What indices mean

$a^2 = a \times a$ (Think 10^2 = 10×10 = 100)

$a^3 = a \times a \times a$ and so on. (Think 10^3 = 10×10×10 = 1000)

Negative indices: $a^{-n} = \frac{1}{a^n}$

Examples: $10^{-2} = \frac{1}{10^2} = \frac{1}{100}$

$x^{-2} = \frac{1}{x^2}$, also $5x^{-2} = 5 \times (x^{-2}) = \frac{5}{x^2}$ (think BIDMAS, this is *not* $(5x)^{-2}$)

Fractional indices: $a^{\frac{1}{n}} = \sqrt[n]{a}$

Examples: $16^{\frac{1}{2}} = \sqrt{16} = 4$

$1000^{\frac{1}{3}} = \sqrt[3]{1000} = 10$

Rules for combining indices

Rule	Example
$a^m \times a^n = a^{m+n}$	$10^2 \times 10^3 = 10^{2+3} = 10^5$
$a^m \div a^n = a^{m-n}$	$10^5 \div 10^3 = 10^{5-3} = 10^2$
$(a^m)^n = a^{mn}$	$(10^3)^2 = 10^{2\times3} = 10^6$
$(ab)^n = a^n \times b^n$	$(2 \times 10)^3 = 2^3 \times 10^3 = 8\times 1000 = 8000$
$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	$\left(\frac{2}{3}\right)^2 = \frac{2^2}{3^2} = \frac{4}{9}$

$$25^{-\frac{1}{2}} = \left(25^{\frac{1}{2}}\right)^{-1} = \left(\sqrt{25}\right)^{-1} = 5^{-1} = \frac{1}{5}$$

Combined numbers and letters examples: $2x^2y \times 3x^5y^2 = (2\times3)x^{2+5}y^{1+2} = 6x^7y^3$

$(10x^{\frac{1}{3}})^2 = 100x^{\frac{2}{3}}$

Don't forget to multiply the numbers as well as the letters:

$2x^4 \times 4x^3 = 8x^7$ not $6x^7$