Math Virtual Learning

Algebra 2A

Polynomial Long Division, Day 2

April 16, 2020

Lesson:

Polynomial Long Division

Learning Target:

LT D2 I can perform polynomial division (long and synthetic) and apply the remainder theorem.

Objective:

Students will be able to long divide polynomials with a divisor that has a degree greater then 1.

Warm up

Today for the warm up, review and practice the skills we learned last week.

1. $(2x^3 - x^4 + 3x - 12) + (21x^4 + 5x^2 - 11x - 8)$
2. $(4x - 11)(2x^2 + 6)$
3. $(8x^2 + 6x + 3) \div (4x + 1)$

Warm Up

Check Your Answers

1. $20x^4 + 2x^3 + 5x^2 - 8x - 20$
2. $8x^3 - 22x^2 + 24x - 66$
3. $2x + 1 + \frac{2}{4x+1}$

Lesson

Today we will be focusing on long dividing with polynomials with degrees greater than 2. The process will be the same as what we did yesterday. If you need to, watch the review video from yesterday. Then watch today's and complete the 4 practice problems.

Review of Yesterday: Intro To Long Dividing of Polynomials

Today's Video: Dividing Polynomials with Remainders

Practice

$$\frac{2x^3 - 4x + 7x^2 + 7}{x^2 + 2x - 1}$$

$$\frac{3x^4 + 9x^3 - 5x^2 - 6x + 2}{3x^2 - 2}$$

$$\frac{2x^4 - 5x^3 + 2x^2 + 5x - 10}{x - 2}$$

$$\frac{12x^3 - 11x^2 + 9x + 18}{4x + 3}$$

Here are four problems for you to try. Check your answers on the next slides when you have first tried the problem on your own.

Set up your problem in descending order

Step 1. $x^2 \cdot 2x = 2x^3$

Stack over like terms

Step 2. Multiply

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

Step 3. Subtract Down

your first term will be zero

Step 4. Drop down & Repeat

$$
\begin{array}{r}
2x+3 \\
x^2+2x-1 \overline{\big) 2x^3+7x^2-4x+7} \\
\ominus\ \underline{2x^3+4x^2-2x} \\
0x^3+3x^2-2x+7 \\
\ominus\ \underline{3x^2+6x-3} \\
-8x+10
\end{array}
$$

Goal

$$\boxed{\text{Answer: } 2x+3+\frac{-8x+10}{x^2+2x-1}}$$

$$
\begin{array}{r}
x^2 + 3x - 1 \\
3x^2 - 2 \overline{\big) 3x^4 + 9x^3 - 5x^2 - 6x + 2} \\
\ominus \quad \underline{\cancel{3x^4} \qquad\quad - 2x^2 \qquad \downarrow} \\
9x^3 - 3x^2 - 6x + 2 \\
\ominus \quad \underline{\cancel{9x^3} \qquad\quad - 6x \qquad \downarrow} \\
-3x^2 + 0x + 2 \\
\ominus \quad \underline{-3x^2 \qquad\quad + 2} \\
0
\end{array}
$$

Work

$3x^2 \cdot \underline{x^2} = 3x^4$

$3x^2 \cdot \underline{3x} = 9x^3$

$3x^2 \cdot \underline{-1} = -3x^2$

$$\boxed{\text{Answer}: x^2 + 3x - 1}$$

$$
\begin{array}{r}
2x^3 - x^2 \qquad\qquad + 5 \\
x-2 \overline{\big) 2x^4 - 5x^3 + 2x^2 + 5x - 10} \\
\ominus \quad \underline{2x^4 - 4x^3} \qquad\qquad \downarrow \\
-x^3 + 2x^2 + 5x - 10 \\
\ominus \quad \underline{-x^3 + 2x^2} \\
0x^2 + 5x - 10 \\
\ominus \quad \underline{5x - 10} \\
0
\end{array}
$$

Work

$x \cdot \underline{2x^3} = 2x^4$

$x \cdot \underline{-x^2} = -x^3$

$x \cdot \underline{5} = 5x$

$\boxed{\text{Answer: } 2x^3 - x^2 + 5}$

$$
\begin{array}{r}
3x^2 - 5x + 6 \\
4x+3 \overline{\big) 12x^3 - 11x^2 + 9x + 18} \\
\ominus \quad \underline{12x^3 + 9x^2} \qquad\qquad \downarrow \\
-20x^2 + 9x + 18 \\
\ominus \quad \underline{-20x^2 - 15x} \qquad \downarrow \\
24x + 18 \\
\ominus \quad \underline{24x + 18} \\
0
\end{array}
$$

Work

$4x \cdot \underline{3x^2} = 12x^3$

$4x \cdot \underline{-5x} = -20x^2$

$4x \cdot \underline{6} = 24x$

$\boxed{\text{Answer: } 3x^2 - 5x + 6}$

Additional Practice

Division of Polynomials

Khan Academy