}{3}x - 8| = 0$

Example - Solve: $|5x + 2| = -3$

Now try 8, 10, 12, 14, 18, 22. (7, 11, 19, 21)

Example - Solve: $2 - |x + 3| = -6$

Example - Solve: $|x - 5| = |2x + 1|$

Now try 26, 28, 30, 34, 36, 40. (More practice? 25, 27, 29, 33, 37, 39)

Absolute Value Inequalities

Example - Consider: $|x| < 2$

Example - Consider: $|x| > 3$

Now try 42, 44. (More practice? 41, 43)

Process - **Steps for Solving an Absolute Value Equation**

1. Solve for the absolute value (get it by itself on the left-hand side of the inequality).
2. Split into two inequalities:
 - One inequality is exactly the same, without the absolute value.
 - To obtain the other inequality, you must flip the inequality symbol and change the sign of the right-hand side (the left-hand side stays the same).
3. Connect the two inequalities with an:
 - AND if the original inequality was $| \quad | <$ or $| \quad | \leq$
 - OR if the original inequality was $| \quad | >$ or $| \quad | \geq$
4. Solve the compound inequality (see section 2.5).

Example - $|x| > 6$

Example - $|x - 2| \geq 3$

Example - $-2|5 - x| \geq -14$

Now try 56, 58, 60, 62, 64, 66, 68, 70, 72, 84, 94. (More practice? 57, 59, 63, 65, 67, 71, 83, 93)

Special Cases

Example - $|x| > 0$

Example - $|2x + 3| + 6 > 0$

Now try 74, 76, 78, 80. (More practice? 75, 77, 79)