

**Exponent Rules Decoder**

“ \_\_\_\_\_  
 6 7 1 10 1 2 2 3 6 4 2 2  
 \_\_\_\_\_  
 5 4 16 12 3 17 8 5 9 2 2 13 7 8  
 \_\_\_\_\_  
 6 5 11 2 15 10 1 2 4 1 14 1.” – The Polar Express

**Simplify each of the following expressions.**

1.  $3x^3y^5z^2 * 4x^2yz^7$

2.  $-4x^{-2}y^3z^9 * 2x^6y^4z^{-5}$

3.  $\frac{6x^4y^{-2}z^5}{3x^2y^{-6}z^3}$

4.  $(-2x^4y^2z^8)^2$

5.  $(3^{-1}x^{-2}y^{-5}z^{-2})^{-2}$

6.  $\frac{-12x^{-5}y^3z^{12}}{2x^{-7}y^2z^{-3}}$

A.  $\frac{256y^{16}z^8}{x^{12}}$

B.  $10x^{16}y^8z^{12}$

E.  $12x^5y^6z^9$

F.  $x = -1$

G.  $-\frac{4x}{y}$

H.  $27x^3y^6z^3$

I.  $4x^8y^4z^{16}$

L.  $-8x^4y^7z^4$

N.  $x = 2$

O.  $\frac{4x^4y^8}{z^8}$

R.  $9x^4y^{10}z^4$

S.  $2x^2y^4z^2$

T.  $-6x^2yz^{15}$

U.  $\frac{7y^8}{x^6z^{10}}$

V.  $x = 3$

W.  $x = -2$

Y.  $x = 4$

7.  $(8x^3y^{-2}z)^0 * (3xy^2z)^3$

8.  $\frac{(4x^{-2}y^4z^{-3})^2}{(2x^{-4}y^0z)^2}$

9.  $(-4x^{-3}y^4z^2)^4$

10.  $(3x^8y^4z^6)^2 + (x^4y^2z^3)^4$

11.  $(2x^{-3}y^4z^{-5})^2 + \frac{3y^8}{x^6z^{10}}$

12.  $\frac{8x^{-5}y^6z^{-2}}{-2x^{-6}y^7z^{-2}}$

Solve for x in each of the following equations:

13.  $4^6 = 4^{-3x}$

14.  $(-5)^{3x+1} = (-5)^{10}$

15.  $7^{4x-9} = 7^{2x-1}$

16.  $\left(\frac{1}{2}\right)^{6x+5} = \left(\frac{1}{2}\right)^{8x+1}$

17.  $4^{7x+9} = 4^{-3x-1}$