FUNCTIONS

What Are Functions?

A **function** is a rule that is performed on a number, called an input, to produce a result called an output. The rule consists of one or more mathematical operations that are performed on the input.

- An example of a function is $y = 2x + 3$, where x is the input and y is the output. The operations of multiplication and addition are performed on the input, **x**, to produce the output, y. By substituting a number for **x**, an output can be determined.

- A table can also be used to show input and output values. In this

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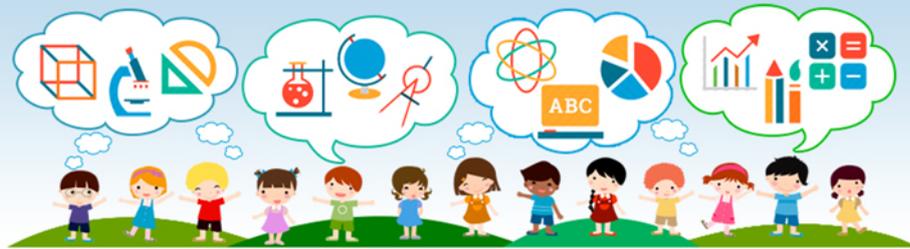
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An **exponential function**, $y = a^x$, is a curved line that gets closer to but does not touch the x-axis. A line that comes close to but never touches the x-axis is called a **horizontal asymptote**.

- An exponential function can be graphed by substituting numbers in for **x** and determining the value of **y** and then plotting the points on the coordinate plane.

A **quadratic function**, $y = ax^2 + bx + c$, produces a parabola when graphed. A parabola is a U-shaped line that can either be facing up or facing down.

- The point where a parabola is at its minimum or maximum is called the **turning point or vertex**.

- The **axis of symmetry** is the line that cuts the parabola into two equal mirror images.

- A quadratic function can be graphed by substituting numbers in for **x** and determining the value of **y** and then plotting the points on the coordinate plane.

Functions represent variables and how they are related to one another. One _____ **ion** and _____ e form _____ of vari _____

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A **li**_____ o dete _____ intercept of the line. When the slope and y-intercept are substituted into the equation, the function is determined. The graph of a linear function is a straight line.

An **exponential function** is always in the form of $y = a^x$. When graphed it is a curved line that comes close to, but never touches the x-axis.

A **quadratic function** is always in the form, $y = ax^2 + bx + c$. When graphed, it is a parabola. The axis of symmetry and turning point can be found with the equation, $x = -b/2a$, where **a** and **b** are the coefficients of the first and second terms in the equation. When **x** is found, it is substituted into the equation to find **y**, and therefore the coordinate of the turning point.

Functions need to be recognized on a graph. The figures show the two types of nonlinear functions.
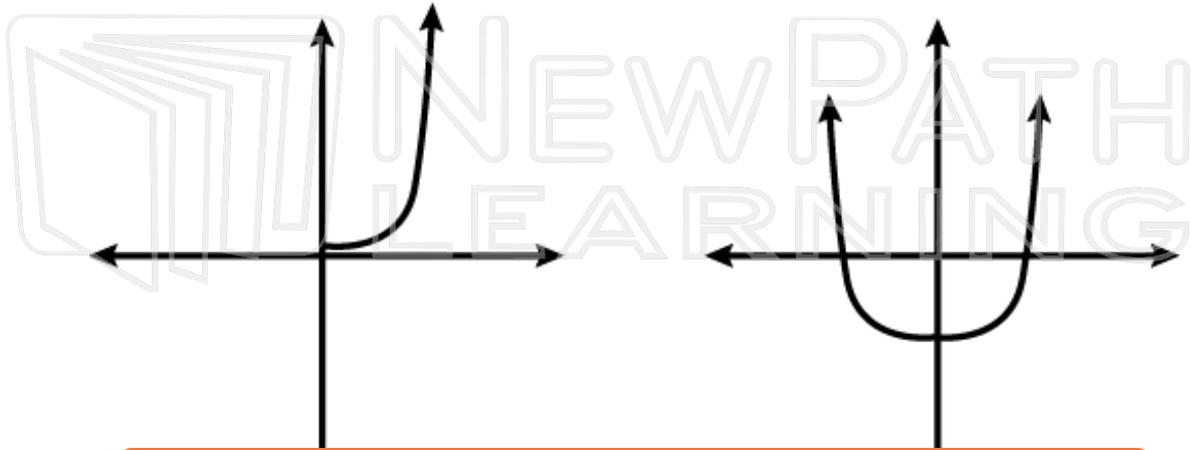
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y	9	18	36	72
x	12	6	3	1.5
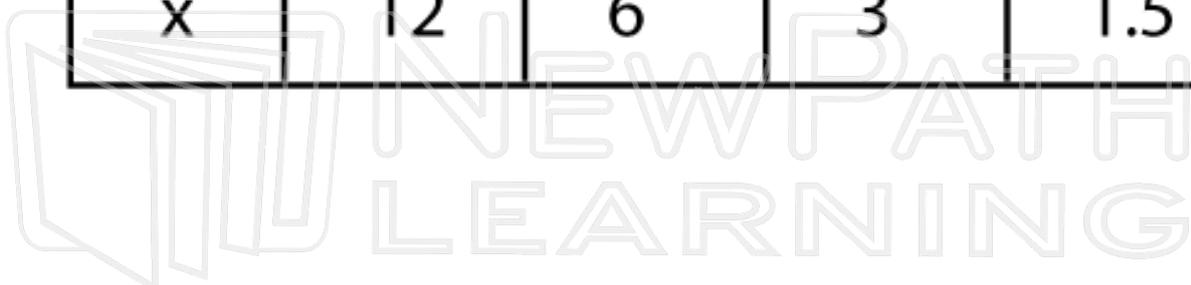
Try This!

1. What are the y values for the **linear function**, $y = -3x + 6$ when the x values are -3, -2, -1?

2. What are the y values for the **exponential function**, $y = 2^x$ when the x values are -1, 0, 1?

3. What are the y values for the **quadratic function**, $y = x^2 + 2x - 4$

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6. If y **varies inversely** as x, and $y = 7$ when $x = 5$, what is the constant of variation?