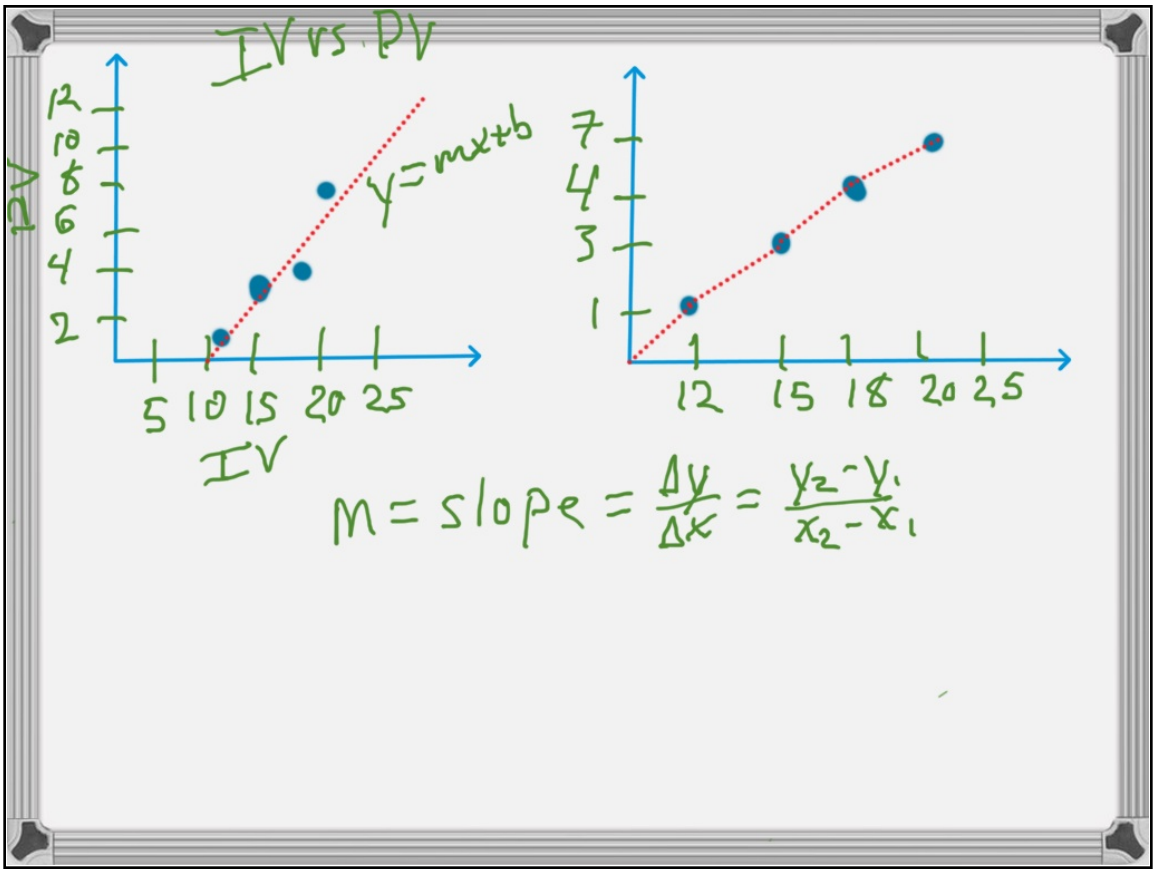
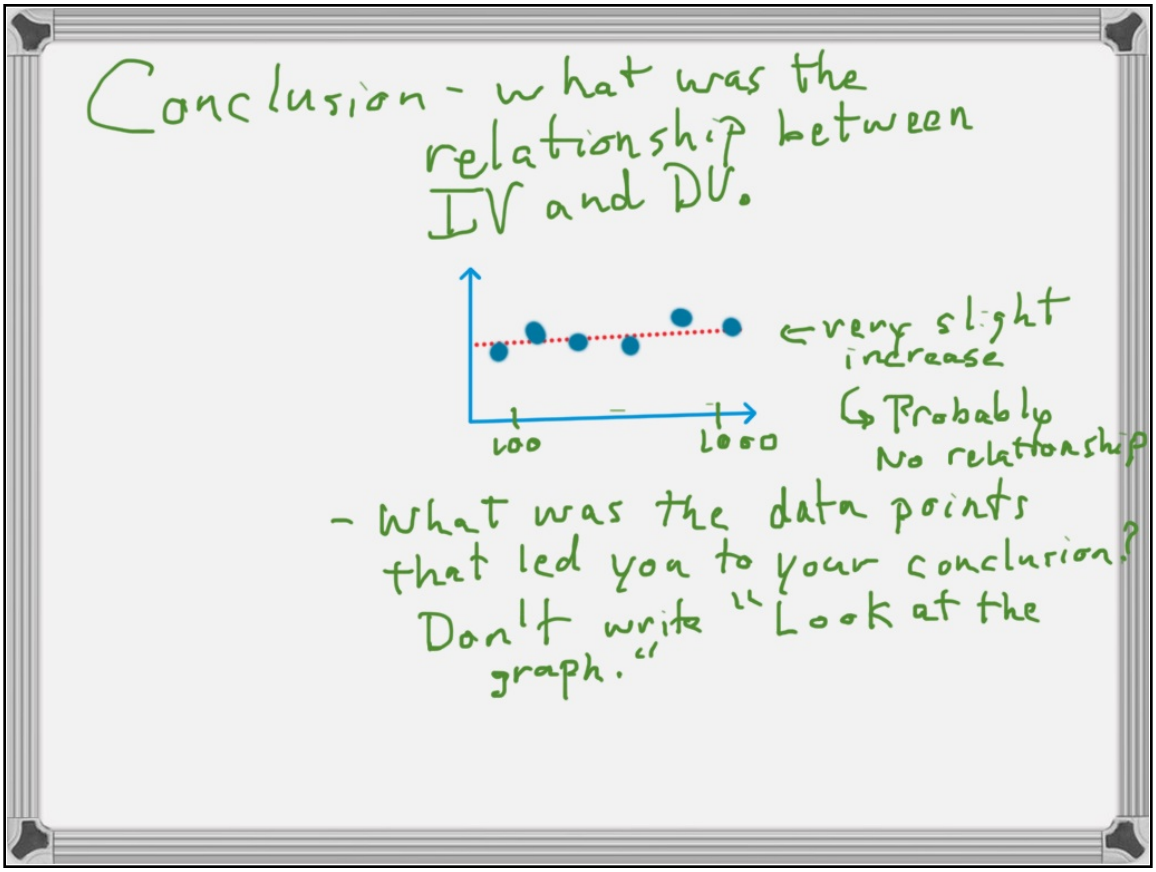
Scientific Method - continued

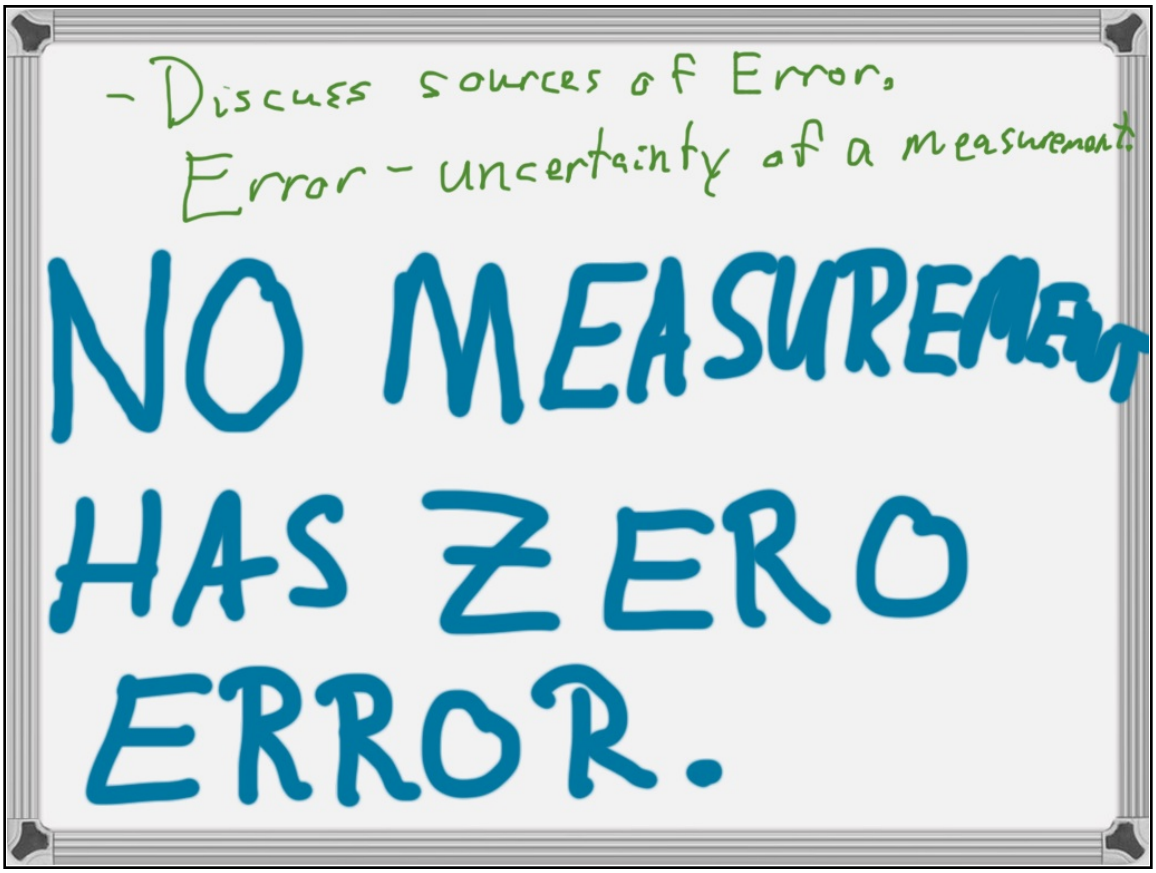
Data Analysis - calculate new values, when we can't measure a value directly, we calculate it.
↳ Show a sample calculation.
$D = m/V = 20/10 = 2\ g/cm^3$

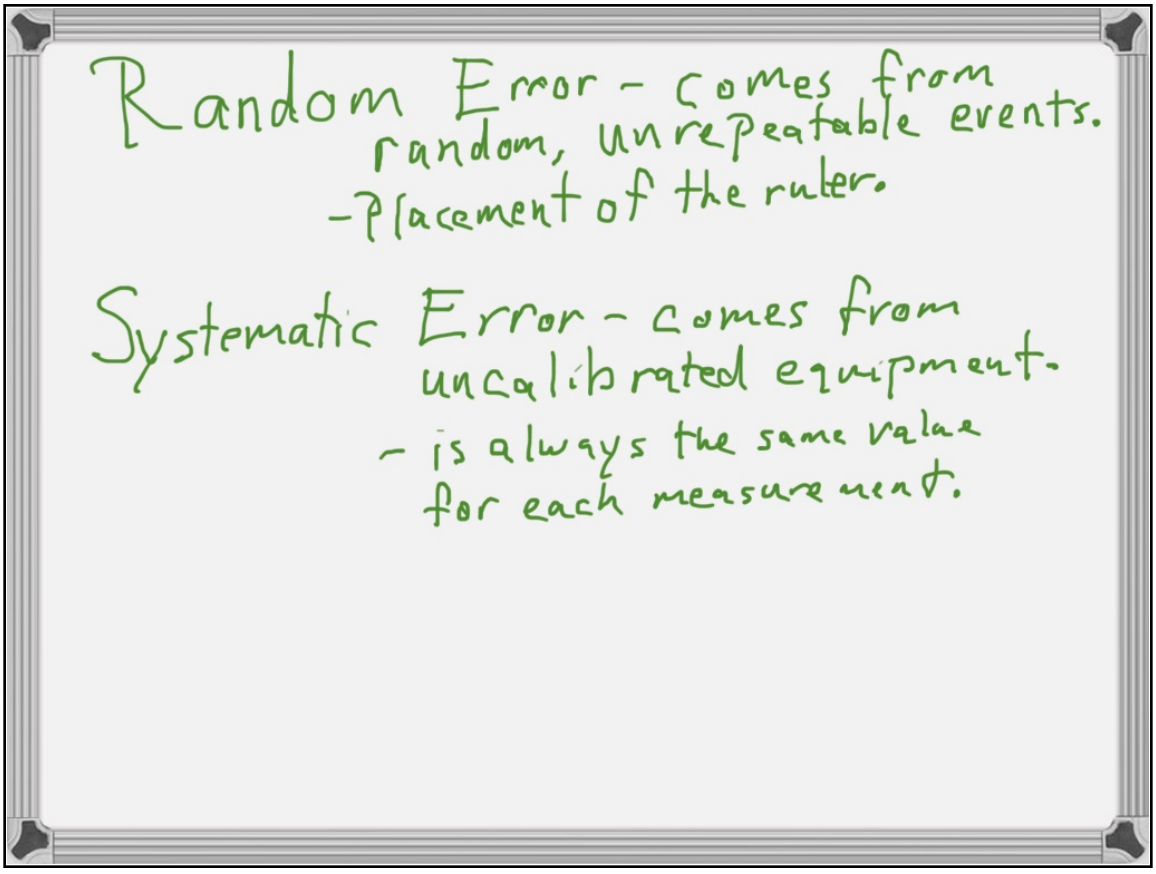
Make a graph of our data.
- Plot points on an x-y plane.
  IV on the x-axis
  Average DV on the y-axis.

All graphs need:
- Axis labels with units.
- Trendline - Not connect the dots
- Title - IV vs. DV
- Equal increments


IV vs. DV
DV
12
10
8
6
4
2
5 10 15 20 25
IV
y=mx+b
7
4
3
1
12 15 18 20 25
M = slope = $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$


Conclusion - what was the relationship between IV and DV.
100
1000
← very slight increase
↳ Probably No relationship
- What was the data points that led you to your conclusion? Don't write "Look at the graph."


- Discuss sources of Error.
Error - uncertainty of a measurement.
NO MEASUREMENT
HAS ZERO
ERROR.


Random Error - comes from
random, unrepeatable events.
- Placement of the ruler.
Systematic Error - comes from
uncalibrated equipment.
- is always the same value
for each measurement.

Accuracy – how close a measurement is to the accepted value.

We use Percent Error to assess accuracy.

$$\%\,Error = \frac{|Accepted - MEasured|}{Accepted} \times 100\%$$

We will consider $\%\,Error < 5\%$ are accurate.

The accepted value for $g = 9.8012$.
What is the % Error if we measure $g = 9.79$?

$$\%\,Error = \frac{|9.8012 - 9.79|}{9.8012} \times 100 = 0.114\%$$

Systematic Error reduces accuracy.

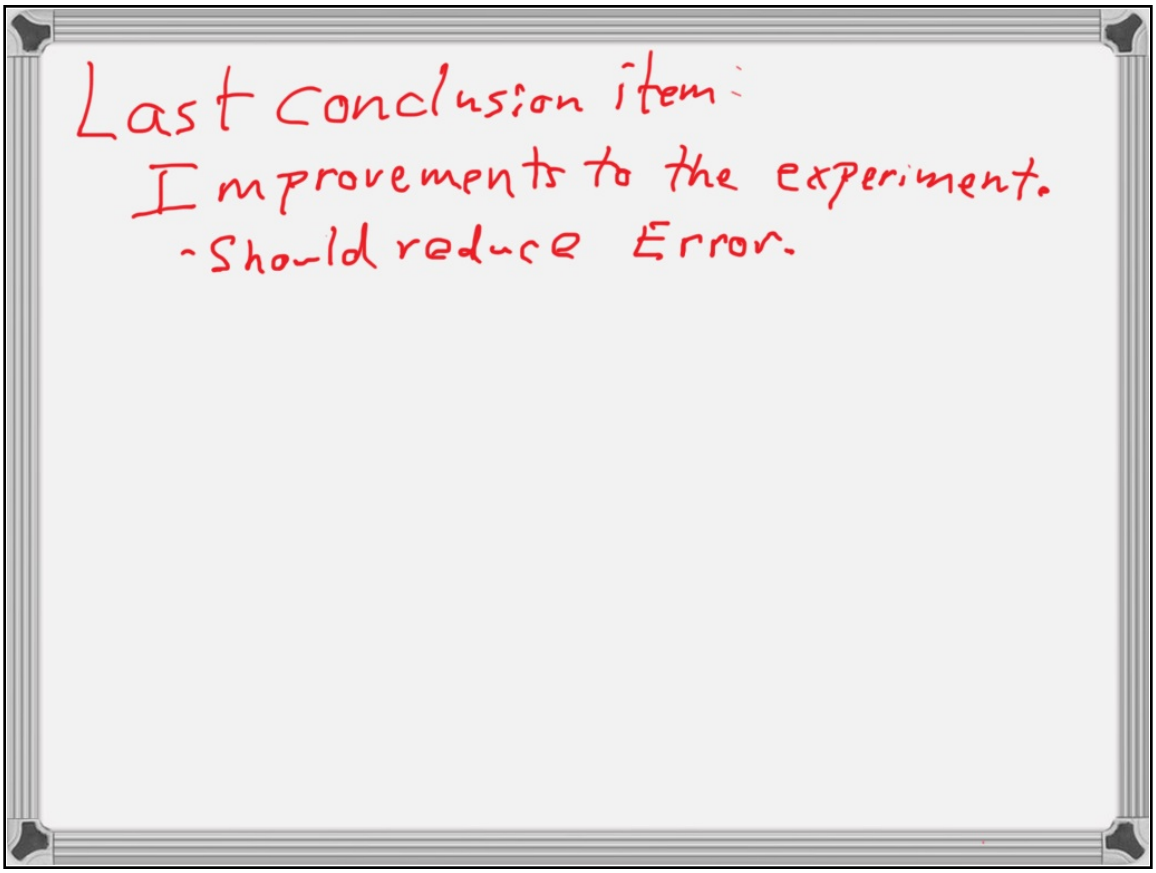
Precision – how repeatable a measurement is.

- we use significant figures to assess precision.

Sig. Fig Rules

1. Count Nonzeroes
2. Count zeroes between nonzeroes.
3. Count zeroes after nonzeroes + before decimal point.
4. Count zeroes following a decimal point and a nonzero.

Random Error reduces precision.


Last conclusion item:
Improvements to the experiment.
-Should reduce Error.