## Lesson 2.4: Exponent Laws 1

- **1.** Write each product as a single power.
  - **a)**  $4^3 \times 4^2$  **b)**  $5^6 \times 5^0$  **c)**  $(-2)^2 \times (-2)^4$ **d)**  $-6^3 \times 6^1$  **e)**  $(-7)^0 \times (-7)^2$  **f)**  $(-9)^6 \times (-9)^3$
- 2. Write each quotient as a single power. a)  $8^7 \div 8^5$  b)  $10^4 \div 10^0$  c)  $(-1)^6 \div (-1)^3$ d)  $\frac{-3^4}{3^4}$  e)  $\frac{\cancel{4}9^{\cancel{5}0}}{\cancel{4}9^{\cancel{5}}}$  f)  $\frac{11^9}{11^6}$
- **3.** Express as a single power.

**a**) 
$$2^3 \times 2^6 \div 2^9$$
 **b**)  $(-5)^8 \div (-5)^4 \times (-5)^3$  **c**)  $\frac{6^3 \times 6^5}{6^2 \times 6^4}$ 

- **4.** Simplify, then evaluate. **a**)  $2^2 - 2^0 \times 2 + 2^3$  **b**)  $(-2)^6 \div (-2)^5 - (-2)^5 \div (-2)^3$  **c**)  $-2^2(2^3 \div 2^1) - 2^3$
- **5.** Simplify, then evaluate.
  - **a)**  $4^3 \div 4^2 + 2^4 \times 3^2$  **b)**  $3^2 + 4^2 \times 4^1 \div 2^3$  **c)**  $\frac{3^4}{3^3} + \frac{4^2 \times 4^0}{2^4}$
- 6. Write each relationship as a product of powers or a quotient of powers.
  - a) One million is 1000 times as great as one thousand.
  - **b**) One billion is 1000 times as great as one million.
  - c) One hundred is one-tenth of one thousand.
  - d) One is one-millionth of one million.
  - e) One trillion is 1000 times as great as one thousand million.
- 7. Identify, then correct any errors in these answers. Explain how you think the errors occurred.

**a**) 
$$5^3 \times 5^2 = 5^6$$
 **b**)  $2^3 \times 4^2 = 8^5$  **c**)  $(-3)^8 \div (-3)^4 = (-3)^4$ 

d) 
$$1^2 \times 1^4 - 1^3 = 1^3$$
 e)  $\frac{4^2 \times 4^4}{4^2 \times 4^1} = 4^2$ 

## **ANSWER KEY for Lesson 2.4**

- **1. a)** 4<sup>5</sup> **b)**  $5^0$ **e)**  $(-7)^2$ **c)**  $(-2)^6$ **f)**  $(-9)^9$ **d**) -6<sup>4</sup>
- **2.** a) 8<sup>2</sup> d) -3<sup>0</sup> **b)**  $10^4$  **c)**  $(-1)^3$ **e)**  $(-9)^5$  **f)**  $11^3$
- **b)**  $(-5)^7$ **3.** a) 2<sup>0</sup> **c)** 6<sup>2</sup>
- **4. a)** 10 **b)** -6 **c)** -24
- 5. a)  $4^3 \div 4^2 + 2^4 \times 3^2 = 4 + 16 \times 9 = 148$ b)  $3^2 + 4^2 \times 4^1 \div 2^3 = 9 + 64 \div 8 = 17$

**c)** 
$$\frac{3^4}{3^3}$$
 +  $\frac{4^2 \times 4^0}{2^4}$  = 3 +  $\frac{16}{16}$  = 3 + 1 = 4

6. a)  $1\ 000\ 000 = 10^3 \times 10^3$ b)  $1\ 000\ 000\ 000\ = 10^3 \times 10^6$ 

**c)** 
$$100 = \frac{10^3}{10^1}$$
 **d)**  $1 = \frac{10^6}{10^6}$ 

- e)  $1\ 000\ 000\ 000\ 000 = 10^3 \times 10^3 \times 10^6$
- 7. a) The exponents were multiplied instead of added.  $5^3 \times 5^2 = 5^5$ b) The bases were multiplied.  $2^3 \times 4^2 = 8 \times 16 = 128$ 

  - c) This solution is correct.
  - d) The exponent 3 was subtracted from the sum of exponents 2 and 4.  $1^2 \times 1^4 1^3 = 1^6 1^3 = 1 1 = 0$
  - e) The exponents were multiplied then divided instead of added and subtracted.  $\frac{4^2 \times 4^4}{4^2 \times 4^1} = \frac{4^6}{4^3} = 4^3$