Name: _____ Date: _____

Recall A quadratic function can be written in

- Standard Form $y = ax^2 + bx + c$ ↑ y-intercept.
- Factored Form $y = (x - m)(x - n)$ x intercepts $(m, 0)$ $(n, 0)$
- Vertex Form $y = a(x - p)^2 + q$ vertex (p, q)

Example On the following graph identify the following features:

a. vertex, $(1, -9)$

b. axis of symmetry, $x = 1$

c. x-intercept, and $(4, 0)$ $(-2, 0)$

d. y-intercept. $(0, -8)$

e. Predict whether $a, b,$ and c are positive, negative or zero.

a positive ∪

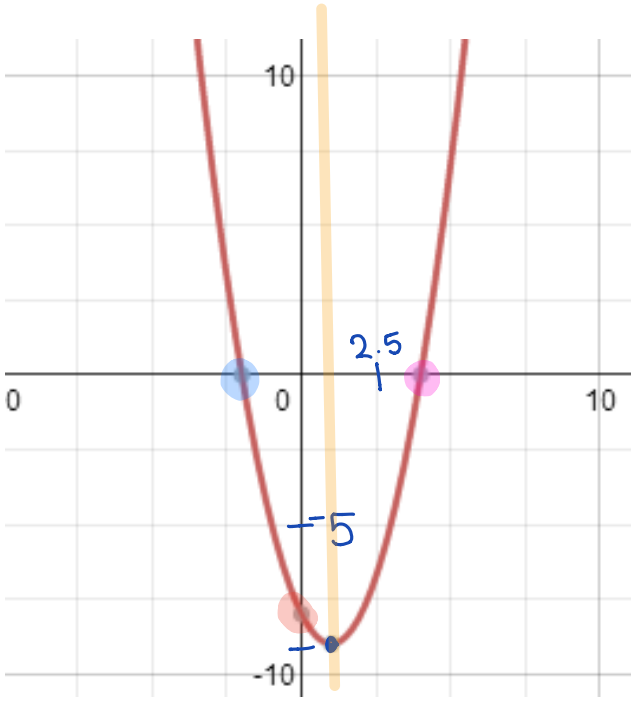
b who cares !! ☺

c (y-int) negative.

$y = ax^2 + bx + c$

f. Does the function have a maximum or a minimum value? What is it?

$y = -9$



Example Consider the quadratic function $y = x^2 - 6x + 5$.

- From this form of the equation we know the Standard form y-intercept (0,5)
- If we factor this equation, we will know the

$-1 \times -5 = 5$ 1×5

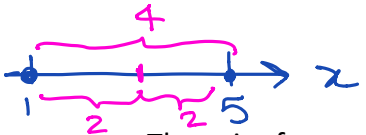
$-1 + -5 = -6$

$y = (x-1)(x-5)$ factored form ↳ x-intercepts.

$x-1=0$ $x-5=0$

$x=1$ $x=5$

- We can find the vertex by



so my vertex is when $x=3$

- The axis of symmetry

So my axis of symmetry is when $x=3$

Complete the table of values (if necessary) and then graph the function.

vertex

x	0	1	2	3	4	5	6
y	5	0		-4		0	5

y-int x-int x-int

Determine the following features.

a. y-intercept, (0,5)

b. x-intercept, (1,0), (5,0)

c. vertex, and

$y = (3)^2 - 6(3) + 5$

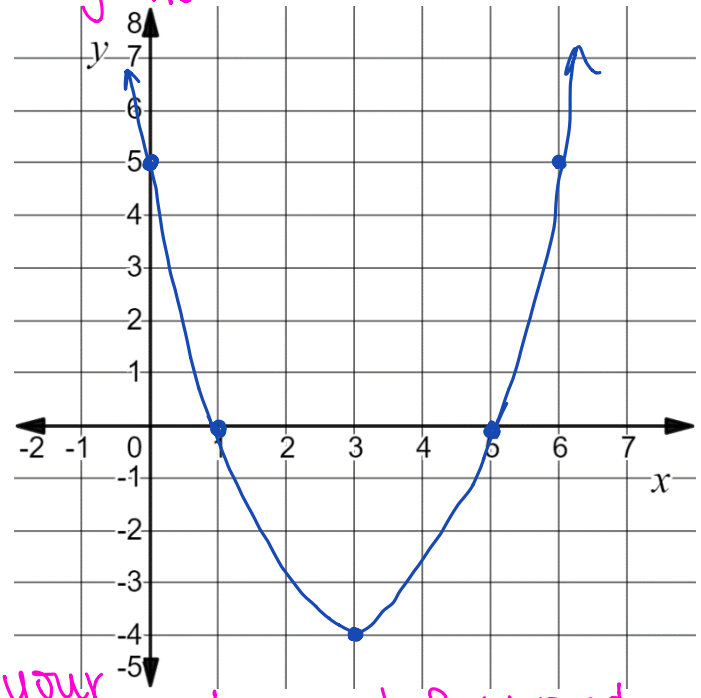
$= 9 - 18 + 5 = -4$

d. axis of symmetry. $x = 3$

e. Does the function have a maximum or a minimum value? What is it? $y = -4$

f. Domain (possible x-values) $x \in \mathbb{R}$ this will always be your answer (except for word problems)

g. Range (possible y-values) $y \geq -4$



Example Show that points $(3, 24)$ and $(-5, 24)$ lie on the parabola defined by the function

$$f(x) = 2x^2 + 4x - 6$$

+ve → smiling ∪ (-1, -8)

a. Does $f(x)$ have a maximum or minimum value?

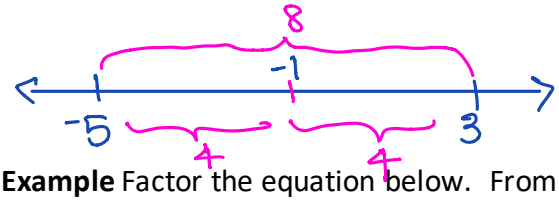
minimum.

b. Determine the coordinates of the vertex.

$x = -1$

$f(-1) = 2(-1)^2 + 4(-1) - 6$
$= 2 - 4 - 6$
$= -8$

$(-1, -8)$ ← value of the minimum



Example Factor the equation below. From your factorization, find the equation of the axis of symmetry, and through that, the vertex. State the domain and range of the function.

a. $y = -x^2 - 2x + 3$

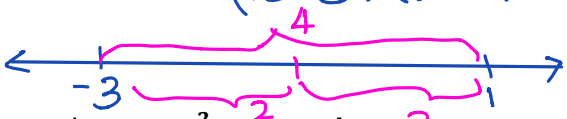
(-1, 4)

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

$3 \times -1 = -3$

$3 + -1 = 2$

$= -(x + 3)(x - 1)$



Axis of symmetry	$x = -1$
Domain	$x \in \mathbb{R}$
Range	$y \leq 4$
Coordinates of the vertex	$(-1, 4)$

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

b. $y = x^2 + 3x - 4$

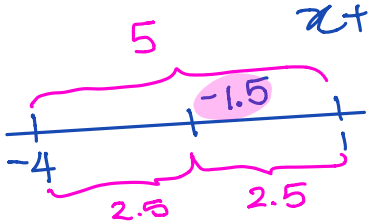
$4 \times -1 = -4$

$4 + -1 = 3$

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

$x + 4 = 0$, $x = -4$

$x - 1 = 0$, $x = 1$



Axis of symmetry	$x = -1.5$
Domain	$x \in \mathbb{R}$
Range	$y \geq -6.25$
Coordinates of the vertex	$(-1.5, -6.25)$

$y = (-1.5)^2 + 3(-1.5) - 4$
$= 2.25 - 4.5 - 4$
$= -6.25$

Assignment ~~Handout~~ p. 368 # 1, 3, 4, 5, 6, 8, 9, 10, 12

Quiz Next Day!