Each by Each

QE04-V1 · storyboard · QE04 Multiply two binomials. Read each picture with its sentences.

Picture 1

Expand $(x+5)(x+3)$.

$$x \cdot x + x \cdot 3 + 5 \cdot x + 5 \cdot 3$$ four products

$$= x^2 + 3x + 5x + 15$$

$$= \boxed{x^2 + 8x + 15}$$ $3x + 5x = 8x$

1. Expand x plus 5, times x plus 3.
2. x times x, x times 3, 5 times x, and 5 times 3: four products.
3. That is x squared, plus 3 x, plus 5 x, plus 15.
4. Add the like terms in the middle: x squared, plus 8 x, plus 15.

Picture 2

Expand $(2x-3)(x+4)$.

$$2x^2+8x-3x-12 \quad \text{keep each sign with its term}$$

$$=\boxed{2x^2+5x-12} \quad 8x-3x=5x$$

5. Expand 2 x minus 3, times x plus 4.
6. 2 x times x is 2 x squared.
7. 2 x times 4 is 8 x.
8. Negative 3 times x is negative 3 x, and negative 3 times 4 is negative 12: keep each sign with its term.
9. 8 x minus 3 x is 5 x.
10. So the answer is 2 x squared, plus 5 x, minus 12.

Picture 3

Trap $(x+5)^2$

$$\times \quad x^2+25$$

$$\checkmark \quad x^2+10x+25$$

11. Watch for the trap: x plus 5, squared, is not x squared plus 25.
12. It is x plus 5 times x plus 5, so there are two cross products, 5 x and 5 x: x squared, plus 10 x, plus 25.

Picture 4

Trap $(x+5)(x+3)$

$\times \; x^2+15$

$\checkmark \quad x^2+8x+15$

13. Another trap: multiplying only the firsts and the lasts gives x squared plus 15.
14. But there are four products, not two: x squared, plus 8 x, plus 15.