Welcome to ...

Pre-Calculus 110

Housework to get done today...

- Attendance

- Introductions

- Review emergency evacuation procedures and "code black".

- Pathways of High School Mathematics

- Course Outline

Aug 31-10:13 PM

How to ... ...

- ☺ F
- ☺ I
- ☺ F
- ☺ W   lass
- ☺ Take   s
- ☺ Think Pos

Sep 2-2:50 PM

Link the Ideas

quadratic function

- a function *f* whose value $f(x)$ at *x* is given by a polynomial of degree two
- for example, $f(x) = x^2$ is the simplest form of a quadratic function
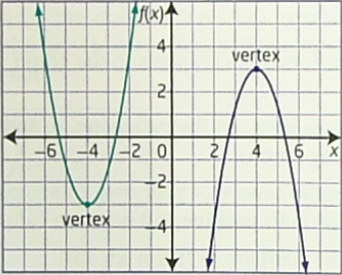
parabola

- the symmetrical curve of the graph of a quadratic function

vertex (of a parabola)

- the lowest point of the graph (if the graph opens upward) or the highest point of the graph (if the graph opens downward)

The graph of a **quadratic function** is a **parabola**.

When the graph opens upward, the **vertex** is the lowest point on the graph. When the graph opens downward, the vertex is the highest point on the graph.
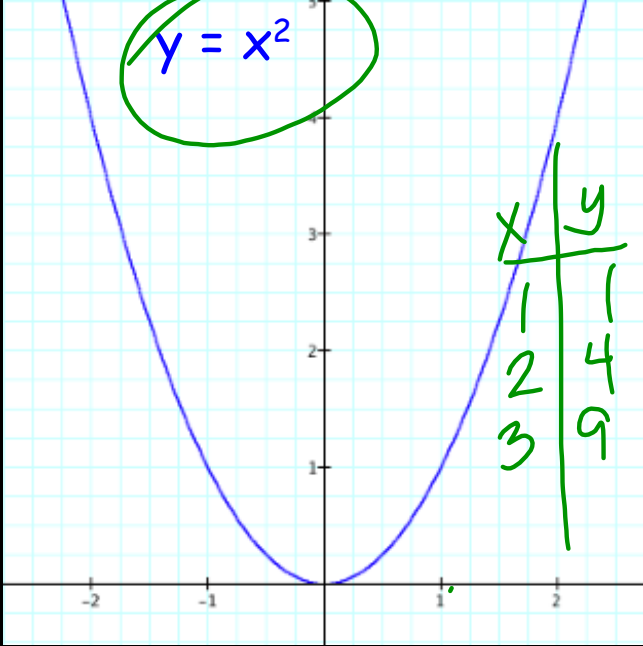
When using function notation, the values for $f(x)$ are often considered the same as the values for *y*.

144 MHR • Chapter 3　　← Found in textbook

Sep 2-11:50 AM

The most "popular" Parabola .....　$y = x^2$

$y = x^2$

x	y
1	1
2	4
3	9

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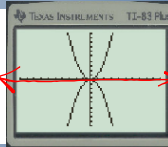## Transformations of the Quadratic Function in **Vertex** Form

stretch   *horizontal*

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

vertical

Direction of Opening: ("Look at the *sign* of the stretch factor")

- If $a > 0$ (+), then the graph *opens upward*. $y = 0^2$ $y = 0$
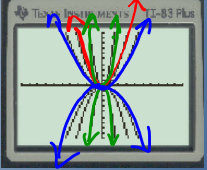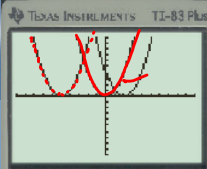- If $a \le 0$ (−), then the graph *opens downward*.

Vertical Stretch: ("Look at the *magnitude* of the stretch factor")

- If $|a| > 1$, then the graph becomes *narrower*. $a > 1$ OR $a < -1$
- If $|a| = 1$, then the graph *stays the same*. $a = 1$ $a = -1$
- If $0 < |a| < 1$, then the graph becomes *wider*. $0 < a < 1$ or $-1 < a < 0$
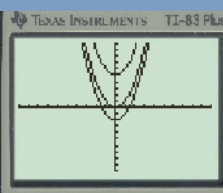
Horizontal Translation: ("Think opposite")

- If $h > 0$, then the graph *moves to the right h units*.
- If $h = 0$, then the graph *does not move horizontally*.
- If $h < 0$, then the graph *moves to the left h units*.

Vertical Translation: ("Exactly the same")

- If $k > 0$, then the graph *moves upward k units*.
- If $k = 0$, then the graph *does not move vertically*.
- If $k < 0$, then the graph *moves downward k units*.

Tranformations in Vertex form

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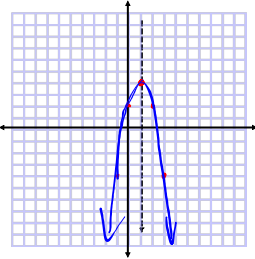
$$y = a(x - h)^2 + k$$

$y = -4(x + 7)^2 - 3$ $a = -4$ $h = -7$ $K = -3$

- identify key properties and points…
  - stretch factor (direction of opening / shape)
  - translations (horizontal / vertical)
  - *** x intercept(s)…let y = 0 and solve for x
    - **(we will come back to this property)**
  - y intercept…let x = 0 and solve for y
  - Domain $\{x \in R\}$
  - Range (depends on direction of opening and "k" value)
  - Max / Min (depends on direction of opening and "k value)
  - axis of symmetry where x = h

ex:

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

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

$a = -2$ vertex
$h = 1$ $(1, 3)$
$K = 3$

Range $y \le 3$
A.O.S $x = 1$

x	y
-1	
0	
1	3
2	
3	

y-int $(0, 1)$
$y = -2(x-1)^2 + 3$
$y = -2(0-1)^2 + 3$
$y = -2(1) + 3$
$y = -2 + 3$
$y = 1$

Feb 8-9:29 AM

$$y = x^2$$

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

$$y = -3(x+4)^2 + 5$$

$(-4, 5)$

Sep 3-1:34 PM

Range $a \oplus$ $y \geq K$

K

K

$a \ominus$ $y \leq K$

Sep 3-1:21 PM

4

$$\cup \quad y \geq k$$

$$\cap \quad y \leq k$$

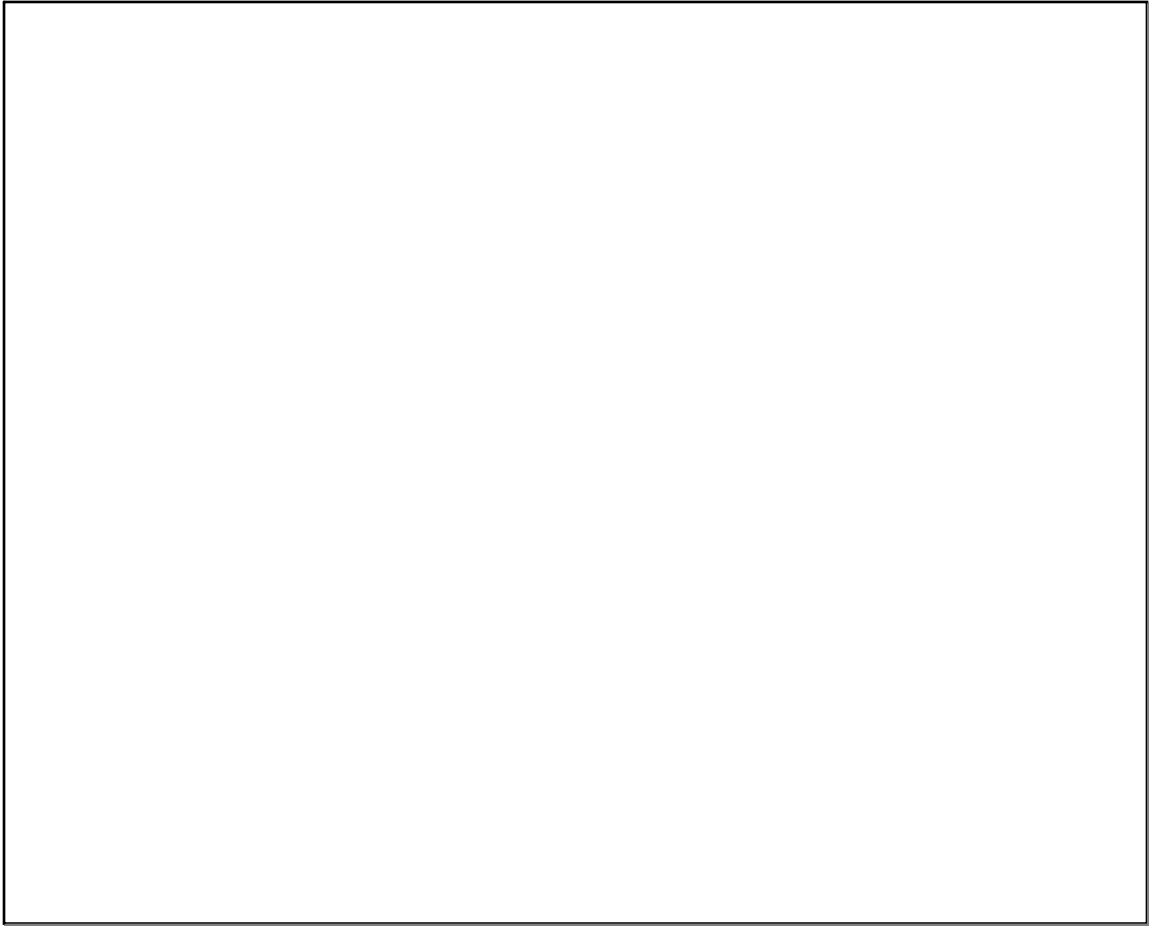Sep 3-9:25 AM

Quadratic Functions worksheet.docx

Quadratic Functions   Name: _____

1. The following equations are in Vertex Form. Please complete the chart.

Function Remember: $y = a(x-h)^2 + k$	a	h think opposite	k	Vertex (h,k)	Axis of symmetry X=h	Range	Standard Form $y = ax^2 + bx + c$
$y = \frac{3}{4}(x-2)^2 + 6$							
$y = -(x-5)^2 - 3$							
$y = 9(x-\frac{1}{2})^2 + 10$							
$y = -2(x+3)^2 + 4$							
$y = 5(x-1)^2$							
$y = 4x^2 + 6$							
$y = (x-3)^2 - 17$							
$y = x^2 - 5$							
$y = \frac{3}{4}(x+2)^2 + 1$							
$y = -4.9(x-1.5)^2 + 40.2$							
$y = x^2$							
$y = (x-2)^2$							
$y = -3(x+5)^2 - 4$							
$y = \frac{1}{2}(x-8)^2 + 7$							

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Attachments

Mathematical Pathways Description.docx

Pre-Calculus 110 - course outline Sept 2013.doc

Quadratic Functions worksheet.docx