ZERO AND NEGATIVE EXPONENTS

A nonzero number to the zero po

$a^0 = 1$

Examples: Evaluate.

1. $5^0 = 1$
2. $(-3)^0 = 1$
3. $(\frac{1}{9})^0 = 1$

ro raised to the zero power is undefi

NEGATIVE EXPONENTS

$$a^{-n} = \frac{1}{a^n} \text{ or } a^n = \frac{1}{a^{-n}}$$

Examples: Evaluate.

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

$= \boxed{\frac{1}{4}}$

5. $\frac{1}{(-3)^{-4}} = \frac{(-3)^4}{1}$

$= (-3)^4$

$= (-3)(-3)(-3)(-3)$

$= 81$

6. $\left(\frac{1}{4}\right)^{-3}$

$\left(\frac{4}{1}\right)^3$

$(4)^3$

$4 \cdot 4 \cdot 4$

64

Examples: Evaluate.

7. $6^{-4} \cdot 6^4$

$\frac{1}{6^4} \cdot \frac{6^4}{1} = \frac{6^4}{6^4} = \boxed{1}$

8. $(2^{-3})^{-2}$

$\left(\frac{1}{2^3}\right)^{-2} = (2^3)^2 = 8^2$

$= \boxed{64}$

9. $(-3 \cdot 2)^{-2}$

$(-6)^{-2} = \frac{1}{(-6)^2} = \boxed{\frac{1}{36}}$

10. $(3^{-2})^{-2}$

$\left(\frac{1}{3^2}\right)^{-2} = (3^2)^2 = 9^2 = \boxed{81}$

11. $(2 \cdot 5)^{-2}$

$(10)^{-2} = \frac{1}{10^2} = \boxed{\frac{1}{100}}$

12. $4^2 \cdot 4^{-3}$

$\frac{4^2}{1} \cdot \frac{1}{4^3} = \frac{4^2}{4^3} = \frac{\cancel{4} \cdot \cancel{4}}{\cancel{4} \cdot \cancel{4} \cdot 4}$

$= \boxed{\frac{1}{4}}$

Examples: Rewrite using positive exponents.

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

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

14. $\frac{5c^{-4}}{d^{-5}}$

$\boxed{\frac{5d^5}{c^4}}$

Examples: Rewrite using positive exponents.

15. $\frac{(5a)^{-3}}{1}$

$\frac{1}{(5a)^3} = \frac{1}{5a \cdot 5a \cdot 5a}$

$= \boxed{\frac{1}{125a^3}}$

16. $\frac{4k^{-3}}{m^{8}p^{-2}}$

$\boxed{\frac{4p^2}{k^3m^8}}$