

6. A polynomial is divided by $x - 3$. The quotient is $x^2 + 5x - 2$ and the remainder is -3 . What is the original polynomial?

Multiply the quotient by the divisor, then add the remainder.

$$\begin{aligned}(x - 3)(x^2 + 5x - 2) + (-3) \\ = x^3 + 5x^2 - 2x - 3x^2 - 15x + 6 - 3 \\ = x^3 + 2x^2 - 17x + 3\end{aligned}$$

The original polynomial is: $x^3 + 2x^2 - 17x + 3$

B

7. Use long division to divide. Write the division statement.

a) $(-8x^2 - 27x + 4x^3 + 45) \div (x - 3)$

Write the polynomial in descending order:

$$\begin{array}{r} 4x^3 - 8x^2 - 27x + 45 \\ x - 3 \overline{) 4x^3 - 8x^2 - 27x + 45} \\ \underline{4x^3 - 12x^2} \\ 4x^2 - 27x \\ \underline{4x^2 - 12x} \\ -15x + 45 \\ \underline{-15x + 45} \\ 0 \end{array}$$

$$4x^3 - 8x^2 - 27x + 45 = (x - 3)(4x^2 + 4x - 15)$$

b) $(-7x + 2x^4 + 13x^3) \div (x + 2)$

Write the polynomial in descending order:

$$2x^4 + 13x^3 - 7x$$

Use zeros as placeholders.

$$\begin{array}{r} 2x^3 + 9x^2 - 18x + 29 \\ x + 2 \overline{) 2x^4 + 13x^3 + 0x^2 - 7x + 0} \\ \underline{2x^4 + 4x^3} \\ 9x^3 + 0x^2 \\ \underline{9x^3 + 18x^2} \\ -18x^2 - 7x \\ \underline{-18x^2 - 36x} \\ 29x + 0 \\ \underline{29x + 58} \\ -58 \end{array}$$

$$2x^4 + 13x^3 - 7x = (x + 2)(2x^3 + 9x^2 - 18x + 29) - 58$$

TEACHER NOTE

Remind students to write the polynomial in descending order and to include a 0 for any term that is missing.

TEACHER NOTE

Achievement Indicator

Question 7 addresses AI 11.2: Divide a polynomial expression by a binomial expression of the form $x - a$, $a \in \mathbb{I}$, using long division or synthetic division.