1 Chapter 1
Scientific Method
Significant Figures
Scientific Notation
Unit Conversions
Estimating

2 Think-Pair-Share
- Conversion: 60 miles/hour (mi/hr) is how many meters/second (m/s)?
  (1 mile = 1609 m)
- The speed of sound is 340 m/s. What is the speed of sound in mi/hr?
- If you count 2 seconds between lightning and thunder, how far away is the
  lightning strike?

3 Scientific Method
- Observations & Experiments
- Model
- Theory
  - must make predictions
  - must be testable
- Testing, testing, testing
- Simple is better (Occum's razor)

4 Significant Figures
- Leading zeros don't count
- Zeros after decimal point count
- All numbers to the left of decimal count

5 Count Significant Figures
- How many sig figs do the following have?
  - 0.00956
  - 200
  - 800.
  - 0.2155

6 Propagating Significant Figures
- Multiplication/Division
  - result is limited by number with least number of significant figures
- Addition/Subtraction
  - result has same number of decimal places as least accurate number
7. Think-Pair-Share
   ◦ Propagating Significant Figures
     ◦ $1.25 \times 15 = $
     ◦ $1.25 + 15 = $
     ◦ $1.25/15 = $
     ◦ $1.25 - 15 = $

8. Pair Action
   ◦ Measure your or your partner's height in units of your hand. Give height and uncertainty.
   ◦ What is % error?
     ◦ % error = uncertainty/height x 100

9. Pair Action
   ◦ Measure your hand in inches.
   ◦ Convert your height and error to inches.
   ◦ Does the error range encompass your actual height?

10. Our adopted units...
    ◦ length = meter (m)
    ◦ mass = kilogram (kg)
    ◦ time = seconds (s)

11. Powers of 10
    ◦ $0.0001$
    ◦ $0.001$
    ◦ $0.01$
    ◦ $0.1$
    ◦ $1$
    ◦ $10$
    ◦ $100$
    ◦ $1000$
    ◦ $10000$

12. Scientific Notation
    ◦ Express as a number between 1 and 10 times a power of 10.
1.07 \times 10^{33} \\
9.99 \times 10^{-6} \\
Provides a convenient way to express VERY large and VERY small numbers.

13 Write in Scientific Notation

- Examples:
  - 15000. = 1.5 \times 10^4 \\
  - 42.5 = 4.25 \times 10^1 \\
  - 0.0032 = 3.2 \times 10^{-3} \\
  - 15000. = 1.5 \times 10^4 \\

- Try these:
  - 1250. \\
  - 0.0046 \\
  - 12. \\
  - 2.

14 Prefixes you should know

- micro \\
- milli \\
- centi \\
- kilo \\
- mega \\
- giga

15 Problem Solving Techniques

- Clearly list problem number. \\
- Given: \\
- Find: \\
- Draw diagram \\
- Show your work \\
- UNITS!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

16 So Here's a Problem

- Ch 1, Prob 50 (on homework!) \\
  - A watch manufacturer claims that its watches gain or lose no more than 8 seconds in a year. How accurate is this watch, expressed as a percentage?

17 Ch 1, Problem 49