3.2 Exponent Laws

MathLinks 9, **pages 99–107**

Key Ideas Review

Match each exponent law in column A to an equation in column B.

A	B
1. You can simplify a quotient of powers with the same base by subtracting the exponents.	**a)** $(a \times b)^m = a^m \times b^m$ **b)** $a^m \div a^n = a^{m-n}$
2. You can simplify a power that is raised to an exponent by multiplying the two exponents.	**c)** $a^0 = 1,\ a \neq 0$
3. When a product is raised to an exponent, you can rewrite each number in the product with the same exponent.	**d)** $(a^m)^n = a^{mn}$
4. When the exponent of a power is 0, the value of the power is 1 if the base is not equal to 0.	

Check Your Understanding

5. Write each expression as a single power. Then, evaluate.

  a) $3^2 \times 3^3$ **b)** $(-2)^4 \times (-2)^3$

  c) $4 \times 4^3 \times 4^4$ **d)** $[(-3)^2]^4$

6. Rewrite each expression as a single power. Then, evaluate.

  a) $7^6 \div 7^4$ **b)** $(-5)^8 \div (-5)^5$

  c) $\dfrac{8^2 \times 8^7}{8^5}$ **d)** $\dfrac{(-6)^2(-6)^4}{(-6)^3}$

7. Write each expression in exponential form.

  a) $(5 \times 5 \times 5) \times (5 \times 5 \times 5) \times (5 \times 5 \times 5) \times (5 \times 5 \times 5)$

  b) $[(-9) \times (-9)] \times [(-9) \times (-9)] \times [(-9) \times (-9)] \times [(-9) \times (-9)] \times [(-9) \times (-9)]$

8. Write each expression as a quotient of two powers, and then as a single power.

  a) $(5 \times 5 \times 5 \times 5) \div (5 \times 5 \times 5)$

  b) $\dfrac{(-2) \times (-2) \times (-2) \times (-2) \times (-2) \times (-2)}{(-2) \times (-2) \times (-2) \times (-2)}$

9. Tony was asked to solve $\frac{6^8 \times 6^4}{6^2}$. Find and explain the mistake in his solution. What is the correct answer?

$$\frac{6^8 \times 6^4}{6^2} = \frac{6^{8+4}}{6^2}$$

$$= \frac{6^{12}}{6^2}$$

$$= 6^{12} \div 2$$

$$= 6^6$$

$$= 46656$$

10. Using $\frac{4^3}{4^3} = 4^{3-3}$ as an example, explain the exponent rule $b^0 = 1, b \neq 0$.

11. a) Write $(5^2)^3$ as a single power. Evaluate.

b) Write $[(-4)^3]^2$ as a single power. Evaluate.

12. The province of Saskatchewan has a population of approximately 1 million (10^6). There are approximately 100 billion (10^{11}) cells in the human body. Estimate the number of human cells in Saskatchewan. Write your answer in exponential and standard form.

Human Cells
in Saskatchewan
_____
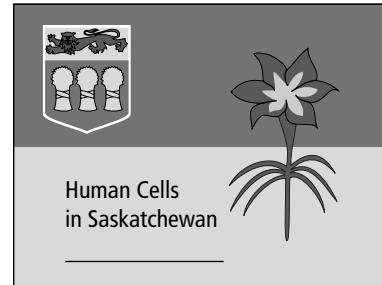
13. Write three different products. Each product must be made up of two powers and must be equal to 6^7. Justify your choices.