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

$-4p^2 + 200p = -4(p^2 - 50p)$

$p^2 - 2 \cdot 25p + 25^2 - 25^2$

$(p-25)^2 - 625$

$25 \times 25 = 125\,0$

$-4[(p-25)^2 - 625]$

$625 \times 4 = 2500$

$= -4(p-25)^2 + 2500$ vertex form.

$(25, 2500)$