

TOPIC: THE QUOTIENT RULE

The Quotient Rule for Exponents

| EXPONENT RULES |                                                                  |                             |                                                                                                  |
|----------------|------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------|
| Name           | Example                                                          | Rule                        | Description                                                                                      |
| Product Rule   | $4^2 \times 4^1 = 4 \times 4 \times 4 = 4^3 = 4^{2+1}$           | $a^m \times a^n = a^{m+n}$  | Multiply terms w/ <b>same base</b> $\Rightarrow$ [ ADD   SUBTRACT ] exp.                         |
| Quotient Rule  | $\frac{4^3}{4^1} = \qquad \qquad \qquad = 4^{\quad} = 4^{\quad}$ | $\frac{a^m}{a^n} = a^{m-n}$ | Divide terms w/ <b>same base</b> $\Rightarrow$ [ ADD   SUBTRACT ] exp.<br>ALWAYS $\quad - \quad$ |

EXAMPLE

Use the quotient rule to evaluate or simplify each exponential expression.

(A)  $\frac{y^7}{y^5}$

(B)  $\frac{m^6}{m^6}$

◆ Zero Exponent Rule: *ANYTHING* (except 0) raised to  $\quad$  exponent =  $\quad$

## TOPIC: THE QUOTIENT RULE

### PRACTICE

Simplify each expression.

(A)

$$\frac{y^{27}}{y^9}$$

(B) *Hint: rewrite using exponents first.*

$$\frac{64}{16}$$

(C)

$$(-4t)^0, t \neq 0$$

**Recall**

$$\frac{a^m}{a^n} = a^{m-n}$$
$$a^0 = 1$$

### EXAMPLE

Use the quotient rule to rewrite the expression, then simplify.

$$\frac{9}{16} \div \frac{3}{4}$$

### PRACTICE

Use the quotient rule to rewrite each expression, then simplify.

(A)

$$-\frac{12b^{11}}{4b^7}$$

(B)

$$\frac{9x^2y^8}{3xy^2}$$

(C)

$$\frac{30x^5y^3z^3}{-15x^2y^3z}$$