Focus (After Day 1 of 5.4)

1) $y = x^2 + 7x - 5$ Convert to vertex form & identify the vertex.

$y + 5 = x^2 + 7x$

$y + 5 + \frac{49}{4} = x^2 + 7x + \frac{49}{4}$

$y + \frac{69}{4} = \left(x + \frac{7}{2}\right)^2$

$y = \left(x + \frac{7}{2}\right)^2 - \frac{69}{4}$

$V\left(-\frac{7}{2}, -\frac{69}{4}\right)$

2) Solve using the SQ Root:

a) $4x^2 + 11 = 33$

$4x^2 = 22$

$x^2 = \frac{22}{4}$

$x^2 = \frac{11}{2}$

$x = \pm\sqrt{\frac{11}{2}} = \pm\frac{\sqrt{11}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{22}}{2}$

$x = \pm\frac{\sqrt{22}}{2}$

b) $x^2 + 12x + 36 = 28$

$(x+6)^2 = 28$

$x + 6 = \pm\sqrt{28}$

$x + 6 = \pm\sqrt{4}\sqrt{7}$

$x + 6 = \pm 2\sqrt{7}$

$x = -6 \pm 2\sqrt{7}$

Day 2

ex: $y = -4x^2 + 20x - 11$ leading coeff. must be 1!!

$y + 11 = -4x^2 + 20x$

$y + 11 = -4(x^2 - 5x)$

$\left(-\frac{5}{2}\right)^2 = \frac{25}{4}$

$y + 11 - 25 = -4\left(x^2 - 5x + \frac{25}{4}\right)$ $\quad * \; -4\left(\frac{25}{4}\right) = -25$

$y - 14 = -4\left(x - \frac{5}{2}\right)^2$

$y = -4\left(x - \frac{5}{2}\right)^2 + 14$ $\quad V(5/2, 14)$

opening down, right 5/2, up 14, and vert. stretch by a factor of 4.

ex: $y = -2x^2 + 7x - 5$

$y + 5 = -2x^2 + 7x$

$y + 5 = -2(x^2 - 7/2\,x)$

$\frac{-\frac{7}{2}}{2} = \left(-\frac{7}{4}\right)^2 = \frac{49}{16}$

$y + \overset{40/8}{\cancel{5}} + -\frac{49}{8} = -2\left(x^2 - \frac{7}{2}x + \frac{49}{16}\right)$ $\quad * \; -2\left(\frac{49}{16}\right) = \frac{-98}{16} = \frac{-49}{8}$

$y - \frac{9}{8} = -2\left(x - \frac{7}{4}\right)^2$

$y = -2\left(x - \frac{7}{4}\right)^2 + \frac{9}{8}$ $\quad V\left(\frac{7}{4}, \frac{9}{8}\right)$

opening down, right 7/4, up 9/8, and a vertical stretch by a factor of 2.

ex: $g(x) = 5x^2 - 50x + 128$

$y = 5x^2 - 50x + 128$

$y - 128 = 5x^2 - 50x$

$y - 128 = 5(x^2 - 10x)$

$y - 128 + \underline{125} = 5(x^2 - 10x + \underline{25})$

$\uparrow 5(25)$

$y - 3 = 5(x-5)^2$

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

vertex: $(5,3)$

aos: $x = 5$

max/min: min @ 3

D: $(-\infty, \infty)$

R: $[3, \infty)$

y-int: $(0,128)$ $\rightsquigarrow$ $y = 5(0-5)^2 + 3$

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

$y = 125 + 3 = 128$