

Additional Indices / Powers for higher tier

(see the foundation tier wiki for Calculating Indices and Powers)

Examples

Fractional indices

use roots

$$\frac{1}{2} = \text{square root} \quad 9^{1/2} = \sqrt{9} = 3$$

$$\frac{1}{3} = \text{cubed root} \quad 27^{1/3} = \sqrt[3]{27} = 3$$

$$\frac{1}{4} = \text{root to the fourth} \quad 38^{1/4} = \sqrt[4]{38} = 2.48$$

$$\left(\frac{4}{9}\right)^{1/2} = \sqrt[4]{\sqrt{9}} = \frac{2}{3}$$

Negative powers

remove the negative power by turning into a fraction with 1 over

$$\left(\frac{1}{2}\right)^{-3} \text{ becomes } \frac{1}{\left(\frac{1}{2}\right)^3} = \frac{1}{\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}} = \frac{1}{1/8} = \frac{8}{1}^* = 8$$

* Both parts of the fraction can be multiplied by the same value and still be in proportion. So, for $\frac{1}{1/8}$, $8 \times 1 = 8$ and $8 \times \frac{1}{8} = 1$, changing the fraction to $\frac{8}{1}$.

$$\left(-1\right)^{-2} \text{ becomes}$$

$$\frac{1}{\left(-1\right)^2} = \frac{1}{-1 \times -1} = \frac{1}{1} = 1$$

$$\left(\frac{2}{5}\right)^{-2} \text{ becomes}$$

$$\begin{aligned} \frac{1}{\left(\frac{2}{5}\right)^2} &= \frac{1}{\frac{2}{5} \times \frac{2}{5}} = \frac{1}{4/25} = 1 \div \frac{4}{25} \\ &= 1 \times \frac{25}{4} \\ &= \frac{25}{4} \end{aligned}$$

~ Remember, when dividing fractions turn the second fraction upside and then multiply.
So, $1 \div \frac{4}{25}$ becomes $1 \times \frac{25}{4}$