

EXAMPLE 12 a. Estimate the result of each computation.

$$\begin{aligned} \text{i. } \frac{247,000}{0.0124} &= \frac{2.47 \times 10^5}{1.24 \times 10^{-2}} \\ &\approx \frac{2.5 \times 10^5}{1.25 \times 10^{-2}} \\ &= 2 \times 10^7 \end{aligned}$$

$$\begin{aligned} \text{ii. } \frac{0.00024 \times 0.000073}{0.00000021} &= \frac{2.4 \times 10^{-4} \times 7.3 \times 10^{-5}}{2.1 \times 10^{-7}} \\ &\approx \frac{2 \times 10^{-4} \times 7 \times 10^{-5}}{2 \times 10^{-7}} \\ &= 7 \times 10^{-2} \end{aligned}$$

b. Compute with the aid of a calculator.

$$\begin{aligned} \text{i. } \frac{2.47 \times 10^5}{1.24 \times 10^{-2}} \\ \approx 1.99 \times 10^7 \end{aligned}$$

$$\begin{aligned} \text{ii. } \frac{2.4 \times 10^{-4} \times 7.3 \times 10^{-5}}{2.1 \times 10^{-7}} \\ \approx 8.3 \times 10^{-2} \end{aligned}$$

EXERCISE 2.5

A

■ Using one or more of the laws of exponents, write each expression as a product or quotient in which each factor occurs only once and all exponents are positive. See Examples 1–3.

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

2. $\frac{y^2}{y^6}$

3. $\frac{x^2y^4}{xy^8}$

4. $\frac{x^4y^6}{x^2y}$

5. $\left(\frac{x}{y^2}\right)^3$

6. $\left(\frac{y^2}{z^3}\right)^2$

7. $\left(\frac{-2x}{3y^2}\right)^3$

8. $\left(\frac{-x^2}{2y}\right)^4$

9. $\frac{(4x)^3}{(-2x^2)^2}$

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

11. $\frac{(xy)^2(-x^2y)^3}{(x^2y^2)^2}$

12. $\frac{(-x)^2(-x^2)^4}{(x^2)^3}$

13. $\left(\frac{-2x}{y^2}\right)^3\left(\frac{y^2}{3x}\right)^2$

14. $\left(\frac{x^2z}{2}\right)^2\left(-\frac{2}{x^2z}\right)^3$

15. $\left(\frac{-3}{x+y}\right)^2\left(\frac{x+y}{x^2}\right)^3$

16. $\left(\frac{2x-y}{y}\right)^2\left(\frac{-3}{2x-y}\right)^3$

■ Write each expression without negative exponents and simplify. See Example 4.

17. 2^{-1}

18. 3^{-2}

19. $\frac{1}{3^{-1}}$

20. $\frac{3}{4^{-2}}$