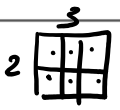
6 Multiplying Polynomials

November 7, 2021 4:26 PM

Math 9: Ch 5 Day 5: Multiplying Polynomials

Learning Goal 5G: I can multiply a polynomial by a monomial.

How do we "**MULTIPLY**" polynomials? Think **AREA** of a rectangle!



$= 2 \times 3$
$= 6$

If we were to represent multiplication with algebra tiles, we can use a chart.

Place the term in front of the brackets on one side and the polynomial on the other side.

Fill in the chart with the tiles (shapes) that the product creates.

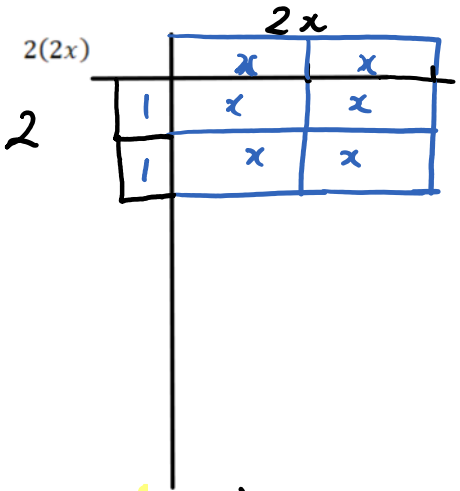
Remember the **Multiplication Sign Rules**!

$\oplus \times \oplus = \oplus$
$\ominus \times \ominus = \oplus$
same signs $= \oplus$

$\oplus \times \ominus = \ominus$
$\ominus \times \oplus = \ominus$
diff. signs $= \ominus$

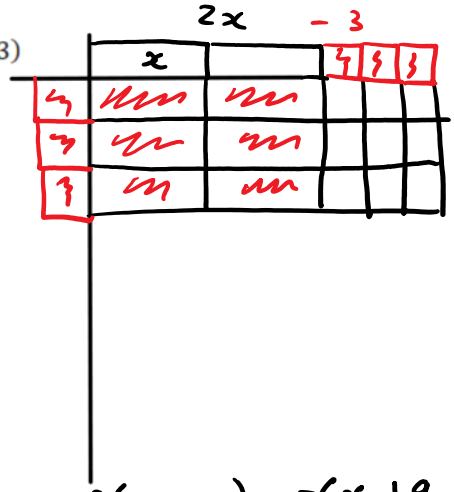
Example 1: Complete the diagram to represent each product, and then determine the product.

a) $2(2x)$



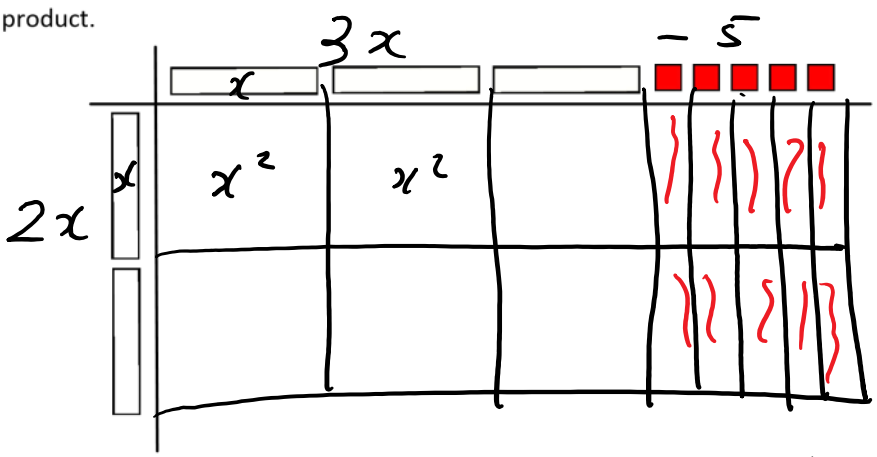
Statement: $2(2x) = 4x$

b) $-3(2x - 3)$



Statement: $-3(2x-3) = -6x + 9$

Example 2: Complete the algebra tile diagram for $2x(3x - 5)$ by filling in the area to find the product.

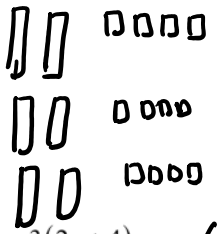


$2x(3x-5) = 6x^2 - 10x$

Another way of using algebra tiles to represent multiplication by a constant is to think of "groups" of the polynomial being multiplied.

For example, $3(2x+4)$ would represent 3 groups of $2x+4$.

This would look like the following:



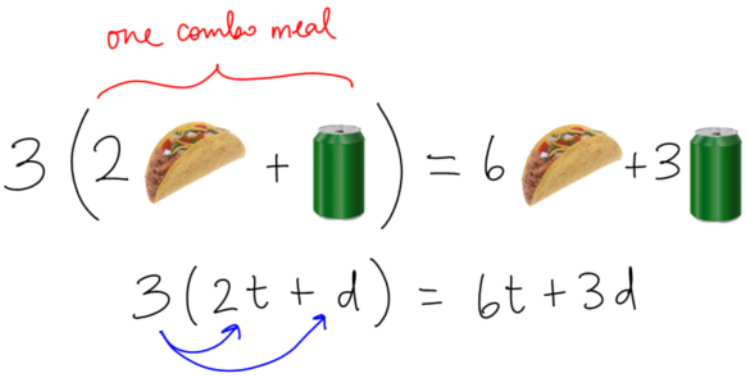
The solution is the total amount of each tile: $3(2x+4) = 6x+12$

To multiply polynomials by a ~~constant~~ monomial algebraically, we use the **distributive property:**

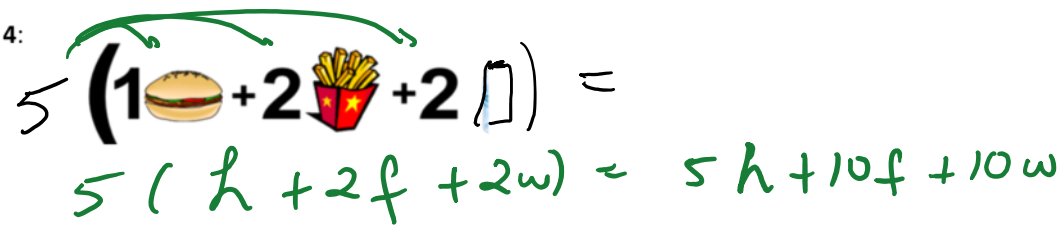
$$a(b+c) = ab + ac$$

This tells you to multiply each term within the brackets by the term outside the brackets.

Example 3:



Example 4:



$x^a \cdot x^b = x^{a+b}$ $x \cdot x = x^2$

Example 5: Determine each product:

a) $4(3a+2) = 4(3a) + 4(2)$

b) $3x(2x-8) = 3x(2x) + 3x(-8)$

Example 5: Determine each product:

a) $4(3a + 2) = 4(3a) + 4(2)$
$= 12a + 8$

b) $3x(2x - 8) = 3x(2x) + 3x(-8)$
$= 6x^2 - 24x$

c) $2(4c^2 - 2c + 3) = 2(4c^2 - 2c + 3)$
$= 8c^2 - 4c + 6$

d) $(d^2 + 2d)(-3d^1) = -3d(d^2 + 2d)$
$= -3d^1(d^2) + -3d(2d)$
$= -3d^3 - 6d^2$

e) $(-2n^2 + n - 1)(6) = 6(-2n^2) + 6(n) + 6(-1)$
$= -12n^2 + 6n - 6$

f) $-3m(-5m^2 + 6m + 7)$
$= -3m^1(-5m^2) + -3m^1(6m^1) + -3m(7)$
$= 15m^3 - 18m^2 - 21m$

Ext

$(3x^2 - 5x)(-4x + 2)$

$(3x^2)(-4x) + (3x^2)(2) + -5x(-4x) - 5x(2)$
$-12x^3 + 6x^2 + 20x^2 - 10x$
$-12x^3 + 26x^2 - 10x$