10.3 – Division with Exponents

Quotient Rule

Complete the table below with a partner. Then answer the questions that follow.

Expression	Expanded Form	Exponential Form
$\frac{6^9}{6^4}$	$\frac{6\cdot6\cdot6\cdot6\cdot6\cdot6\cdot6\cdot6\cdot6}{6\cdot6\cdot6\cdot6} = \frac{6\cdot6\cdot\cancel{6}\cdot\cancel{6}\cdot\cancel{6}\cdot\cancel{6}\cdot6\cdot6\cdot6}{\cancel{6}\cdot\cancel{6}\cdot\cancel{6}\cdot\cancel{6}} = 6\cdot6\cdot6\cdot6\cdot6$	6^5
$\frac{100^3}{100^2}$		
$\frac{t^{15}}{t^{11}}$		

1. Look at the table above. Compare the first and third column. Describe, using words, the relationship that you see between them.

2. Use your observations from the last question to fill in the box and complete the math sentence below.

$$\frac{a^m}{a^n} = a^{\square}$$

3. The rule you discovered in the question above is called the "**quotient rule**." Use it to simplify the questions below.

a. $\frac{16^7}{16^3}$

b. $\frac{1}{w^{10}} \cdot w^{25}$

c. $\frac{4^3 \cdot 4^7}{4^5}$

Simplify the expressions. Write your answer as a power.

1. $\frac{10^{11}}{10^3}$

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

3. $\frac{6^3 \cdot 6^7}{6^4}$

4. $\frac{m^{14}}{m^{10}} \cdot \frac{m^5}{m^2}$

5. $\frac{x^5 \cdot z^4}{x^2 \cdot z^2}$

6. $\frac{a^{12}b^8}{a^{10}b^5}$

7. $\frac{c^6 \cdot d^{10} \cdot 2^6}{d^5 \cdot 2^3}$

Find the value of x in the equation without evaluating the power.

8. $\frac{5^9}{5^x} = 5^4$

9. $\frac{3^7 \cdot 3^x}{3^6} = 3^2$