Unit 2 Lesson 15: The Remainder Theorem

1 Notice and Wonder: Division Leftovers (Warm up)

Student Task Statement

What do you notice? What do you wonder?

$$\begin{array}{r} 33 \\ 10\overline{)330} \\ \underline{300} \\ 30 \\ \underline{30} \\ 0 \end{array}$$

$$\begin{array}{r} 82 \\ 4\overline{)330} \\ \underline{320} \\ 10 \\ \underline{8} \\ 2 \end{array}$$

$$\begin{array}{r} 66 \\ 5\overline{)330} \\ \underline{300} \\ 30 \\ \underline{30} \\ 0 \end{array}$$

A. $330 = 33(10) + 0$

B. $330 = 4(82) + 2$

C. $330 = 5(66) + 0$

2 The Unknown Coefficient

Student Task Statement

Consider the polynomial function $f(x) = x^4 - ux^3 + 24x^2 - 32x + 16$ where u is an unknown real number. If $x - 2$ is a factor, what is the value of u? Explain how you know.

3 A Study of Remainders

Student Task Statement

1. Which of these polynomials could have $(x - 2)$ as a factor?
   a. $A(x) = 6x^2 - 7x - 5$

   b. $B(x) = 3x^2 + 15x - 42$

   c. $C(x) = 2x^3 + 13x^2 + 16x + 5$

   d. $D(x) = 3x^3 - 2x^2 - 15x + 14$

   e. $E(x) = 8x^4 - 41x^3 - 18x^2 + 101x + 70$

   f. $F(x) = x^4 + 5x^3 - 27x^2 - 101x - 70$

2. Select one of the polynomials that you said doesn't have $(x - 2)$ as a factor.
   a. Explain how you know $(x - 2)$ is not a factor.

   b. If you have not already done so, divide the polynomial by $(x - 2)$. What is the remainder?

3. List the remainders for each of the polynomials when divided by $(x - 2)$. How do these values compare to the value of the functions at $x = 2$?