

Bell Ringer:

Choose your breath:

Initial (monitor breath's rhythm)

Heart/Belly

Calming (2 in, 4 out)

Energizing (4 in, 2 out)

Bell Ringer:

Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the n th day.

$$h(n) = 1.5n + 1.5$$

$$a_n = a_1 + d(n-1)$$

$$a_n = 3 + 1.5(n-1)$$

$$3 + 1.5n - 1.5$$

$$a_n = 1.5n + 1.5$$

Polynomials, as we saw in the last lesson, behave a lot like integers (whole numbers including the negatives). We saw that just like integers, **adding one polynomial to another polynomial results in a third polynomial**. The same will occur with multiplying them. First, a review problem.

Exercise #1: Monomials are the simplest of **polynomials**. They consists of one **term** (terms are separated by addition and subtraction). Find the following products of monomials.

(a) $5x^3 \cdot 2x^2 = 5 \cdot x^3 \cdot 2 \cdot x^2$ (b) $-3x^{-8} \cdot x \cdot x = x^{1+1}$ (c) $\frac{1}{2}x^2y^5 \cdot \frac{3}{4}x^9y$

$10x^5$ $24x^2$ $\frac{3}{8}x^{11}y^6$

We have also used the **Distributive Property** in previous lessons to multiply polynomials that are more complicated.

Exercise #2: Find each of the following products in simplest form by using the distributive property once or twice.

(a) $2x(3x-1)$ $6x^2-2x$

(b) $x^2(4x^2+3)$ $4x^4+3x^2$

(c) $-2x^2y^3(2xy-5x)$ $-4x^3y^4+10x^3y^3$

(d) $(x+2)(x-6)$ $x^2-6x+2x-12$

(e) $(2x+7)(x+3)$ $2x \cdot x + 2x \cdot 3 + 7 \cdot x + 7 \cdot 3$
 $2x^2+6x+7x+21$
 $2x^2+13x+21$

(f) $(3x-2)(5x-1)$

	$3x$	-2
$5x$	$15x^2$	$-10x$
-1	$-3x$	2

$15x^2-13x+2$

Never forget that as we do these manipulations we are using **properties of equality** to produce **equivalent expressions**.

Exercise #3: Consider the product of the two **binomial polynomials** $(x-1)(x-3)$.

(a) Find this product and express it as a **trinomial polynomial** written in standard form. Fill in the result in the first row (third column) of table (b).

(b) Fill out the table below using **TABLES** on your calculator to show they are equivalent.

Handwritten FOIL method grid for $(x-1)(x-3)$:

	x	-1
x	x^2	$-x$
-3	$-3x$	3

Resulting trinomial: $x^2 - 4x + 3$

x	$(x-1)(x-3)$	$x^2 - 4x + 3$
0	3	3
1	0	0
2	-1	-1
3	0	0
4	3	3

We can evaluate more complicated products, just as we have done in the past with normal numbers. The key will always be the careful use of the **distributive property**.

Exercise #4: Find each of the following more challenging products.

(a) $(2x+5)^2$

$(2x+5)(2x+5)$
 $4x^2 + 10x + 10x + 25$
 $4x^2 + 20x + 25$

(c) $(x-4)(x+3)(x-5)$

$(x^2 - x - 12)(x - 5)$
 $x^3 - x^2 - 12x - 5x^2 + 5x + 60$

$x^3 - 6x^2 - 7x + 60$

(b) $(x+2)(x^2+4x+3)$

	x^2	$4x$	3
x	x^3	$4x^2$	$3x$
2	$2x^2$	$8x$	6
$x^3 + 6x^2 + 11x + 6$			

(d) $(3x+2)^3 = (3x+2)(3x+2)(3x+2)$

	$9x^2$	$12x$	4
$3x$	$27x^3$	$36x^2$	$12x$
2	$18x^2$	$24x$	8
$27x^3 + 54x^2 + 36x + 8$			

Exercise #5: Consider the product $(3x+2)(2x+1)$.

(a) Write this product as an equivalent trinomial expression in standard form.

(b) How can you use your answer from (a) to evaluate the product $(32)(21)$? Find the product and check using your calculator.