

Algebra RH

Simplifying Exponential Expressions Practice

Do Now: Simplify each expression. The simplified expression should not contain any negative exponents.

a) $3y^{-2}z^0$

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

b) $(-xy)^{-3}$

$$\frac{1}{(-xy)^3}$$

$$\frac{1}{-x^3y^3}$$

c) $\left(\frac{z^3}{xy}\right)^4$

$$\frac{z^{12}}{x^4y^4}$$

d) $\frac{4x^5}{9x^3}$

$$\frac{4x^2}{9}$$

e) $\frac{(x^{-6})^{-3}}{(x^{-6})^2} \rightarrow \frac{x^{18}}{x^{-12}}$

$$(x^{-6})^{-5}$$

$$x^{30}$$

Here are the rules we know....



- **Zero Power and Negative Exponents:** $a^0 = 1, a \neq 0$

$$a^{-n} = \frac{1}{a^n} \text{ and } \frac{1}{a^{-n}} = a^n, a \neq 0$$

- **Product of Powers Property:** $a^m \cdot a^n = a^{m+n}$
- **Power of a Power Property:** $(a^m)^n = a^{m \cdot n}$
- **Power of a Product Property:** $(a \cdot b)^m = a^m \cdot b^m$
- **Quotient of Powers Property:** $\frac{a^m}{a^n} = a^{m-n}, a \neq 0$
- **Power of Quotient Property:** $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$



Now it's time to ... **SIMPLIFY!**

The simplified expression should not contain any negative exponents.

1. 12^{-2}

$$\frac{1}{144}$$

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

$$\frac{125}{8}$$

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

$$\frac{1}{125}$$

4. $\frac{8^1}{18x^{-3}y^9}$

$$\frac{x^3}{3y^9}$$

5. $(7x^8)^{-2}$

$$\frac{1}{49x^{16}}$$

$$6. \left(\frac{x^6}{x^{12}}\right)^8$$

$$\left(\frac{1}{x^6}\right)^8$$

$$\boxed{\frac{1}{x^{48}}}$$

$$7. \frac{3x^{-3}y^2}{4y}$$

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

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

$$8. \frac{(a^6 \cdot a^3)^3}{a^7}$$

$$\frac{(a^9)^3}{a^7}$$

$$\frac{a^{27}}{a^7} = \boxed{a^{20}}$$

$$9. \frac{(2z)^4}{3z^2}$$

$$\frac{2^4 z^4}{3z^2}$$

$$\boxed{\frac{16z^2}{3}}$$

$$10. (-x^2y)(2x^{-1}y^{-1})$$

$$-2x^{-2}y^0$$

$$\boxed{\frac{-2}{x^2}}$$

$$11. \left(\frac{4x^6y^{-6}}{x^4y^{-3}}\right)^3$$

$$(4x^2y^{-3})^3$$

$$4^3 x^6 y^{-9}$$

$$\boxed{\frac{64x^6}{y^9}}$$

$$12. \left(\frac{2x^{-5}y^{12}}{3x^{-14}y^8}\right)^{-6}$$

$$\left(\frac{2x^9y^4}{3}\right)^{-6}$$

$$\left(\frac{3}{2x^9y^4}\right)^6$$

$$\frac{3^6}{2^6 x^{54} y^{24}} = \boxed{\frac{729}{64x^{54}y^{24}}}$$

$$13. \frac{-3x^5 \cdot 2x^{10}y}{x^{13}y \cdot 15y^2}$$

$$\frac{-6x^{15}y}{15x^{13}y^3}$$

$$\boxed{\frac{-2x^2}{5y^2}}$$

$$14. \left(\frac{5xy}{8x^{-1}y^2}\right)^2 \cdot \frac{y^3}{5x^2y^5}$$

$$\frac{5^2 x^2 y^2}{8^2 x^{-2} y^4} \cdot \frac{y^3}{5x^2 y^5}$$

$$\frac{25x^4}{64y^2} \cdot \frac{1}{8x^2 y^2} = \boxed{\frac{5x^2}{64y^4}}$$

$$15. \frac{-2x^6y^{-3}}{3x^{-2}y^{-5}} \cdot \frac{-2x^{-10}y}{-4x}$$

$$\frac{4x^{-4}y^{-2}}{-x^{-1}y^{-5}}$$

$$-4x^{-3}y^3 = \boxed{\frac{-4y^3}{x^3}}$$

$$16. \left(\frac{2x^2y}{3y}\right)^{-1} \cdot \frac{(4y^3)^2}{x^4}$$

$$\frac{3y}{2x^2y} \cdot \frac{4^2 y^6}{x^4}$$

$$\frac{3}{2x^2} \cdot \frac{16y^6}{x^4}$$

$$\boxed{\frac{24y^6}{x^6}}$$

$$17. \left(\frac{7x^4}{8x^3}\right)^2$$

$$\frac{7^2 x^8}{8^2 x^6}$$

$$\boxed{\frac{49x^2}{64}}$$

$$18. \frac{32a^4b^{-2}}{2a^3b^3} \cdot \frac{3a^2b^7}{-2a^5}$$

$$\frac{24a^6b^5}{-a^8b^3}$$

$$-24a^{-2}b^2$$

$$\boxed{\frac{-24b^2}{a^2}}$$

$$19. \frac{36a^8b^2}{ab} \cdot \left(\frac{6}{ab^2}\right)^{-1}$$

$$\frac{36a^8b^2}{ab} \cdot \frac{ab^2}{6}$$

$$\frac{6a^9b^4}{ab}$$

$$\boxed{6a^8b^3}$$

$$20. \frac{6x^{-2}y^2}{xy^3} \cdot (4x^2y^{-2})^2$$

$$6x^{-3}y^{-1} \cdot 4^2 x^4 y^{-4}$$

$$6x^{-3}y^{-1} \cdot 16x^4 y^{-4}$$

$$96x^1 y^{-5} \rightarrow \boxed{\frac{96x}{y^5}}$$