1.1 Dividing a Polynomial by a Binomial

Lesson Organizer
60 – 75 min

Key Math Concepts
Polynomials can be divided by binomials using long division or synthetic division. If the remainder is 0, the binomial is a factor of the polynomial.

Curriculum Focus

SO	AI
RF11	11.1, 11.2

Processes: C, CN, ME

Teacher Materials
- scientific calculator (*optional*)

Student Materials
- scientific calculator
- graphing calculator (*optional*)

Vocabulary
division statement, synthetic division

TEACHER NOTE

DI: Common Difficulties
Students may have forgotten how to do long division. You may need to review the process before students complete *Get Started*.

TEACHER NOTE

For *Get Started*, ensure students understand the meanings of the terms dividend, divisor, quotient, and remainder.

FOCUS Use different strategies to divide a polynomial by a binomial.

Get Started

Use long division to determine each quotient. Verify the answer.

$2748 \div 13$

$$\begin{array}{r} 211 \\ 13\overline{)2748} \\ \underline{26} \\ 14 \\ \underline{13} \\ 18 \\ \underline{13} \\ 5 \end{array}$$

$2748 \div 13 = 211\text{ R}5$
Verify:
$211 \times 13 + 5 = 2748$

$4212 \div 27$

$$\begin{array}{r} 156 \\ 27\overline{)4212} \\ \underline{27} \\ 151 \\ \underline{135} \\ 162 \\ \underline{162} \\ 0 \end{array}$$

$4212 \div 27 = 156$
Verify:
$156 \times 27 = 4212$

What does a remainder of 0 mean?

When the remainder is 0, the divisor is a factor of the dividend.

Construct Understanding

Divide. Assume each divisor never equals zero.

Compare the strategies you used with those for dividing real numbers.

$(3x^2 - 4x + 5) \div (x - 2)$ $(2x^3 - x^2 - 2x + 1) \div (x + 1)$

$$\begin{array}{r} 3x + 2 \\ x - 2\overline{)3x^2 - 4x + 5} \\ \underline{3x^2 - 6x}\phantom{{}+5} \\ 2x + 5 \\ \underline{2x - 4} \\ 9 \end{array}$$

$(3x^2 - 4x + 5) \div (x - 2)$
$= 3x + 2\text{ R}9$

$$\begin{array}{r} 2x^2 - 3x + 1 \\ x + 1\overline{)2x^3 - x^2 - 2x + 1} \\ \underline{2x^3 + 2x^2}\phantom{{}-2x+1} \\ -3x^2 - 2x\phantom{{}+1} \\ \underline{-3x^2 - 3x}\phantom{{}+1} \\ x + 1 \\ \underline{x + 1} \\ 0 \end{array}$$

$(2x^3 - x^2 - 2x + 1) \div (x + 1)$
$= 2x^2 - 3x + 1$