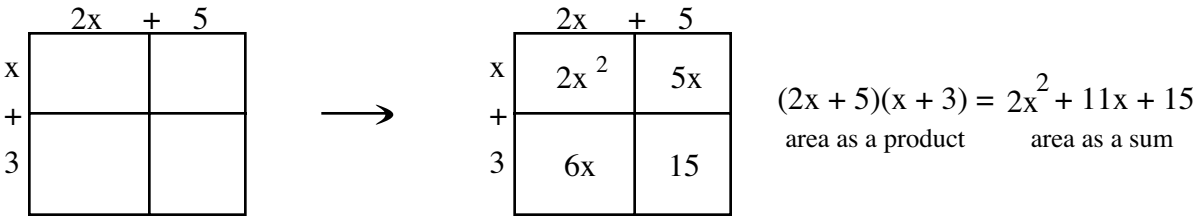
MULTIPLYING POLYNOMIALS #12

We can use generic rectangles as area models to find the products of polynomials. A generic rectangle helps us organize the problem. It does not have to be drawn accurately or to scale.

Example 1

Multiply $(2x + 5)(x + 3)$

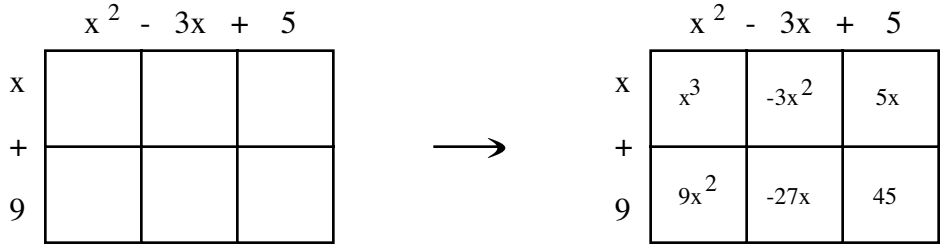


$(2x + 5)(x + 3) = 2x^2 + 11x + 15$

area as a product area as a sum

Example 2

Multiply $(x + 9)\left(x^2 - 3x + 5\right)$



Therefore $(x + 9)\left(x^2 - 3x + 5\right) = x^3 + 9x^2 - 3x^2 - 27x + 5x + 45 = x^3 + 6x^2 - 22x + 45$

Another approach to multiplying binomials is to use the mnemonic "F.O.I.L." F.O.I.L. is an acronym for First, Outside, Inside, Last in reference to the positions of the terms in the two binomials.

Example 3

Multiply $(3x - 2)(4x + 5)$ using the F.O.I.L. method.

F.	multiply the FIRST terms of each binomial	$(3x)(4x) = 12x^2$
O.	multiply the OUTSIDE terms	$(3x)(5) = 15x$
I.	multiply the INSIDE terms	$(-2)(4x) = -8x$
L.	multiply the LAST terms of each binomial	$(-2)(5) = -10$

Finally, we combine like terms: $12x^2 + 15x - 8x - 10 = 12x^2 + 7x - 10$.

Multiply, then simplify each expression.

1. $x(2x-3)$
2. $y(3y-4)$
3. $2y\left(y^2+3y-2\right)$
4. $3x\left(2x^2-x+3\right)$
5. $(x+2)(x+7)$
6. $(y-3)(y-9)$
7. $(y-2)(y+7)$
8. $(x+8)(x-7)$
9. $(2x+1)(3x-5)$
10. $(3m-2)(2m+1)$
11. $(2m+1)(2m-1)$
12. $(3y-4)(3y+4)$
13. $(3x+7)^2$
14. $(2x-5)^2$
15. $(3x+2)\left(x^2-5x+2\right)$
16. $(y-2)\left(3y^2+2y-2\right)$
17. $3(x+2)(2x-1)$
18. $-2(x-2)(3x+1)$
19. $x(2x-3)(x+4)$
20. $2y(2y-1)(3y+2)$

Answers

1. $2x^2-3x$
2. $3y^2-4y$
3. $2y^3+6y^2-4y$
4. $6x^3-3x^2+9x$
5. $x^2+9x+14$
6. $y^2-12y+27$
7. $y^2+5y-14$
8. x^2+x-56
9. $6x^2-7x-5$
10. $6m^2-m-2$
11. $4m^2-1$
12. $9y^2-16$
13. $9x^2+42x+49$
14. $4x^2-20x+25$
15. $3x^3-13x^2-4x+4$
16. $3y^3-4y^2-6y+4$
17. $6x^2+9x-6$
18. $-6x^2+10x+4$
19. $2x^3+5x^2-12x$
20. $12y^3+2y^2-4y$