

16.3 – Negative Exponents

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

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

Note: A negative exponent does not indicate a negative number.

Evaluate the following. ** Answers cannot have negative exponents!*

1. $5^{-4} \cdot 5^3 =$

$$5^{-4+3} = 5^{-1} = \frac{1}{5^1} = \frac{1}{5}$$

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

$$2^{-6} = \frac{1}{2^6} = \frac{1}{64}$$

3. $\frac{8^3 \cdot 8^5}{8^9} =$

$$= \frac{8^8}{8^9} = 8^{8-9} = 8^{-1} = \frac{1}{8^1} = \frac{1}{8}$$

4. $\left(\frac{5}{6}\right)^{-3} =$

$$\frac{5^{-3}}{6^{-3}} = \frac{6^3}{5^3} = \frac{216}{125}$$

Simplify the following.

5. $x^4 \cdot x^8 = x^{12}$

6. $\frac{1}{x^{-5}} = x^5$

7. $\left(\frac{x^2}{y}\right)^{-3} = \frac{x^{-6}}{y^{-3}} = \frac{y^3}{x^6}$

8. $\left(\frac{x^5 y^3}{x^3 y^5}\right)^{-4} = (x^2 y^{-2})^{-4} = x^{-8} y^8 = \frac{y^8}{x^8}$

9. $\frac{5x^4 y^3}{8x^5} \cdot \frac{3x^3 y^5}{6y^4} =$

$$\frac{5y^3}{8x} \cdot \frac{1x^3 y}{2} = \frac{5x^3 y^4}{16x} = \frac{5x^2 y^4}{16}$$

10. $\frac{x^{-2} y^3 z^{-1}}{x^{-3} y^2} \cdot \frac{x^2 y^{-1} z}{z^3} =$

$$x^{-2-(-3)} y^{3-2} z^{-1} \cdot x^2 y^{-1} z^{-2} = x y z^{-1} \cdot x^2 y^{-1} z^{-2} = x^3 y^0 z^{-3} = \frac{x^3}{z^3}$$