

$$3. \frac{-4a^3b^4 \cdot -4a^2b^3}{2a^2b^2}$$

$$\frac{-4 \cdot -4 \cdot a^3 \cdot \cancel{a^2} \cdot b^4 \cdot b^3}{2\cancel{a^2}b^2}$$

$$\frac{16a^3b^7}{2b^2}$$

$$8a^3b^5$$

$$12. \frac{\cancel{4}x^3 \cdot x^{-2}}{\cancel{4}x^0 y^4}$$

$$\frac{x^{-2}}{y^4}$$

$$\frac{1}{x^2 y^4}$$

$$\frac{6}{2} = \underline{\underline{3}}$$

$$16. \frac{3x^2y^{-1} \cdot 2x^{-2}y^{-3}}{2x^2y^3}$$

$$\frac{3 \cdot \cancel{2} \cdot \cancel{x^2} \cdot x^{-2} \cdot \cancel{y^{-1}} \cdot y^{-3}}{\cancel{2} \cdot \cancel{x^2} y^3}$$

$$\frac{3x^{-2}y^{-4}}{y^3}$$

$$\frac{3}{x^2y^7}$$

$$25. \frac{4}{2^{-3}} = \frac{4 \cdot 2^3}{1} = 48 \cdot (32)$$

$$17. \frac{\cancel{(-4)^4}}{\cancel{(-4)^4} \cdot \cancel{(-4)^3} \cdot \cancel{(-4)^4}} = \frac{1}{(-4)^7}$$

$$24. \frac{(-4)^{-1}}{(-4)^{-2} \cdot (-4)^2} = \frac{(-4)^{-1}}{(-4)^0} = \frac{(-4)^{-1}}{1}$$

$$\frac{1}{(-4)^1} = -\frac{1}{4}$$

Content and Language Objective:

Students will learn the processes for raising powers, products, and quotients to powers rules and be able to explain the process for using these new rules in their own words.

Warm-Up

1. $\frac{10x^5}{5x^{-3}} = 2x^8$

2. $\frac{12a^2b^3}{18a^4b^2}$ $\frac{2b}{3a^2}$

Content and Language Objective:

Students will learn the processes for raising powers, products, and quotients to powers rules and be able to explain the process for using these new rules in their own words.

How should we evaluate $(4^3)^2$. To answer this question consider the following:

$$(4^3)^2 = 4^3 \cdot 4^3 = 4^6$$

$$(x^4)^3 = (x^4)(x^4)(x^4) = x^{12}$$

These results suggest that to raise a power to a power, multiply the exponents.

Content and Language Objective:

Students will learn the processes for raising powers, products, and quotients to powers rules and be able to explain the process for using these new rules in their own words.

Try It!

$$(5^2)^3 = 5^6$$

$$(2^4)^{-2} = 2^{-8} = \frac{1}{2^8}$$

$$(b^{-7})^5 = b^{-35} = \frac{1}{b^{35}}$$

$$\frac{(x^3)^{-2}}{(x^{-5})^2} = \frac{1}{(x^{-5})^2 \cdot (x^3)^2} = \frac{1}{x^{-10} \cdot x^6} = \frac{x^{-6}}{x^{-10}} = \frac{x^{10}}{x^6} = x^4$$
$$\frac{1}{x^{-60}} = x^{60}$$

Content and Language Objective:

Students will learn the processes for raising powers, products, and quotients to powers rules and be able to explain the process for using these new rules in their own words.

How can we simplify the expression $(2x)^3$? Consider the following:

$$(2x)^3$$

$$\begin{array}{l} 2x \\ 2x \\ 2x \\ \hline 8x^3 \end{array}$$

$$(2x)^3 = (2x)(2x)(2x) = 8x^3$$

$$2^3 x^3 = 8x^3$$

This result suggests that to cube a product, cube each factor.

Content and Language Objective:

Students will learn the processes for raising powers, products, and quotients to powers rules and be able to explain the process for using these new rules in their own words.

Try It!

$$(6y)^2 \quad 36y^2$$

$$(x^2y)^{-2} \quad x^{-4}y^{-2}$$

$$(2xy^3)^4 \quad 16x^4y^{12}$$

$$\frac{(2a^2b^{-3})^2}{4(ab^3)^3} \quad \frac{2^2a^4b^{-6}}{4a^3b^9} = \frac{a}{b^{15}}$$

Content and Language Objective:

Students will learn the processes for raising powers, products, and quotients to powers rules and be able to explain the process for using these new rules in their own words.

The expression $(\frac{a}{b})^3$ can be simplified as:

$$\left(\frac{a}{b}\right)^3 = \left(\frac{a}{b}\right)\left(\frac{a}{b}\right)\left(\frac{a}{b}\right) = \frac{a^3}{b^3}$$

Content and Language Objective:

Students will learn the processes for raising powers, products, and quotients to powers rules and be able to explain the process for using these new rules in their own words.

Try It!

$$\left(\frac{3}{x}\right)^3$$

$$\left(\frac{1}{2^3}\right)^{-2}$$

$$\left(\frac{3x^{-3}}{y^2}\right)^4$$

$$\left(\frac{3x^2}{4y^2z}\right)^3$$

Content and Language Objective:

Students will learn the processes for raising powers, products, and quotients to powers rules and be able to explain the process for using these new rules in their own words.

1. $\left(\frac{9x^2y}{3y^4z} \right)^3$

2. $\left(\frac{2}{2^3} \right)^{-3}$

$$1. (-3, 2) (-5, 4) = -1$$

$$2. (1, 3) (0, 5) = -2$$

$$3. (2, -1) (2, -3) = \text{undefined}$$

$$4. (3, 4) (-2, 4) = 0$$

$$5. (-2, 0) (-3, 2) = -2$$

$$6. (-2, 5) (-1, 0) = -5 \quad \frac{0-5}{-1+2} = \frac{-5}{1} = -5$$

$$7. \underset{x_1 \ y_1}{(6, 4)} \underset{x_2 \ y_2}{(0, -1)} = \frac{5}{6} \quad \frac{-1-4}{0-6} = \frac{-5}{-6} = \frac{5}{6}$$

$$8. (3, 4) (5, 6) = 1$$

$$9. (6, -2) (1, 2) = -4/5$$

$$10. (3, 1) (6, 0) = -1/3$$

