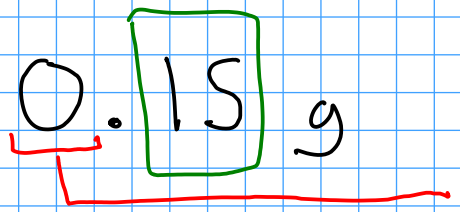
A small problem

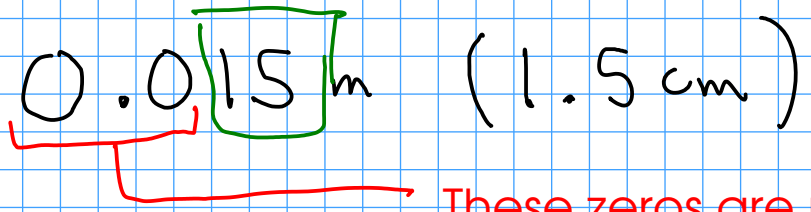
The number ZERO has several uses. It may be a measured number, but it may also be a mere "placeholder" that wasn't measured at all!

So how do we tell a measured zero from a placeholder? There are a few ways:

1: BEGINNING ZEROS: Beginning zeros are NEVER considered significant.



This zero merely indicates that there is a decimal point coming up!



These zeros are placeholders. They'll disappear if you change the UNITS of this number!

None of these zeros are considered significant

2: END ZEROS are sometimes considered significant. They are significant if

- there is a WRITTEN decimal point in the number
- there is another written indicator that the zero is significant. Usually this is a line drawn over or under the last zero that is significant!

1.50 km ± 0.01

This zero IS considered significant. There's a written decimal.

1500 m ± 100 m

These zeros ARE NOT considered significant (no written decimal, and no other indication that the zeros are significant)

1430̄00 g ± 100 g

These zeros are not significant.

This zero IS significant. It's marked.

How many significant figures are there in each of these measurements?

76.070 g ± .001 g

5

85000. mm ± 1 mm

5

0.001030 kg ± 0,000001 kg

4

156.0002 g ± 0.0001 g

7

0.10 s ± 0,01 s

2

17000000 mg ± 1,000,000 mg

2

120000 km ± 100 km

4

1350 ms ± 10 ms

3

Calculations with measurements

When you calculate something using measured numbers., you should try to make sure the ANSWER reflects the quality of the data used to make the calculation.

An ANSWER is only as good as the POOREST measurement that went into finding that answer!

$$\begin{array}{r} 14.206 \\ 154.72 \\ 1.6 \\ +\ \ 0.222 \\ \hline 170.748 \end{array}$$

Round so that there's only one uncertain digit in the answer!

How should we report this answer? How much uncertainty is in this answer?

170.7

- If you add an uncertain number to either a certain or an uncertain number, then the result is uncertain!
- If you add certain numbers together, the result is certain!