

## Our friends, the Significant Figures

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How many significant figures are in the following measurement:  
415.2 cm

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How many significant figures are in the following measurement:  
0.00065 s

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How many significant figures are in the following measurement:  
1500 g

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How many significant figures are in the following measurement:  
0.007250 W

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How many significant figures are in the following measurement:  
105.00 cm

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What is the answer to the following calculation:  
 $1.25 \text{ cm} + 6.5 \text{ cm} + 11.75 \text{ cm} + 0.055 \text{ cm}$

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What is the answer to the following calculation:  
 $1.25 \text{ cm} + 6.5 \text{ cm} + 11.75 \text{ cm} + 0.055 \text{ cm}$

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What is the answer to the following calculation:  
 $25.50 \text{ m} * 12.057 \text{ m} * 0.095 \text{ m}$

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## Significant Figures (sig. figs.)

- All digits in a measurement that are known for certain, plus the first estimated (uncertain) digit
- Sig figs give an indication of the degree of precision for a measurement and/or a calculation
- ONLY used when a number is (or is assumed to be) a measurement
- EXACT quantities do not have “sig figs”

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## Sig Fig Rules—Know and USE these!!

- Rules for determining how many sig figs are in a measurement:
  - All non-zero values ARE significant
    - i.e. 54 mm has 2 s.f.; 5400 m has 2 s.f.
  - All zeros between non-zero digits ARE significant
    - i.e. 504 N has 3 s.f.
  - For numbers LESS THAN 1:
    - Zeros directly after the decimal point are NOT significant
      - i.e. 0.00565 J has 3 s.f.

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## Sig Fig Rules—Know and USE these!!

- A zero to the right of a decimal AND following a non-zero digit IS significant
  - 0.150 m has 3 s.f.; 15.0 kg has 3 s.f.;
- All other zeros are NOT significant
- Examples: How many sig figs in each of the following?
  - 15.035 cm
  - 0.0560 s
  - 35000 kg

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## Scientific notation and sig figs

- Use Scientific notation when you need to specify how many zeros are significant
- i.e. Write 1500 N with 3 s.f.
  - The best way to do this is with scientific notation:  $1.50 \times 10^3$  N
- Write 10600 kg with 4 s.f.

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## Note on book problems:

- Most of the problems in your book will have values which look like they only have 1 s.f.
- **Assume that all digits in book problems are significant**
- i.e. if a problem says that an object has a mass of 100 kg, please treat that as 3 s.f.
- We'll be a lot pickier in your labs!

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## Sig. Figs in Calculations

- When adding or subtracting:
  - Your answer must have the same degree of precision as the least precise measurement
  - (that means...go to the fewest number of decimal places)
- i.e.:

$$24.2 \text{ g} + 0.51 \text{ g} + 7.134 \text{ g} = 31.844 \text{ g} \rightarrow \mathbf{31.8 \text{ g}}$$

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## Sig. Figs in Calculations

- When multiplying and dividing:
  - The number of sig figs in the answer is equal to the least number of sig figs in any of the measurements used in the calculation
- i.e.  
 $3.22 \text{ cm} * 12.34 \text{ cm} * 1.8 \text{ cm} = 71.52264 \text{ cm}^3 \rightarrow 72 \text{ cm}^3$

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