Parabolae

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

dom $(-\infty, \infty)$

range $(-\infty, -4]$

axis of sym $x = -2$

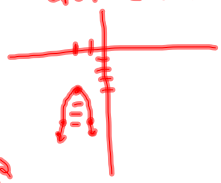
y int $y+4 = -3(0+2)^2$

$y+4 = -12$

$y = -16$

vertex $(-2, -4)$

open down



Completing the square

$y = x^2 + 8x + 12$

$y - 12 = x^2 + 8x + \_\_$

$y - 12 \overset{+16}{} = x^2 + 8x + 16$

$y + 4 = (x+4)^2$

#3 $y = \overset{a}{5}x^2 + \overset{b}{20}x + 23$

$\frac{-20}{2 \cdot 5} = -2$

$\frac{-20}{10} = -2$

$y - 23 = 5x^2 + 20x$

$y - 23 = 5(x^2 + 4x + \_\_)$

$y - 23 \overset{+20}{} = 5(x^2 + 4x + 4)$

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

5.4

Today - Find the vertex using $\frac{-b}{2a}$

if $y = ax^2 + bx + c$

x_v of vertex $= \left(\frac{-b}{2a}\right)$

Ex #1 $y = 4x^2 + 24x + 13$

$x_v = -\frac{b}{2a}$ $\frac{-24}{2 \cdot 4}$ $\frac{-24}{8} = -3$

therefore $x = -3$

y value $= 4(-3)^2 + 24(-3) + 13$

$36 - 72 + 13 = -23$

So.. vertex is $(-3, -23)$

#2 $y = 2x^2 + 12x + 7$

$2(-3)^2 + 12(-3) + 7$

$18 - 36 + 7 = -11$

$\frac{-b}{2a}$ $x_v = -3$

$(-3, -11)$

#3 $y = -4x^2 - 16x + 3$

$-4(-2)^2 - 16(-2)$

$-16 + 32 + 3 = 19$

$x_v = \frac{16}{2(-4)} = -2$

$(-2, 19)$

#4 $y = 5x^2 + 30x + 17$

$45 - 90 + 17$

$-45 + 17$

$x_v = -3$

$(-3, -28)$

$\frac{-b}{2a}$