

4.5 Dividing Polynomials

Solutions

Simplify.

$$1. \quad \frac{15x^5}{3x^2} = \frac{15}{3} \cdot \frac{x^5}{x^2} = \boxed{5x^3}$$

$$2. \quad \frac{20x^7}{5x^3}$$

$$3. \quad \frac{15y^5}{9y^7} = \frac{15}{9} \cdot \frac{y^5}{y^7} = \frac{5}{3} \cdot \frac{1}{y^2} = \boxed{\frac{5}{3y^2}}$$

$$4. \quad \frac{16a^3}{12a^4}$$

$$5. \quad \frac{-8a^2b^7}{24a^2b^2} = \frac{-8}{24} \cdot \frac{a^2}{a^2} \cdot \frac{b^7}{b^2}$$

$$= \frac{-1}{3} \cdot 1 \cdot \frac{b^5}{1} = \boxed{-\frac{b^5}{3}}$$

$$6. \quad \frac{-15ab^5}{25a^2b^2}$$

$$7. \quad \frac{-3xy^4z^5}{-9x^5y^4z^4} = \frac{-3}{-9} \cdot \frac{x}{x^5} \cdot \frac{y^4}{y^4} \cdot \frac{z^5}{z^4}$$

$$= \frac{1}{3} \cdot \frac{1}{x^4} \cdot 1 \cdot \frac{z^5}{1} = \boxed{\frac{z^5}{3x^4}}$$

$$8. \quad \frac{-2x^2yz^3}{-10xy^2z^2}$$

Answers: 1. $5x^3$; 3. $\frac{5}{3y^2}$; 5. $-\frac{b^5}{3}$; 7. $\frac{z^5}{3x^4}$

Simplify.

$$\begin{aligned} 9. \quad \frac{12x^5 + 9x^4}{3x^2} &= \frac{12x^5}{3x^2} + \frac{9x^4}{3x^2} \\ &= 4x^3 + 3x^2 \end{aligned}$$

$$10. \quad \frac{15x^4 + 10x^3}{5x^2}$$

$$\begin{aligned} 11. \quad \frac{-18a^7 + 12a^5 - 24a^3}{6a} \\ &= \frac{-18a^7}{6a} + \frac{12a^5}{6a} - \frac{24a^3}{6a} \end{aligned}$$

$$= -3a^6 + 2a^4 - 4a^2$$

$$12. \quad \frac{15x^3 - 12x^2 + 21x}{3x}$$

$$13. \quad \frac{20x^3 - 15x^2 + 35x}{-5x}$$

$$\begin{aligned} &= \frac{20x^3}{-5x} - \frac{15x^2}{-5x} + \frac{35x}{-5x} \\ &= -4x^2 - (-3x) + (-7) = -4x^2 + 3x - 7 \end{aligned}$$

$$14. \quad \frac{12x^4 - 8x^3 + 4x}{-4x}$$

Answers: 9. $4x^3 + 3x^2$; 11. $-3a^6 + 2a^4 - 4a^2$; 13. $-4x^2 + 3x - 7$

Divide.

$$\begin{array}{r} 15. \quad x+3 \overline{)x^2+8x+15} \\ \quad \underline{x^2+3x} \\ \quad \quad 5x+15 \\ \quad \quad \underline{5x+15} \\ \quad \quad \quad 0 \end{array}$$

$$16. \quad x+2 \overline{)x^2+6x+8}$$

$$\begin{array}{r} 17. \quad 3x+2 \overline{)3x^2+14x+8} \\ \quad \underline{3x^2+2x} \\ \quad \quad 12x+8 \\ \quad \quad \underline{12x+8} \\ \quad \quad \quad 0 \end{array}$$

$$18. \quad x+3 \overline{)2x^2+x-15}$$

Answers: 15. $x+5$; 17. $x+4$

Divide.

19. $(x^3 - 64) \div (x - 4)$

$$\begin{array}{r} x^2 + 4x + 16 \\ x - 4 \overline{) x^3 + 0x^2 + 0x - 64} \\ \underline{x^3 - 4x^2} \\ 4x^2 + 0x \\ \underline{4x^2 - 16x} \\ -16x - 64 \\ \underline{-16x - 64} \\ 0 \end{array}$$

20. $(x^3 - 125) \div (x - 5)$

21. $(3x^4 + x^2 + x - 2) \div (x + 1)$

$$\begin{array}{r} 3x^3 - 3x^2 + 4x - 3 + \frac{1}{x+1} \\ x + 1 \overline{) 3x^4 + 0x^3 + x^2 + x - 2} \\ \underline{3x^4 + 3x^3} \\ -3x^3 + x^2 \\ \underline{-3x^3 - 3x^2} \\ 4x^2 + x \\ \underline{4x^2 + 4x} \\ -3x - 2 \\ \underline{-3x - 3} \\ 1 \end{array}$$

22. $(2x^4 - x^2 + x - 2) \div (x - 1)$

Answers: 19. $x^2 + 4x + 16$; 21. $3x^3 - 3x^2 + 4x - 3 + \frac{1}{x+1}$