

Warm-up

$$f(x) = -4x^2 + 8x + 5 \quad \text{Find:}$$

a)  $x=0$

$$f(0) = -4(0)^2 + 8(0) + 5$$

$$f(0) = 5, \quad (0, 5)$$

a) y-int

d) axis of Symmetry

b) x-int(s)

e) Domain

c) vertex

f) Range

b)  $f(x) = -(4x^2 - 8x - 5) = 0$

$$= -(2x+1)(2x-5) = 0$$

$$2x+1=0$$

$$x_1 = -\frac{1}{2}$$

$$\left(-\frac{1}{2}, 0\right)$$

$$2x-5=0$$

$$x_2 = \frac{5}{2}$$

$$\left(\frac{5}{2}, 0\right)$$

c) x-value Vertex:  $\frac{x_1 + x_2}{2} = \frac{-\frac{1}{2} + \frac{5}{2}}{2} = \frac{2}{2} = 1$

y-value Vertex:  $f(1) = -4(1)^2 + 8(1) + 5$   
 $= 9$   
 $(1, 9)$

d) Vertical line in Middle:  $x = 1$

• vertex

Middle

e)  $x \in \mathbb{R}$

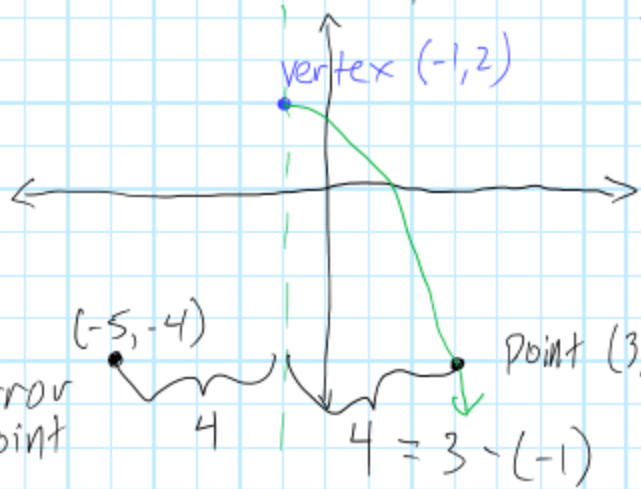
f) Down  
 $y \leq 9$



Ex 1 Vertex  $(-1, 2)$

Point  $(3, -4)$

What other point does the parabola pass through?



$(-5, -4)$

Mirror Point

Th: <sup>Go over</sup> Quiz ⊕ Work time

Mon: Quiz 1.3/1.4

Chp 1

Wed: Review

Fri: Test

## General Form

$$f(x) = ax^2 + bx + c$$

## Standard Form

(way easier to graph)

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

'a' still tells

us about Shape

Vertex: (h, k)

$a > 0$ ; up

$a < 0$ ; down

$|a| < 1$ ; wide;  $-1 < a < 1$

$|a| > 1$ ; narrow

Find i) vertex ii) y-int

iii) x-int(s)

Ex 2

$$f(x) = -\frac{1}{4}(x-1)^2 + 4$$

i) vertex  $(h, k)$   $a(x-h)^2 + k$

$(1, 4)$   $h=1$   $k=4$

ii) y-int:  $x=0$ ;  $f(0) = -\frac{1}{4}(0-1)^2 + 4$

$$= -\frac{1}{4}(-1)^2 + 4 = -\frac{1}{4} + 4$$

$$= -\frac{1}{4} + \frac{16}{4} = \frac{15}{4} \text{ or } (0, \frac{15}{4})$$

iii) x-int:  $f(x) = 0 = -\frac{1}{4}(x-1)^2 + 4$

$$-4 = -\frac{1}{4}(x-1)^2$$

$$16 = (x-1)^2$$

$$\pm 4 = x-1$$

$$1 \pm 4 = x$$

Sq root

$$x_1 = 1+4 = 5$$

$$x_2 = 1-4 = -3$$

Ex 3  $f(x) = 3(x+1)^2 - 3$

i)  $(h, k) \quad a(x-h)^2 + k$

$(-1, -3) \quad h = -1 \quad k = -3$

ii)  $f(0) = 3(0+1)^2 - 3 = 3(1)^2 - 3$   
 $= 3 - 3 = 0 \quad (0, 0)$

iii)  $f(x) = 0 = 3(x+1)^2 - 3$

$$3 = 3(x+1)^2 \div 3$$

$$1 = (x+1)^2 \quad \text{Sq root}$$

$$\begin{matrix} + \\ - \end{matrix} | = x+1$$

$$-1 \pm 1 = x$$

$x_1 = -1 + 1 = 0$
$x_2 = -1 - 1 = -2$