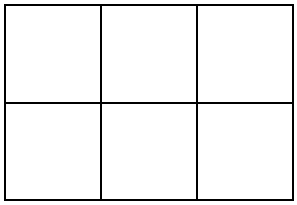
Lesson 3: The Division of Polynomials

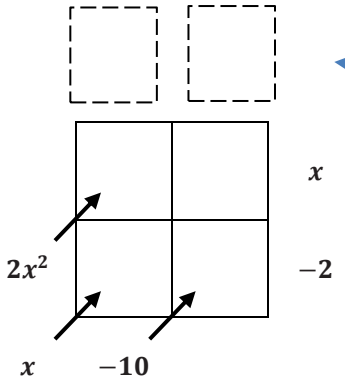
Exploratory Challenge

1. Does $\frac{2x^3+15x^2+27x+5}{2x+5} = (x^2 + 5x + 1)$? Justify your answer.



2. Describe the process you used to determine your answer to Exercise 1.

3. Reverse the tabular method of multiplication to find the quotient: $\frac{2x^2+x-10}{x-2}$.



What values go into these spaces that make this true?

4. Test your conjectures. Create your own table and use the *reverse tabular method* to find the quotient.

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

5. How can we predict the number of boxes that we will need to do this division?

6. Test your conjectures. Use the *reverse tabular method* to find the quotient.

$$\frac{3x^5 - 2x^4 + 6x^3 - 4x^2 - 24x + 16}{x^2 + 4}$$

7. What is the quotient of $\frac{x^5-1}{x-1}$? What is the quotient of $\frac{x^6-1}{x-1}$?

HINT:

- The number of rows will be one MORE than the degree of bottom polynomial.
- The number of Columns will be one MORE than the difference between the degree of the numerator and the denominator.

Problem Set

Use the reverse tabular method to solve these division problems. **Choose at least 3, (one from each box) for homework!**

1. $\frac{2x^3+x^2-16x+15}{2x-3}$

2. $\frac{3x^5+12x^4+11x^3+2x^2-4x-2}{3x^2-1}$

3. $\frac{x^3-4x^2+7x-28}{x^2+7}$

4. $\frac{x^4-2x^3-29x-12}{x^3+2x^2+8x+3}$

5. $\frac{6x^5+4x^4-6x^3+14x^2-8}{6x+4}$

6. $\frac{x^3-8}{x-2}$

Complete all of the questions below (7, 8 and 9)

7. $\frac{x^3+2x^2+2x+1}{x+1}$

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

9. Use the results of Problems 7 and 8 to predict the quotient of $\frac{x^5+2x^4+2x^3+2x^2+2x+1}{x+1}$.

   Explain your prediction. Then check your prediction using the reverse tabular method. Please use complete sentences.

10. Use the results of Problems 7–9 above to predict the quotient of $\frac{x^4-2x^3+2x^2-2x+1}{x-1}$. Explain your prediction. Then check your prediction using the reverse tabular method.

11. Make and test a conjecture about the quotient of $\frac{x^6+x^5+2x^4+2x^3+2x^2+x+1}{x^2+1}$. Explain your reasoning.

12. Consider the following quotients:

$$\frac{4x^2+8x+3}{2x+1} \text{ and } \frac{483}{21}$$

a. How are these expressions related?

b. Find each quotient.

c. Explain the connection between the quotients.