**Simplify the following. Answers should contain only positive exponents. Find the value of any constants.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Product Rule** | 1) $k(k^{3})$ | 2) $2q^{2}(9q^{4})$ | 3) $5m^{2}y^{3}m^{5}y^{7}(9)$ |
| 4) $(5u^{4}v)(7u^{4}v^{3})$ | 5) $(14fg^{2}h^{2})(-3f^{4}g^{2}h^{2})$ | 6) $(b^{8}c^{6}d^{5})(7b^{6}c^{2}d)$ |
|  |  |  |  |
| **Power of a Power Rule** | 7) $[\left(3^{3}\right)^{2}]^{2}$ | 8) $\left(x^{2}\right)^{3}$ | 9) $5\left(y^{5}\right)^{4}$ |
|  |  |  |  |
| **Power of a Product Rule** | 10) $\left(xy\right)^{2}$ | 11) $\left(2m\right)^{4}$ | 12) $\left(hg^{4}\right)^{6}$ |
| 13) $\left(4a^{4}b^{9c}\right)^{2}$ | 14) $\left(-2f^{2}g^{3}h^{2}\right)^{3}$ | 15) $\left(-3p^{5}t^{6}\right)^{4}$ |
| 16) $[\left(4r^{2}t\right)^{3}]^{2}$ | 17) $\left(2a^{3}\right)^{4}\left(a^{3}\right)^{3}$ | 18) $\left(5x^{2}y\right)^{2}\left(2xy^{3}z\right)^{3}\left(4xyz\right)$ |
|  |  |  |  |
| **Quotient Rule** | 19) $\frac{m^{4}}{m^{2}}$ | 20) $\frac{m^{6}r^{5}p^{3}}{m^{5}r^{2}p^{3}}$ | 21) $\frac{10g^{8}h^{2}m}{5g^{7}h}$ |
|  |  |  |  |
| **Power of a Quotient Rule** | 22) $\left(\frac{x^{3}y^{2}z^{6}}{z^{5}x^{2}y}\right)^{2}$ | 23) $\left(\frac{2a^{3}b^{5}}{a^{2}b}\right)^{2}$ | 24) $\left(\frac{2c^{3}d^{5}}{18cg^{2}}\right)^{3}$ |
| 25) $\left(\frac{c^{4}d^{4}f^{3}}{c^{2}d^{4}f^{3}}\right)^{6} $ | 26) $\left(\frac{3xy^{4}}{5z^{2}}\right)^{2}$ | 27) $\left(\frac{2r^{3}t^{6}}{5u^{9}}\right)^{4}$ |
|  |  |  |  |
| **Negative Exponent Rule** | 28) $t^{-5}$ | 29) $m^{-2}$ | 30) $y^{-2}m^{-4}(x^{3})$ |
|  |  |  |  |
| **Zero Exponent Rule** | 31) $\left(5y\right)^{0}$ | 32) $\left(m^{3}y^{5}m^{8}\right)^{0}$ | 33) $\left(\frac{9xy^{3}h^{15}}{3m^{2}y^{7}}\right)^{0}$ |
|  |  |  |  |
| **One Exponent Rule** | 34) $b^{1}$ | 35) $\left(4am\right)^{1}$ | 36) $\left(\frac{3}{4}\right)^{1}$ |
|  |  |  |  |
| **Rule Mix Up!** | 37) $\frac{14f^{-3}g^{2}h^{0}}{21k^{3}}$ | 38) $\frac{12m^{-4}p^{2}}{-15m^{3p^{-9}}}$ | 39) $\frac{g^{0}h^{7}j^{-2}}{g^{-5}h^{0}j^{-2}}$ |
| 40) $\left(\frac{a^{-2}b^{4}c^{5}}{a^{-4}b^{-4}c^{3}}\right)^{2}$ | 41) $\frac{\left(16x^{2}y^{-1}\right)^{0}}{\left(4x^{0}y^{-4}z\right)^{2}}$ | 42) $\left(\frac{-3x^{-6}y^{-1}z^{-2}}{6x^{-2}yz^{-5}}\right)^{2}$ |
|  |  |  |  |
| **Rational Exponents** | 43) $144^{\frac{1}{2 }}$ | 44) $512^{\frac{2}{3}}$ | 45) $343^{\frac{4}{3}}$ |
| 46) $36^{\frac{3}{2}}$ | 47) $81^{\frac{5}{2}}$ | 48) $3125^{\frac{2}{5}}$ |