$y = ax^2 + bx \qquad y = x(ax + b)$

a. y-intercepts

y-intercept is @ zero

No "c" value.

b. x-intercepts

$x = -\frac{b}{a} \qquad x = 0$

c. maximum or minimum point

$x = -\frac{b}{2a}$

Find y plug x back into equation.

6. Explore the following examples and look for explanations of the patterns observed.

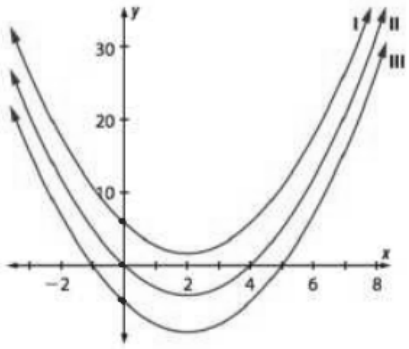
a. The diagram at the right gives graphs for three of the four quadratic functions below.

II $y = x^2 - 4x$

I $y = x^2 - 4x + 6$

~~$y = x^2 - 4x$~~

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



Without using a graphing technology:

i. Determine the function with the graph that is missing on the diagram.

$y = -x^2 - 4x$

Non-open down.

ii. Match the remaining functions to their graphs, and be prepared to explain your reasoning.

$(-2)^2+4(-2)$
$4+(-8)$
-4

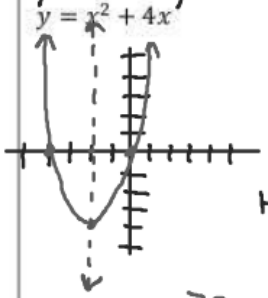
Vertex (min)
$x=-2$
$(-2,-4)$

$\left(-\frac{b}{a}, c\right)$

b. Without using graphing technology, sketch the pattern of graphs you would expect for the next set of quadratic functions. Explain your reasoning in making the sketch. $x=-\frac{b}{2a}$

$y=x(x+4)$

$y = x^2 + 4x$



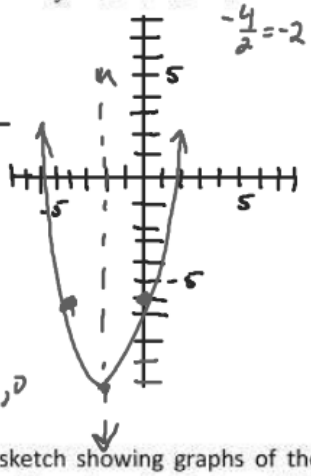
Opens up $a>0$

move Left

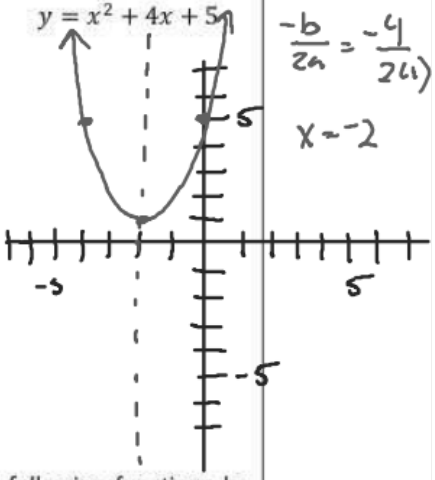
x-intercepts $x=-4, 0$

$y = x^2 + 4x - 6$

$-\frac{4}{2}=-2$



$y = x^2 + 4x + 5$



$(-2)^2+4(-2)+4$
$4-8+4$

$\frac{-b}{2a}=\frac{-4}{2(1)}$

$x=-2$

c. How would the sketch showing graphs of the following functions be similar to and different from those in Part a and b? Explain your reasoning.

$y = -x^2 + 4x$ $y = -x^2 + 4x - 6$ $y = -x^2 + 4x + 5$

d. How can the properties of the special quadratic functions $y = ax^2$, $y = ax^2 + c$, and $y = ax^2 + bx$ help in reasoning about shape and location of graphs for functions in the form $y = ax^2 + bx + c$?