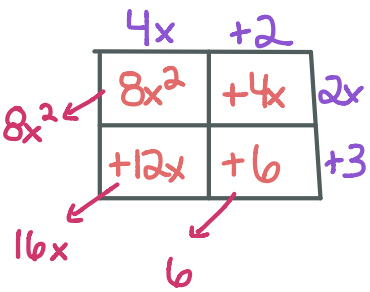
NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

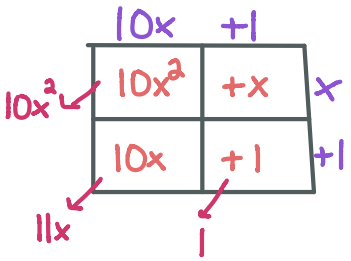
Use an area model to compute the following products:

1. $(4x + 2)(2x + 3)$



$8x^2+16x+6$

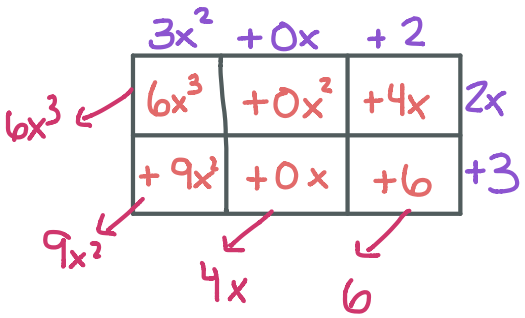
2. $(10x + 1)(x + 1)$



$10x^2+11x+1$

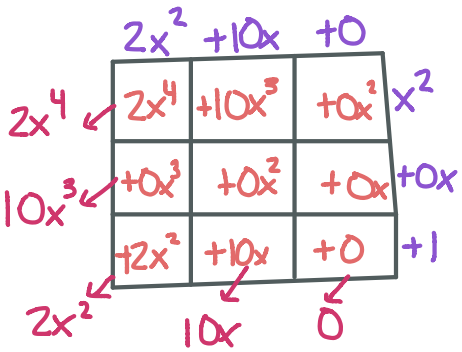
Hint: For Problems 3 and 4, use 0-terms as shown in Exercise 13.

3. $(3x^2 + 2)(2x + 3)$



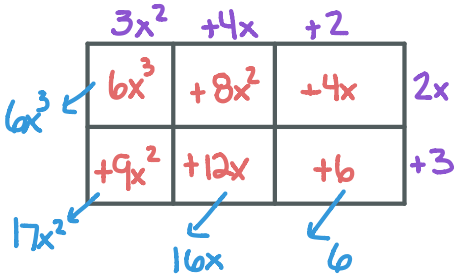
$6x^3+9x^2+4x+6$

4. $(2x^2 + 10x)(x^2 + 1)$



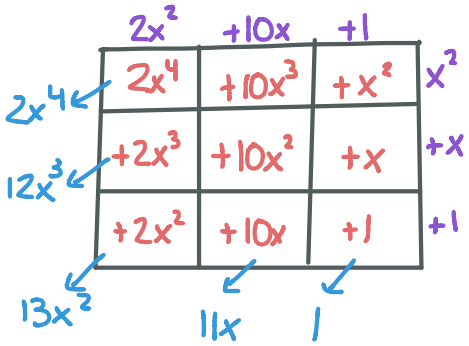
$2x^4+10x^3+2x^2+10x$

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



$6x^3+17x^2+16x+6$

6. $(2x^2 + 10x + 1)(x^2 + x + 1)$



$2x^4+12x^3+13x^2+11x+1$

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

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

$3x^6-6x^3+3x^2+x^5-2x^2+x-x^4+2x-1$

$3x^6+x^5-x^4-6x^3+x^2+3x-1$

8. 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's and Myisha's polynomials?

$(x^3+\dots)(x^5+\dots)=x^8+\dots$

The degree of the polynomial would be 8

Use either method to write each of the following expressions as the sum of monomials.

9. $3a(4 + a)$

$12a+3a^2$

$3a^2+12a$

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

x^2+2x+1

11. $(x - 4)(x + 5)$

$x^2+5x-4x-20$

x^2+x-20

12. $(2z - 1)(3z^2 + 1)$

$6z^3+2z-3z^2-1$

$6z^3-3z^2+2z-1$

13. $(10w - 1)(10w + 1)$

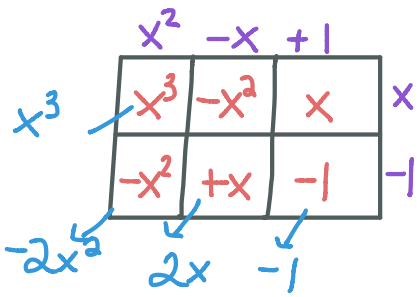
$100w^2+10w-10w-1$

$100w^2-1$

14. $(-5w - 3)w^2$

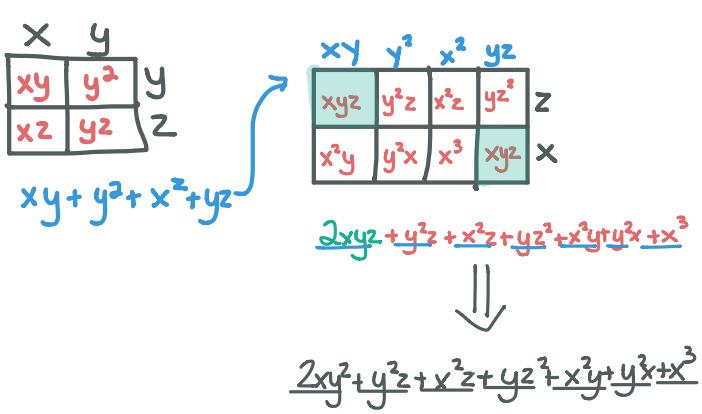
$-5w^3-3w^2$

15. $(x^2 - x + 1)(x - 1)$

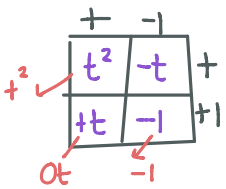


x^3-2x^2+2x-1

16. $(x + y)(y + z)(z + x)$



17. $(t - 1)(t + 1)(t^2 + 1)$



$(t^2-1)(t^2+1)$

$t^4 + t^2 - t^2 - 1$

$\boxed{t^4-1}$

18. $(w + 1)(w^4 - w^3 + w^2 - w + 1)$

$w(w^4-w^3+w^2-w+1) = w^5 - w^4 + w^3 - w^2 + w$

$+1\,|\,(w^4-w^3+w^2-w+1) = w^4 - w^3 + w^2 - w + 1$

$\boxed{w^5+1}$

Be careful here!

You'll need to multiply each term separately. Then combine like terms.

19. $z(2z + 1)(3z - 2)$

$(2z^2+z)(3z-2)$

$6z^3 - 4z^2 + 3z^2 - 2z$

$6z^3 - z^2 - 2z$

20. $3xz(9xy + z) - 2yz(x + y - z)$

$27x^2yz + 3xz^2 - 2xyz + 2y^2z + 2yz^2$

21. Use the distributive property (and your wits!) to write each of the following expressions as a sum of monomials. If the resulting polynomial is in one variable, write the polynomial in standard form.

A. $(a + b)^2$

$(a+b)(a+b)$
$a^2+2ba+b^2$

B. $(a + 1)^2$

$(a+1)(a+1)$
a^2+2a+1

C. $(3 + b)^2$

$(3+b)(3+b)$
$9+6b+b^2$

D. $(3 + 1)^2$

$(3+1)(3+1)$
$9+6+1$
16

E. What do you notice about all of these problems? Is there a pattern?

17A is the pattern

22. Andrew started to multiply the polynomials, $(x - 1)$ and $(x^3 + 6x^2 - 5)$, using the distributive property. Examine Andrew's work and then complete the problem.

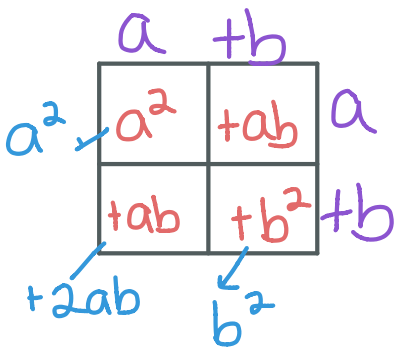
$(x - 1) \cdot (x^3 + 6x^2 - 5) =$

$x \cdot (x^3 + 6x^2 - 5) - 1(x^3 + 6x^2 - 5) =$

$x^4+6x^3-5x-x^3-6x^2+5 = \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_$

$x^4+5x^3-6x^2-5x+5$

23. Leela is convinced that $(a + b)^2 = a^2 + b^2$. Use an area model to explain to her why she is wrong.



$a^2 + 2ab + b^2$

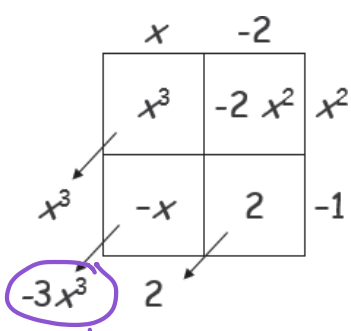
24. Sara started to use the area model to multiply $(x - 2)$ by $(x^2 - 1)$. Explain where Sara went wrong in her area model. What could she have done to prevent this mistake?

Sara should have used a placeholder in the expression

$(x^2 - 1)$

$\rightarrow x^2 + 0x - 1$

↑ placeholder



cannot be combined (not like terms)

Challenge Problems

25. $(x + y + z)^2$

$(x+y+z)(x+y+z)$

	x	y	z
x	x^2	xy	xz
y	xy	y^2	yz
z	xz	yz	z^2

$x^2+2xy+2xz+2yz+y^2+z^2$

26. $(x + 1 + z)^2$

$(x+1+z)(x+1+z)$

x^2+x+xz
$x+1+z$
$xz+z+z^2$

$x^2+2x+2xz+2z+z^2+1$

27. The expression $10x^2 + 6x^3$ is the result of applying the distributive property to the expression $2x^2(5 + 3x)$. It is also the result of 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 (A) to (E) below, write down an expression such that if you applied the distributive property to your expression, it would give the result presented. Give interesting answers!

sample answers

Example: $10x^2 + 6x^3$ can be written as:
$2x^2(5 + 3x)$

A. $6a + 14a^2$ can be written as:

$2a(3+7a)$

B. $2x^4 + 2x^5 + 2x^{10}$ can be written as:

$2x^4(1+x+x^6)$

C. $6z^2 - 15z$ can be written as:

$3z(2z-5)$

D. $42w^3 - 14w + 77w^5$ can be written as:

$7w(6w^2-2+11w^4)$

*E. $z^2(a + b) + z^3(a + b)$ can be written as:

$z((a+b)+z(a+b))$