Powers of Ten and Base 10

Let's remember how exponents work for a minute.....

$10^3 = 10 \times 10 \times 10 = 1000$

$10^2 = 10 \times 10 = 100$

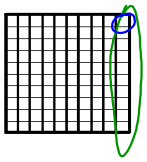
$10^1 = 10 = 10$

$10^0 = 1 = 1$

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

$10^{-2} = 1/100 = 0.01$

$10^{-3} = 1/1000 = 0.001$



Because our system is a base 10 system, there are a lot of neat things that happen when we are using exponents with tens. Let's see if we can find a pattern

$5 \times 10^3 = 5 \times 1000 = 5000$

$5 \times 10^2 = 5 \times 100 = 500$

$5 \times 10^1 = 5 \times 10 = 50$

$5 \times 10^0 = 5 \times 1 = 5$

$5 \times 10^{-1} = 5 \times .1 = .5$

$5 \times 10^{-2} = 5 \times .01 = .05$

$5 \times 10^{-3} = 5 \times .001 = .005$

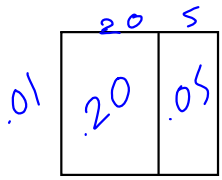
This will also work for multi digit numbers

$25 \times 10^2 = 2500$

$25 \times 10^1 = 250$

$25 \times 10^{-1} = 2.5$

$25 \times 10^{-2} = .25$



In these cases we are multiplying each part of the number (20 and 5) by the power of 10. Thus, we will change where they lie in regards to the decimal point.

And what about when we throw in decimals?

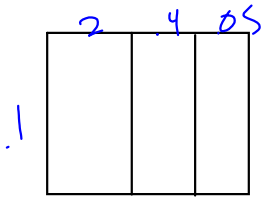
$2.45 \times 10^2 = 245$

$2.45 \times 10^1 = 24.5$

$2.45 \times 10^0 = 2.45$

$2.45 \times 10^{-1} = .245$

$2.45 \times 10^{-2} = .0245$



Again we are multiplying each part of the number by a power of 10. We will change where each part lies in relation to the decimal point.

So what we have hopefully noticed is that we can use a shortcut (gasp!) when multiplying by powers of 10. Each part of the number will be moved a relative number of spaces equal to the power of ten.

$54.32 \times 10^3 = 54,320.$

$23.16 \times 10^2 = 2316.$

$1.34 \times 10^{-1} = .134$