

8. Use synthetic division to divide. Write the division statement.

a) $(-21x^2 + 5x^4 - 12 - 40x + 12x^3) \div (x + 3)$

Write the polynomial in descending order:

$$5x^4 + 12x^3 - 21x^2 - 40x - 12$$

$$\begin{array}{r|rrrrrr} -3 & 5 & 12 & -21 & -40 & -12 \\ & & -15 & 9 & 36 & 12 \\ \hline & 5 & -3 & -12 & -4 & 0 \end{array}$$

$$5x^4 + 12x^3 - 21x^2 - 40x - 12 = (x + 3)(5x^3 - 3x^2 - 12x - 4)$$

b) $(-11x^3 + 6x^4 + 5 - x^5) \div (1 + x)$

Write the polynomial and binomial in descending order:

$$(-x^5 + 6x^4 - 11x^3 + 5) \div (x + 1)$$

Use zeros as placeholders.

$$\begin{array}{r|rrrrrrr} -1 & -1 & 6 & -11 & 0 & 0 & 5 \\ & & 1 & -7 & 18 & -18 & 18 \\ \hline & -1 & 7 & -18 & 18 & -18 & 23 \end{array}$$

$$-x^5 + 6x^4 - 11x^3 + 5 = (x + 1)(-x^4 + 7x^3 - 18x^2 + 18x - 18) + 23$$

9. Divide the polynomial $2x^5 - x^4 + 2x^3 - 3x^2 + 2x + 10$ by each binomial.

a) $x - 2$

$$\begin{array}{r|rrrrrr} 2 & 2 & -1 & 2 & -3 & 2 & 10 \\ & & 4 & 6 & 16 & 26 & 56 \\ \hline & 2 & 3 & 8 & 13 & 28 & 66 \end{array}$$

$$\text{Result: } 2x^4 + 3x^3 + 8x^2 + 13x + 28 \text{ R}66$$

b) $4 + x$

Write the binomial in descending order: $x + 4$

$$\begin{array}{r|rrrrrr} -4 & 2 & -1 & 2 & -3 & 2 & 10 \\ & & -8 & 36 & -152 & 620 & -2488 \\ \hline & 2 & -9 & 38 & -155 & 622 & -2478 \end{array}$$

$$\text{Result: } 2x^4 - 9x^3 + 38x^2 - 155x + 622 \text{ R}(-2478)$$

TEACHER NOTE

Achievement Indicator

Questions 8 and 9 address AI 11.2: Divide a polynomial expression by a binomial expression of the form $x - a$, $a \in I$, using long division or synthetic division.