

5.8

Division of a Polynomial by a Binomial with Remainder

• Example 1

Divide $4x^2 - 8x + 11$ by $2x - 3$.

$$\begin{array}{r}
 \overline{2x-1} \text{ Quotient} \\
 2x-3 \overline{)4x^2-8x+11} \\
 \underline{4x^2-6x} \\
 -2x+11 \\
 \underline{-2x+3} \\
 8 \text{ Remainder}
 \end{array}$$

This result can be written as $4x^2 - 8x + 11 = (2x - 1)(2x - 3) + 8$, or, equivalently,

$$\begin{aligned}
 & \frac{4x^2 - 8x + 11}{2x - 3} \\
 &= \underbrace{2x - 1}_{\text{Quotient}} + \frac{8}{2x - 3}
 \end{aligned}$$

← Remainder
← Divisor

• • • CHECK YOURSELF 1

Divide.

$$(6x^2 - 7x + 15) \div (3x - 5)$$

• Example 2

Divide $6x^3 + x^2 - 4x - 5$ by $3x - 1$.

$$\begin{array}{r}
 2x^2 + x - 1 \\
 3x - 1 \overline{) 6x^3 + x^2 - 4x - 5} \\
 \underline{6x^3 - 2x^2} \\
 3x^2 - 4x \\
 \underline{3x^2 - x} \\
 -3x - 5 \\
 \underline{-3x + 1} \\
 -6
 \end{array}$$

This result can be written as $6x^3 + x^2 - 4x - 5 = (2x^2 + x - 1)(3x - 1) - 6$, or, equivalently,

$$\frac{6x^3 + x^2 - 4x - 5}{3x - 1} = 2x^2 + x - 1 + \frac{-6}{3x - 1}$$

• • • CHECK YOURSELF 2

Divide $4x^3 - 2x^2 + 2x + 15$ by $2x + 3$.

• • • CHECK YOURSELF ANSWERS

$$\text{1. } 2x + 1 + \frac{20}{3x - 5} \qquad \text{2. } 2x^2 - 4x + 7 + \frac{-6}{2x + 3}$$

5.8 Exercises

Name _____

Section _____

Date _____

A N S W E R S

Perform the indicated divisions.

1. $\frac{2x^2 - 3x - 5}{x - 3}$

2. $\frac{3x^2 + 17x - 12}{x + 6}$

3. $\frac{4x^2 - 18x - 15}{x - 5}$

4. $\frac{3x^2 - 18x - 32}{x - 8}$

5. $\frac{6x^2 - x - 10}{3x - 5}$

6. $\frac{4x^2 + 6x - 25}{2x + 7}$

7. $\frac{4x^3 + 7x^2 + 10x + 5}{4x - 1}$

8. $\frac{2x^3 - 3x^2 + 4x + 4}{2x + 1}$

9. $\frac{x^3 - x^2 + 5}{x - 2}$

10. $\frac{x^3 + 4x - 3}{x + 3}$

11. $\frac{25x^3 + x}{5x - 2}$

12. $\frac{8x^3 - 6x^2 + 2x}{4x + 1}$

13. $\frac{2x^2 - 8 - 3x + x^3}{x - 2}$

14. $\frac{x^2 - 18x + 2x^3 + 32}{x + 4}$

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____