

## 13.4 DIVISION WITH EXPONENTS

A. Divide each of the following and leave your answer in exponential form.

1.  $3^3 \div 3^2$   $3^1$  2.  $5^5 \div 5^2$   $5^3$  3.  $4^3 \div 4^3$   $4^0$
4.  $(-5)^3 \div (-5)^2$   $(-5)^1$  5.  $(\frac{1}{2})^5 \div (\frac{1}{2})^4$   $(\frac{1}{2})^1$  6.  $x^6 \div x^4$   $x^2$
7.  $(0.5)^6 \div (0.5)^3$   $0.5^3$  8.  $7^2 \div 7^3$   $7^{-1}$  9.  $8^5 \div 8^7$   $8^{-2}$
10.  $10^4 \div 10^2$   $10^2$  11.  $c^5 \div c^{-4}$   $c^9$  12.  $x^3 \div x^{-4}$   $x^7$
13.  $5^{13} \div 5^5$   $5^8$  14.  $7^{15} \div 7^{12}$   $7^3$  15.  $8^{-3} \div 8^6$   $8^{-9}$
16.  $15^{-12} \div 15^{-10}$   $15^{-2}$  17.  $(-2)^5 \div (-2)^3$   $(-2)^2$  18.  $x^8 \div x^6$   $x^2$
19.  $9^{-12} \div 9^{-12}$   $9^0$  20.  $(-6)^5 \div (-6)^5$   $(-6)^0$  21.  $7^{-10} \div 7^{-3}$   $7^{-7}$
22.  $8^{15} \div 8^{12}$   $8^3$  23.  $(6.2)^{15} \div (6.2)^{-8}$   $6.2^{23}$  24.  $19^{10} \div 19^7$   $19^3$
25.  $12^0 \div 12^{-3}$   $12^3$  26.  $15^3 \div 15^{-7}$   $15^{10}$  27.  $82^{-9} \div 82^{-10}$   $82^1$
28.  $x^7 \div x^{-8}$   $x^{15}$  29.  $m^{-6} \div m^{-12}$   $m^6$  30.  $7^{15} \div 7^{-13}$   $7^{28}$
31.  $x^{-13} \div x^{-12}$   $x^{-1}$  32.  $x^0 \div x^{-1}$   $x^1$  33.  $34^6 \div 34^2$   $34^4$
34.  $13^{-23} \div 13^4$   $13^{-27}$  35.  $25^3 \div 25^{-3}$   $25^6$  36.  $8^{-5} \div 8^{-6}$   $8^1$

B. Simplify each of the following.

$$1. \frac{8^5 \times 8^6}{8^3 \times 8^4} = 8^4$$

$$2. \frac{7^{10} \times 7^5}{7^{-3}} = 7^{18}$$

$$3. \frac{5^{-3} \times 6^{-3} \times 9^{-4}}{5^{-6} \times 6^{-5} \times 9^{-3}} = 5^3 \cdot 6^2 \cdot 9^{-1}$$

$$4. \frac{12^1 \times 12^2 \times 12^{-3}}{12^{-5}} = 12^5$$

$$5. \frac{8^{-3} \times 7^{-6}}{8^{-3} \times 7^{-6}} = 8^0 \cdot 7^0$$

$$6. \frac{7^{-12} \times 7^6 \times 7^9}{7^6 \times 7^8} = 7^{-11}$$

$$7. \frac{5^{-3} \times 8^6 \times 5^{-4} \times 8^7}{5^{-8} \times 8^5 \times 5^{-3}} = 5^4 \cdot 8^8$$

$$8. \frac{7^8 \times 8^5 \times 9^3 \times 8^5}{7^5 \times 9^4 \times 8^3} = 7^3 \cdot 8^7 \cdot 9^{-1}$$

$$9. \frac{6^3 \times 6^5 \div 6^8}{6^7 \times 6^3 \times 6^2} = 6^{-12}$$

$$10. \frac{x^0 y^8 z^0}{x^0 y^{-8} z^0} = x^0 y^{16} z^0$$

$$11. \frac{15^{-10} \times 5^4}{5^{-8} \times 15^{-10}} = 5^4 \cdot 15^0$$

$$12. \frac{x^3 y^3 z^5}{x^{-2} y^5 z^{-8}} = x^5 y^{-2} z^{13}$$

$$13. \frac{x^{15} \cdot y^{-20} \cdot z^{-20}}{x^6 \cdot y^{-30} \cdot z^{-8}} = x^9 y^{10} z^{-12}$$

$$14. \frac{4^{-3} \cdot x^{-5} \cdot y^{-6}}{4^8 \cdot x^{-6} \cdot y^7} = 4^{-11} x^1 y^{-13}$$

$$15. \frac{5^{10} \cdot x^7 \cdot y^8}{5^2 \cdot x^6 y^2} = 5^8 x^1 y^6$$

$$16. \frac{12^{16} 15^{-21} 17^{-4} 12^5 15^3 17^5}{12^{-4} 15^{-3} 17^4 15^6 17^{-3}} = 12^{25} \cdot 15^{-21} \cdot 17^{-3}$$

$$17. \frac{12^2 \cdot 13^{-5} \cdot 12^{-5} \cdot 13^{-7} \cdot 12^3}{12^5 \cdot 13^3 \cdot 13^6 \cdot 12^5} = 12^{-10} \cdot 13^{-21}$$

$$18. \frac{y^8 x^1 (x^{24} \div x^{14}) x^1 y^9}{(y^7 \div y^5) x^1 x^{16}} = x^{-5} \cdot y^{15}$$

$$19. \frac{x^{16} \div x^{12}}{x^{14} \div x^9} = x^{-1}$$

$$20. \frac{5^2 \cdot 6^3 \cdot 5^{-4} \cdot 6^{-3}}{5^5 \cdot 6^{-4} \cdot 5^8 \cdot 6^{-7}} = 5^{-15} \cdot 6^{11}$$