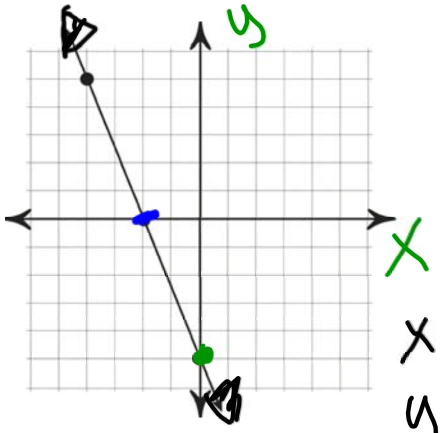
p.54-55 Vertex form of Quadratic Functions

p.54

Warm-up



What kind of graph is this? linear

y-intercept: $(0, -5)$

x-intercept: $(-2, 0)$

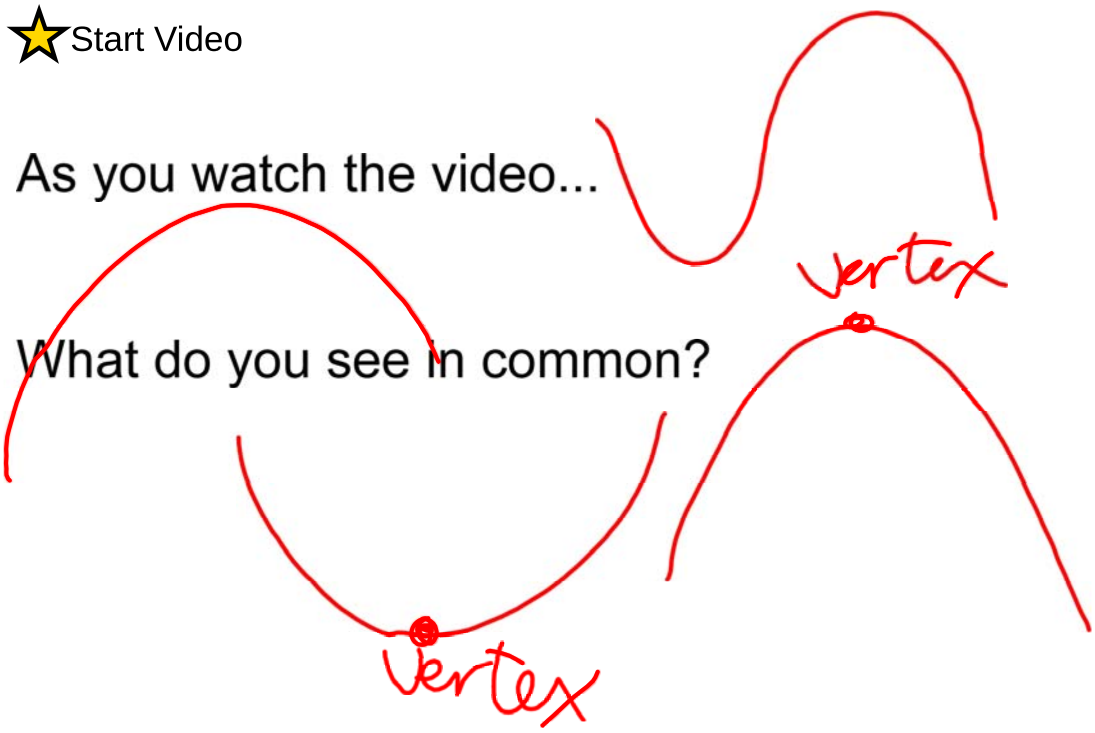
x Domain: $(-\infty, +\infty)$

y Range: $(-\infty, +\infty)$

★ Start Video

As you watch the video...

What do you see in common?



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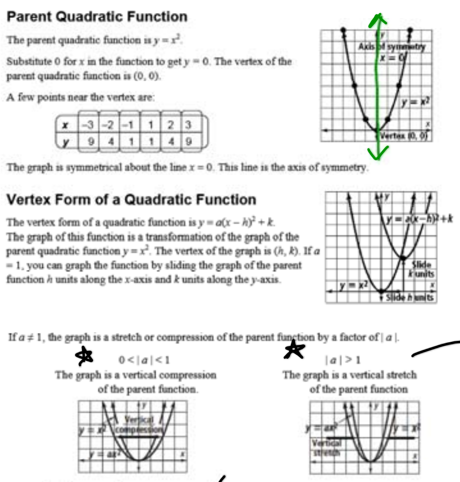


Parent Quadratic Function

The parent quadratic function is $y = x^2$.

Substitute 0 for x in the function to get $y = 0$. The vertex of the parent quadratic function is (0, 0).

A few points near the vertex are:

x	−3	−2	−1	1	2	3
y	9	4	1	1	4	9

The graph is symmetrical about the line $x = 0$. This line is the axis of symmetry.

y
Axis of symmetry
$x = 0$
$y = x^2$
x
Vertex (0, 0)

Vertex Form of a Quadratic Function

The vertex form of a quadratic function is $y = a(x - h)^2 + k$. The graph of this function is a transformation of the graph of the parent quadratic function $y = x^2$. The vertex of the graph is (h, k). If $a = 1$, you can graph the function by sliding the graph of the parent function h units along the x-axis and k units along the y-axis.

y
$y = a(x - h)^2 + k$
Slide k units
$y = x^2$
x
Slide h units

If $a \neq 1$, the graph is a stretch or compression of the parent function by a factor of $|a|$.

☆ $0 < |a| < 1$
The graph is a vertical compression of the parent function.

y
$y = x^2$
Vertical compression
$y = ax^2$
x

☆ $|a| > 1$
The graph is a vertical stretch of the parent function

y
$y = ax^2$
$y = x^2$
Vertical stretch
x

$$f(x) = a(x - h)^2 + k$$

Vertex Form

p.55

$$y = a(x - h)^2 + k$$

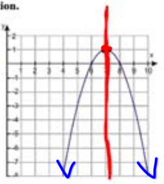
This makes it easy to find the vertex and the axis of symmetry

Line of symmetry	Vertex
x = h	(h,k)

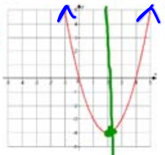
Algebra 2 ______________________ **the Quadratic Grapher**
Graphing Quadratics – Vertex Form **Date:** ______________________ **Period:** __________

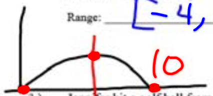
Given the graph of a quadratic, state all the important information.

1.) Opens: down Max/Min: max
Axis of Symmetry: x=7 Vertex: (7,1)
Domain: $(-\infty, +\infty)$
Range: $(-\infty, 1]$



2.) Opens: UP Max/Min: min.
Axis of Symmetry: x=2 Vertex: (2,-4)
Domain: $(-\infty, +\infty)$
Range: $[-4, +\infty)$





3.) Jennifer hit a golf ball from the ground which could be represented by the function $h(x) = -10x^2 + 100x$, where x is the time in seconds, and h is the height of the ball in yards. At what **time** did her golf ball reach its **highest point**? What was the height at this time?

h=25C

$-10x(x-10)$

5 s.

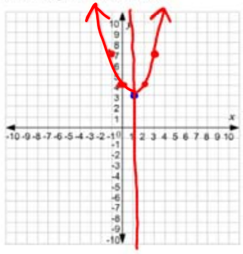
$x-10=0$

$h=-10(5)^2+100(5)$

Graph each quadratic function given its standard form. State all the important information.

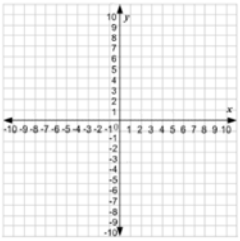
4.) $y = (x-1)^2 + 3$

a+ Opens: UP Max/[✓ Min]
Axis of Symmetry: X=1
Vertex: (1,3)
~~Max/Min:~~
Domain: $(-\infty, +\infty)$
Range: $[3, +\infty)$



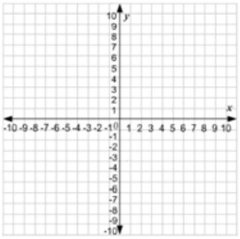
4.) $y = -(x+4)^2 - 2$

Opens: _______ Max/Min
Axis of Symmetry: ___________
Vertex: ___________________
Domain: ___________________
Range: ___________________

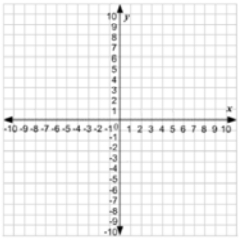


5.) $y = (x+2)^2 + 1$

Opens: _______ Max/Min
Axis of Symmetry: ___________
Vertex: ___________________
Domain: ___________________
Range: ___________________



6.) $y = 2(x-1)^2 + 3$

Opens: _______ Max/Min
Axis of Symmetry: ___________
Vertex: ___________________
Domain: ___________________
Range: ___________________