Algebra II

Section 5-5

VERTEX FORM

QUADRATIC FUNCTION VERTEX FORM:
$y = a(x - h)^2 + k$ where the vertex = (h,k), the axis of symmetry is x = h and the direction of opening is up if "a" is positive and down if it is negative.

Examples (in, or almost in vertex form)

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

V: (2, -5)

AOS: x = 2

Opens: up

Graph it!

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

V: (-1, 3)

AOS: x = -1

Opens: down

Graph it!

3) $y = 3x^2 - 7$ $y = 3(x+0)^2 - 7$

V: (0, -7)

AOS: x = 0

Opens: up

Graph it!

x/y-charts for the graphs are shown @the end of the note page

Examples (not in vertex form):

1) $y = x^2 - 8x + 11$

1/2 of 8 squared = 16,
+16 for factoring, -16 @ the end

$y = x^2 - 8x + 16 + 11 - 16$
$y = (x - 4)(x - 4) + 11 - 16$
$y = (x - 4)^2 - 5$

V=(4, -5) AOS: x = 4 up

2) $y = -5x^2 - 10x - 9$

$\frac{y}{-5} = x^2 + 2x + \frac{9}{5}$

$\frac{y}{-5} = x^2 + 2x + 1 + \frac{9}{5} - 1$

$\frac{y}{-5} = (x+1)^2 + \frac{4}{5}$ mult by -5 to get y by itself

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

V = (-1, -4) AOS: x = -1 down

3) $y = \frac{1}{2}x^2 - 7x + \frac{32}{}$

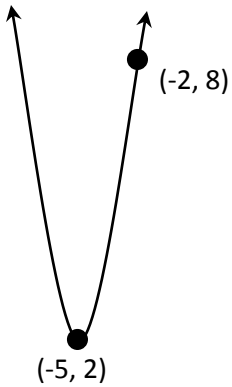
$2y = x^2 - 14x + 3$
$2y = x^2 - 14x + 49 + 3 - 49$
$2y = (x - 7)^2 - 46$
divide by 2 to get y by itself

$y = \frac{1}{2}(x - 7)^2 - 23$

V=(7, -23) AOS: x = 7 up

Write the quadratic equation (in vertex form) for each graph pictured.

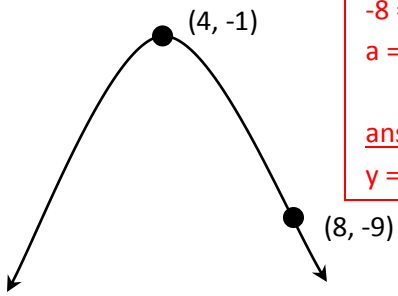
1)



$y = a(x + 5)^2 + 2$ (plugged in vertex no.s)
insert -2 & 8 for x & y
$8 = a(-2+5)^2 + 2$
then solve for a
$8 = a(3)^2 + 2$
$8 = 9a + 2$
$6 = 9a$
$a = 2/3$

answer
$y = 2/3(x + 5)^2 + 2$

2)



$y = a(x - 4)^2 - 1$
$-9 = a(8 - 4)^2 - 1$
$-9 = a(4)^2 - 1$
$-9 = 16a - 1$
$-8 = 16a$
$a = -1/2$

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

3) Vertex = (10, 6)
Coordinate = (12, 18)

$y = a(x - 10)^2 + 6$
$18 = a(12 - 10)^2 + 6$
$18 = a(2)^2 + 6$
$18 = 4a + 6$
$12 = 4a$
$a = 3$

answer
$y = 3(x - 10)^2 + 6$

1)

x	y
2	-5
3	-4
4	-1

2)

x	y
-1	3
0	1
1	-5

3)

x	y
0	-7
1	-4
2	5

graph the points in each x/y-chart, then "reflect" the symmetrical points to the opposite side