Unit 2 Lesson 13: Polynomial Division (Part 2)

1 Notice and Wonder: Different Divisions (Warm up)

Student Task Statement

What do you notice? What do you wonder?

$$\begin{array}{r} 2 \\ 11\overline{)2772} \\ \underline{22} \\ 5 \end{array}$$

$$\begin{array}{r} 25 \\ 11\overline{)2772} \\ \underline{22} \\ 57 \\ \underline{55} \\ 2 \end{array}$$

$$\begin{array}{r} 252 \\ 11\overline{)2772} \\ \underline{22} \\ 57 \\ \underline{55} \\ 22 \\ \underline{22} \\ 0 \end{array}$$

$$\begin{array}{r} 2x^2 \\ x+1\overline{)2x^3+7x^2+7x+2} \\ \underline{-2x^3-2x^2} \\ 5x^2+7x \end{array}$$

2 Polynomial Long Division

Student Task Statement

1. Diego used the long division shown here to figure out that $6x^2 - 7x - 5 = (2x + 1)(3x - 5)$. Show what it would look like if he had used a diagram.

$$
\begin{array}{r}
3x - 5 \\
2x + 1 \overline{)\,6x^2 - 7x - 5} \\
\underline{-6x^2 - 3x} \\
-10x - 5 \\
\underline{10x + 5} \\
0
\end{array}
$$

$2x$	$6x^2$	
1		

Pause here for a whole-class discussion.

2. $(x - 2)$ is a factor of $2x^3 - 7x^2 + x + 10$, which means there is some other factor A where $2x^3 - 7x^2 + x + 10 = (x - 2)(A)$. Finish the division started here to find the value of A.

$$
\begin{array}{r}
2x^2 \\
x - 2 \overline{)\,2x^3 - 7x^2 + x + 10} \\
\underline{-2x^3 + 4x^2}
\end{array}
$$

3. Jada used the diagram shown here to figure out that $2x^3 + 13x^2 + 16x + 5 = (2x + 1)(x^2 + 6x + 5)$. Show what it would look like if she had used long division.

	x^2	$6x$	5
$2x$	$2x^3$	$12x^2$	$10x$
1	x^2	$6x$	5

$$2x + 1 \overline{)\,2x^3 + 13x^2 + 16x + 5}$$

3 More Long Division

Student Task Statement

Here are some polynomial functions with known factors. Rewrite each polynomial as a product of linear factors using long division.

1. $A(x) = x^3 - 7x^2 - 16x + 112, (x - 7)$

$$
\begin{array}{r}
x^2 \\
x - 7 \overline{)\, x^3 - 7x^2 - 16x + 112} \\
\underline{-x^3 + 7x^2} \\
\end{array}
$$

2. $C(x) = x^3 - 3x^2 - 13x + 15, (x + 3)$

4 Missing Numbers (Optional)

Student Task Statement

Here are pairs of equivalent expressions, one in standard form and the other in factored form. Find the missing numbers.

1. $x^2 + 9x + 14$ and $(x + 2)(x + \square)$
2. $x^2 - 9x + 20$ and $(x - \square)(x - \square)$
3. $2x^2 + 2x - 24$ and $2(x + \square)(x - 3)$
4. $\square x^3 + 11x^2 - 17x + 6$ and $(-x + 3)(2x - 1)(x - 2)$
5. $6x^3 + 2x^2 - 16x + 8$ and $(x - 1)(2x + 4)(\square x - 2)$
6. $2x^3 + 7x^2 - 7x - 12$ and $(2x - 3)(x + \square)(x + \square)$
7. $x^3 + 6x^2 + \square x - 10$ and $(x + 2)(x - 1)(x + \square)$