Concept: Multiplying Expressions

Name:

COMPUTER COMPONENT: Part A

Instructions: In UMATH X follow the **Content Menu** path:

Algebra > **Multiplying Expressions**

Work through all Sub Lessons of the following Lessons **in order**:

- *Our Problem*
- *Recall Tile Concepts*
- *Multiplying Monomials*
- *Multiplying Monomials and Binomials*

NOTE: You will not be finishing the entire section before stopping to complete some **OFF COMPUTER EXERCISES**.

Additional Required Materials: *Colored pencils.*

As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

When you reach the end of the lesson *Multiplying Monomials and Binomials* on the computer, move on to the **OFF COMPUTER EXERCISES** below.

SUMMARY: Part A

We know that…

In order to multiply powers with the same base, we ADD the exponents.

Example: $(a^5)(a^4) = a^9$

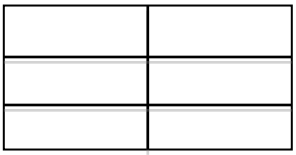
Demonstrate your previous knowledge of 'Tile Concepts' by completing the table below.

Description	Drawing	Area
A unit tile		**1 x 1 = 1**
An x tile		**1 x x = x**
An x^2 tile		***x(x)=x*^{2}**

A y tile		***y(1)=y***
A y^2 tile		***y(y)=y²***
An xy tile		***x(y)=xy***

Fill in the spaces below to create notes for *Multiplying Monomials…* with Tiles

Example 1: Use tiles to completely fill this 3 units × 2x units rectangle.



We can find the total area by adding up all of the shapes in the rectangle.

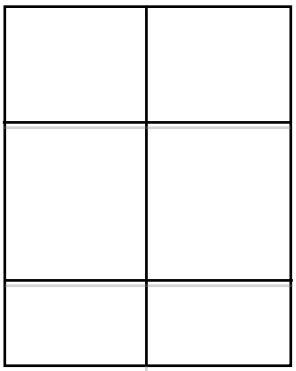
x + ***x*** + ***x*** + ***x*** + ***x*** + ***x*** = ***6 x***

ALSO, we can find the total area by multiplying the length and the width together.

Area = length × width = ***2x*** × ***3x*** = $6x$

*Which procedure do you think is the most efficient? Why****? Although repeated addition is correct, the simple multiplication algorithm is more efficient.***

Example 2: Use tiles to completely fill this 3x units × 2x units rectangle.



We can find the total area by adding up all of the shapes in the rectangle.

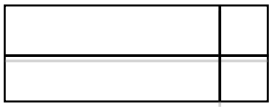
x² + ***x²*** + ***x²*** + ***x²*** + ***x²*** + ***x²*** = ***6x²***

ALSO, we can find the total area by multiplying the length and the width together.

Area = length × width = $\underline{2x^2}$ × $\underline{3x^2}$ = $6x^2$

Fill in the spaces below to create notes for multiplying Monomials by Binomials ... With Tiles

Example 1: Use tiles to completely fill this 2 units by (x + 1) units rectangle.



We can find the total area by adding up all of the shapes in the rectangle.

$\underline{x}$ + $\underline{x}$ + $\underline{1}$ + $\underline{1}$ = $\underline{2x + 2}$

ALSO, we can find the total area by multiplying the length and the width together.

Area = length × width = $\underline{x + 1}$ × $\underline{2}$ = $2x + 2$

Example 2: Use tiles to completely fill this 2x units by (x + 1) units rectangle.

We can find the total area by adding up all of the shapes in the rectangle.

$\underline{x^2}$ + $\underline{x^2}$ + $\underline{x^2}$ + $\underline{x^2}$ = $\underline{2x^2 + 2x}$

ALSO, we can find the total area by multiplying the length and the width together.

Area = length × width = $\underline{(x + 1)}$ × $\underline{2x}$ = $2x^2 + 2$

We know that…

The ***Distributive*** law shows us how to multiply a monomial with a binomial.

Example: $2(x + 5) =$ ***2*** $(x) +$ ***2*** $(5) = 2x + 10$

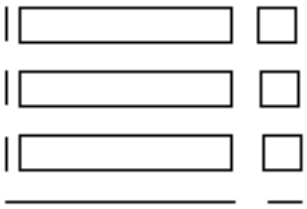
OFF COMPUTER EXERCISES: PART A

1. Find the product for the following.

   (a) $2^3 \times 2^4 =$ $\mathbf{2^7}$ (b) $5^6 \times 5^2 =$ $\mathbf{5^7}$

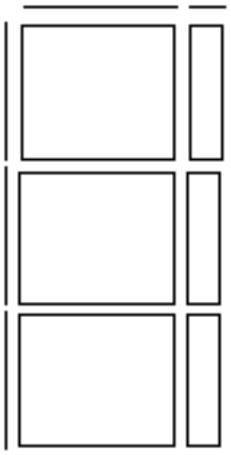
   (c) $a^3 \times a^6 =$ $\mathbf{a^9}$ (d) $y^5 \times y =$ $\mathbf{y^5}$

2. (a) Use tiles to fill a rectangle that is 3 units by (x+1) units. *Be sure to use a ruler.*



= 3x + 3

(b) Use tiles to fill a rectangle that is 3x units by (x+1) units. Be sure to use a ruler.



= 3x² + 3x

(c) What is the total area of the rectangle in part (a)?

3x + 3

(d) What is the total area of the rectangle in part (b)?

$3x^2 + 3x$

3. Find the product of these monomials. You may use tiles to support your understanding of the concept.

$= \frac{1}{6}n^2$ $= \frac{1}{2}x^5y^6$

Example: $(-3a^3)(5a^2)$

$= -3 \times a^3 \times 5 \times a^2$

$= -3 \times 5 \times a^3 \times a^2$

$= -15\,a^5$

(a) $(-5x^2)(6x^5)$

$= -5 \times x^2 \times 6 \times x^5$

$= -5 \times 6 \times x^2 \times x^5$

$= -30x^7$

(b) $(2b)(3b)$

$= 2 \times b \times 3 \times b$

$= 2 \times 3 \times b \times b$

$= 6b^2$

(c) $(-6a^4)(-3a^5)$

$= -6 \times a^4 \times -3 \times a^5$

$= -6 \times -3 \times a^4 \times a^5$

$= 18a^9$

(d) $(-7v)(-3v^4)$

$= -7 \times v \times -3 \times v^4$

$= -7 \times -3 \times v \times v^4$

$= 21v^5$

(e) $(d^2\,e^3)(2d\,e^3)$

$= d^2 \times e^3 \times 2 \times d \times e^3$

$= d^2 \times d \times e^3 \times e^3 \times 2$

$= 2d^3e^6$

(f) $(-10r^5)(2r^3)(-4r^4)$

$= -10 \times r^5 \times 2 \times r^3 \times -4 \times r^4$

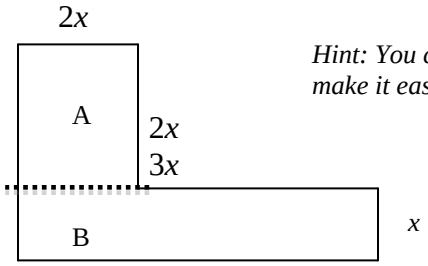
$= -10 \times 2 \times -4 \times r^5 \times r^3 \times r^4$

$= 80r^{12}$

(g) $\left(\frac{1}{2}n\right)\left(\frac{1}{3}n\right)$

(h) $\left(-\frac{2}{3}x^2y^3\right)\left(-\frac{3}{4}x^3y^4\right)$

4. Find the area of this figure.



Hint: You can do something to this shape to make it easier to work with.

Remember to show all of your thinking in the space below.

Area of A= (2x)(2x) ***Area of B= (3x + 2x)(x)*** ***Total Area= $4x^2 + 5x^2 = 9x^2$***

= $4x^2$ ***= $5x^2$***

5. Simplify the following expressions by using the distributive law.

Example: **5a(a - 2)**

= 5a(a) - 5a(2)

= $5a^2$ - 5(2)a

= $5a^2$ - 10a

(a) a (a + b)

= a^2 + ab

(b) 3a (2a + 3b - 4c)

= $6a^2$ + 9ab – 12ac

(c) 4m (-2m + 4y)

= $-8m^2$ + 16my

(d) 4 (x + 2)

= 4x + 8

(e) -3 (2d + 4)

= -6d - 12

(f) p (2p -1)

= $2p^2$ -p

(g) 6f (2f -3)

= $12f^2$ – 18f

(h) -5mn (4mn + 8m - 2n)

= $20m^2n^2 – 40m^2n + 10mn^2$