**Unit 1 : Absolute Value Functions**

 Absolute value variable equations are written as:

* f(x) = │mx + b│ + c
* Graph has the shape of the letter \_\_\_\_\_\_ .
	+ - Opens up if the coefficient in front of the absolute value symbols is \_\_\_\_\_\_\_\_\_\_\_.

 f(x) = 4│x + 2│ + 3 opens up

Opens down if the coefficient in front of the absolute value symbols is \_\_\_\_\_\_\_\_\_\_\_.

 f(x) = -4│x + 2│ + 3 opens down

Let’s start with f(x) = │x│ and graph the equation. This is called the parent function.

![[image]]()

What’s the vertex? (\_\_,\_\_)

Does it open up or down? \_\_\_

Domain:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Range:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

You try f(x) = │x +2│. How is it different from the parent graph? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

![[image]]()

 What’s the vertex? (\_\_,\_\_)

 Does it open up or down? \_\_\_

 Domain:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Range:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now try:

 f(x) = │x│ + 2. How is it different from the parent graph?

![[image]]() What’s the vertex? (\_\_,\_\_)

 Does it open up or down? \_\_\_

 Domain:\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Range:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Vertical Transformations:**

A constant added outside the absolute value symbol shifts the graph UP that many units.

 f(x) = │x│ + 5 moves the parent graph \_\_\_\_\_\_\_\_\_\_\_\_\_\_

A constant subtracted outside the absolute value symbol shifts the graph DOWN that many units.

 f(x) = │x│ - 3 moves the parent graph \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Horizontal Transformations:**

 A constant added inside the absolute value symbols shifts the graph LEFT horizontally.

 f(x) = │x + 2│ moves the parent graph \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

A constant subtracted inside the absolute value symbols shifts the graph RIGHT horizontally.

 f(x) = │x - 2│ moves the parent graph \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Reflection over the x-axis:**

If you have a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in front of the absolute value, the graph will be reflected, or \_\_\_\_\_\_\_\_\_\_\_\_, over the x-axis.

 f(x) = -| x | moves the parent graph \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Vertical Stretch/Compression:**

C•f(x), where C is a real number > 0

If C > 1, then f(x) has a vertical \_\_\_\_\_\_\_\_ by a factor of C units.

If 0 < C < 1, then f(x) has a vertical \_\_\_\_\_\_\_\_\_ by a factor of C units.

 f(x) = 2|x| How does this compare to the parent?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 f(x) = 0.5|x| How does this compare to the parent?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Quick Recap:

**In what way would the graph of y = │x│ move according to the following equations? Be specific.**

1. y = 4│x + 3│- 5 2. y =-│x - 2│ + 7

**Application:**

A rainstorm begins as a drizzle, builds up to a heavy rain, and then drops back to a drizzle. The rate r (in inches per hour) at which it rains is given by the functionamd t represents time in hours.

Graph the function.

How long does it rain?

When does it rain the hardest?

What is the rate of the rain after 30 minutes?