

MATH 1030/1040

**ABSOLUTE VALUE EQUATIONS**

EX 1:  $|2x - 7| - 5 = 4$

○ Isolate the absolute value

$$|2x - 7| = 9$$

○ Break into two equations

$$2x - 7 = 9$$

$$2x - 7 = -9$$

$$2x = 16$$

$$2x = -2$$

$$x = 8$$

$$x = -1$$

EX 2:  $|x + 6| = |2x - 3|$

$$x + 6 = 2x - 3$$

$$x + 6 = -(2x - 3)$$

$$6 = x - 3$$

$$x + 6 = -2x + 3$$

$$9 = x$$

$$3x + 6 = 3$$

$$3x = -3$$

$$x = -1$$



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**ABSOLUTE VALUE INEQUALITIES**

EX 1.

$$|-2x + 3| < 5$$

The quantity must be "between" -5 and 5 on the number line.

$$-5 < -2x + 3 < 5$$

○ Subtract "3" from all parts

$$\frac{-3}{-3} \quad \frac{-3}{-3} \quad \frac{-3}{-3}$$

$$-8 < -2x < 2$$

○ Divide all parts by -2

$$-8/-2 < -2/-2 x < 2/-2$$

$$4 > x > -1$$

○ When dividing an Inequality by a negative, reverse the inequality sign

$$-1 < x < 4$$



Interval Notation:  $(-1, 4)$

EX 2.

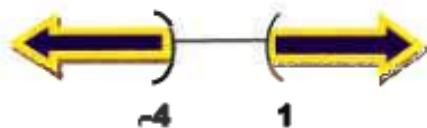
$$|2x + 3| > 5$$

This quantity must be "outside" of -5 and 5 on the number line

$$2x + 3 < -5 \quad \text{or} \quad 2x + 3 > 5$$

$$2x < -8 \quad \text{or} \quad 2x > 2$$

$$x < -4 \quad \text{or} \quad x > 1$$



Interval Notation:  $(-\infty, -4) \cup (1, \infty)$

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