## 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?



A. $330=33\left(10\right)+0$



B. $330=4\left(82\right)+2$



C. $330=5\left(66\right)+0$

### 2 The Unknown Coefficient

#### Student Task Statement

Consider the polynomial function $f\left(x\right)=x^{4}−ux^{3}+24x^{2}−32x+16$ 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 $\left(x−2\right)$ as a factor?
	1. $A\left(x\right)=6x^{2}−7x−5$
	2. $B\left(x\right)=3x^{2}+15x−42$
	3. $C\left(x\right)=2x^{3}+13x^{2}+16x+5$
	4. $D\left(x\right)=3x^{3}−2x^{2}−15x+14$
	5. $E\left(x\right)=8x^{4}−41x^{3}−18x^{2}+101x+70$
	6. $F\left(x\right)=x^{4}+5x^{3}−27x^{2}−101x−70$
2. Select one of the polynomials that you said doesn’t have $\left(x−2\right)$ as a factor.
	1. Explain how you know $\left(x−2\right)$ is not a factor.
	2. If you have not already done so, divide the polynomial by $\left(x−2\right)$. What is the remainder?
3. List the remainders for each of the polynomials when divided by $\left(x−2\right)$. How do these values compare to the value of the functions at $x=2$?



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