Function Notation - is a way of writing the rule of a function. We use $f(x)$ (or $g(x)$, or $h(x)$, etc.) in the equation instead of y.

e.g. $y = 3x^2$ becomes $f(x) = 3x^2$

Why? It lets us know that a relation is a function.

We can show a point on the graph.

x- spot

e.g. $f(4) = 40$ means that when $x = 4$ then

y

$y = 40$, or the point $(4, 40)$.

Example: If $f(x) = 2x - 6$, determine $f(4)$.

let $x = 4$

$$f(4) = 2(4) - 6$$
$$f(4) = 8 - 6$$
$$f(4) = 2$$

Function Parameters

- Every "family" has a parent (or basic) function - the simplest form of that function.
- We transform a function (or make a new member of the family) by changing certain values called parameters.
- We consider the parameter a.
- In a basic function, $a = 1$

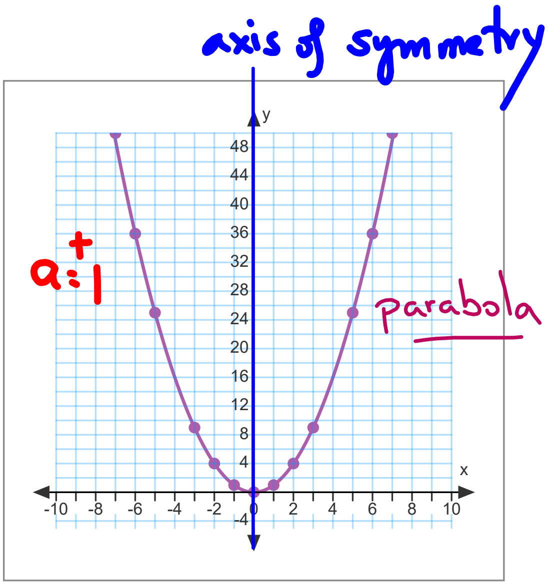
Second-degree Function

- AKA: Quadratic Function $f(x) = ax^2$

Basic Function:

$f(x) = x^2$

x	y
-2	4
-1	1
0	0
1	1
2	4



Summary:

0.4 , 1/8 , − 1/8

As *a gets closer to zero*, the function moves towards the x-axis (flattens out) and we say it is compressed.

wider parabola

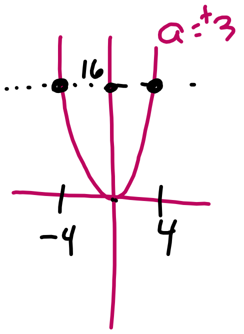
As *a gets farther from zero*, the function moves away from the x-axis (gets thinner) and we say it is stretched.

2, 5 7.1 , −5

If a is positive, then the function is above the x-axis.

If a is negative, then the function is below the x-axis.

Example: Given the function $y = 3x^2$, find...



a) the y-coordinate in the point $(-2, y)$ $x = -2$

$$y = 3(-2)^2$$
$$= 3(^{+}4)$$
$$= 12$$

b) the x-coordinate of the point $(x, 48)$ y

let $y = 48$

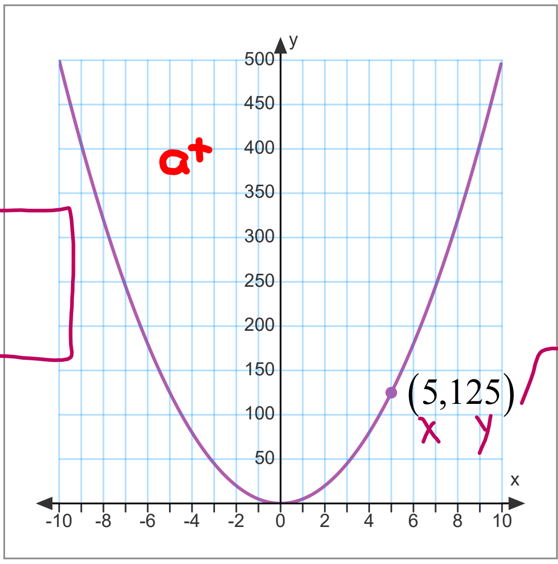
$$48 = 3x^2$$
$$\div 3 \quad \div 3$$
$$16 = x^2$$
$$\pm\sqrt{16} = x$$

$$x = 4, -4$$

Finding the Rule of a Second-degree Function

- Given: a point on the curve.

Example:



$\boxed{y = 5x^2}$

Use: $y = ax^2$

find a

fill in $x = 5$
$y = 125$

$125 = a(5)^2$

solve for a

$125 = a \cdot 25$
$\div 25 \quad \div 25$
$5 = a$

- Given: a table of values.

Example:

X	Y
-6	-4
-3	-1
9	-9
15	-25
0	0

choos 1

only in 2nd degree

Use: $y = ax^2$

$x = -3$ $y = -1$

$-1 = a(-3)^2$

$-1 = a \cdot 9$

$\div 9 \quad \div 9$

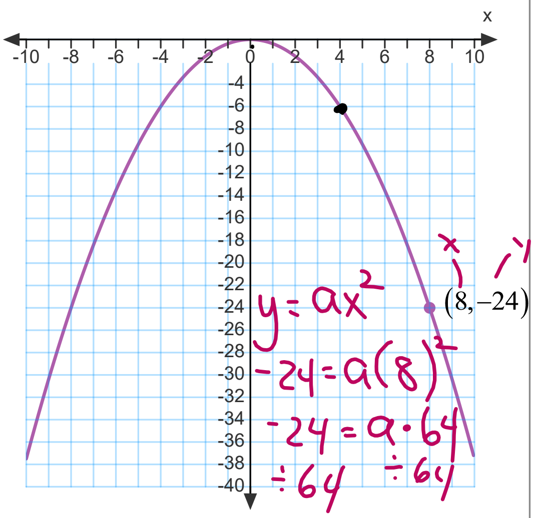
$-0.\overline{1} = -\frac{1}{9} = a$

$$\boxed{y = -\frac{1}{9}x^2}$$

Examples: Determine the rules

$y = ax^2$

1.



$y = ax^2$

$-24 = a(8)^2$

$-24 = a \cdot 64$

$\div 64 \quad \div 64$

$-\frac{3}{8}$ or $-0.375 = a$

$y = -0.375x^2$

2.

X	Y
0	0
2	4.8

x y

$y = ax^2$

$4.8 = a(2)^2$

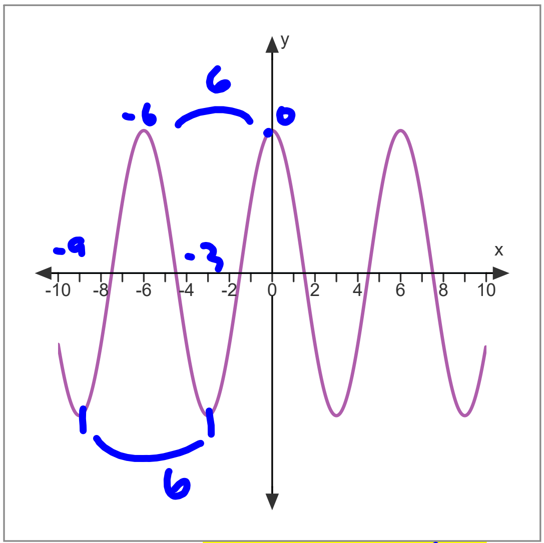
$4.8 = a \cdot 4$

$\div 4 \quad \div 4$

$1.2 = a$

$y = 1.2x^2$

<u>Periodic Function</u> A periodic function is one whose graph shows a pattern that is repeated over and over again at regular intervals.

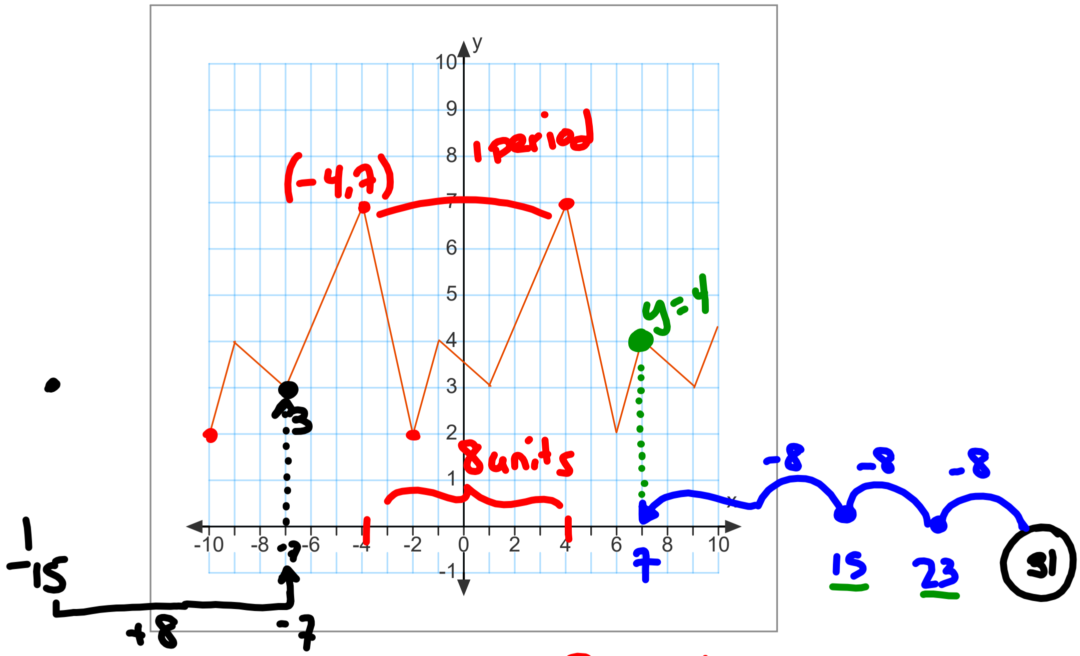


The length of the pattern (measured by the horizontal axis) is called the period of the function.

Period = 6

We can use the period to predict other points.

Example: Given the following function, ...



a) Determine the period. 8 units

b) Determine

i) $f(-15)$ y if x=-15 y=3

ii) $f(31)$ x=31 y: ? y=4