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Lesson 9: Multiplying Polynomials

WARM-UP

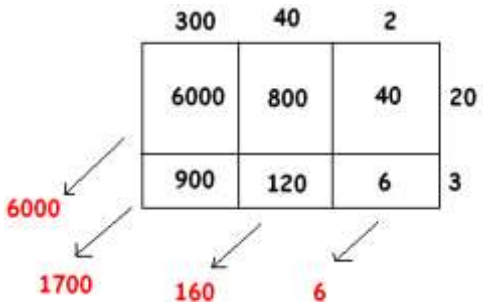
1. Find $(w^2 - w + 1) + (w^3 - 2w^2 + 99)$.

2. Is the sum of three polynomials always another polynomial?

LESSON

Exercise 1

a. Gisella computed 342×23 as follows:



Can you explain what she is doing? What is her final answer?

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Use a geometric diagram to compute the following products:

b. $(3x^2 + 4x + 2) \times (2x + 3)$

c. $(2x^2 + 10x + 1)(x^2 + x + 1)$

d. $(x - 1)(x^3 + 6x^2 - 5)$

What do you notice about the terms along the diagonals in the rectangles you drew?

Could we have found this product without the aid of a geometric model? What would that look like?

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Exercise 2

Multiply the polynomials using the distributive property: $(3x^2 + x - 1)(x^4 - 2x + 1)$

Exercise 3

The expression $10x^2 + 6x^3$ is the result of applying the distributive property to the expression $2x^2(5 + x)$. It is also the result of the applying the distributive property to $2(5x^2 + 3x^3)$ or to $x(10x + 6x^2)$, for example, or even to $1 \cdot (10x^2 + 6x^3)$!

For (i) to (x) below, write down an expression such that if you applied the distributive property to your expression it will give the result presented. Give interesting answers!

i. $6a + 14a^2$

ii. $2x^4 + 2x^5 + 2x^{10}$

iii. $6z^2 - 15z$

iv. $42w^3 - 14w + 77w^5$

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v. $z^2(a+b)+z^3(a+b)$

Exercise 4

Sammy wrote a polynomial using only one variable, x, of degree 3. Myisha wrote a polynomial in the same variable of degree 5. What can you say about the degree of the product of Sammy and Myisha's polynomials?

CLOSING

Is the product of two polynomials sure to be another polynomial?

Is a polynomial squared sure to be another polynomial?

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PROBLEM SET

1. Use the distributive property to write each of the following expressions as the sum of monomials.
   a. $3a(4+a)$
   b. $x(x+2)+1$
   c. $4x(x^3-10)$
   d. $(x-4)(x+5)$
   e. $(2z-1)(3z^2+1)$
   f. $(10w-1)(10w+1)$
   g. $(-5w-3)w^2$
   h. $(x^2-x+1)(x-1)$
   i. $3xz(9xy+z)-2yz(x+y-z)$
   j. $(t-1)(t+1)(t^2+1)$
   k. $(w+1)(w^4-w^3+w^2-w+1)$

2. Use the distributive property (and your wits!) to write each of the following expressions as a polynomial in standard form.
   a. $(s^2+4)(s-1)$
   b. $3(s^2+4)(s-1)$
   c. $s(s^2+4)(s-1)$
   d. $(s+1)(s^2+4)(s-1)$
   e. $(u-1)(u^5+u^4+u^3+u^2+u+1)$