Lecture 4

Wednesday, September 11, 2024 2:28 PM

* Significant digits:

Consider the sentence: "this city has 45000 people."

The number 45000 is most likely an approximation. The true population could be 45209, 44859, 45487, ...

The digits 4 and 5 are reliable, but the zeros are not.

The digits 4 and 5 are significant digits. The population has been rounded to the nearest thousand.

Another view: $45000 = 45 \times 10^3$

the zeros are absorbed into a power of 10

Another example: the weight of a grain of rice is 0.030 gram.

0.030

not significant | significant

The last zero is significant because it implies the precision. The true weight could be 0.0303, 0.0304, ... but not 0.031 or 0.0309.

The first two digits are not significant because they can be absorbed into a power of 10.

$$0.030 = 3.0 \times 10^{-2}$$

Another example:

0.0002005000
not sign. | significant

1000.00
all are significant digits

1.0002005000
all are significant

Note that saying that a digit is not significant doesn't mean that it is not important. You will be wrong if you throw away a non-significant digit. There are digits that are more important than others.

Rule: • the zeros at the end of the number and on the right side of the decimal point are always significant.

• The zeros at the end of the number which has no decimal point are not significant.

• The nonzero digits are always significant.

• The digits in between two significant digits are always Significant.

Ex

1.020 : the last zero indicates that the number is precise to the nearest thousandth.

800: 8 is the only significant digit. It indicates that the number is precise to the nearest hundred.

Ex The Savior was born 2000 years ago. Here, 2 is the only significant

digit. You can say that the Savior was born $2000+24=2024$ years ago.

You can also round to the nearest hundred: $2024 \approx 2000$.

*Note: Above are the correct use of numbers. In real life, people don't always use numbers correctly. Now you know the correct way.

[Some problems to work on the worksheet]