# EXPERIMENTAL DESIGN

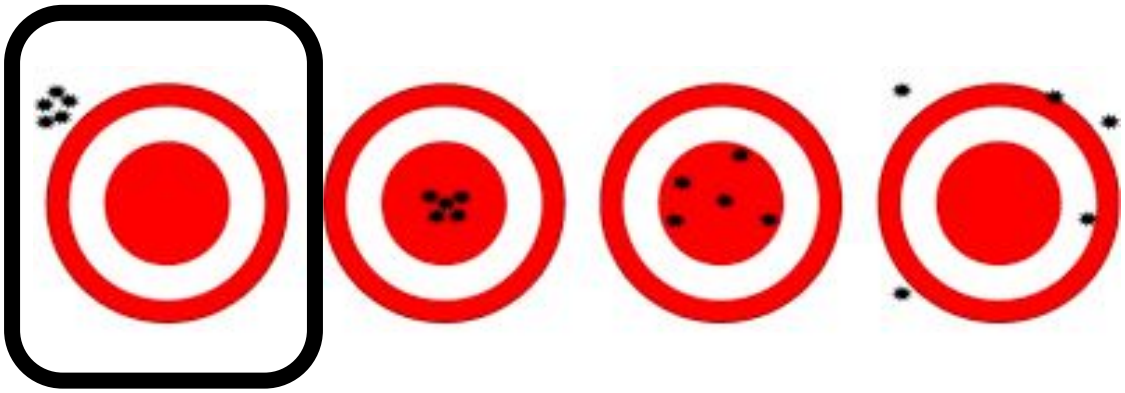
PHYSICS

MR. KESSLER

# ACCURACY AND PRECISION

- **Accuracy and Precision:** http://www.youtube.com/watch?v=8Cl5CeiT7hU
- **Accuracy – getting the *right* measurement**
- **Precision – getting the *same* measurement *repeatedly***

| | | Accuracy | |
|---|---|---|---|
| | | High | Low |
| Precision | High | X | X |
| | Low | X | X |



# DESIGNING AN EXPERIMENT

- **Controlled Experiment:**
  - **only one thing is changed (*independent variable*)**
  - **to see what it effects (*dependent variable*)**
- ***Example:*** **You want to see if the amount of water given to a plant will change how high a plant grows.**
  - **Independent Variable: Amount of water (you control this)**
  - **Dependent Variable: Height of the plant (the effect of the change)**
- **Everything else in the experiment is held constant from one trial to the next.**

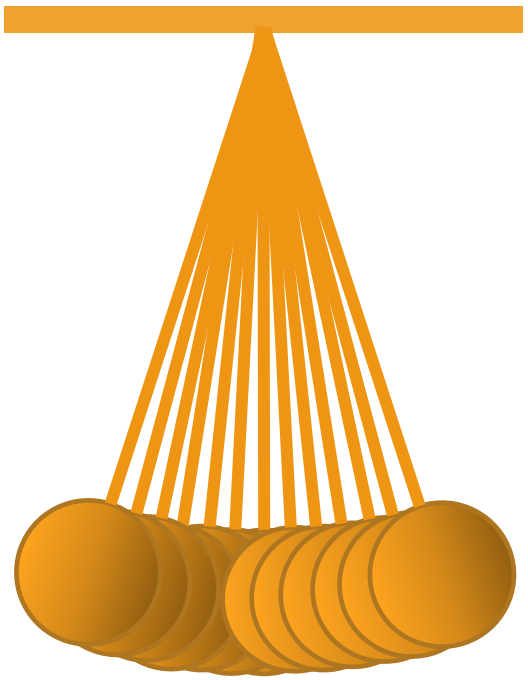
# DESIGNING AN EXPERIMENT

- **Procedures *must*:**
  - **…be written in a list**
  - **…be repeatable**
  - **…have at least 3 trials to confirm results; if they are not consistent, redo the trials.**

**So…**

**How can we build a timing device?**

# DESIGNING AN EXPERIMENT – PENDULUM




- ***Experimental Design Wkst***
- **Possible Independent Variables: What can we change?**
  - **Length of String**
  - **Mass of Bob**
  - **Amplitude (how far back the pendulum is pulled)**
- **Dependent Variable: What are we measuring as a result?**
  - **Period (time for one cycle)**

# DESIGNING AN EXPERIMENT – PENDULUM

- **After being given an Independent Variable for your group, write out a procedure for changing only that one thing and keeping all other things constant.**
- **Be sure that your procedures are:**
  - **…in a list,**
  - **…repeatable,**
  - **…and consistent.**

End Slide

# DESIGNING AN EXPERIMENT – PENDULUM

***Experiment***

# DESIGNING AN EXPERIMENT – PENDULUM

- **Graphing the Data:**
  - ***x*** **–axis (independent variable)** h
  - ***y*** **–axis (dependent variable): cycle)**
  - **Graph Title: Period vs. Length**

End Slide

# BALL BOUNCE LAB

***Experiment***

# BALL BOUNCE LAB

- **Graphing the Data:**
  - ***x*–axis (independent variable)** t
  - ***y*–axis (dependent variable):** ıt
  - **Graph Title:** t
  - **Relationship:**

$$y = mx + b$$