Introduction to Significant Figures & Scientific Notation

Significant Figures

- Scientist use _____ to determine how _____ a measurement is.
- Significant digits in a measurement include all of the _____ plus one _____ .

For example…

- Look at the ruler below

- What would be the measurement in the correct number of sig figs?
- _____

Let's try this one

- Look at the ruler below

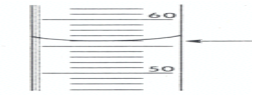
- What would be the measurement in the correct number of sig figs?
- _____

The same rules apply with all instruments

- The same rules apply
- Read to the last digit that you know
- Estimate the final digit

Let's try graduated cylinders

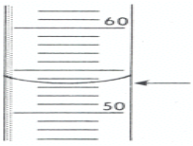
- Look at the graduated cylinder below



- What would be the measurement in the correct number of sig figs?
- _____

One more graduated cylinder

- Look at the cylinder below…



- What would be the measurement in the correct number of sig figs?
- _____

Rules for Significant figures Rule #1

- All non zero digits are **ALWAYS** significant
- How many significant digits are in the following numbers?

274	_____
25.632	_____
8.987	_____

Rule #2

- All zeros between significant digits are **ALWAYS** significant
- How many significant digits are in the following numbers?

504 _____

60002 _____

9.077 _____

Rule #3

- All **FINAL** zeros to the right of the decimal **ARE** significant
- How many significant digits are in the following numbers?

32.0 _____

19.000 _____

105.0020 _____

Rule #4

- All zeros that act as place holders are **NOT** significant
- Another way to say this is: zeros are only significant if they are between significant digits OR are the very final thing at the end of a decimal

For example

How many significant digits are in the following numbers?

1) 0.0002 1) _____
2) 6.02×10^{23} 2) _____
3) 100.000 3) _____
4) 150000 4) _____
5) 800 5) _____

Rule #5

- All counting numbers and constants have an infinite number of significant digits
- For example:

  1 hour = 60 minutes

  12 inches = 1 foot

  24 hours = 1 day

  There are 30 students in the class

How many significant digits are in the following numbers?

1) 0.0073 1) _____
2) 100.020 2) _____
3) 2500 3) _____
4) 7.90×10^{-3} 4) _____
5) 670.0 5) _____
6) 0.00001 6) _____
7) 18.84 7) _____

Rules Rounding Significant Digits Rule #1

- If the digit to the immediate right of the last significant digit is less that 5, do not round up the last significant digit.
- For example, let's say you have the number 43.82 and you want 3 significant digits

Rounding Rule #2

- If the digit to the immediate right of the last significant digit is greater that a 5, you round up the last significant figure
- Let's say you have the number 234.87 and you want 4 significant digits

Rounding Rule #3

- If the number to the immediate right of the last significant is a 5, and that 5 is followed by a non zero digit, round up
- 78.657 (you want 3 significant digits)

Rounding Rule #4

- If the number to the immediate right of the last significant is a 5, and that 5 is followed by a zero, you look at the last significant digit and make it even.
- 2.5350 (want 3 significant digits)

Say you have this number

- 2.5250 (want 3 significant digits)

Let's try these examples…

200.99	(want 3 SF)	_____
18.22	(want 2 SF)	_____
135.50	(want 3 SF)	_____
0.00299	(want 1 SF)	_____
98.59	(want 2 SF)	_____

Scientific Notation

- Scientific notation is used to express very _____ or very _____ numbers
- I consists of a number between _____ followed by _____ to an _____
- The _____ can be determined by the number of _____ you have to move to get only 1 number in front of the decimal

Large Numbers

- If the number you start with is greater than 1, the exponent will be _____
- Write the number 39923 in scientific notation

Small Numbers

- If the number you start with is less than 1, the exponent will be _____
- Write the number 0.0052 in scientific notation

Scientific Notation Examples

Place the following numbers in scientific notation:

1) 99.343 1) _____
2) 4000.1 2) _____
3) 0.000375 3) _____
4) 0.0234 4) _____
5) 94577.1 5) _____

Going from Scientific Notation to Ordinary Notation

- You start with the number and move the decimal the same number of spaces as the _____ .
- If the exponent is _____ , the number will be greater than 1
- If the exponent is _____ , the number will be less than 1

Going to Ordinary Notation Examples

Place the following numbers in ordinary notation:

1) 3×10^{6} 1) _____
2) 6.26×10^{9} 2) _____
3) 5×10^{-4} 3) _____
4) 8.45×10^{-7} 4) _____
5) 2.25×10^{3} 5) _____