[The algebra of Ratio]

The majority of conversions preserve ratio. For example, 1 inch is equal to 2.54 cm, 2 inches is equal to 2 x 2.54 = 5.08 cm and the ratio is the same. Expressed using fractions notation:

$1/2.54 = 2/5.08$

If we want to know how many inches or how many cm a length is, we can write an equation with an unknown. For example, if we want to know how many cm there are in 12 inches

$1/2.54 = 12/x$

and now we can solve for x

$x \; 1/2.54 = 12$

$x = 12 \times 2.54 = \ldots$

On the other hand if we want to know how many inches there are in 30 cm, we would have

$1/2.54 = x/30$

$30 \times 1/2.54 = x = \ldots$

So the key is just keeping track of the ratio we're preserving. Of course, we can express the ratio in a different form too. In the example where we want to know how many cm there are in 12 inches, we can say that the ratio of inches, 1/12 will be the same as the ratio of cm 2.54/x, and you'll note that the equation will rearrange equivalently to before.

$1/12 = 2.54/x$

$x \; 1/12 = 2.54$
$x = 2.54 \times 12$

How about some other conversions that preserve ratio?

1 Australian dollar is 0.7662 US dollars. How much in AUD is a book from the US that costs 35.99 USD?

$1/0.7662 = x / 35.99$

or

$1/x = 0.7662 / 35.99$

In fact if there's any kind of ratio relationship going on, we can set up this kind of equation.