

1.

$$\begin{aligned}
\left(\frac{2a^{-2}c^4}{b^4}\right)^{-3} : \left(\frac{2a^{-3}}{b^2c^{-5}}\right)^{-4} &= \left(\frac{2a^{-2}c^4}{b^4}\right)^{-3} \cdot \left(\frac{2a^{-3}}{b^2c^{-5}}\right)^4 \\
&= \left(\frac{2^{-3}a^6c^{-12}}{b^{-12}}\right) \cdot \left(\frac{2^4a^{-12}}{b^8c^{-20}}\right) \\
&= \frac{2^{-3}a^6c^{-12}2^4a^{-12}}{b^{-12}b^8c^{-20}} \\
&= \frac{2^{-3+4}a^{6+(-12)}c^{-12-(-20)}}{b^{-12+8}} \\
&= \frac{2^1a^{-6}c^8}{b^{-4}} \\
&= \frac{2b^4c^8}{a^6}
\end{aligned}$$

2.

$$\begin{aligned}
\left(\frac{3d^{-2}u^4}{4dv^{-2}}\right)^2 : \left(\frac{2u^{-4}d^2}{3v^{-2}}\right)^{-3} &= \left(\frac{3d^{-2}u^4}{4dv^{-2}}\right)^2 \cdot \left(\frac{2u^{-4}d^2}{3v^{-2}}\right)^3 \\
&= \left(\frac{3^2d^{-4}u^8}{4^2d^2v^{-4}}\right) \cdot \left(\frac{2^3u^{-12}d^6}{3^3v^{-6}}\right) \\
&= \frac{3^2d^{-4}u^82^3u^{-12}d^6}{4^2d^2v^{-4}3^3v^{-6}} \\
&= \frac{v^{10}}{2 \cdot 3u^4} \\
&= \frac{v^{10}}{6u^4}
\end{aligned}$$

3.

$$\begin{aligned}
\left(\frac{6^3}{xy^2z^{-1}}\right)^2 : \left(\frac{x^4y^{-7}z^2}{(9x^{-2}y)^{-3}}\right) &= \left(\frac{6^3}{xy^2z^{-1}}\right)^2 \cdot \left(\frac{(9x^{-2}y)^{-3}}{x^4y^{-7}z^2}\right) \\
&= \left(\frac{6^6}{x^2y^4z^{-2}}\right) \cdot \left(\frac{9^{-3}x^6y^{-3}}{x^4y^{-7}z^2}\right) \\
&= \frac{6^69^{-3}x^6y^{-3}}{x^2y^4z^{-2}x^4y^{-7}z^2} \\
&= 2^6 \cdot 3^6 \cdot 3^{-6} \\
&= 2^6 = 64
\end{aligned}$$