

WRITING EQUATIONS IN VERTEX FORM

AGENDA

Warm-Up

HW Check

Notes p.92

HW #1-6

REMINDER

Test THURS!

All HW due FRI!!

SB next week!!!

ESSENTIAL QUESTION

How do I write an equation of a quadratic given a point and the vertex?

WARM UP TUESDAY

1. Find the vertex of $y = -2(x+4)^2 - 3$.

$(-4, -3)$

2. A function is described by the equation $f(x) = -2x^2 + 3x + 1$. If the replacement set for the domain ~~x~~ is $\{-3, 0, 2, 6\}$, which could be the corresponding set for the range?

A. $\{-13, -4, 2, -19\}$

B. $\{-26, 1, -1, -53\}$

C. $\{-3, 0, 2, 6\}$

D. $\{-8, 1, -13, -89\}$

NORMAL FLOAT AUTO REAL DEGREE HP PRESS + FOR Δ Tbl					
X	Y1				
-4	-43				
-3	-26				
-2	-13				
-1	-4				
0	1				
1	2				
2	-1				
3	-8				
4	-19				
5	-34				
6	-53				

X = -4

QUESTIONS, COMMENTS, CONCERNS?

Algebra I Unit 8- Writing Equations of Quadratics

Student Practice – Vertex Form of a Quadratic

Name _____ Date _____ Period _____

Name the vertex of the following parabolas.

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

3. $y = \frac{1}{2}(x - 12)^2 - 15$

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

4. $y = -2(x + 9)^2 - 20$

Write the equation of a parabola with $a=1$ that has the vertex at the point listed.

5. (2, 1)

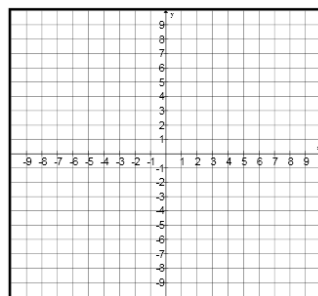
7. (-8, -4)

6. (-4, 5)

8. (1, -9)

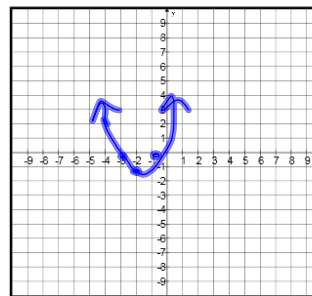
Graph the following parabolas.

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



Vertex: _____
 Minimum or Maximum
 Concave Up or Concave Down
 Axis of Symmetry: _____

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



Vertex: $(-2, -1)$
 Minimum or Maximum
 Concave Up or Concave Down
 Axis of Symmetry: $x = -2$
 X-intercepts: $(-3, 0)$ and $(-1, 0)$
Roots
Solution
Zeros

WRITING EQUATIONS IN VERTEX FORM

ESSENTIAL QUESTION

How do I write an equation of a quadratic given a point and the vertex?

Vertex Form of a Quadratic Equation:

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

(h, k) vertex (x, y) point

Given the following vertex and a point on the graph of the parabola, write the quadratic equation in vertex form.

Given	Label	Plug into Vertex Form	Solve for "a"	Plug a, h, and k back into Vertex Form
Vertex: (2, -4) Point: (0, 1)	$(2, -4)$ h k $(0, 1)$ x y	$y = a(x - h)^2 + k$ $1 = a(0 - 2)^2 + (-4)$	$1 = a(-2)^2 - 4$ $1 = 4a - 4$ $+4 \quad +4$ <hr/> $5 = 4a$ $\frac{5}{4} = \frac{4a}{4}$ $\frac{5}{4} = a$	$y = \frac{5}{4}(x - 2)^2 - 4$

WRITING EQUATIONS IN VERTEX FORM

ESSENTIAL QUESTION

How do I write an equation of a quadratic given a point and the vertex?

Vertex Form of a Quadratic Equation:

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

Given the following vertex and a point on the graph of the parabola, write the quadratic equation in vertex form.

Given	Label	Plug into Vertex Form	Solve for "a"	Plug a, h, and k back into Vertex Form
Vertex (3, 1)	(3, 1) h k	$3 = a(v - 3)^2 + 1$	$ \begin{array}{r} 3 = a(3)^2 + 1 \\ 3 = 9a + 1 \\ -1 \quad \quad -1 \\ \hline 2 = 9a \\ \frac{2}{9} = \frac{9a}{9} \\ \frac{2}{9} = a \end{array} $	$y = \frac{2}{9}(x - 3)^2 + 1$
Point: (6, 3)	(6, 3) x y			

WRITING EQUATIONS IN VERTEX FORM

ESSENTIAL QUESTION

How do I write an equation of a quadratic given a point and the vertex?

Vertex Form of a Quadratic Equation:

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

Given the following vertex and a point on the graph of the parabola, write the quadratic equation in vertex form.

Given	Label	Plug into Vertex Form	Solve for "a"	Plug a, h, and k back into Vertex Form
Point: (2,1)	(2,1) x y	$1 = a(2 - (-2))^2 - 2$	$1 = a(2 + 2)^2 - 2$ $1 = a(4)^2 - 2$ $1 = 16a - 2$ $+2 \quad +2$ <hr/> $3 = 16a$ $\frac{3}{16} = \frac{16a}{16}$ $\frac{3}{16} = a$	$y = \frac{3}{16}(x + 2)^2 - 2$
Vertex: (-2,-2)	(-2,-2) h k			

WRITING EQUATIONS IN VERTEX FORM

ESSENTIAL QUESTION

How do I write an equation of a quadratic given a point and the vertex?

Vertex Form of a Quadratic Equation:

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

Given the following vertex and a point on the graph of the parabola, write the quadratic equation in vertex form.

Given	Label	Plug into Vertex Form	Solve for "a"	Plug a, h, and k back into Vertex Form
Vertex: (4,1) Point: (-3,-5)				

WRITING EQUATIONS IN VERTEX FORM

ESSENTIAL QUESTION

How do I write an equation of a quadratic given a point and the vertex?

Vertex Form of a Quadratic Equation:

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

5. If a parabola has a vertex at (4,5) and passes through the point (1,-2), what is the value of a?

$$\begin{aligned} -2 &= a(1-4)^2 + 5 \\ -2 &= a(-3)^2 + 5 \\ -2 &= 9a + 5 \end{aligned}$$

$$\begin{aligned} -2 &= 9a + 5 \\ -7 &= 9a \\ -\frac{7}{9} &= a \end{aligned}$$

$$\boxed{-\frac{7}{9} = a}$$

6. If a parabola passes through the point (1,2) and has a vertex at (4,8), write the quadratic equation in standard form.

$$\begin{aligned} 2 &= a(1-4)^2 + 8 \\ 2 &= a(-3)^2 + 8 \\ -2 &= 9a + 8 \\ -\frac{2}{9} &= a \end{aligned}$$

$$\begin{aligned} -\frac{6}{9} &= \frac{9a}{9} \\ -\frac{2}{3} &= a \end{aligned}$$

$$(x-4)(x-4)$$

	x	-4
x	x ²	-4x
-4	-4x	+16

$$y = -\frac{2}{3}(x-4)^2 + 8$$

$$\begin{aligned} y &= -\frac{2}{3}(x^2 - 8x + 16) + 8 \\ y &= -\frac{2}{3}x^2 + \frac{16}{3}x - \frac{32}{3} + 8 \end{aligned}$$

$$\boxed{y = -\frac{2}{3}x^2 + \frac{16}{3}x - \frac{8}{3}}$$

WRITING EQUATIONS IN VERTEX FORM

ESSENTIAL QUESTION

How do I write an equation of a quadratic given a point and the vertex?

~~Summary.~~

Write the steps you take to write the equation of a parabola given a vertex and one point.

Algebra I Unit 8- Writing Equations of Quadratics**Student Practice – Writing equations of quadratics given a point and vertex**

Name _____ Date _____ Period _____

Find the quadratic function with the given vertex and point. Put your answer in vertex form.

1) Vertex (0; 0) passing through (-2; 8):

4) Vertex (0; 1) passing through (-1; 0):

2) Vertex (2; 0) passing through (1; 3):

5) Vertex (2; 5) passing through (3; 7):

3) Vertex (-3; 0) passing through (-5; -4):

6) Vertex (-3; 4) passing through (0; 0):

HW HELP: WRITING EQUATIONS IN VERTEX FORM

NO WORK, NO CREDIT, NO KIDDING

1. Vertex (0,0) passing through (-2,8).

LABEL

Plug in

solve

for a

$$8 = a(-2-0)^2 + 0$$

$$8 = a(-2)^2$$

$$\frac{8}{4} = \frac{4a}{4}$$

$$2 = a$$

plug in
a, h, k

$$y = 2(x-0)^2 + 0$$

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

1. $a = 2$

2. $a = 3$

3. $a = -1$

4. $a = -1$

5. $a = 2$

6. $a = -4/9$

Follow the steps and make sure you
plug a, h, and k back into the vertex
form formula!