By the end of the lesson you will:

- Divide a polynomial by a monomial.
- Divide polynomials using long division.
- Divide polynomials using synthetic division.
- Divide polynomial functions.
- Use the Remainder and Factor Theorems.

STEPS FOR SYNTHETIC DIVISION:

Step 1: Rewrite the dividend in descending order of power (if necessary). Copy the coefficients of the dividend, putting in a zero for any missing powers of x.

Step 2: Insert the division symbol. Rewrite the divisor in the form x-c (for instance, if it's x+c, rewrite as x-(-c)). Insert the value of c to the left of the division symbol.

Step 3: Bring the first coefficient of the dividend down two rows and enter it in row 3.

Step 4: Multiply the last entry in row 3 by the value of c and place the result in row 2, but one column to the right.

Step 5: Add the entry in Row 2 to the entry above it in Row 1 and enter the sum in row 3.

Step 6:   Repeat steps 4 and 5 until there aren't any more entries left in Row 1.

Step 7: The last entry in row 3 is the remainder. The other entries in row 3 are the coefficients of the answer in descending order.

Example E) Use synthetic division to find the quotient and remainder. $2x^3 - 3x^2 - 4x + 11$ *divided by* $x + 2$

DIVIDING POLYNOMIAL FUNCTIONS

If f and g are functions, then the quotient f/g is the function defined by

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}, \qquad g(x) \neq 0$$

Example F) $f(x) = x^3 - 2x^2 - 4x - 5$ and $g(x) = x + 2$.

Find $\left(\frac{f}{g}\right)(x)$ and $\left(\frac{f}{g}\right)(2)$

Rational Exponents

Fraction exponents, called **rational exponents**, are another way to represent roots. For rational exponents, the *numerator* represents the power, and the *denominator* represents the root.

$$a^{\frac{1}{m}} = \sqrt[m]{a}$$

$$5^{\frac{1}{3}} = \sqrt[3]{5}$$

$$a^{\frac{n}{m}} = \sqrt[m]{a^n} = \left(\sqrt[m]{a}\right)^n$$

$$5^{\frac{2}{3}} = \sqrt[3]{5^2} = \left(\sqrt[3]{5}\right)^2$$

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Examples:

a.) $36^{\frac{1}{2}} =$

b.) $64^{\frac{1}{3}} =$

c.) $36^{\frac{3}{2}} =$

d.) $27^{\frac{4}{3}} =$

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Examples:

e.) $9^{\frac{3}{2}} =$

f.) $27^{\frac{2}{3}} =$

g.) $49^{-\frac{1}{2}} =$

h.) $\left(\frac{1}{8}\right)^{-\frac{1}{3}} =$

Homework:

Pg. 386: #13, 17, 19, 25, 29, 31, 37, 39, 43, 49, 51, 55, 61, 63, 67, 71, 73, 77, 81, 85, 95

&

Pg. 390: #2-10 all

AND

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