

$$1a) r^{-3} = \left(\frac{1}{r^3}\right)$$

$$1b) 2^{-3} = \frac{1}{2^3} = \left(\frac{1}{8}\right)$$

$$1c) \frac{1}{2^{-3}} = 2^3 = (8)$$

$$2a) \begin{array}{c} a^0 + 9b^0 \\ \downarrow \\ | + 9 \cdot | \\ | + 9 \\ (10) \end{array}$$

$$2b) \begin{array}{c} -7^0 \\ \downarrow \\ (-1) \end{array}$$

$$3) \frac{v^{-5}w^4}{v^7w^{-10}} = \frac{w^4w^{10}}{v^5v^7} = \left(\frac{w^{14}}{v^{12}}\right)$$

$$4) (-4x^{10}y^{-2})(5x^{-7}y^{-6})$$

On many of these problems, your work may differ from the key, but your answers must always match.

$$-20x^{10-7}y^{-2-6}$$

$$-20x^3y^{-8} = \left(\frac{-20x^3}{y^8}\right)$$

$$5) \left(\frac{x^{-12}y^1}{x^8y^{-6}z^3}\right)^2 = \left(\frac{y^1y^6}{x^{12}x^8z^3}\right)^2 = \left(\frac{y^7}{x^{20}z^3}\right)^2 = \left(\frac{y^{14}}{x^{40}z^6}\right)$$

$$6) \left(\frac{5m^{-1}n^3}{mn}\right)^{-2} = \left(\frac{m^1n}{5m^{-1}n^3}\right)^2 = \left(\frac{mm}{5n^2}\right)^2 = \left(\frac{m^2}{5n^2}\right)^2 = \left(\frac{m^4}{25n^4}\right)$$

$$7) \left(\frac{c^{-3}d^{-5}}{c^{-2}d^{-9}}\right)^3 = \left(\frac{c^2d^4}{c^3d^5}\right)^3 = \left(\frac{d^4}{c}\right)^3 = \left(\frac{d^{12}}{c^3}\right)$$

$$8a) x^{-9}x^5x^{-7}$$

$$x^{-9+5-7} = x^{-11} = \left(\frac{1}{x^{11}}\right)$$

$$8b) 4^5 \cdot 4^{-7}$$

$$4^{5-7} = 4^{-2} = \frac{1}{4^2} = \left(\frac{1}{16}\right)$$

$$9) (5x^3y^0)^{-2} = \frac{1}{(5x^3)^2} = \left(\frac{1}{25x^6}\right)$$

$$10) 2^{-3} + 8^{-1}$$

$$\frac{1}{2^3} + \frac{1}{8}$$

$$\frac{1}{8} + \frac{1}{8}$$

$$\frac{2}{8} = \left(\frac{1}{4}\right)$$

$$11a) 6x^{-4}y^2 = \left(\frac{6y^2}{x^4}\right)$$

$$11b) \frac{3}{r^{-7}} = (3r^7)$$