Concept: Solving Absolute Value Equations

Name:

Warm Up

1. Determine what values of x make each inequality true. *Graph each answer.*

(a) $9x - 2 \leq 7x + 8$

Remember:

If you multiply or divide both sides by a negative quantity, the inequality sign must be _____.

(b) $2x - 3 < 5x - 9$

COMPUTER COMPONENT

Instructions: In UMATH X follow the **Content Menu** path:

Equations > **Solving Absolute Value Equations**

Work through all Sub Lessons of the following Lessons **in order**:

- *Absolute Value… What is it?*
- *Absolute Value Equations in 1 Variable*
- *Absolute Value Inequalities in 1 Variable*
- *Absolute Value Equations in 2 Variable*

Additional Required Materials: Pencil Crayons

As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

NOTES:

The absolute value measures the _____ a number is away from the origin (_____) on the number line.

Distance is always a _____ number.

Absolute value is always a _____ number.

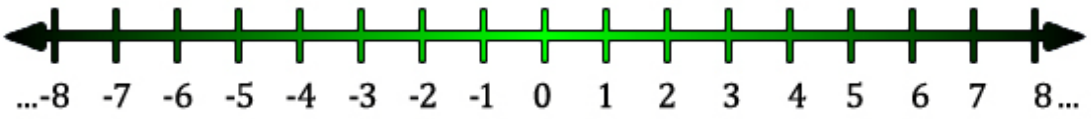
If you have | x | you can have two solutions for x:

If x ≥ 0, then | x | = _____

If x < 0, then | x | = _____

Example:

What two numbers have an absolute value of 6? Show your answer on the number line.



Practice:

(a) $|x| = 4$

Then Case 1: $x \geq 0$ then $|x| =$ _____

Case 2: $x < 0$ then $|x| =$ _____

(b) $|x + 4| = 8$

Then Case 1: $x+4 \geq 0$ then $|x + 4| =$ _____

Case 2: $x+4 < 0$ then $|x + 4| =$ _____

Recall, if $(2x - 6) < 0$, then $|2x - 6| = -(2x - 6)$

Solving an equation with absolute value in it, requires you to examine _____cases.

Use the definition of absolute value to set up the two equations. The resulting linear equation is then solved. Finally you must _____ to see if the _____ makes the _____ true.

Practice:

$| x + 4 | = 8$

Case 1	Case 2
$x+4 \geq 0$ then $| x + 4 | =$ _____	$x+4 < 0$ then $| x + 4 | =$ _____
Rewrite the equation: _____ $= 8$	Rewrite the equation: _____ $= 8$
Solve the linear equation: _____ $= 8$ $x =$ _____	Solve the linear equation: _____ $= 8$ _____ $x =$ _____ $x =$ _____
Check: Substitute x = _____ into (1) L.S. $| x + 4 | =$ $|$ _____ $+ 4|$ $=$ _____ R. S $= 8$ Does it check?	Check: Substitute x = _____ into (1) L.S. $| x + 4 | =$ $|$ _____ $+ 4|$ $=$ _____ R. S $= 8$ Does it check?

OFF COMPUTER EXERCISES

1. The absolute value of a number is 5. What is the original number?

2. Graph $| x | \leq 4$.

3. Solve.

(a) $|2x - 6| = 10$

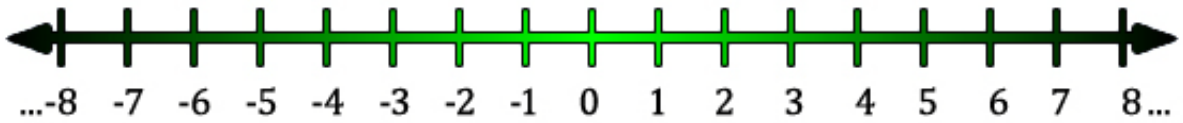
(b) $|x + 4| = 1$

(c) $|x - 2| = 4$

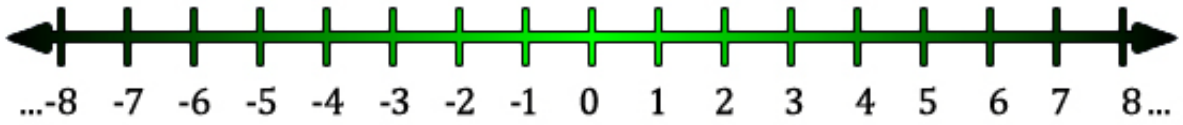
(d) $|3x - 1| = 5$

4. Graph the inequality

(a) $|x| \leq 5$



(b) $|x - 2| < 4$



5. Solve

(a) $| 3 - x | \leq 8$

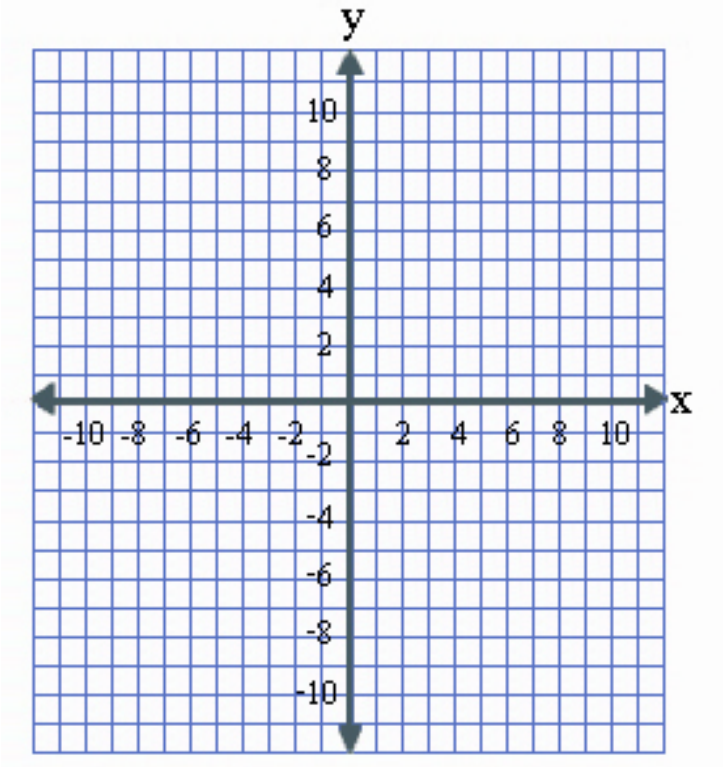
(b) $| x - 2 | < 2$

(c) $| 5x + 2 | > 3$

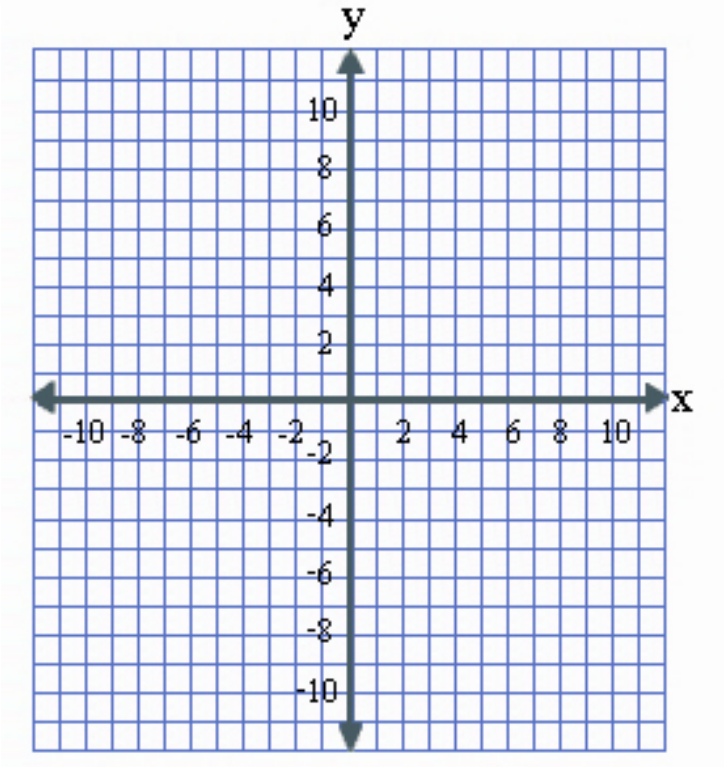
(d) $| 5x - 2 | \leq 3x + 1$

6. Graph

(a) $y = |x + 2|$



(b) $y = 3|x| - 1$



7. Graph the following absolute value equation:

(a) $y = |x|$

Case 1: For $x \geq 0$

$y =$ _____

y-intercept (0 , _____)

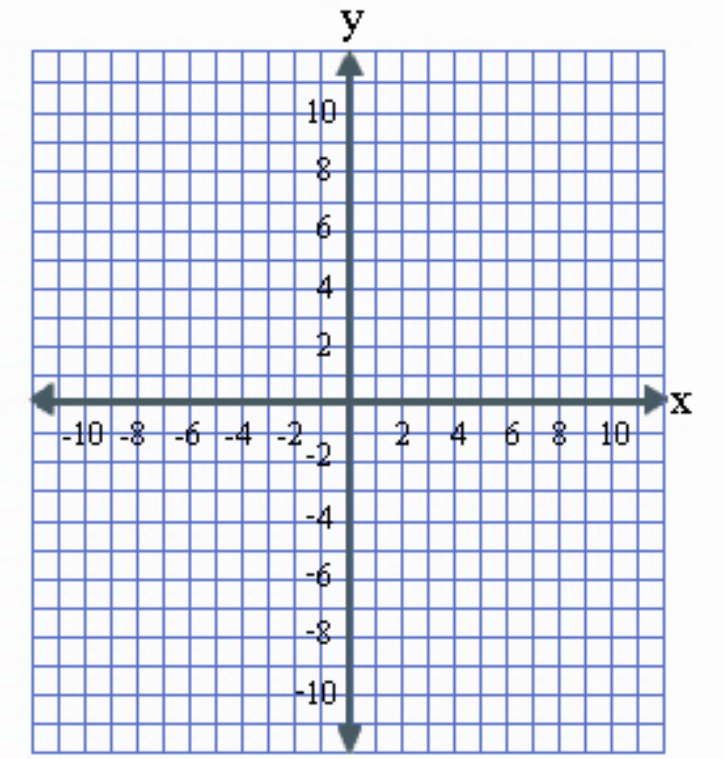
Slope of line _____

Case 2: For $x < 0$

$y =$ _____

y intercept (0 , _____)

Slope of line _____



(b) $y = |x| + 3$

Case 1: For $x \geq 0$

$y =$ _____

y-intercept (0 , _____)

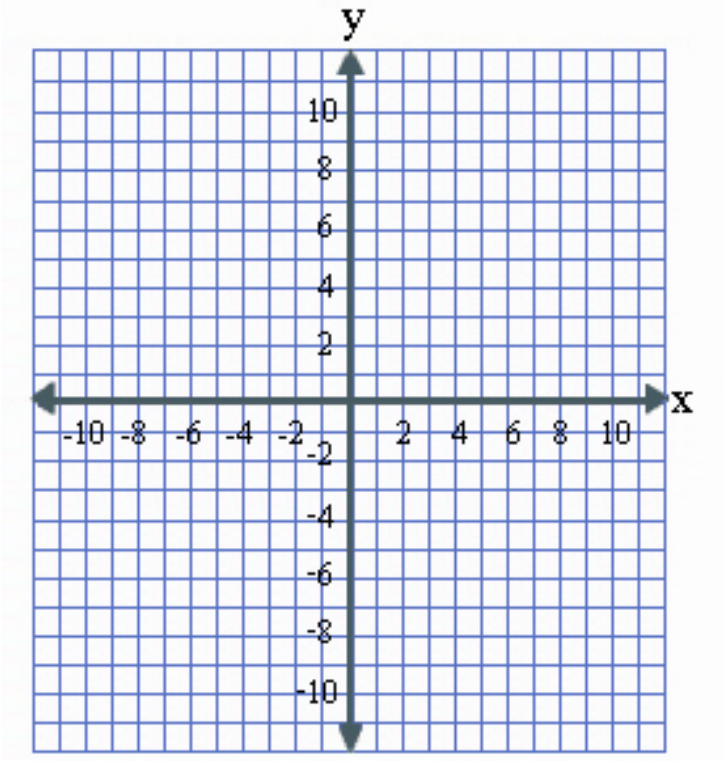
Slope of line _____

Case 2: For $x < 0$

$y =$ _____

y intercept (0 , _____)

Slope of line _____



(c) $y = |x + 4| + 3$

Case 1: For $x + 4 \geq 0$

$y =$ _____

y-intercept (0 , _____)

Slope of line _____

Since $x + 4 \geq 0$

$x \geq$ _____

Case 2: For $x + 4 < 0$

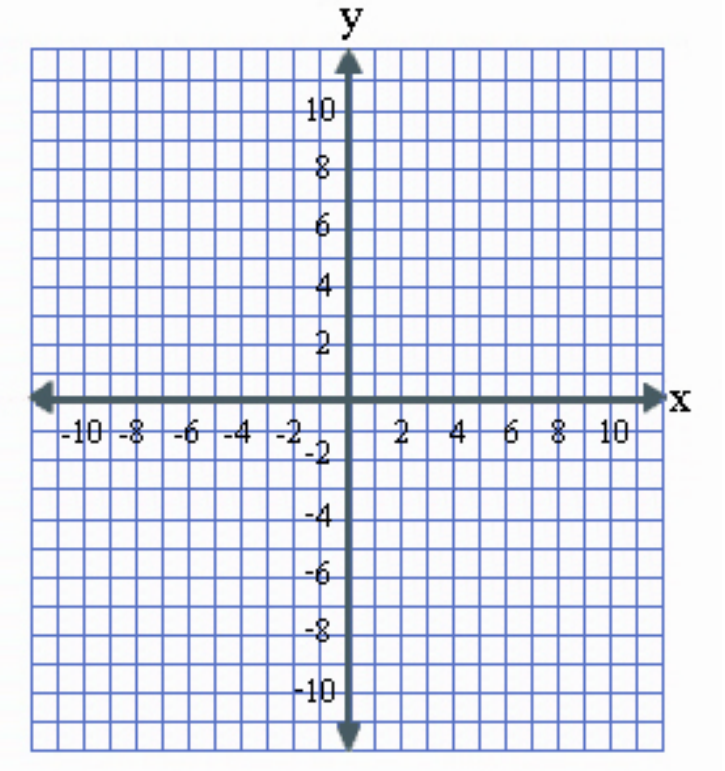
$y =$ _____

y intercept (0 , _____)

Slope of line _____

Since $x + 4 < 0$

$x <$ _____



(d) $y = -|x + 4| + 3$

Case 1: For $x + 4 \geq 0$

$y =$ _____

y-intercept (0 , _____)

Slope of line _____

Since $x + 4 \geq 0$

$x \geq$ _____

Case 2: For $x + 4 < 0$

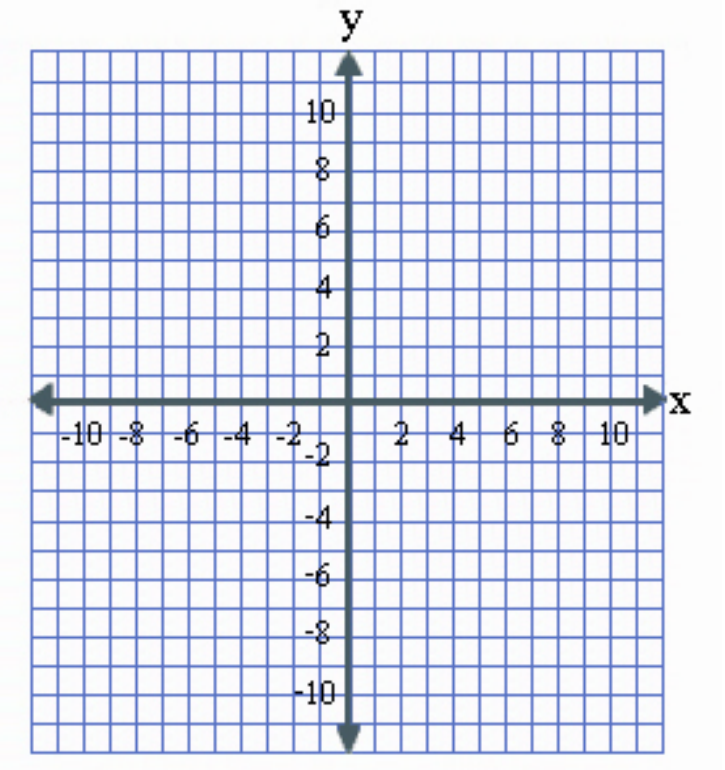
$y =$ _____

y intercept (0 , _____)

Slope of line _____

Since $x + 4 < 0$

$x <$ _____



(e) $y = -5|x + 4| + 3$

Case 1: For $x + 4 \geq 0$

$y =$ _____

y-intercept (0 , _____)

Slope of line is _____

Since $x + 4 \geq 0$

$x \geq$ _____

Case 2: For $x + 4 < 0$

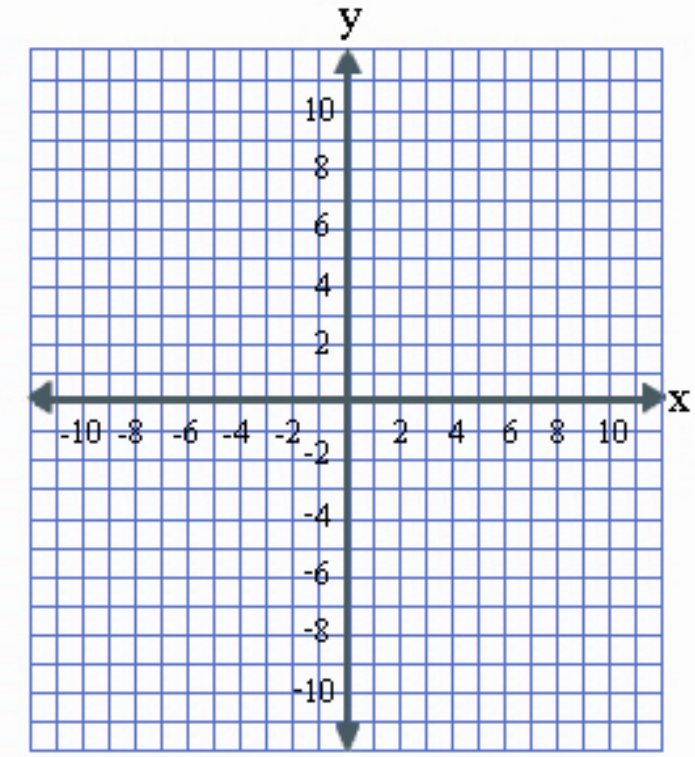
$y =$ _____

y intercept (0 , _____)

Slope of line is _____

Since $x + 4 < 0$

$x <$ _____



8. In the above graphs of the absolute value equations, + 3, + 4, "-" and - 5 were added to the equation $y = |x|$. *What effect did adding these numbers have on the graphs in relationship to their shape and position?*

_____

_____

_____

_____

_____

_____