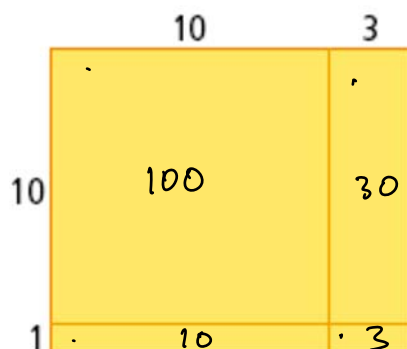


3.2 Polynomial Multiplication

Exploring Polynomial Multiplication

Multiply: $13 \times 11 = 143$

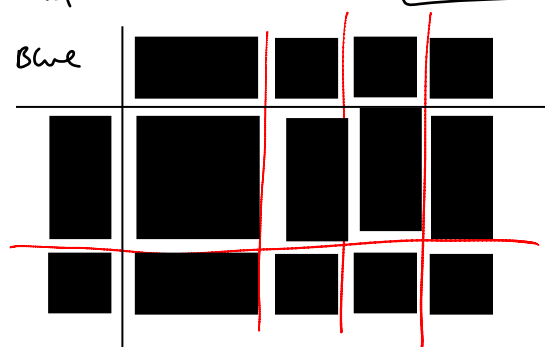
Use the area model below to multiply 13×11 :



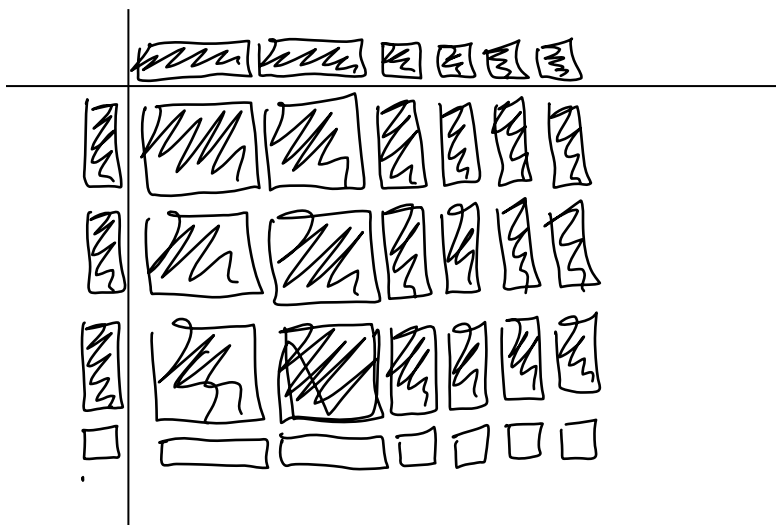
$$100 + 30 + 10 + 3 = 143$$

Use algebra tiles to determine the product:

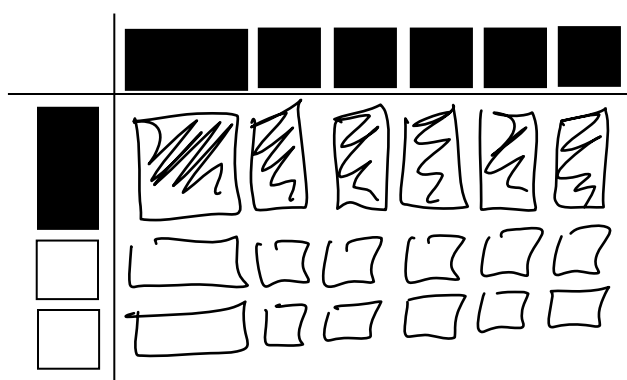
 + Red
 - Blue



$$(2x + 4)(3x - 1)$$



$$(x+5)(x-2) = x^2 + 1x - 2x - 10$$



$$x^2 + 3x - 10$$

$$= 6x^2 + 12x - 2x - 4$$

$$= 6x^2 + 10x - 4$$

Can also use the distributive property to multiply polynomials:

Ex. Simplify:

$$\begin{aligned}
 & (x-2)(2x+1) \\
 &= x(2x+1) - 2(2x+1) \\
 &= 2x^2 + x - 4x - 2 \\
 &= \boxed{2x^2 - 3x - 2}
 \end{aligned}$$

$$\begin{aligned}
 & (x-3)(x-5) \\
 &= x(x-5) - 3(x-5) \\
 &= x^2 - 5x - 3x + 15 \\
 &= \boxed{x^2 - 8x + 15}
 \end{aligned}$$

$$\begin{aligned}
 & (5m-1)(2m-6) \\
 &= 5m(2m-6) - 1(2m-6) \\
 &= 10m^2 - 30m - 2m + 6 \\
 &= \boxed{10m^2 - 32m + 6}
 \end{aligned}$$

$$\begin{aligned}
 & (b-4)^2 \\
 &= (b-4)(b-4) \\
 &= b(b-4) - 4(b-4) \\
 &= b^2 - 4b - 4b + 16 \\
 &= \boxed{b^2 - 8b + 16}
 \end{aligned}$$

Can be extended to multiplication of larger polynomials:

Ex. Simplify:

$$\begin{aligned}
 & (x+2)(2x^2-5x+1) \\
 &= x(2x^2-5x+1) + 2(2x^2-5x+1) \\
 &= 2x^3 - 5x^2 + x + 4x^2 - 10x + 2 \\
 &= \boxed{2x^3 - x^2 - 9x + 2}
 \end{aligned}$$

$$\begin{aligned}
 & (q^2+q-2)(2q^2-3q+1) \\
 &= q^2(2q^2-3q+1) + q(2q^2-3q+1) - 2(2q^2-3q+1) \\
 &= 2q^4 - 3q^3 + q^2 + 2q^3 - 3q^2 + q - 4q^2 + 6q - 2 \\
 &= \boxed{2q^4 - q^3 - 6q^2 + 7q - 2}
 \end{aligned}$$