

## Laws of indices

### The Laws

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{m \times n}$$

$$(ab)^m = a^m \times b^m$$

$$a^{\frac{1}{m}} = \sqrt[m]{a}$$

$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

$$a^{-m} = \frac{1}{a^m}$$

### Special results

$$a^0 = 1$$

$$0^m = 0$$

It therefore logically follows that  $0^0$  is undefined, as something to the power of zero in all other cases is 1, yet 0 to the power of something in all other cases is 0.

### Why is $a^0=1$ ?

This is because it fits the sequence:

$$10^3 = 1000$$

$$10^2 = 100$$

$$10^1 = 10$$

$$10^0 = 1$$

$$10^{-1} = 0.1$$

etc.

### References

Attwood, G. et al. (2017). *Edexcel AS and A level Mathematics - Pure- Year 1*. London: Pearson Education.  
p.2.