

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

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

$= 32x^{-2} = \frac{32}{x^2}$

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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.

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

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

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!

$$\frac{3^6}{3^2}$$

$$3^{6-2} = 3^4 = 81$$

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

$$2^{-6+4}$$

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

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More Practice

$$\frac{10^4}{10^6} \quad 10^{-2} \frac{1}{10^2} = \frac{1}{100} \quad \frac{x^5}{x^2} \times 3$$

$$\frac{15x^2y^3}{5x^4y} = \frac{15}{5} \cdot x^{2-4} y^{3-1} \quad \frac{3a^{-2}b^5}{9a^4b^{-3}} \quad \frac{3}{9} a^{-2-4} b^{5-3}$$
$$3 \cdot x^{-2} y^2 = \frac{3y^2}{x^2} \quad \frac{1}{3} a^{-6} b^8 \quad \left(\frac{b^8}{3a^6} \right)$$

