

Content and Language Objective:

Students will explore the rules for dividing exponents and recall the rules they have already used to solve a variety of problems.

Warm-Up

Simplify and solve.

$$1. 7^{-3} \bullet 7^5 = 7^2 = 49$$
$$7^{-2} = \frac{1}{7^2} = \frac{1}{49}$$

$$2. 8x^3 \bullet 4x^{-5}$$
$$8 \cdot x^3 \cdot 4 \cdot x^{-5}$$
$$8 \cdot 4 \cdot x^3 \cdot x^{-5}$$
$$32x^{-2}$$
$$\frac{32}{x^2}$$

$$10^3 \cdot 10^4 = \cancel{10^7}$$
$$= 10^7$$

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When we used the **product rule** we **add** the exponents of like bases, when we use the **quotient rule** we will **subtract** the exponents of like bases.

$$4^3 \bullet 4^5 = 4 \bullet 4 \bullet 4 \bullet 4 \bullet 4 \bullet 4 \bullet 4 \bullet 4 = 4^8$$

$$\frac{6^5}{6^3} = \frac{6 \bullet 6 \bullet 6 \bullet 6 \bullet 6}{6 \bullet 6 \bullet 6} = \frac{6}{6} \bullet \frac{6}{6} \bullet \frac{6}{6} \bullet \frac{6}{1} \bullet \frac{6}{1} = 1 \bullet 1 \bullet 1 \bullet 6 \bullet 6 = 6^2$$

Because there are "two more" 6s in the numerator, the result is $6^{5-3} = 6^2$. Thus, to divide exponential expressions with like bases, subtract exponents.

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Try It!

$$\frac{3^6}{3^2} = 3^{6-2} = 3^4$$

$$\frac{2^{-6}}{2^{-4}} = 2^{-6+4} = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}$$

$$\frac{2^4}{2^6} = 2^{4-6} = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}$$

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More Practice

$$\frac{10^4}{10^6}$$

$$10^{4-6} = 10^{-2}$$

$$1/100$$

$$\frac{x^5}{x^2}$$

$$x^3$$

$$\frac{15x^2y^3}{5x^4y}$$

$$= \frac{15}{5} \cdot \frac{x^2}{x^4} \cdot \frac{y^3}{y^1}$$

$$3x^{-2}y^2 = \frac{3y^2}{x^2}$$

$$\frac{3a^{-2}b^5}{9a^4b^{-3}}$$

$$= \frac{3}{9} \cdot \frac{a^{-2}}{a^4} \cdot \frac{b^5}{b^{-3}}$$

$$= \frac{1}{3} \cdot a^{-2-4} b^{5+3}$$

$$\frac{1a^{-6}b^8}{3}$$

$$\frac{1b^8}{3a^6} = \frac{b^8}{3a^6}$$

