Algebra RH

Essential Question: How do we evaluate zero and negative exponents?

Do Now: Evaluate.

2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}
16	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$

Important Concepts

a^n ← exponent

base

$a^0 = 1,\ a \neq 0$

any non-zero number raised to the zero power = 1

any expression raised to the negative power moves that expression to the other part of the fraction

$a^{-n} = \frac{1}{a^n}$ $\qquad \frac{1}{a^{-n}} = a^n$

Simplifying Exponential Expressions (express answers with positive exponents)

1. 3^{-2} $\qquad \frac{1}{3^2}$ $\qquad \frac{1}{9}$

2. 2^{-4} $\qquad \frac{1}{2^4}$ $\qquad \frac{1}{16}$

3. a^{-3} $\qquad \frac{1}{a^3}$

4. $\left(\frac{2}{3}\right)^{-2}$ $\qquad \left(\frac{3}{2}\right)^2 \rightarrow \frac{9}{4}$ $\qquad \frac{2^{-2}}{3^{-2}} \rightarrow \frac{3^2}{2^2} = \frac{9}{4}$

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

6. $(-11)^2 y^0$ $\qquad (-11)(-11)(1)$ $\qquad 121$

7. $x^{-10}y^{21}$ $\qquad \frac{y^{21}}{x^{10}}$

8. $20x^{-8}y^{-8}$

$$\frac{20}{x^8 y^8}$$

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

3^2

9

10. $\frac{1}{x^{-4}}$

x^4

11. $\frac{6}{18x^{-3}}$

$\frac{1x^3}{3} \rightarrow \frac{x^3}{3}$

12. $\frac{8^{-2}}{2^{-4}x^{-4}}$

$\frac{2^4 x^4}{8^2} \rightarrow \frac{16x^4}{64} \rightarrow \frac{x^4}{4}$

13. $\frac{x^{-4}}{(12y)^{-2}}$

$\frac{(12y)^2}{x^4} \rightarrow \frac{144y^2}{x^4}$

14. $\left(\frac{2x}{y^{-1}}\right)^2$

$(2xy)^2 \rightarrow 2^2x^2y^2 \rightarrow 4x^2y^2$

15. $\left(\frac{2x}{y^{-1}}\right)^{-2}$ take the reciprocal

$\left(\frac{y^{-1}}{2x}\right)^2 \quad \left(\frac{1}{2xy}\right)^2 \rightarrow \frac{1}{4x^2y^2}$

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

or $(2xy)^{-2} \rightarrow \frac{1}{(2xy)^2} \rightarrow \frac{1}{4x^2y^2}$