

Multiplying Special Cases (Section 2-4)

* If a binomial is squared, you still need to distribute!

ex: $(a+b)^2 \neq a^2 + b^2$

$$(a+b)^2 = (a+b)(a+b) \\ = a^2 + \underline{2ab} + b^2$$

↑
Don't forget the
Middle!

ex: $(a-b)^2 \neq a^2 - b^2$

$$(a-b)^2 = (a-b)(a-b) \\ = a^2 - 2ab + b^2$$

ex: $(n-7)^2 = (n-7)(n-7)$

$$= n^2 - 14n + 49$$

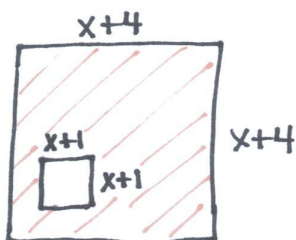
(this was $-7n + -7n$)

ex: $(4x-6)^2 = (4x-6)(4x-6)$

$$= 16x^2 - 48x + 36$$

(this was $-24x + -24x$)

ex:



Find the area of the shaded region.

$$A = (x+4)^2 - (x+1)^2 \\ = (x+4)(x+4) - (x+1)(x+1) \\ = x^2 + 8x + 16 + \cancel{(x^2 + 2x + 1)} \\ = 6x + 15$$

ex: what is 85^2 ? Use mental math.

$$\begin{aligned} &\downarrow \\ (80+5)^2 &= (80+5)(80+5) \\ &= 6400 + 800 + 25 \\ &= 7225 \end{aligned}$$

ex: Find 61^2 using mental math.

$$\begin{aligned} (60+1)(60+1) \\ = 3600 + 120 + 1 \\ = 3721 \end{aligned}$$

* The product of a sum & a difference \rightarrow the middle cancels out!

$$\begin{aligned} \text{ex: } (a+b)(a-b) &= a^2 + \cancel{ab} - \cancel{ab} - b^2 \\ &= a^2 - b^2 \end{aligned}$$

$$\begin{aligned} \text{ex: } (x+9)(x-9) \\ &= x^2 - 9x + 9x - 81 \\ &= x^2 - 81 \end{aligned}$$

$$\begin{aligned} \text{ex: } (6+m^2)(6-m^2) \\ &= 36 - 6m^2 + 6m^2 - m^4 \\ &= 36 - m^4 \end{aligned}$$

$$\begin{aligned} \text{ex: } (3c-4)(3c+4) \\ &= 9c^2 - 16 \end{aligned}$$

$$\begin{aligned} \text{ex: } (10+y)(10-y) \\ &= 100 - y^2 \end{aligned}$$

$$\begin{aligned} \text{ex: Find } 52 \cdot 48 \text{ using mental math.} \\ &\quad \downarrow \quad \downarrow \\ & (50+2)(50-2) \\ &= 2500 - 4 \\ &= 2496 \end{aligned}$$

$$\begin{aligned} \text{ex: Find } 303 \cdot 297 \\ &= (300+3)(300-3) \\ &= 90000 - 9 \\ &= 89991 \end{aligned}$$