

$$\begin{aligned}
 5. \quad (4x^{-1}y^{-2})^2(2x^4y^5)^3 &= [4^2(x^{-1})^2(y^{-2})^2][2^3(x^4)^3(y^5)^3] \\
 &= (16x^{-2}y^{-4})(8x^{12}y^{15}) = 128x^{-2+12}y^{-4+15} \\
 &= 128x^{10}y^{11}
 \end{aligned}$$

$$\begin{aligned}
 6. \quad \frac{(5x^4y^3)^3}{(15xy^5)^2} &= \frac{5^3(x^4)^3(y^3)^3}{15^2x^2(y^5)^2} = \frac{125x^{12}y^9}{225x^2y^{10}} = \frac{125}{225}x^{12-2}y^{9-10} = \frac{5}{9}x^{10}y^{-1} \\
 &= \frac{5x^{10}}{9} \cdot \frac{1}{y} = \frac{5x^{10}}{9y}
 \end{aligned}$$