

# Solutions VI Exponent Laws Quiz 1

$$\begin{aligned} \textcircled{1} (5^1 x^{-7} y^1)^{-2} &= 5^{-2} x^{14} y^{-2} \\ &= \frac{1}{5^2} \frac{x^{14}}{1} \frac{1}{y^2} \\ &= \boxed{\frac{x^{14}}{5^2 y^2}} = \boxed{\frac{x^{14}}{25 y^2}} \end{aligned}$$

$$\begin{aligned} \textcircled{2} \left[ \frac{(4^1 x^{-5} y^1)^{-4}}{2 x^3 y^{-6}} \right]^3 &= \left[ \frac{4^{-4} x^{20} y^{-4}}{2^1 x^3 y^{-6}} \right]^3 \\ &= \frac{4^{-12} x^{60} y^{-12}}{2^3 x^9 y^{-18}} = \frac{1}{2^3} \frac{1}{4^{12}} \frac{x^{60}}{1} \frac{y^{18}}{y^{12}} \\ &= \frac{1}{2^3 (2^2)^{12}} \frac{x^{60}}{1} \frac{y^6}{1} \\ &= \frac{1}{2^3 \cdot 2^{24}} \frac{x^{60}}{1} \\ &= \boxed{\frac{1}{2^{27}} \frac{x^{60} y^6}{1}} = \boxed{\frac{x^{60} y^6}{134217728 y^{20}}} \end{aligned}$$

$$\textcircled{3} \left[ \frac{5}{2} \frac{x^1}{1} \frac{y^6}{1} \right]^{-2} \left[ 10^1 x^{-4} y^3 \right]^2$$

$$\left[ \frac{5^{-2}}{2^2} \frac{x^{-2}}{1} \frac{y^{-12}}{1} \right] \left[ 10^2 x^{-8} y^6 \right]$$

$$\left[ \frac{2^2}{5^2} \frac{1}{x^2} \frac{1}{y^{12}} \right] \left[ \frac{10^2}{1} \frac{1}{x^8} \frac{y^6}{1} \right]$$

$$\frac{2^2 \cdot 10^2}{5^2} \cdot \frac{1}{x^2 x^8} \frac{y^6}{y^{12}}$$

$$\frac{2^2 \cdot (5 \cdot 2)^2}{5^2} \frac{1}{x^{10}} \frac{1}{y^6}$$

$$\frac{2^2 \cdot 5^2 \cdot 2^2}{5^2} \cdot \frac{1}{x^{10}} \frac{1}{y^6}$$

$$= \frac{2^4 \cdot 5^2}{5^2} \frac{1}{x^{10} y^6}$$

$$= \frac{400}{25} \frac{1}{x^{10} y^6}$$

$$= \textcircled{\frac{16}{x^{10} y^6}}$$

$$(4) \left( \frac{10^1 x^1 y^5}{5^1 x^0 y^1} \right)^2 = \frac{10^2 x^2 y^{10}}{5^2 x^0 y^2}$$

outside  
in

$$= \frac{(5 \cdot 2)^2}{5^2} \frac{x^2}{1} \frac{y^8}{1}$$

$$= \frac{5^2 2^2}{5^2} \frac{x^2}{1} \frac{y^8}{1}$$

$$= \frac{100}{25} \frac{x^2}{1} \frac{y^8}{1}$$

$$= \frac{4}{1} \frac{x^2}{1} \cdot y^8 = \boxed{4x^2 y^8}$$

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$$\left( \frac{10}{5} \frac{x^1}{x^0} \frac{y^5}{y^1} \right)^2 = \left[ \frac{2}{1} \frac{x^1}{1} \frac{y^4}{1} \right]^2$$

$$= 2^2 x^2 y^8$$

$$= \boxed{4x^2 y^8}$$

Problem 5

$$\left[ \frac{4^1 x^1 y^{10}}{y^{11}} \right]^{-2}$$

outside/in

$$\frac{4^{-2} x^{-2} y^{-20}}{y^{-22}}$$

$$= 4^{-2} x^{-2} y^{-20} y^{22}$$

$$= \boxed{4^{-2} x^{-2} y^2}$$

$$\left[ \frac{4^1 x^1 y^{10}}{y^{11}} \right]^{-2}$$

inside out

$$\left[ \frac{4^1 x^1}{1} \frac{1}{y} \right]^{-2}$$

$$\frac{4^{-2} x^{-2} \cdot 1}{1 \cdot 1 \cdot y^{-2}}$$

$$\boxed{4^{-2} x^{-2} y^2}$$

$$(6) \quad 4^{-3} x^2 y^{-4} z^6$$

$$\frac{4^{-3}}{1} \quad \frac{x^2}{1} \quad \frac{y^{-4}}{1} \quad \frac{z^6}{1}$$

$$\frac{1}{4^3} \quad \frac{x^2}{1} \quad \frac{1}{y^4} \quad \frac{z^6}{1}$$

$$\frac{1}{4^3} \frac{x^2 z^6}{y^4} =$$

$$\boxed{\frac{x^2 z^6}{4^3 y^4}}$$

$$= \boxed{\frac{x^2 z^6}{64 y^4}}$$

Problem 7  $\left[ \frac{(6'x^{-6}y^1)^0 \cdot 3^1x^5}{12x^w y^{-4}} \right]^{-v}$

$$\left[ \frac{6^0 x^0 y^0 \cdot 3^1 x^5}{12^1 x^w y^{-4}} \right]^{-v} = \left[ \frac{1 \cdot 3^1 x^5}{12^1 x^w y^{-4}} \right]^{-v}$$

$$\left[ \frac{3}{12} \right]^{-v} \left[ \frac{x^5}{x^w} \right]^{-v} \left[ \frac{y^1}{1} \right]^{-v}$$

$$\left[ \frac{1}{4} \right]^{-v} \left[ \frac{x^{-5v}}{x^{vw}} \right] \left[ \frac{y^{-4v}}{1} \right]$$

$$\left[ \frac{1}{4^{-v}} \right] \left[ \frac{x^{vw}}{x^{5v}} \right] \left[ \frac{1}{y^{4v}} \right]$$

$$\left[ \frac{4^v}{1} \right] \left[ \frac{x^{vw}}{x^{5v}} \right] \left[ \frac{1}{y^{4v}} \right]$$

$$\boxed{\frac{4^v x^{vw}}{x^{5v} y^{4v}}}$$

or with single bases

$$\boxed{\frac{4^v x^{vw-5v}}{y^{4v}}}$$