

## 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  $x = 2$ ?