

Notes (Last two properties)

Algebra 1: Module 14 More Exponents

Properties of Exponents

$$1) a^0 = 1 \quad 2^0 = 1 \quad (x^2)^0 = x^0 = 1 \quad (-3x^3y^4)^0 = 1 \quad 4x^0 = 4 \cdot 1 = 4 \quad \left(\frac{-1}{4}\right)^0 = 1$$

Negative Exponents are never allowed!

$$2) \frac{a^{-n}}{1} = \frac{1}{a^n} \quad 2^{-2} = \frac{1}{2^2} = \frac{1}{4} \quad (x^2y)^{-2} = x^{-4} \cdot y^{-2} = \frac{1}{x^4y^2} \quad \left(\frac{3}{4}\right)^{-4} = \left(\frac{4}{3}\right)^4 = \frac{4^4}{3^4}$$

$$3) \frac{1}{a^{-n}} = a^n \quad \frac{1}{(-5)^{-2}} = (-5)^2 = 25 \quad \frac{1}{(x^2y)^{-2}} = (x^2y)^2 = x^4y^2$$

Simplify each expression.

$$1. \left(\frac{2}{3}\right)^0 = 1$$

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

$$3. \frac{1}{2^{-3}}$$

$$4. (-1)^0 = 1$$

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

$$\frac{1}{(-8)^2} = \frac{1}{64}$$

$$2^3 = 8$$

$$5. \left(\frac{2}{3}\right)^{-2}$$

$$6. \frac{1}{4^{-3}}$$

$$7. (5^3)^{-1}$$

$$8. (-2)^5 \cdot (-2)^{-5}$$

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

$$4^3$$

$$5^3$$

$$(-2)^{5-5}$$

$$= \frac{9}{4}$$

$$= 64$$

$$125$$

$$(-2)^0$$

$$1$$

$$9. 0^{-7} = 0$$

$$10. \frac{6^{-2}}{6^2}$$

$$11. \frac{7^3}{7^5} \quad \begin{array}{l} 7 \cdot 7 \cdot 7 \\ \cancel{7} \cdot \cancel{7} \cdot \cancel{7} \cdot 7 \cdot 7 \end{array}$$

$$12. \frac{1}{8^{-2}} = 8^2 = 64$$

$$\begin{array}{l} \swarrow \quad \searrow \\ \frac{1}{6^2 \cdot 6^2} \quad \begin{array}{l} 6^{-2-2} \\ 6^{-4} \\ 6^4 \\ 1296 \end{array} \\ \frac{1}{6^4} \\ \frac{1}{1296} \end{array}$$

$$\begin{array}{l} 7^{-2} \\ \frac{1}{7^2} \\ \frac{1}{49} \end{array}$$

$$13. (3^3)^{-2}$$

$$14. (2xy^{-5})^3$$

$$15. (3x^{-2}y^2)^3$$

$$\begin{array}{l} \swarrow \quad \searrow \\ \frac{1}{(3^3)^2} \quad 3^{-6} \\ \frac{1}{3^6} \quad \frac{1}{3^6} \\ \frac{1}{729} \quad \frac{1}{729} \end{array}$$

$$\begin{array}{l} 2^3 \cdot x^3 \cdot y^{-15} \\ \frac{8x^3}{y^{15}} \end{array}$$

$$3^3 \cdot x^{-6} \cdot y^6 \quad \frac{27y^6}{x^6}$$

$$16. \frac{(2x)^{-2}y^5}{-4x^2y^2}$$

$$17. \frac{3xy^{-3}}{9x^3y^4}$$

$$18. \frac{4x^{-2}y^4}{8xy^6}$$

$$\begin{array}{l} y^5 \\ \hline -4 \cdot (2x)^2 \cdot x^2 \cdot y^2 \end{array}$$

$$\begin{array}{l} \frac{1}{3x^2y^4} \end{array}$$

$$\begin{array}{l} \frac{4 \cdot y^4}{x^2 \cdot 8 \cdot x^1 \cdot y^6} \quad (y^{-2}) = \frac{1}{y^2} \end{array}$$

$$\begin{array}{l} y^5 \\ \hline -4 \cdot 4 \cdot x^2 \cdot x^2 \cdot y^2 \end{array}$$

$$\begin{array}{l} \frac{1}{2x^3y^2} \end{array}$$

$$\begin{array}{l} y^3 \\ \hline -16x^4 \end{array}$$