BE - Alg. 2 Wednesday 2-24-10

① Solve $-2x^2 + 8x - 5 = 0$

By completing the square.
(EXACT answers)

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

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

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

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

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

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

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

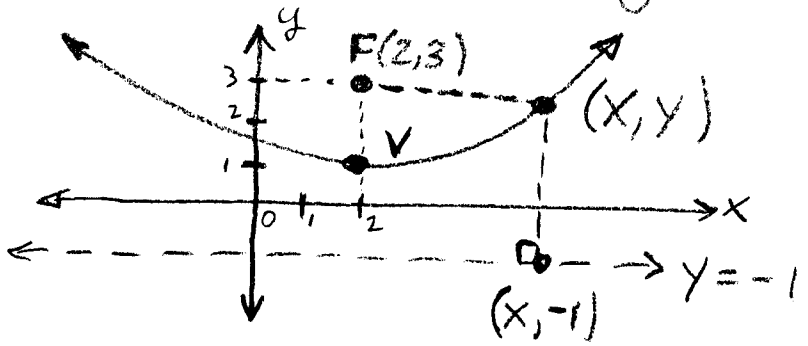
$= \frac{4}{2} \pm \frac{\sqrt{6}}{2}$

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

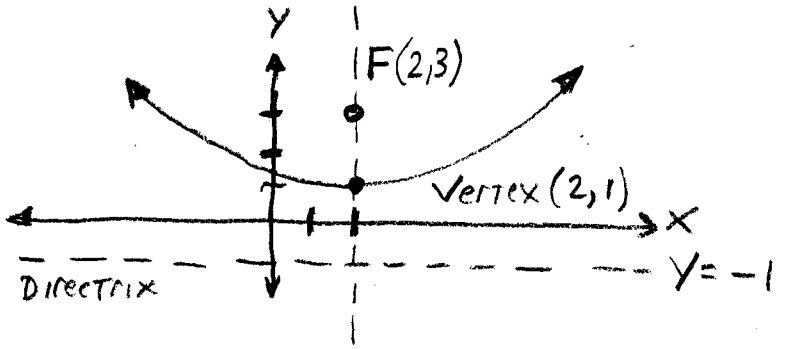
$$(x-2)^2+(y^2-6y+9) = y^2+2y+1$$

$$-y^2+6y-1 \qquad -y^2+6y-1$$

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

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

Vertex, V(2,1) (x, y)



AOS $x=2$ SINCE $F(2,3)$ ↑ $x=2$

h = HORIZONTAL SHIFT !!
k = VERTICAL SHIFT !!

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

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

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

$$y = 3\left[x^2+8x+\boxed{4^2}\right]+50\ \boxed{-(3\cdot 16)}$$

WHY ⊖? WHY 3·16?

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

AOS ⇒ $x=-4$

$y = a(x-h)^2+k$ ∪

Summary of 2 forms of a Parabola:

STANDARD FORM

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

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

$+a$ ☺ $\quad -a$ ☹

CTS ↕ CAN SWITCH BETWEEN ↕ DP + FOIL

VERTEX FORM

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

$x = h = AOS$

$+a$ ☺ $\quad -a$ ☹

Ex 2b Pg 421 Graph $y = -2(x-2)^2 + 3$

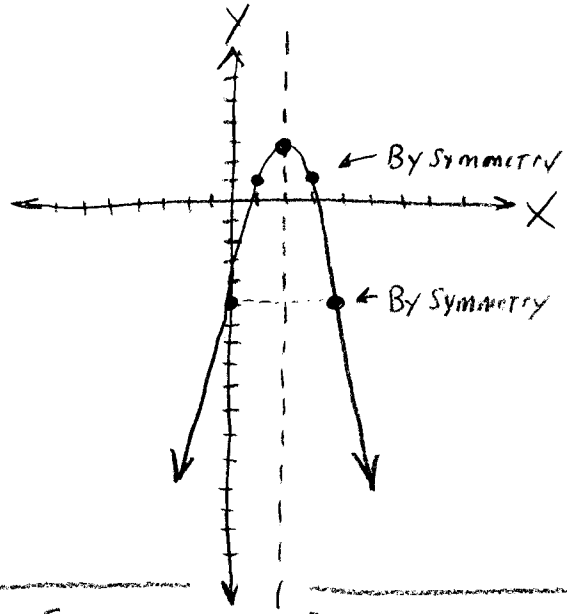
⇒ ☹

⇒ AOS ⇒ $x = 2$

⇒ $V(2,3)$

⇒ "Smart T-table"

x	y
0	5 ←
1	1



BC ⇒ $2 \pm \sqrt{\frac{3}{2}} \cong 2 \pm 1.22 \Rightarrow \{3.22, 0.78\}$ = 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