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## Graphing Absolute Value Functions

Unit 5 Lesson 8

# GRAPHING ABSOLUTE VALUE FUNCTIONS

## Students will be able to:

Understand how to graph absolute value functions and also translate the graphs of absolute functions

## Key Vocabulary:

- Absolute Value Function
- Translations of Absolute Value Function
- Reflection of Absolute Value Function

# GRAPHING ABSOLUTE VALUE FUNCTIONS

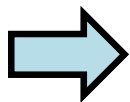
## Absolute Value Function

An absolute value function is of the form:

$$f(x) = |x|$$

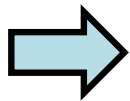
Such that when:

$$x > 0$$

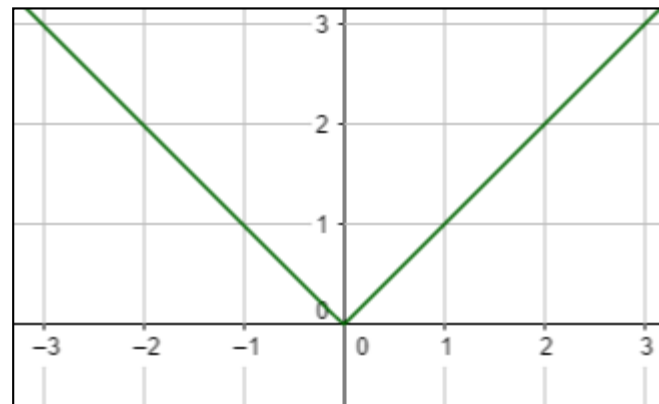


$$f(x) = x$$

$$x < 0$$



$$f(x) = -x$$



$$f(x) = |x|$$

The graph of an absolute value function is shown.

# GRAPHING ABSOLUTE VALUE FUNCTIONS

## Translations of Absolute Value Function

An absolute value function translated in y-direction is of the form:

$$f(x) = |x| + k$$

- If ***k*** is positive, the graph of  $y = |x|$  is translated up by ***k*** units.
- If ***k*** is negative, the graph of  $y = |x|$  is translated down by ***k*** units.

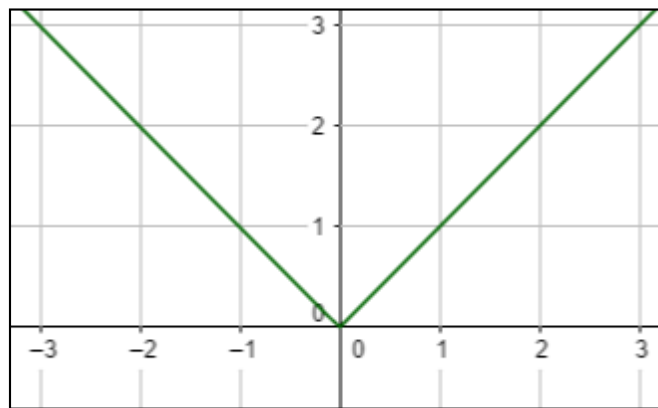
## GRAPHING ABSOLUTE VALUE FUNCTIONS

**Problem 1:** What is the graph of  $y = |x| - 3$ ?

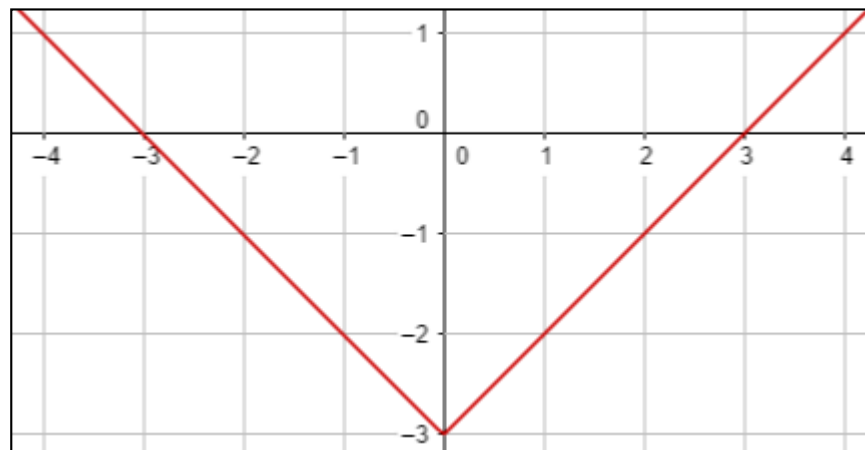
# GRAPHING ABSOLUTE VALUE FUNCTIONS

**Problem 1:** What is the graph of  $y = |x| - 3$ ?

Since  $k$  is negative i.e.  $k = -3$ , so the graph of  $y = |x|$  is translated 3 units down.



$$f(x) = |x|$$



$$f(x) = |x| - 3$$

# GRAPHING ABSOLUTE VALUE FUNCTIONS

## Translations of Absolute Value Function

An absolute value function translated in x-direction is of the form:

$$f(x) = |x + h|$$

- If ***h*** is positive, the graph of  $y = |x|$  is translated left by ***h*** units.
- If ***h*** is negative, the graph of  $y = |x|$  is translated down by ***h*** units.

## GRAPHING ABSOLUTE VALUE FUNCTIONS

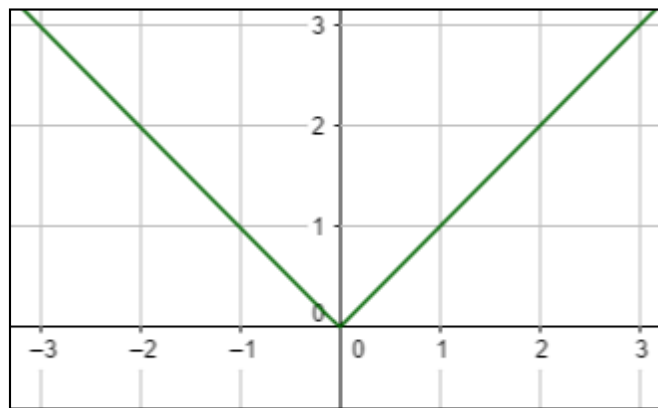
**Problem 2: What is the graph of  $y = |x + 2|$ ?**



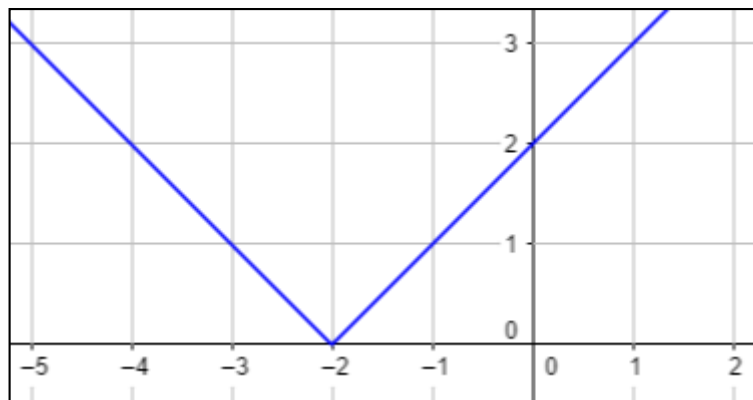
# GRAPHING ABSOLUTE VALUE FUNCTIONS

**Problem 2: What is the graph of  $y = |x + 2|$ ?**

Since  $h$  is positive i.e.  $h = 2$ , so the graph of  $y = |x|$  is translated 2 units left.



$$f(x) = |x|$$



$$f(x) = |x + 2|$$

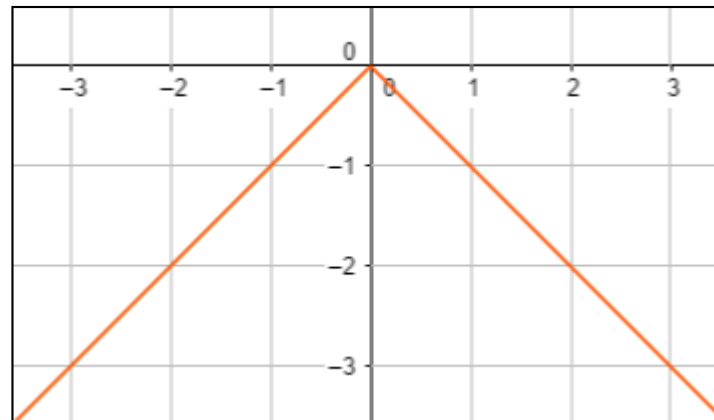
# GRAPHING ABSOLUTE VALUE FUNCTIONS

## Reflection of Absolute Value Function

An absolute value function reflected downwards is of the form:

$$f(x) = -|x|$$

The graph of the reflected absolute value function is shown.



$$f(x) = -|x|$$

