BE – Alg. 2 | WEDNESDAY 2-29-12

① Solve $-2x^2 + 8x - 5 = 0$

By completing the square. (EXACT ANSWER)

$$-2x^2 + 8x - 5 = 0$$

$$\frac{-2x^2}{-2} \frac{+8x}{-2} = \frac{5}{-2}$$

$$x^2 - 4x + 2^2 = -\frac{5}{2} + 4 \quad \left(= \frac{8}{2}\right)$$

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

$$x - 2 = \pm\sqrt{\frac{3}{2}}$$

$$\boxed{x = 2 \pm \sqrt{\frac{3}{2}}} = 2 \pm \frac{\sqrt{3}}{\sqrt{2}} = 2 \pm \frac{\sqrt{6}}{2}$$

EXACT

$$= \frac{4}{2} \pm \frac{\sqrt{6}}{2}$$

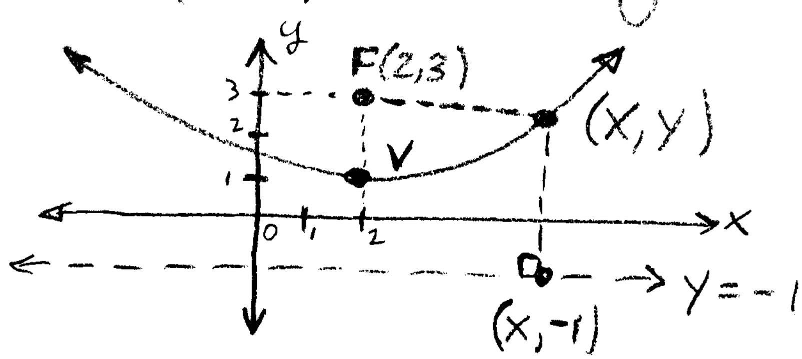
$$= \boxed{\frac{4 \pm \sqrt{6}}{2}}$$

SIMPLIFIED

Ch 8-2 Parabolas

Ex - Pg. 419 ⇒ Using the distance formula to find the equation of a parabola, if you know the coordinates (X, Y) of the focus and the equation of the directrix ⇒ horizontal line, $y = \text{constant}$

Given: Focus (2, 3), directrix $y = -1$



(X, Y) is any point on the line.

By definition of parabola:

distance from F(2, 3) to (X, Y) = distance from (X, Y) to (X, −1)

$$\sqrt{(X-2)^2 + (Y-3)^2} = \sqrt{(X-X)^2 + (Y-(-1))^2}$$

Square both sides

$$(X-2)^2 + (Y-3)^2 = 0^2 + (Y+1)^2$$

Get "y" by itself

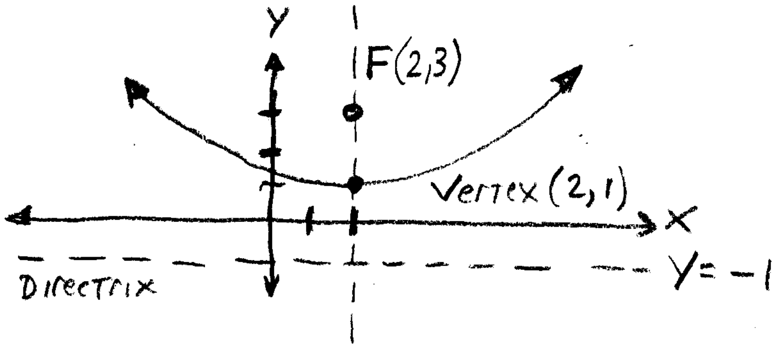
$$(X-2)^2 + (Y^2 - 6Y + 9) = Y^2 + 2Y + 1$$

$$\quad -Y^2 + 6Y - 1 \qquad -Y^2 + 6Y - 1$$

$$\frac{(X-2)^2}{8} + \frac{8}{8} = \frac{8y}{8}$$

$$\boxed{\frac{1}{8}(X-2)^2 + 1 = y}$$

Vertex, $V(2, 1)$
$\quad X, Y$



AOS $x = 2$ since $F(2,3)$ ← $x = 2$

h = horizontal shift !!
k = vertical shift !!

$$\boxed{y = \frac{1}{8}(x-2)^2 + 1} \qquad V(2,1)$$

$$\boxed{y = a(x-h)^2 + k}$$

book → "STANDARD" Form of Equation of a parabola.
(I call this h, k form)
other books → "Vertex Form"

$V(h,k)$
AOS $x = h$
$a = +$ ☺
$a = -$ ☹

Any parabola in the $ax^2 + bx + c = y$ form can be written in h, k form.

EX1 pg420 WRITE $y = 3x^2 + 24x + 50$ in h, k form
⇒ First factor GCF

$$y = 3(x^2 + 8x) + 50$$

↑ complete the square

$$y = 3[x^2 + 8x + 4^2] + 50 - (3 \cdot 16)$$

why ⊖? why $3 \cdot 16$?

$$\boxed{y = 3[x+4]^2 + 2} \qquad V(-4,2)$$

AOS ⇒ $x = -4$

$$y = a(x-h)^2 + k$$ ☺

Summary of 2 forms of a parabola:

STANDARD FORM

$$ax^2 + bx + c = y \qquad V\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$$

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

$+a$ $\quad$ $-a$

CTS

CAN SWITCH BETWEEN

DP + FOIL

VERTEX FORM

$$y = a(x-h)^2 + k \qquad V(h, k)$$

$$x = h = AOS$$

$+a$ $\quad$ $-a$

Ex 2b PG 421 GRAPH $y = -2(x-2)^2 + 3$

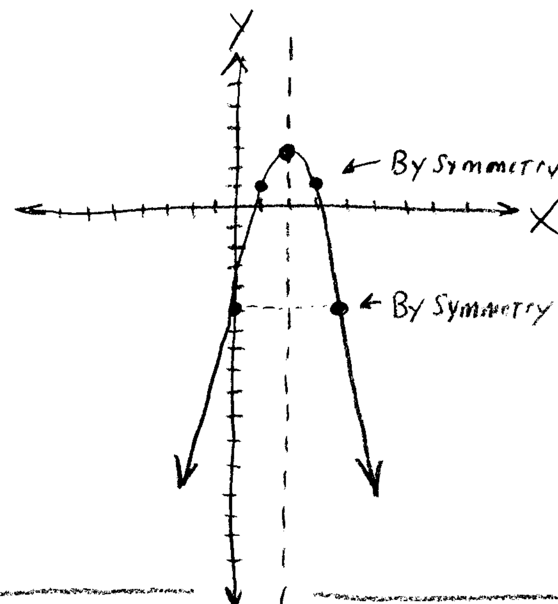
$\Rightarrow$

$\Rightarrow$ AOS $\Rightarrow x = 2$

$\Rightarrow V(2,3)$

$\Rightarrow$ "Smart T-table"

X	Y
0	-5
1	1



BE $\Rightarrow 2 \pm \sqrt{\frac{3}{2}} \cong 2 \pm 1.22 \Rightarrow \{3.22, 0.78\}$ = X INTERCEPTS ✓

PUT $y = -2(x-2)^2 + 3$ INTO STANDARD FORM & THEN graph IT.

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

$$y = -2[x^2 - 4x + 4] + 3$$

$$y = -2x^2 + 8x - 8 + 3$$

$$y = -2x^2 + 8x - 5$$

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

$x = \frac{-8}{2(-2)} = 2$

$a = -2 \Rightarrow$

	x	Y
V	2	$-2(2)^2 + 8(2) - 5$ $-8 + 16 - 5 = 3$
	0	-5
	1	1

$\Rightarrow$ SAME AS $y = -2(x-2)^2 + 3$ graph

Homework: GRAPH THE following parabolas:
Pg 423 # 1, 4, 6