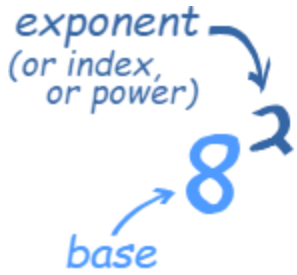
Powers

Powers or exponents come around for the same reason that multiplying does - mathematicians are lazy.

$$2 + 2 + 2 + 2 = 4 \times 2$$

$$2 \times 2 \times 2 \times 2 = 2^4$$



First Rule:

$$x^a x^b = x^{a+b}$$

In English: If you have "a" x's multiplied by "b" x's, then the total number of x's is a+b.

Ie:

$$x^3 x^2 = x^5$$
$$(xxx)(xx) = xxxxx$$

You Try:

$x^4 x^2$	$x^{100} x$	$x^{3.7} x^{2.3}$

Second Rule:

This is a variation of the first:

$$\frac{x^a}{x^b} = x^{a-b}$$

In English: If you have "a" x's divided by "b" x's, then the total number of x's is a-b.

Ie:

$$\frac{xxx}{xx}$$
$$= \frac{\cancel{x}\cancel{x}x}{\cancel{x}\cancel{x}}$$
$$= x$$

You Try:

$\frac{x^5}{x^2}$	$\frac{3^5}{3^2}$	$\frac{x^2y^6}{xy^3}$

Third Rule:

$$(x^a)^b = x^{ab}$$

In English: If you have "a" x's, and that is multiplied "b" times, then the total x's that you have is ab.

Ie:

$$(x^3)^2$$
$$= (xxx)(xxx)$$
$$= x^6$$

You Try:

$(x^3)^3$	3^{2^4}	$(x^5)^2$

A thing to keep in mind:
If an exponent is on a bracket → that exponent is on everything in that bracket.

$$(abc)^2 = a^2b^2c^2$$
$$(\frac{a}{b})^2 = \frac{a^2}{b^2}$$

Also, anything to the zero power equals 1.

$$x^0 = 1$$

Last thing:

$\dfrac{x^2}{x^5}$ $= x^{2-5}$ $= x^{-3}$	$\dfrac{xx}{xxxxx}$ $= \dfrac{\cancel{x}\cancel{x}}{\cancel{x}\cancel{x}xxx}$ $= \dfrac{1}{xxx}$

$$\therefore x^{-1} = \frac{1}{x}$$

It's bad math 'grammar' to leave an exponent negative. If you come across this scenario, move it across the line.

Ie:

$$\frac{x^2}{x^5}$$
$$= x^{2-5}$$
$$= x^{-3}$$
$$= \frac{1}{x^3}$$