Secondary Math 2 Honors

Completing the Square to Find Vertex Form of an Equation

- You have learned to complete the square to solve quadratic equations. Completing the square can also be used to find the vertex form of a quadratic equation so that you will be able to graph the equation.
- Solving and putting the equation into vertex form are different. When solving you set the equation equal to zero and then solve. When putting into vertex form the equation will be set equal to y and all of the work will be done on one side of the equation.
- You will add and subtract the value created to the same side of the equation so that the value of the equation will not be changed.

Steps:

1. The a-value must be 1. If it is not 1 then **factor** out the value of a
2. Slide the value of c to the right one place to create room for the new c value created.
3. Take $\frac{1}{2}$ of the b value. Square that number.
4. Add that number to the space created and subtract that number in a space created to the right of the original c value.
5. Factor the perfect square trinomial and combine the two constants.
6. Graph.

ex: $y = x^2 + 4x + 6$

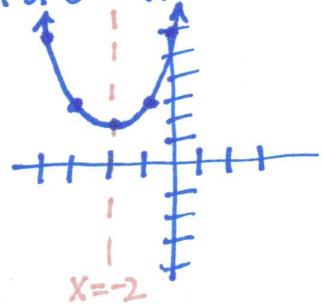
$= (x^2 + 4x + \underline{4}) + 6 - \underline{4}$

$\frac{4}{2} = (2)^2$

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

V: $(-2, 2)$

A of S: $x = -2$



ex: $y = 4x^2 - 24 + 38$

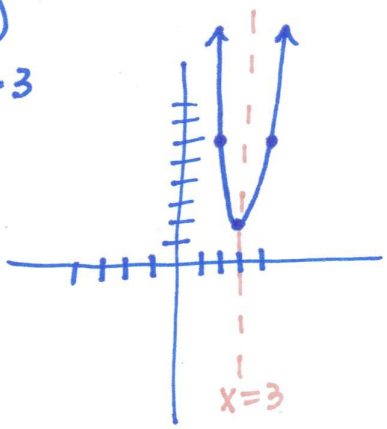
$= 4(x^2 - 6x + \underline{9}) + 38 - \underline{36}$

$-\frac{6}{2} = (-3)^2$

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

V: $(3, 2)$

A of S: $x = 3$



Secondary Math 2 Honors

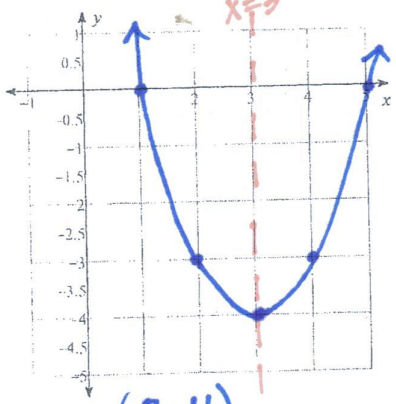
Name_____

Graphing Quadratics in Standard Form Notes

Date_____ Period____

Sketch the graph of each function. Write the vertex (V) and the axis of symmetry (A of S). Then change the equation to standard form (St) by FOIL and combining like terms.

1) $y=(x-3)^2-4$ → $x^2-6x+9-4$

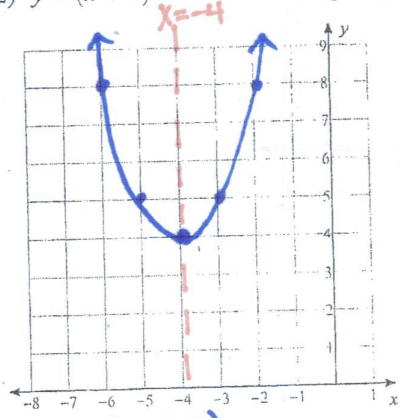


V: (3,-4)

A of S: x=3

St: $y=x^2-6x+5$

2) $y=(x+4)^2+4$ → $x^2+8x+16+4$



V: (-4,4)

A of S: x=-4

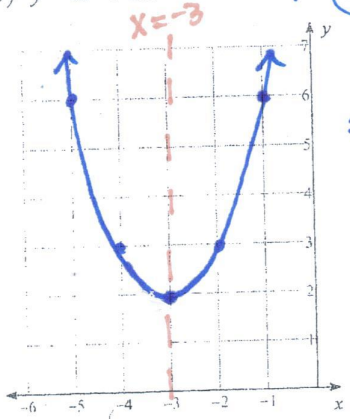
St: $y=x^2+8x+20$

Change the equation to vertex form (VF) by completing the square. Graph it. Write the vertex (V) and axis of symmetry (A of S).

3) $y=x^2+6x+11$ → $(x^2+6x+\underline{9})+11-\underline{9}$

$\frac{6}{2}=(3)^2$

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



VF: $y=(x+3)^2+2$

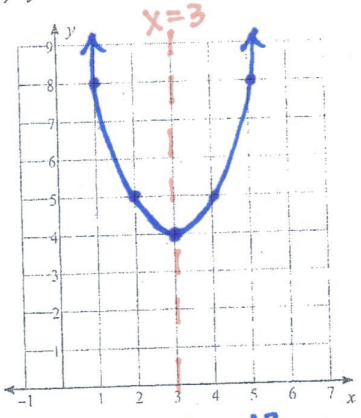
V: (-3,2)

A of S: x=-3

4) $y=x^2-6x+13$ → $(x^2-6x+\underline{9})+13-\underline{9}$

$\frac{-6}{2}=(-3)^2$

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



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

V: (3,4)

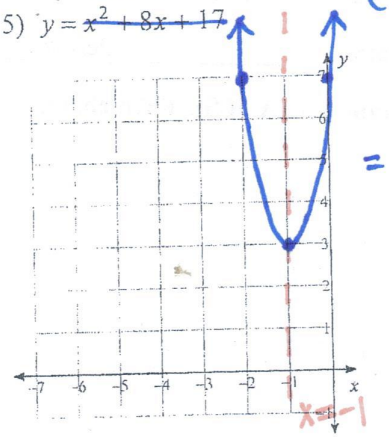
A of S: x=3

$4x^2+8x+7 \rightarrow 4(x^2+2x+\underline{1})+7-\underline{4}$

$\frac{2}{2}=(1)^2$

$=4(x+1)^2+3$

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



VF: $y=4(x+1)^2+3$

V: $(-1,3)$

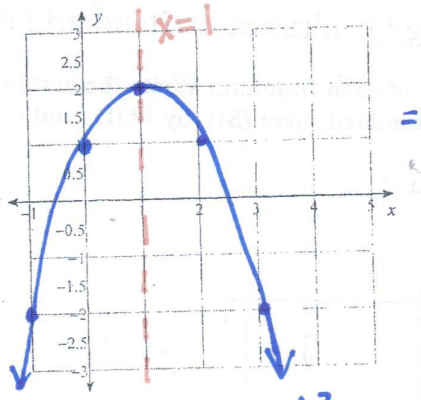
A of S: $x=-1$

$-x^2+2x+1 \rightarrow -(x^2-2x+\underline{1})+1+\underline{-1}$

$\frac{-2}{2}=(-1)^2$

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

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



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

V: $(1,2)$

A of S: $x=1$