Quadratic Transformation Worksheet Name Answer Key

1. Write the vertex form of a quadratic equation.

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

2. What does changing the "a" variable do to the graph of a quadratic?

Changes the width of the graph

3. Being specific, name 3 ways that a parabola changes with different types of "a" values.

1. $a > 1$ makes the graph open up
2. $a < 1$ makes the graph open down
3. $a > 1$ or $a < -1$ makes the graph stretch vertically (narrower)
4. $-1 < a < 1$ $a \neq 0$ makes the graph wider

4. What does changing the "h" variable do to the graph of a quadratic?

- moves the graph horizontally

5. If "h" is positive how does the parabola move? If negative?

$h > 0$ moves the graph to the right i.e. $(x-4)$ $h = 4$

$h < 0$ moves the graph to the left $(x+4)$ $h = -4$

6. What does changing the "k" variable do to the graph of a quadratic?

Moves the graph vertically

7. If "k" is positive how does the parabola move? If negative?

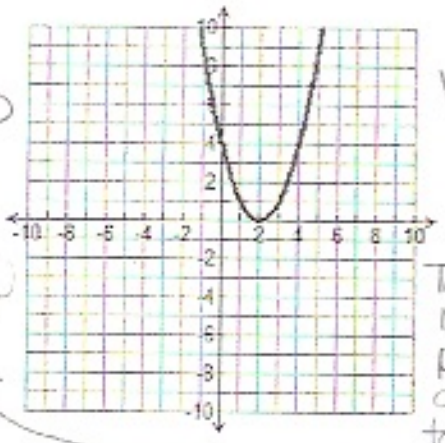
$k > 0$ moves the graph up
$k < 0$ moves the graph down

8. What conclusion can you make about the variables of h and k together?

(h, k) is the vertex of the graph

Write the quadratic equation, in vertex form for each graph.

1.



$4 = a(0-2)^2 + 0$

$4 = 4a$

$a = 1$

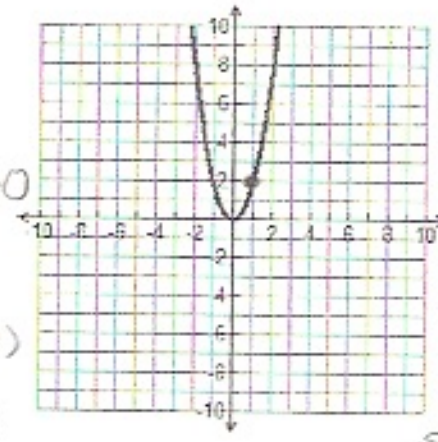
$y = 1(x-2)^2$

Vertex is $(2, 0)$

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

To solve for a use another point (i.e. $0, 4$) and input to solve for a

2.



Vertex is $(0,0)$ another p $(1,2)$

$y = a(x-0)$

$y = ax^2$

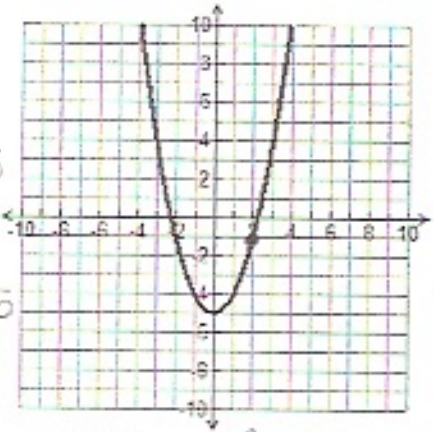
$2 = a(1)^2$

$a = 2$

so

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

3.



Vertex is $(0, -5)$

$y = a(x-0)^2 - 5$

another pt $(2, -1)$

$-1 = a(2-0)^2 - 5$

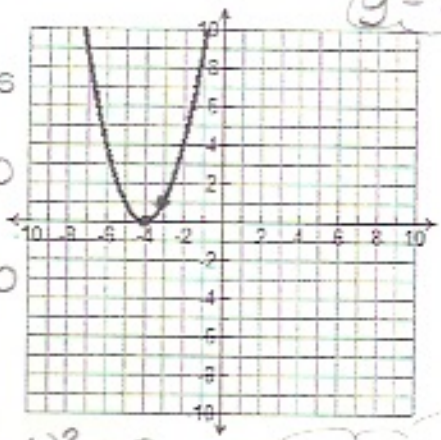
$-1 = 4a - 5$

$4 = 4a$

$a = 1$

$y = 1(x-0)^2 - 5$ or $y = x^2 - 5$

4.



Vertex is $(-4, 0)$

$y = a(x+4)^2 + 0$

point $(-3, 1)$

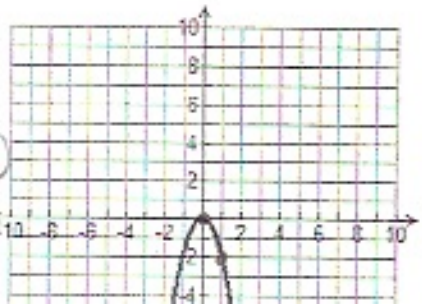
$1 = a(-3+4)^2 + 0$

$1 = 1a$

$a = 0$

$y = 1(x+4)^2 + 0$ or $y = (x+4)^2$

5.



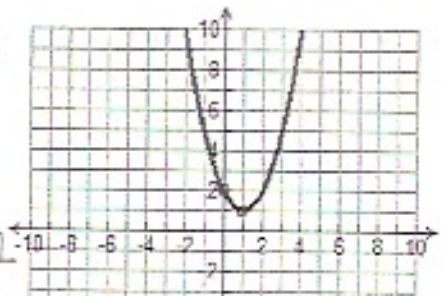
Vertex is $(0,0)$

point is $(1, -2)$

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

$= a(1)^2$

6.



Vertex is $(1, 1)$

point is $(0, 2)$

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

~~Math 2 Support~~ Name: _____

Converting Quadratic Equations Worksheet: Standard to Vertex

Convert the following quadratics from vertex form to standard form.

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

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

$y = -x^2 + 2x - 1 - 1$

$y = -x^2 + 2x - 2$

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

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

$y = 2x^2 - 8x + 8 - 3$

$y = 2x^2 - 8x + 5$

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

$y = x^2 + 8x + 16 + 4$

$y = x^2 + 8x + 20$

Convert the following quadratics from standard form to vertex form.

4) $y = x^2 - 8x + 15$

$y = (x^2 - 8x + 16) + 15 - 16$

$y = (x-4)^2 - 1$

5) $y = x^2 - 4x$

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

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

6) $y = x^2 + 8x + 18$

$y = (x^2 + 8x + 16) + 18 - 16$

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

7) $y = x^2 + 4x + 3$

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

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

8) $y = x^2 - 2x + 5$

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

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

9) $y = x^2 - 8x + 17$

$y = (x^2 - 8x + \underline{16}) + 17 - 16$

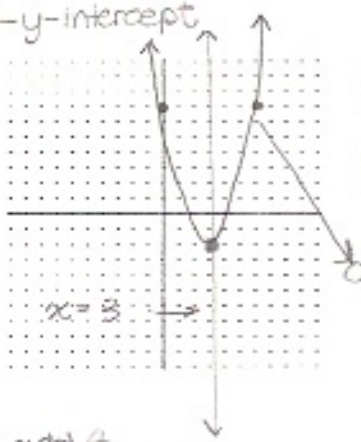
$y = (x-4)^2 + 1$

Convert the following quadratics from standard form to vertex form, then graph them.

10) $y = x^2 - 6x + 7$ ← y-intercept

$y = (x^2 - 6x + 9) + 7 - 9$

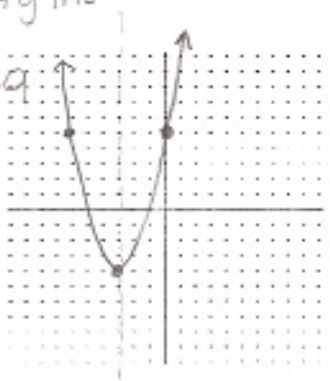
$y = (x-3)^2 - 2$



11) $y = x^2 + 6x + 5$ → y-int

$y = (x^2 + 6x + 9) + 5 - 9$

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



12) $y = -x^2 + 4x - 1$

-4 so add 4.

$= -(x^2 - 4x + 4) - 1 + 4$

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

vertex is $(2,3)$

y-intercept is $(0,-1)$

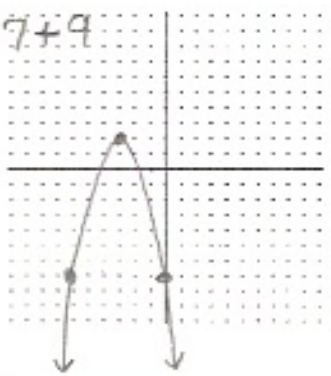
13) $y = -x^2 - 6x - 7$

$y = -(x^2 + 6x + 9) - 7 + 9$

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

vertex is $(-3,2)$

y-intercept is -7



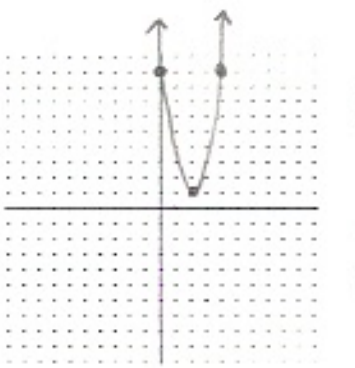
14) $y = 2x^2 - 8x + 9$

$= 2(x^2 - 4x + 4) + 9 - 8$

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

vertex is $(2,1)$

y-intercept 9



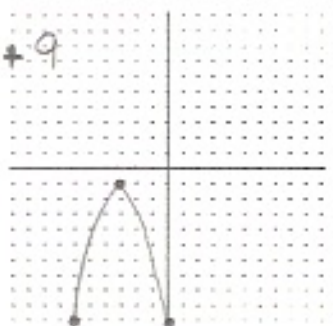
15) $y = -x^2 - 6x - 10$

$y = -(x^2 + 6x + 9) - 10 + 9$

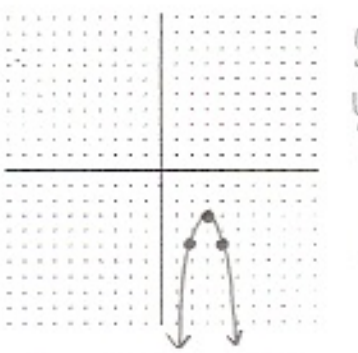
$y = -(x+3)^2 - 1$

vertex $(-3,-1)$

y-intercept -10



16) $y = -2x^2 + 12x - 21$



$= -2(x^2 - 6x + 9) - 21 + 18$

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

Vertex $(3,-3)$

y-int is -21

"hard" to graph

choose another pt?

if $x = 4$ $y = -2(4-3)^2 - 3 = -2(1) - 3 = -5$

17) $y = x^2 + 8x + 15$

$y = (x^2 + 8x + 16) + 15 - 16$

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

vertex is $(-4,-1)$

y-int is 15

choose another pt?

$x = -2$

$y = (-2+4)^2 - 1$

$y = 2^2 - 1 = 3$

$(-2,3)$