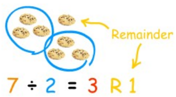
What’s the Remainder?

Name:_______________________________



What happens when you divide polynomials? We will divide polynomials in many different ways to explore new techniques and make connections between remainders and factors.

1. Use the area box method to multiply $(3x + 2)(x^2 + 3x + 4)$

2. If we know $(x + 1)$ is a factor of $(x^3 - 4x^2 - x + 4)$, how can we use the box to figure out the remaining factors?

x	x^3		
1			

3. Did this divide evenly? What does this mean?

4. Can you factor any further to find out the other roots of the polynomial? If so, write the completely factored polynomial below.

5. Use the same method to divide: $(x^3 - 4x^2 - x + 4)$ by $(x - 3)$.

6. What do you notice about the constant term? How can you make the answer more correct?

7. Given $f(x) = x^3 - 4x^2 - x + 4$
    a. Use your work above to identify the x-intercepts.

    b. Find $f(-1)$. Show your work.

    c. Find $f(3)$. Show your work.

8. Now compare these to the remainders from #3 and #6. Make a conjecture about how evaluating a function and dividing are connected.

Lesson 2.3 Day 1—Factor and Remainder Theorem

Important Ideas:

Check Your Understanding

1. Divide: $(x^3 + 2x^2 - 5x + 4) \div (x^2 + 3x - 2)$

2. Divide: $(x^3 + 2x^2 - 5x + 4) \div (x - 4)$

3. Is $(x + 2)$ a factor of $(x^3 + 8x^2 - 2x + 3)$? How do you know?

4. **SAT Practice!**

   For a polynomial $p(x)$, the value of $p(3)$ is -2.
   Which of the following must be true about $p(x)$?

   A) $x - 5$ is a factor of $p(x)$.

   B) $x - 2$ is a factor of $p(x)$.

   C) $x + 2$ is a factor of $p(x)$.

   D) The remainder when $p(x)$ is divided by $x - 3$ is -2.