MAT 011, Multiplying Polynomials, Part 1 (5.3)   Name _____ **KEY**

1. Multiply.

   a. $-4n^3 \cdot 7n^7$

   $-28n^{10}$

   e. $\left(-\frac{3}{4}y^7\right)\left(\frac{1}{7}y^4\right)$

   $-\frac{3}{28}y^{11}$

   b. $(2x)(-3x^2)(4x^5)$

   $-24x^8$

   f. $3x(2x+5)$

   $6x^2 + 15x$

   c. $-2a(a+4)$

   $-2a^2 - 8a$

   g. $4x(5x^2 - 6x - 10)$

   $20x^3 - 24x^2 - 40x$

   d. $-y(4x^3 - 7x^2y + xy^2 + 3y^3)$

   $-4x^3y + 7x^2y^2 - xy^3 - 3y^4$

   h. $\frac{1}{2}x^2(8x^2 - 6x + 1)$

   $4x^4 - 3x^3 + \frac{1}{2}x^2$

2. Use the FOIL method to multiply.

   a. $(x+4)(x+3)$

   $x^2 + 4x + 3x + 12 =$
   $x^2 + 7x + 12$

   e. $(2y-4)^2 = (2y-4)(2y-4)$

   $4y^2 - 8y - 8y + 16 = 4y^2 - 16y + 16$

   b. $(a+7)(a-2)$

   $a^2 - 2a + 7a - 14 =$
   $a^2 + 5a - 14$

   f. $(4x-3)(3x-5)$

   $12x^2 - 20x - 9x + 15 =$
   $12x^2 - 29x + 15$

   c. $\left(x+\frac{2}{3}\right)\left(x-\frac{1}{3}\right)$

   $x^2 - \frac{1}{3}x + \frac{2}{3}x - \frac{2}{9} =$
   $x^2 + \frac{1}{3}x - \frac{2}{9}$

   g. $(x^2+4)^2 = (x^2+4)(x^2+4)$

   $x^4 + 8x^2 + 16$

   d. $(3x^2+1)(4x^2+7)$

   $12x^4 + 21x^2 + 4x^2 + 7 =$
   $12x^4 + 25x^2 + 7$

3. Explain the difference between $4y^2(-y^2)$ and $4y^2 - y^2$.

   in the first case $4y^2$ and $-y^2$ are being multiplied resulting in $-4y^4$. in the second they are being subtracted and can be simplified as like terms to $3y^2$

4. Multiply.
   a. $(x-2)(x^2-3x+7)$

   $x^3 - 3x^2 + 7x - 2x^2 + 6x - 14$

   $x^3 - 5x^2 + 13x - 14$

   d. $(2a-3)(5a^2-6a+4)$

   $10a^3 - 12a^2 + 8a - 15a^2 + 18a - 12$

   $10a^3 - 27a^2 + 26a - 12$

   b. $(x+2)^3$

   $(x+2)(x+2)(x+2) =$
   $(x+2)(x^2+4x+4) =$
   $x^3 + 4x^2 + 4x + 2x^2 + 8x + 8 =$
   $x^3 + 6x^2 + 12x + 8$

   e. $(y-1)^3$

   $(y-1)(y-1)(y-1) = (y-1)(y^2-2y+1) =$
   $y^3 - 2y^2 + y - y^2 + 2y - 1 =$
   $y^3 - 3y^2 + 3y - 1$

   c. $(x^2+5x-7)(2x^2-7x-9)$

   $2x^4 - 7x^3 - 9x^2 + 10x^3 - 35x^2$
   $-45x - 14x^2 + 49x + 63 =$
   $2x^4 + 3x^3 - 58x^2 + 4x + 63$

   f. $(a^2+3a-2)(2a^2-5a-1)$

   $2a^4 - 5a^3 - a^2 + 6a^3 - 15a^2 - 3a - 4a^2 + 10a + 2$
   $2a^4 + a^3 - 20a^2 + 7a + 2$

5. Find the area of the rectangle.

   $(2x+5)(2x-5) =$

   $4x^2 - 25$

   $2x+5$

   $2x-5$

6. Find the area of the triangle. $(A = \frac{1}{2}bh)$

   $\frac{1}{2}(4x)(3x-2) = 2x(3x-2) =$

   $6x^2 - 4x$

   $4x$

   $3x-2$

   $x+4$
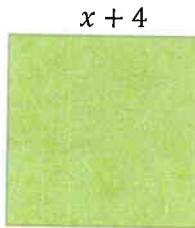
7. Find the area of the square.

   $(x+4)(x+4) = x^2 + 8x + 16$
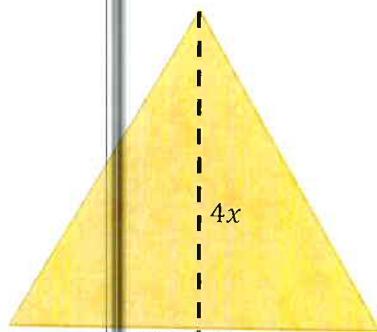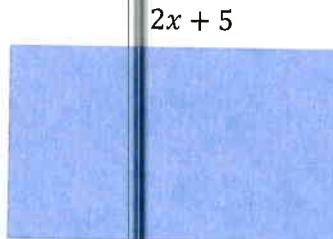
8. Simplify each expression by performing the indicated operation.

a. $(3x - 1)(10x - 6)$

$30x^2 - 18x - 10x + 6$

$30x^2 - 28x + 6$

e. ~~$(3x - 1)(10x - 6)$~~ $(3x - 1) + (10x - 6)$

$13x - 7$

b. $(2x - 1) - (10x - 7)$

$2x - 1 - 10x + 7$

$-8x + 6$

f. $(2x - 1)(10x - 7)$

$20x^2 - 14x - 10x + 7$

$20x^2 - 24x + 7$

c. $2(x + 4)$

$2x + 8$

g. $(x + 4)^2$

$x^2 + 8x + 16$

d. $(a + b)(a - b)$

$a^2 - b^2$

h. $(2x + 3y)(2x - 3y)$

$4x^2 - 9y^2$

9. Find the value of each of the following expressions and compare.

a. $(2 + 3)^2$ vs. $2^2 + 3^2$

$5^2 = 25$ $4 + 9 = 13$

b. $(8 + 10)^2$ vs. $8^2 + 10^2$

$18^2 = 324$ $64 + 100 = 164$

c. $(5 - 2)^2$ vs. $5^2 + 2^2$ vs. $5^2 - 2^2$

$3^2 = 9$ $25 + 4 = 29$ $25 - 4 = 21$

d. What can you say about $(x + y)^2$ and $x^2 + y^2$ in general? [Hint: are they always equal?]

they are not equal.