

## Exponents - Worksheet

Evaluate or simplify. If the values are greater than 150, you don't need to evaluate.

$$A = \frac{2^3 \times 2^5}{2^4 \times 2^8} = \frac{2^8}{2^{12}} = \frac{1}{2^4} = \frac{1}{16}$$

$$B = \frac{8x^5y^{-4}}{16x^8y^2} = \frac{1}{2} x^{-3} y^{-6} = \frac{1}{2x^3y^6}$$

$$C = (2x^3y)^2 \cdot \left(\frac{3}{4}x^2y^5\right)^{-2} = 2^2x^6y^2 \left(\frac{3}{4}\right)^{-2} x^{-4} y^{-10} = \frac{64x^2}{9y^8}$$

$$= \frac{2^6}{3^2} x^2 y^{-8}$$

$$D = \left[\left(\frac{3}{4}\right)^2 \times \left(\frac{3}{4}\right)^{-3}\right]^{-2} = \left[\left(\frac{3}{4}\right)^{-1}\right]^{-2} = \left(\frac{3}{4}\right)^2 = \frac{9}{16}$$

$$E = \frac{(3xy)^2(2x^2y)^{-1}}{(2xy^2)^{-3}} = \frac{3^2x^2y^2 \cdot 2^{-1}x^{-2}y^{-1}}{2^{-3}x^{-3}y^{-6}} = 3^2 2^2 x^3 y^7 = 36x^3y^7$$

$$F = (2x^3y^{-2})^{-4} (3xy^{-5})^2 = 2^{-4} x^{-12} y^8 \cdot 3^2 x^2 y^{-10} = \frac{9}{16x^{10}y^2}$$

$$G = 2^{-5} x^6 y \times \left(\frac{3}{5} x^2 y^{-1}\right)^{-2} = 2^{-5} x^6 y \left(\frac{3}{5}\right)^{-2} x^{-4} y^2 = \frac{25x^2y^3}{32 \times 9} = \frac{25}{288} x^2 y^3$$

$$= \frac{5^2}{2^5 3^2} x^2 y^3$$

$$H = \frac{16x^2y^{-3}}{8x^3y^2} = 2x^{-1}y^{-5} = \frac{2}{xy^5}$$

$$I = \frac{-32x^2y^4}{64x^3y^5} = -\frac{1}{2} x^{-1} y^{-1} = -\frac{1}{2xy}$$

$$J = \left( \frac{7x^3}{14x^{-5}} \right)^{-2} = \left( \frac{x^8}{2} \right)^{-2} = \frac{x^{-16}}{2^{-2}} = \frac{4}{x^{16}}$$

$$K = \left( \frac{3 \cdot 2x^3y^5}{1.6x^2y^{-1}} \right)^{-3} = (2xy^6)^{-3} = 2^{-3}x^{-3}y^{-18} = \frac{1}{8x^3y^{18}}$$

$$L = \frac{2^{x+3} \times 2^{3x+1}}{2^{x-3}} = \frac{2^{4x+4}}{2^{x-3}} = 2^{3x+7}$$

$$M = \left( \frac{3^{x+1}}{3^{x-5}} \right)^{\frac{1}{3}} = \left( 3^{x+1-(x-5)} \right)^{\frac{1}{3}} = \left( 3^6 \right)^{\frac{1}{3}} = 3^2 = 9$$

$$N = (5^{x+3})^2 \times \frac{3}{5^{2x+1}} = 5^{2x+6} \times \frac{3}{5^{2x+1}} = 3 \times 5^{2x+6-(2x+1)} = 3 \times 5^5$$

$$P = \frac{x^5(3x^2y^{-3})^2}{9x^3y^{-2}} = \frac{x^5 \cdot 3^2 x^4 y^{-6}}{9x^3y^{-2}} = x^6 y^{-4} = \frac{x^6}{y^4}$$

$$Q = \left( \frac{2a^{-2}b^3}{3a^3b^2} \right)^{-3} = \left( \frac{2}{3} \right)^{-3} a^{15} b^{-3} = \frac{27a^{15}}{8b^3}$$

$$R = (5^0 a^2 b^{-3})^{-2} (5a^3 b^{-2})^2 = a^{-4} b^6 \cdot 5^2 a^6 b^{-4} = 25a^2 b^2$$

$$S = \frac{2xy^0(3x^2y^{-4})^{-3}}{(2xy)^2} = \frac{2x \cdot 3^{-3} x^{-6} y^{12}}{2^2 x^2 y^2} = \frac{y^{10}}{2 \times 3^3 x^7} = \frac{y^{10}}{54x^7}$$

$$T = \frac{3^3 - 3^5}{3^2 - 3^0} = \frac{27 - 243}{9 - 1} = -\frac{216}{8} = -27$$

$$U = (2x^{\frac{1}{2}}y^{\frac{2}{3}})^{-6} (2xy^{-3})^2 = 2^{-6} x^{-3} y^{-4} 2^2 x^2 y^{-6} = 2^{-4} x^{-1} y^{-10} = \frac{1}{16xy^{10}}$$

$$V = \frac{6^5}{6} = 6^4$$

$$W = \left(\frac{2}{3}x^2y^{-3}\right)^{-3} \left(\frac{9}{4}x^{-3}y^{-4}\right)^2 = \left(\frac{2}{3}\right)^{-3} x^{-6} y^9 \cdot \left(\frac{3}{2}\right)^4 x^{-6} y^{-8} = \left(\frac{3}{2}\right)^7 x^{-12} y = \frac{3^7 y}{2^7 x^{12}}$$

$$X = \left(\frac{5x^2y^3}{7x^{-3}y}\right)^{-2} \left(\frac{5}{7}x^{-2}y^0\right)^3 = \left(\frac{5}{7}\right)^{-2} x^{-10} y^{-4} \left(\frac{5}{7}\right)^3 x^{-6} = \frac{5}{7} x^{-16} y^{-4} = \frac{5}{7x^{16}y^4}$$

$$Y = \frac{3^{17}}{3^{20}} = \frac{1}{3^3} = \frac{1}{27}$$

$$Z = \frac{5^3 \times 2^{-3}}{2^5 \times 5^4} = \frac{1}{2^8 \cdot 5} = \frac{1}{256 \cdot 5} = \frac{1}{1280}$$

$$A' = \frac{27^3 x^{-5} y^2}{9^4 x^{-2} y^{-3}} = \frac{3^9 x^{-5} y^2}{3^8 x^{-2} y^{-3}} = 3x^{-3} y^5 = \frac{3y^5}{x^3}$$

$$B' = (3x^2y^{-3})^{-4} = 3^{-4} x^{-8} y^{12} = \frac{y^{12}}{81x^8}$$

$$C' = \left(\frac{2x^3y^2}{3x^8y^{-4}}\right)^{-5} = \left(\frac{2}{3}\right)^{-5} x^{25} y^{-30} = \frac{3^5 x^{25}}{2^5 y^{30}} = \frac{243 x^{25}}{32 y^{30}}$$

$$D' = \left(\frac{2}{3}x^2y^{-4}\right)^{-3} \left(\frac{2}{3}x^{-3}y^5\right)^2 = \left(\frac{2}{3}\right)^{-3} x^{-6} y^{12} \left(\frac{2}{3}\right)^2 x^{-6} y^{10} = \frac{3}{2} x^{-12} y^{22} = \frac{3y^{22}}{2x^{12}}$$

$$E' = (5x - 3)^2 = 25x^2 - 30x + 9$$

$$F' = \frac{2^6 - 2^5}{2^4 - 2^3} = \frac{64 - 32}{16 - 8} = \frac{32}{8} = 4$$

$$G' = \frac{5x^2y^{-1}(2xy^3)^4}{10x^3y^{-5}} = \frac{5x^2y^{-1}2^4x^4y^{12}}{10x^3y^{-5}} = \frac{1}{2}x^3y^{16}2^4 = 2^3x^3y^{16} = 8x^3y^{16}$$

$$H' = \frac{(0.3x^2y^3)^5}{(3xy^{-2})^{-4}} = (0.3x^2y^3)^5 (3xy^{-2})^4 = \left(\frac{3}{10}\right)^5 x^{10}y^{15} 3^4 x^4 y^{-8}$$
$$= \frac{3^9 x^{14} y^7}{10^5}$$