Indices and Surds

Multiplying with indices
To multiply indices you add the powers
\[ a^2 \times a^3 = (a \times a) \times (a \times a \times a) = a^{2+3} = a^5 \]

Dividing with indices
To divide indices you subtract the powers
\[ a^5 \div a^3 = (a \times a \times a \times a \times a) \div (a \times a \times a) = a^{5-3} = a^2 \]

Power raised to a power
When a power is raised to a power you multiply the powers
\[ (a^3)^5 = a^{3 \times 5} = a^{15} \]

Fractional powers
In a fractional power the denominator (the bottom power) is the root
\[ a^{\frac{1}{3}} = \sqrt[3]{a} \]

Negative powers
A negative power means the reciprocal of the number
\[ a^{-2} = \frac{1}{a^2} \]

Fractional and negative powers
When the power is both negative and a fraction the fractional power is dealt with first and then put to the reciprocal.
\[ a^{-\frac{1}{3}} = \frac{1}{\sqrt[3]{a}} \]

Zero powers
If the power of the number is 0 then it equals 1
\[ a^0 = 1 \]