


Mathematics and Science in Schools in Sub-Saharan Africa

Peter Gange



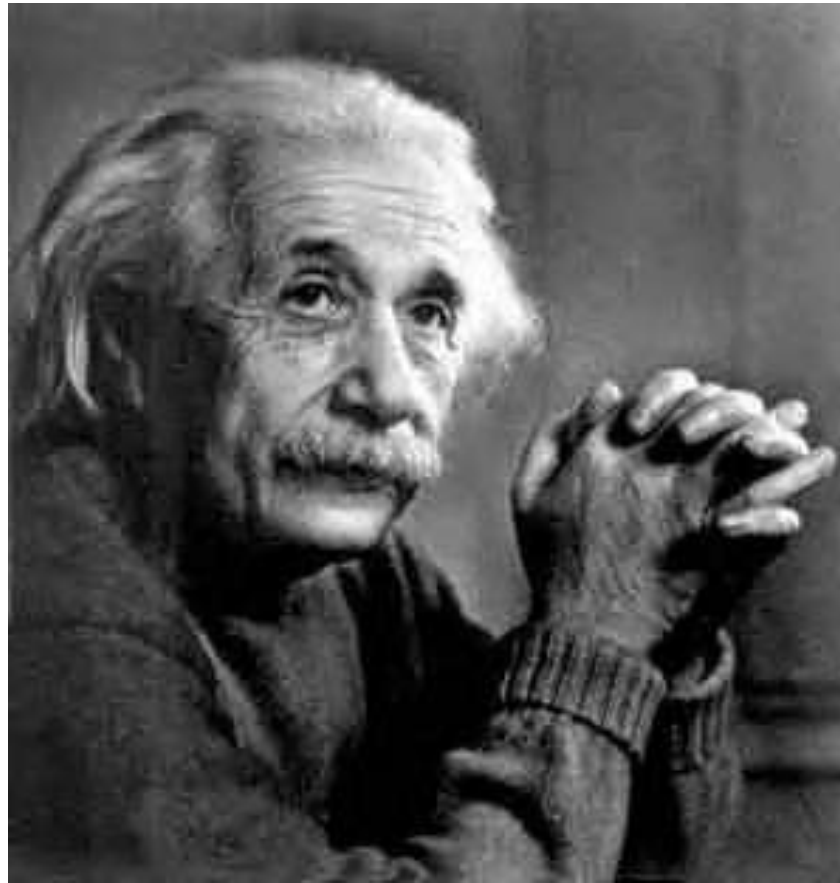


***Introduction
to***



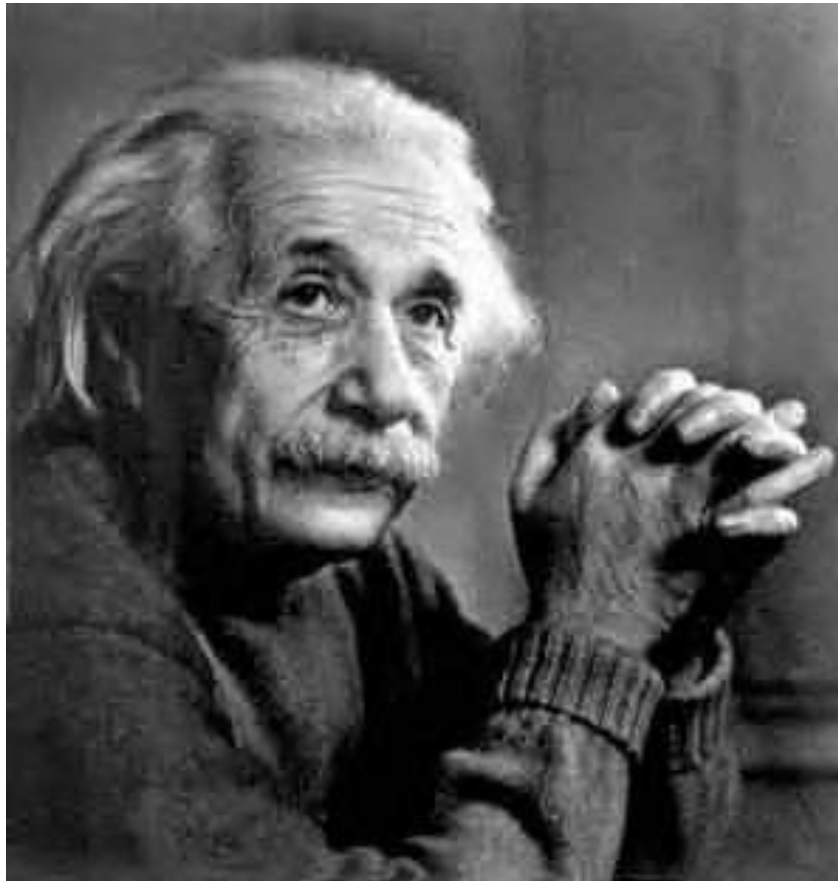
***Material
Science
Honors***

What is Material Science?



The Study of Stuff !

What is Material Science Honors?



Lab Based Engineering Course



Grading Policy

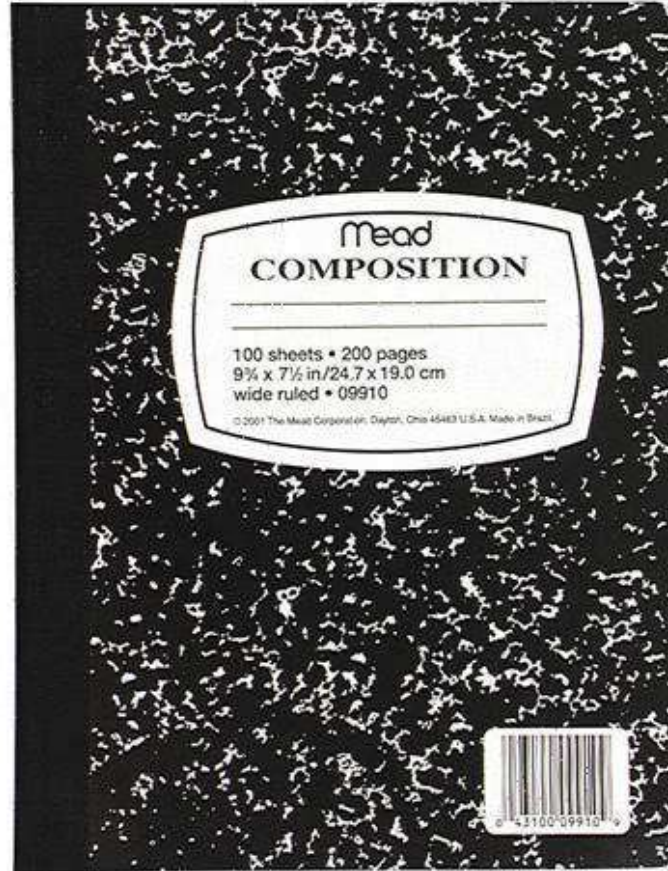


Lab Reports = 25%

Quiz & Tests = 50%

Research Projects = 25%

Lab Journal



Class Website

Course Syllabus

On-Line Text Book

On-Line Homework Quiz

On-Line Unit Review Games

On-Line Unit Tests



Course Syllabus

Introduction to Engineering

Microscopy

Material Properties

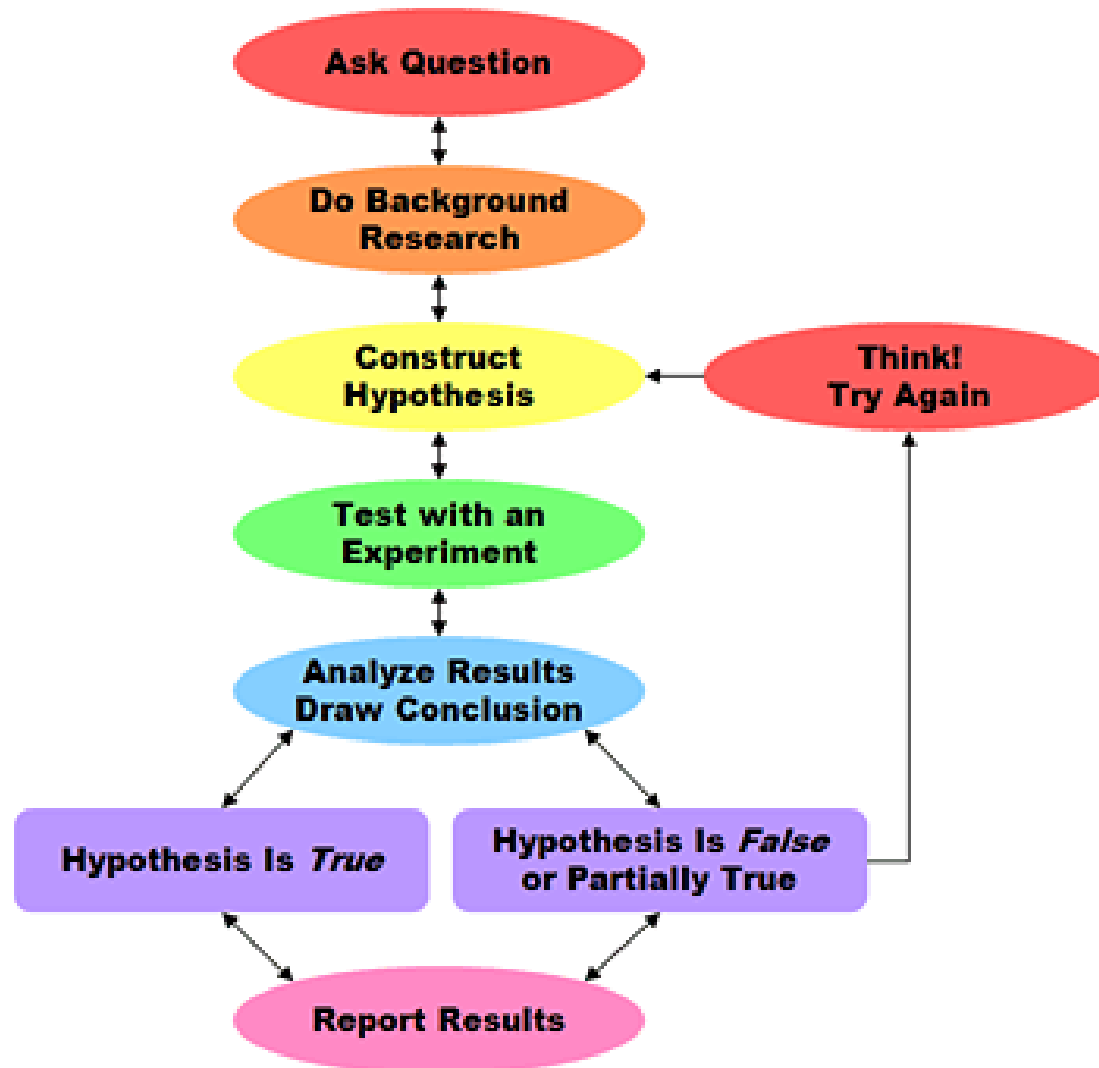
Material Structure

Bonding

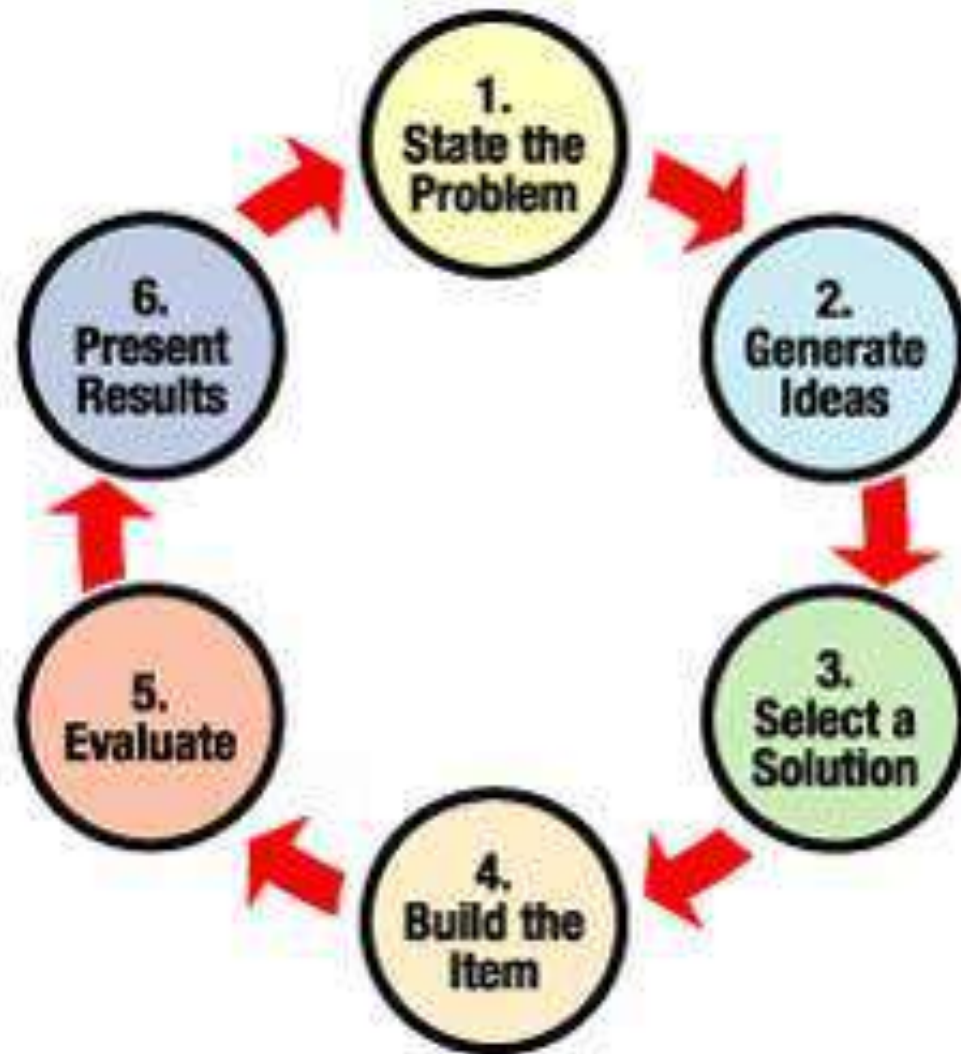
What is the Engineering Process?

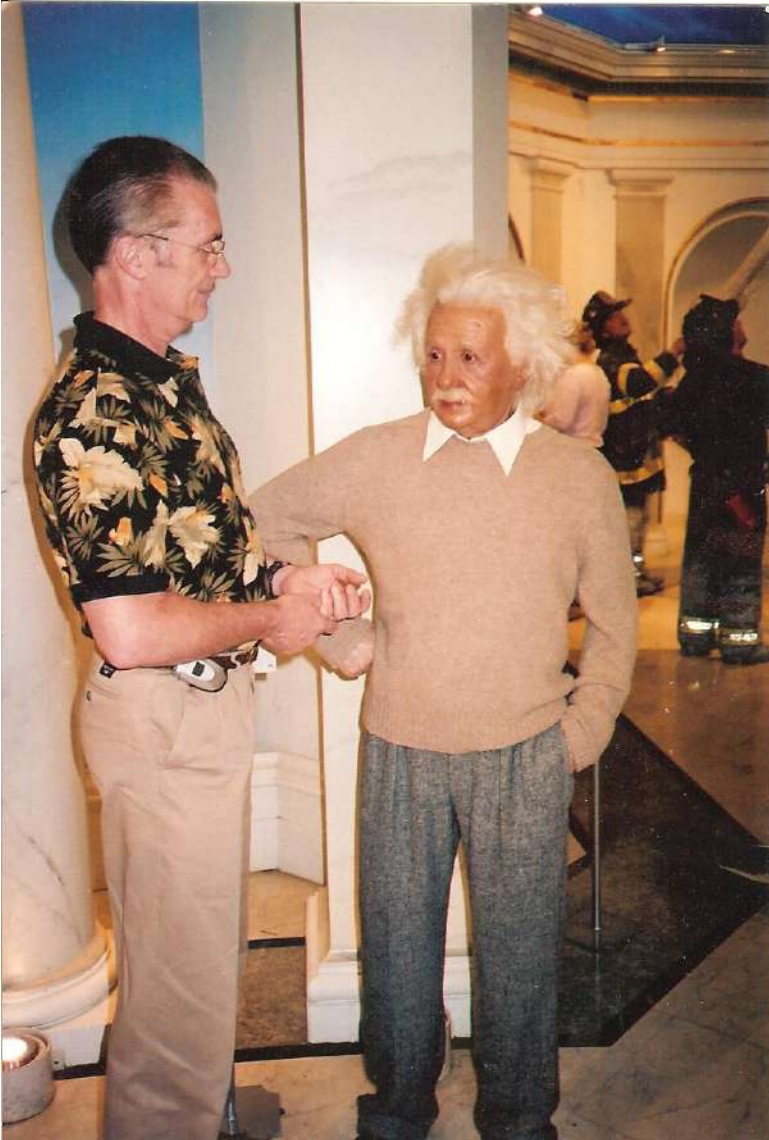


Scientific Method



Engineering Process



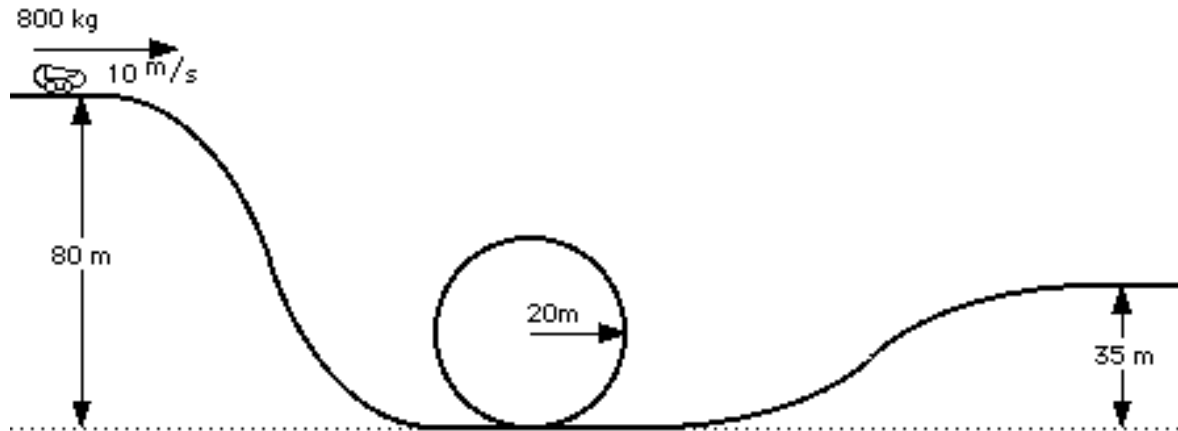


***In real life problem
solving situations,
scientists often do
some “engineering”
work while
engineers
frequently apply the
Scientific Method!***

Roller Coaster Physics



Roller Coaster Physics



Using just your rubber tubing, construct a roller coaster!

The ball bearing must complete the whole course!

Scoring: Each vertical loop (360°) = 10 Points!

You may try as often as you like, best score counts!

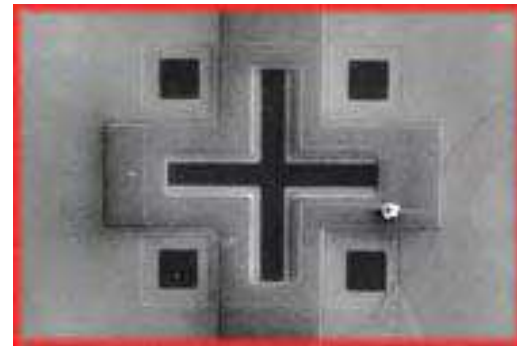
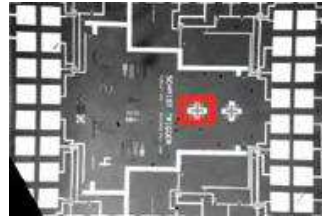
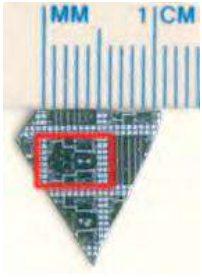
Failure is just a reason to start over more intelligently!



Microscopy



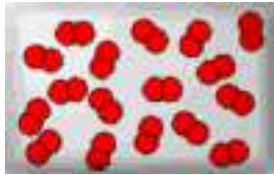
Advances in Magnification



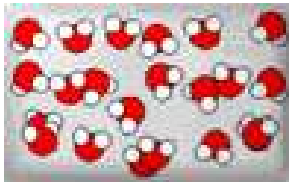


Types of Matter

Pure Substances

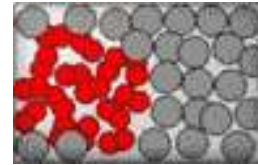


Elements

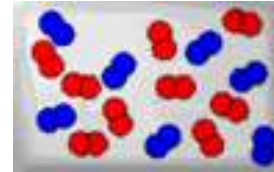


Compounds

Mixtures

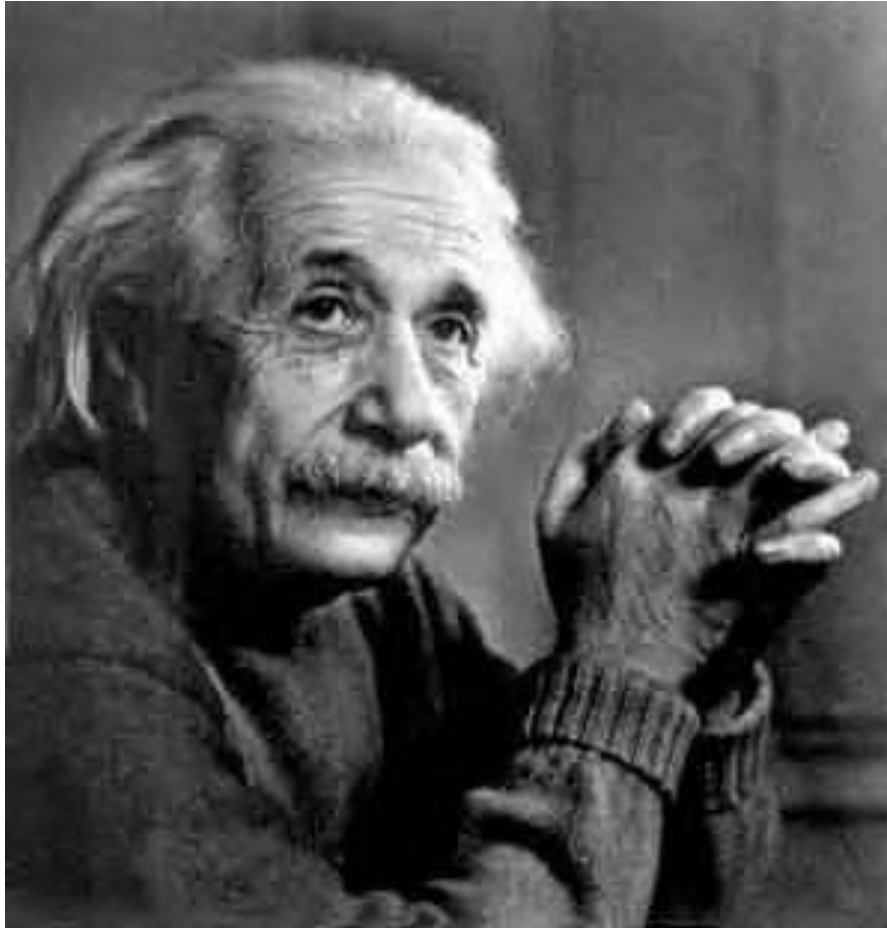


Heterogeneous



Homogeneous

Lab: “Nuts & Bolts” of Classifying



Lab: “Nuts & Bolts” of Classifying

Data Chart

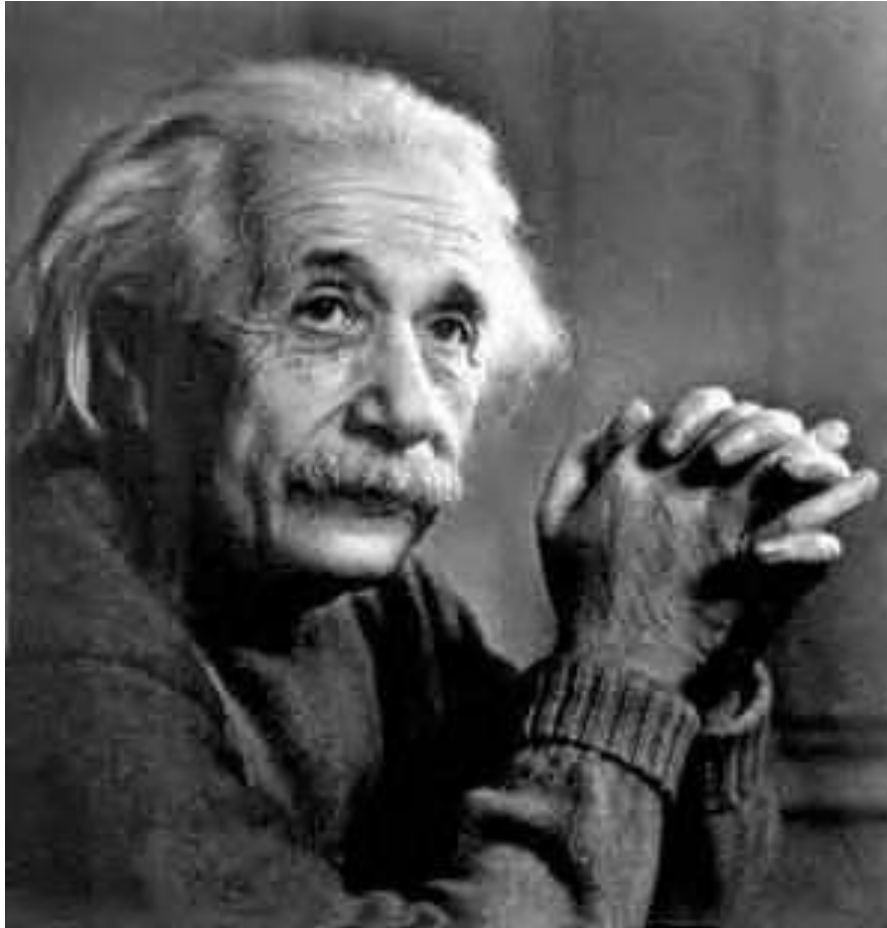
Sample	Classification
A	
B	
C	
D	
E	
F	
G	
H	
I	

Lab: “Nuts & Bolts” of Classifying

Data Chart

Sample	Classification
A	Element
B	Element
C	Element
D	Mixture
E	Mixture
F	Compound
G	Compound
H	Mixture
I	Mixture

Lab: Lab: AFM-The Inside Story



Lab: Lab: AFM-The Inside Story

Beanie Baby	Diagram
<i>Prince</i>	
<i>Claude</i>	
<i>Gracy</i>	
<i>Scorch</i>	
<i>Jester</i>	
<i>Morrie</i>	
<i>Pattie</i>	
<i>Crunch</i>	
<i>Inky</i>	
<i>Ecko</i>	

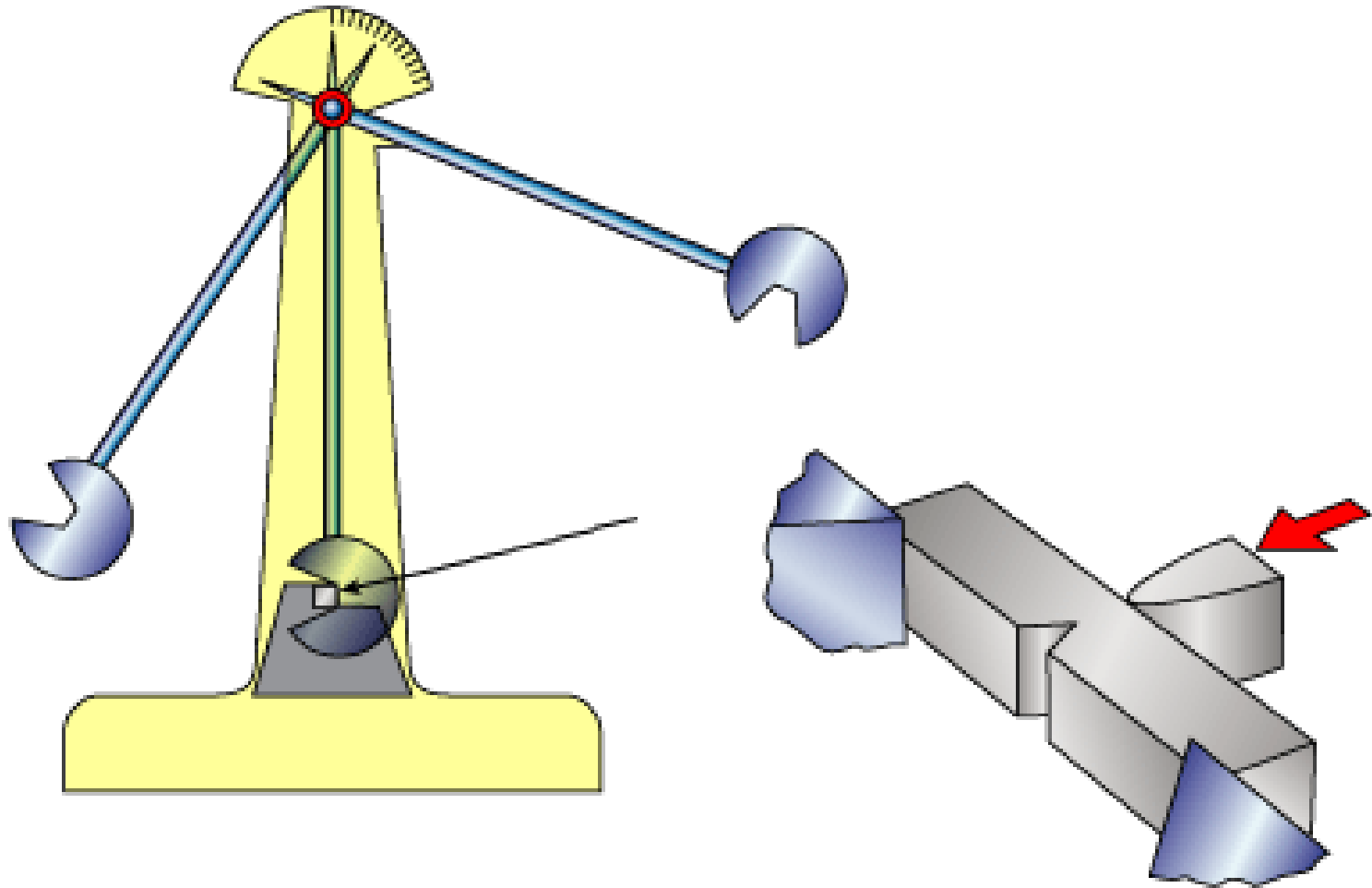
Material Properties



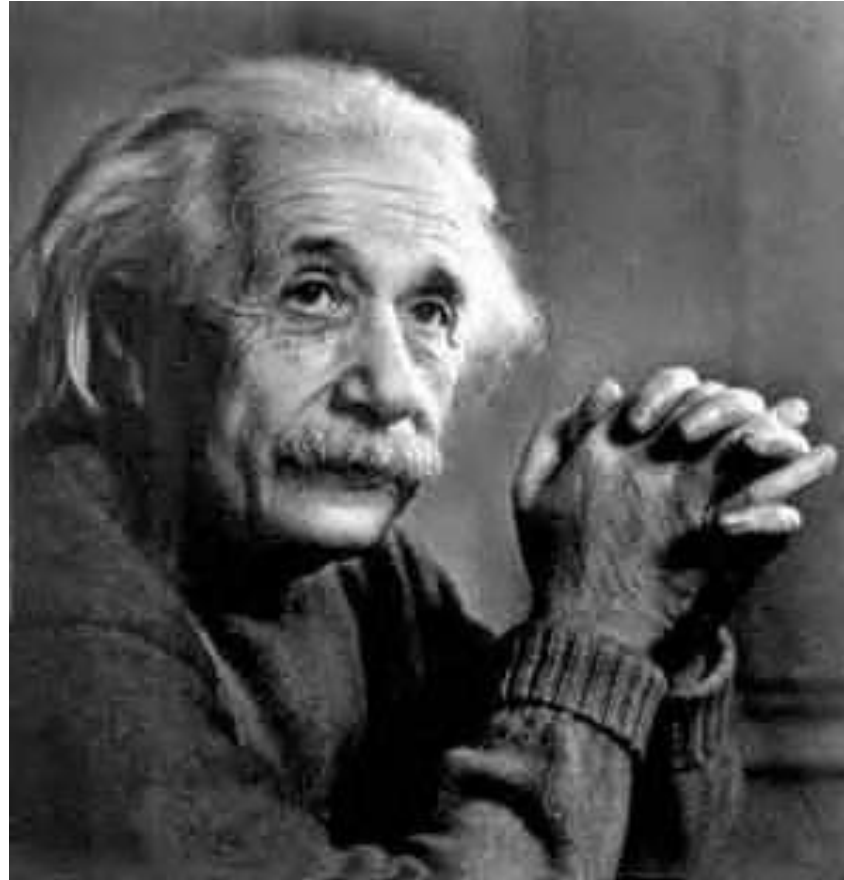
Material Failure



Material Failure



Lab: Destructive Testing



Lab: Destructive Testing

Data Chart

Paper Clip Type	# of Turns



Improving Energy Absorption



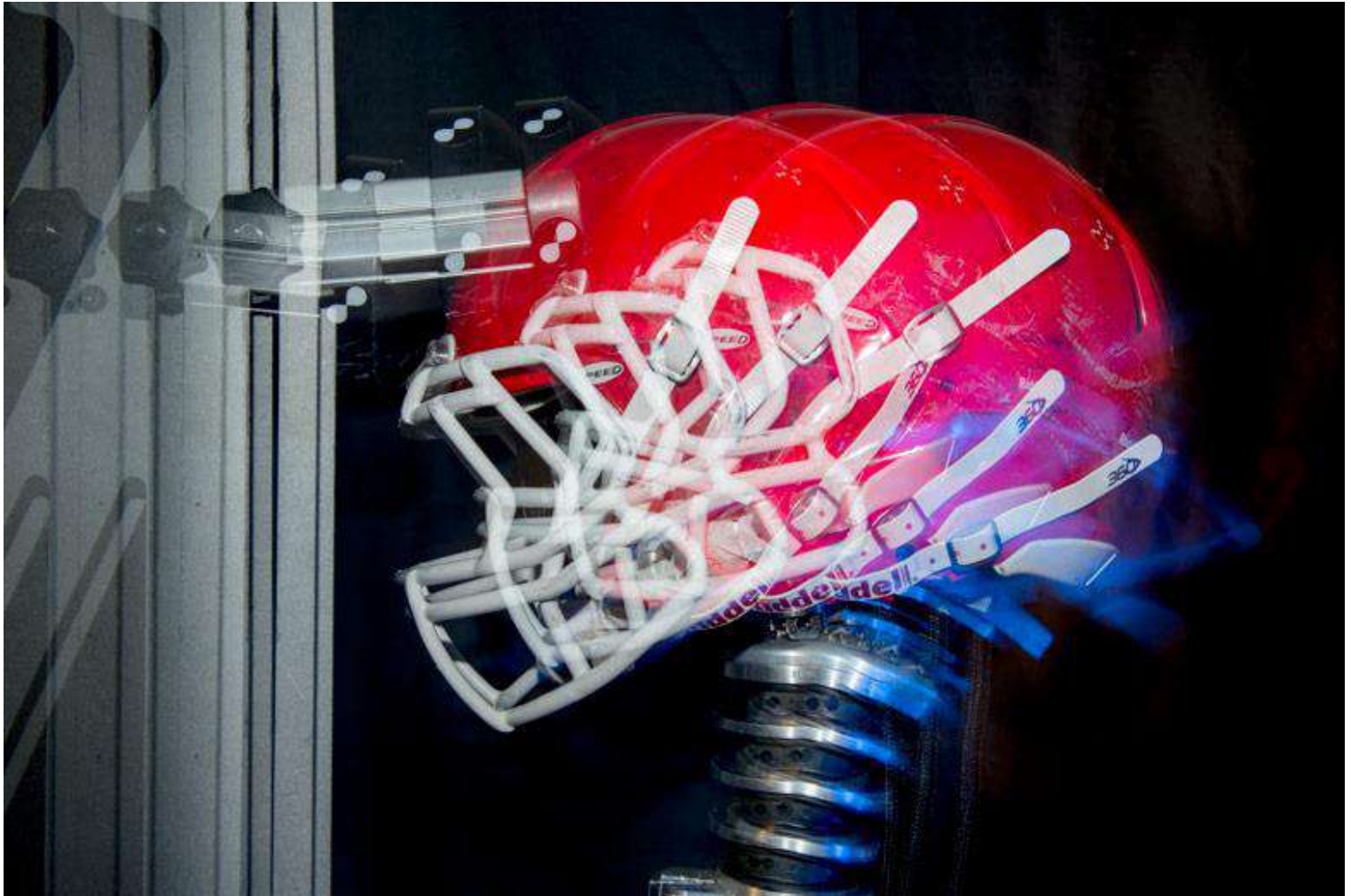
Photo Courtesy of Autoliv



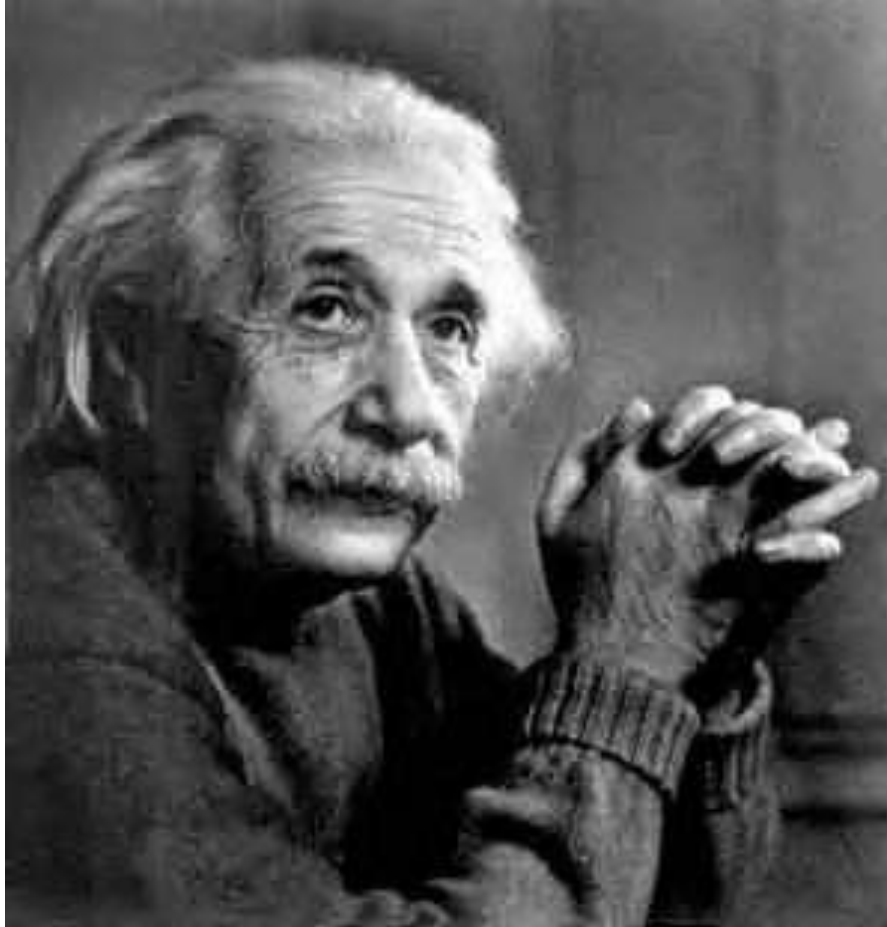
Improving Energy Absorption



Improving Energy Absorption



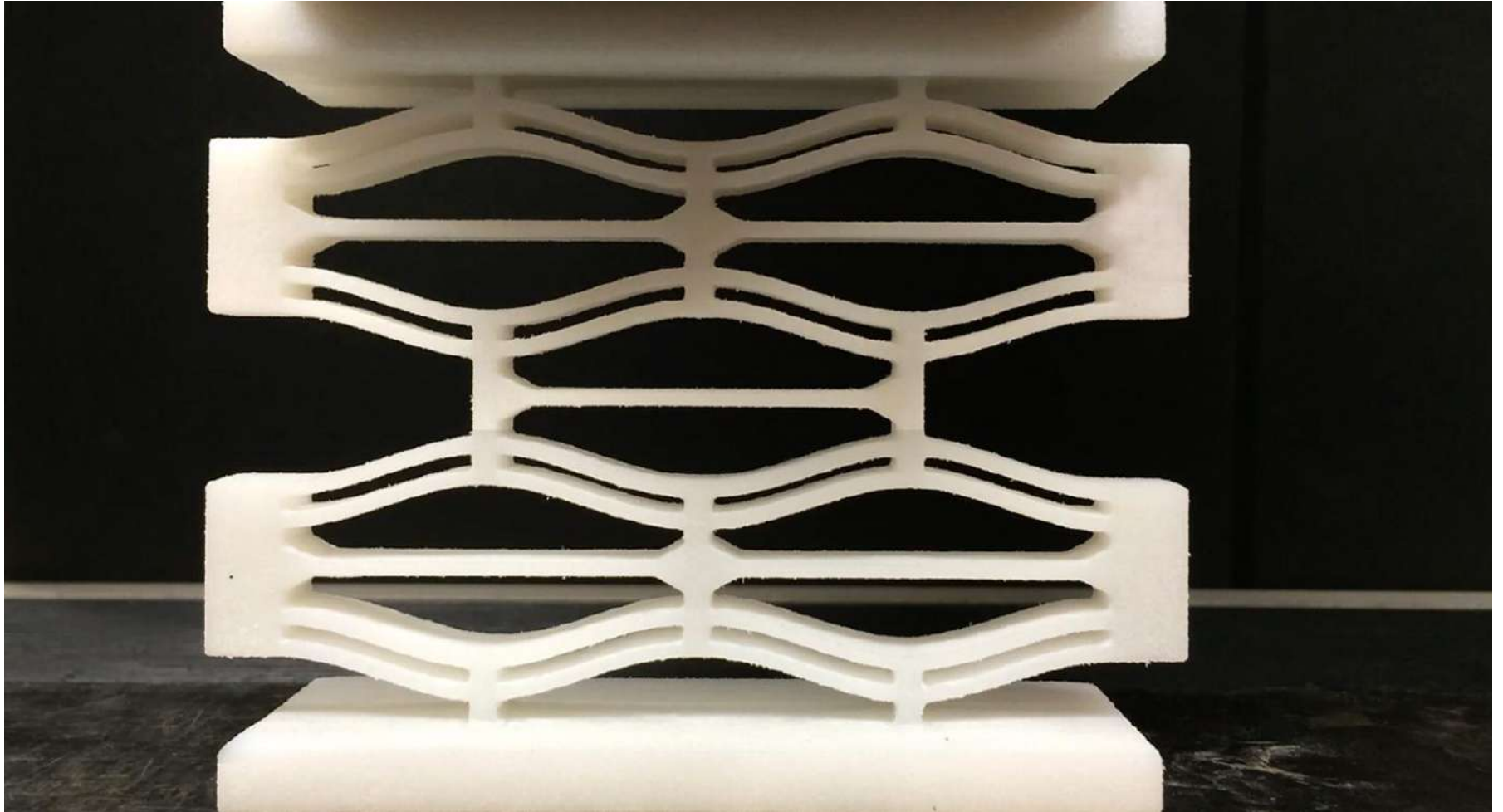
Lab: Energy Absorption



Lab: Energy Absorption

[illegible]

Improving Energy Absorption



Sneaker Science

Quantum Chemistry's Who Am I 12/6
Electron Configuration 12/10

Igneous Rock 12/10

Earth Science
C.P. Chemistry
Material Science







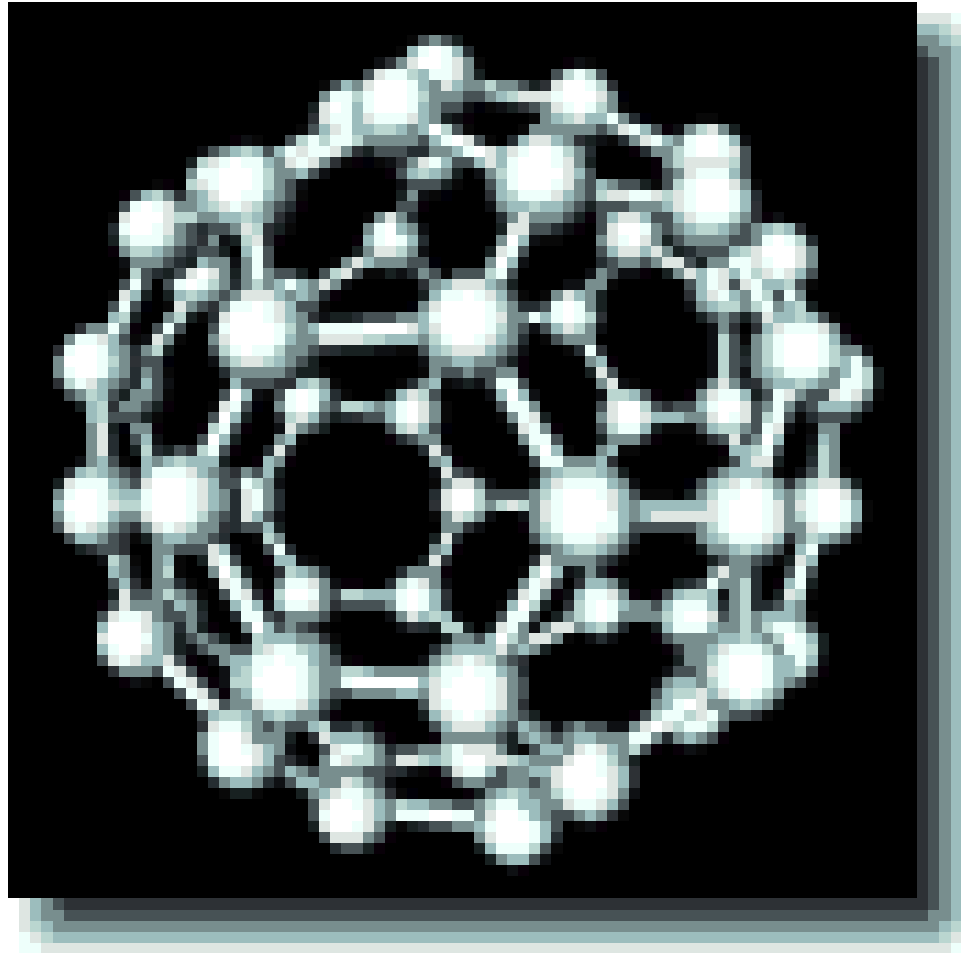




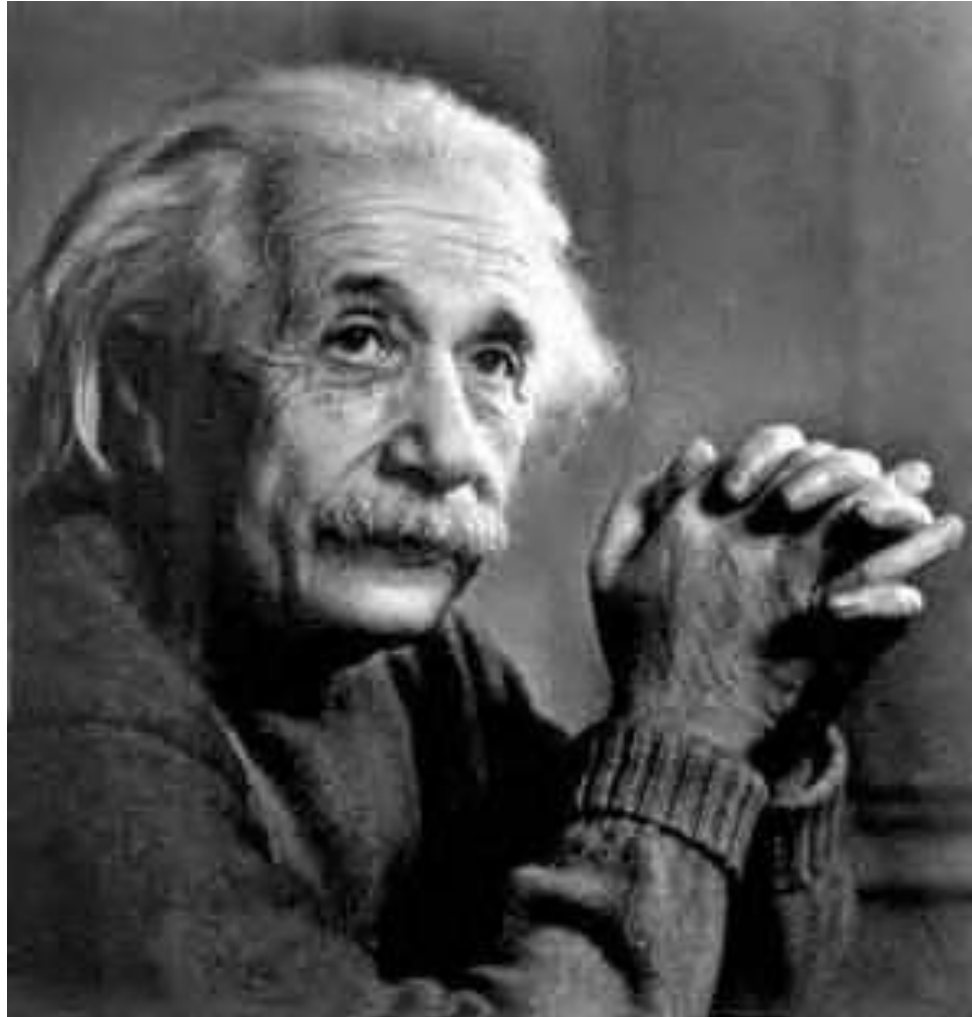




Material Structure



Lab: Magnetism-The Inside Story



Structure Challenge









Course Syllabus

Metals

Ceramics

Polymers

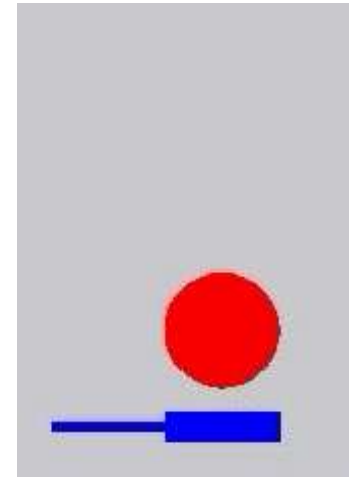
Semiconductors

Composites

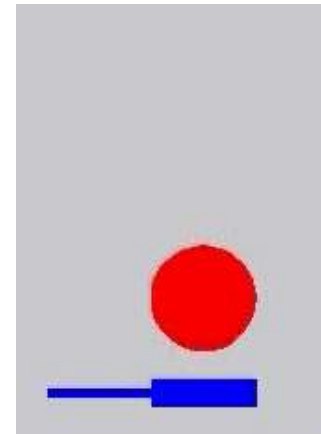
Sustainable Energy

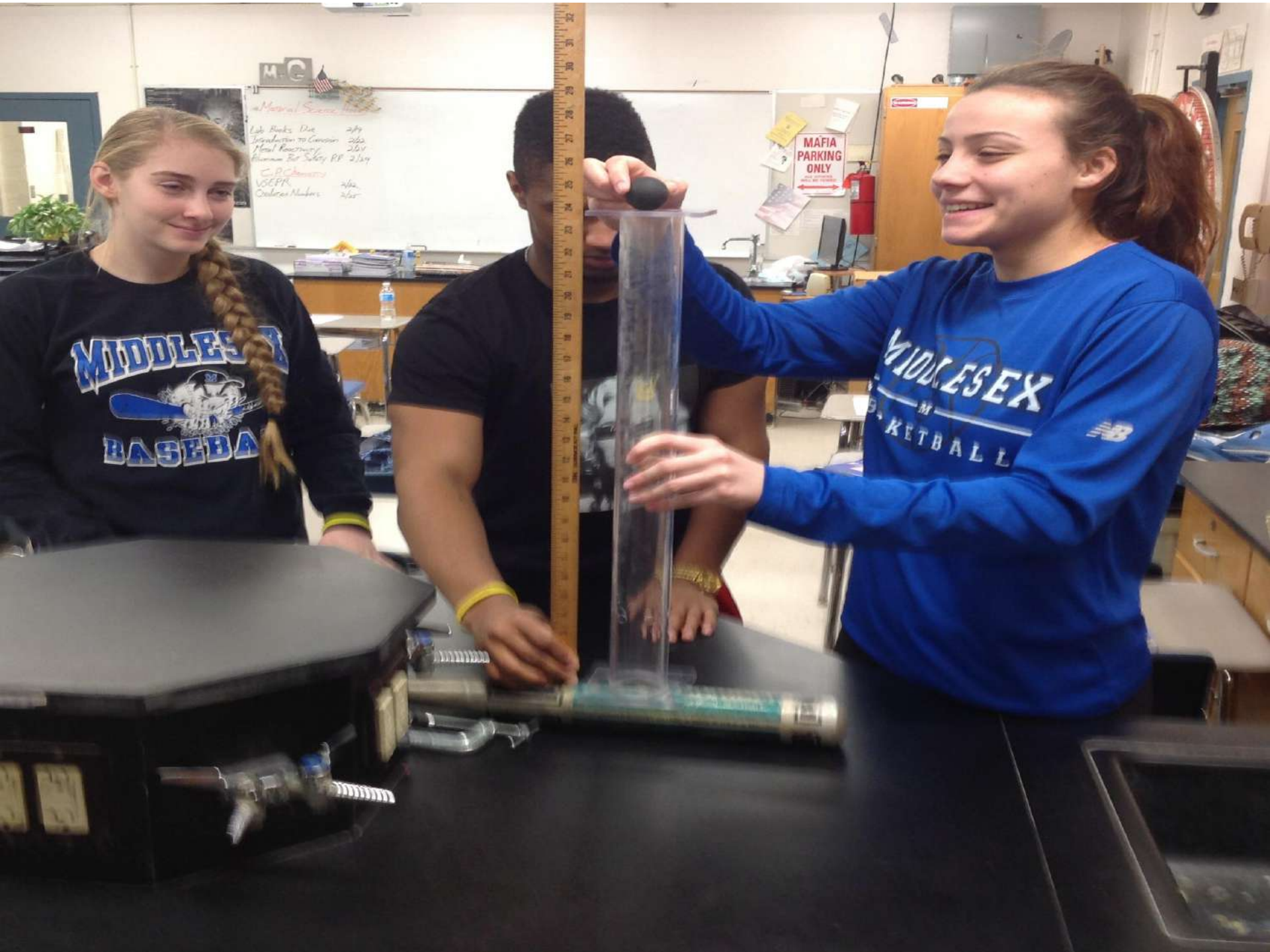
Metals





Aluminum Bat Safety





M.C.

Marshall Science

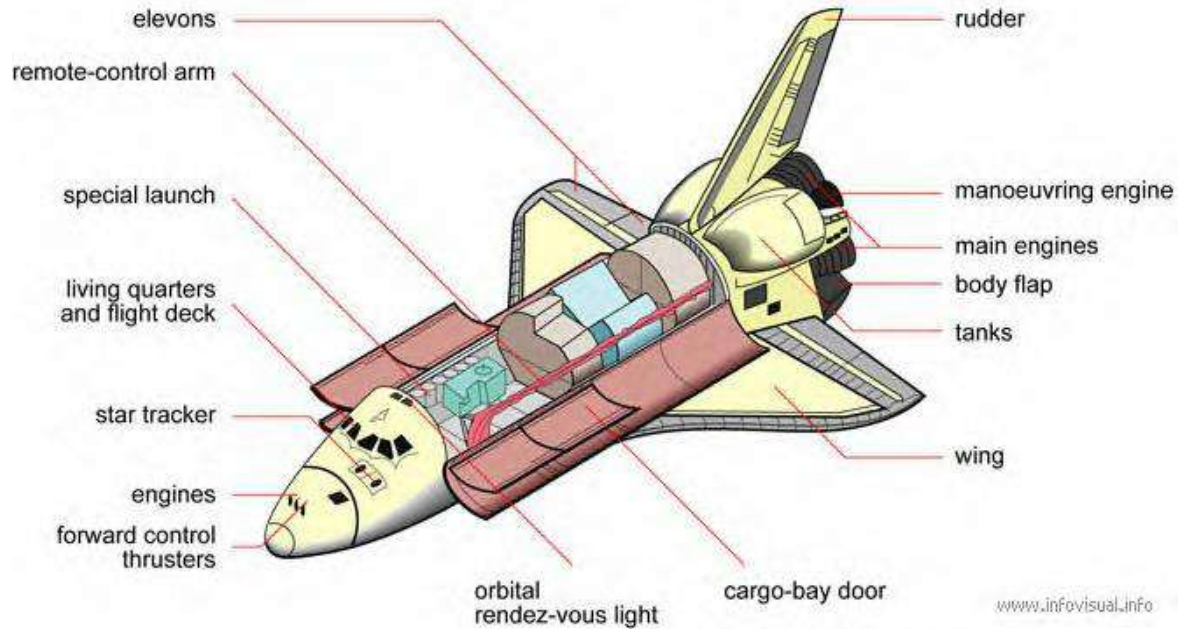
Life Books Due 2/19
Introduction to Chemistry 2/20
Metal Reactivity 2/21
Molecular Structure 2/22
C.P. Chemistry 2/23
VSEPR 2/24
Oxidation Numbers 2/25

MAFIA
PARKING
ONLY



Ceramics

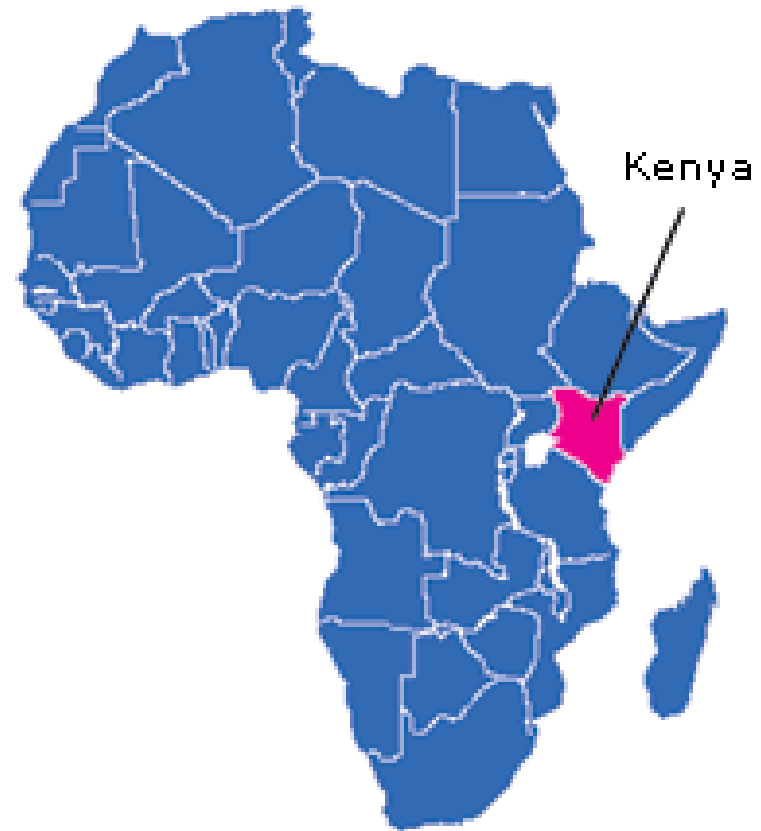
SPACE SHUTTLE



Water Crisis in Africa



Global Science Initiative



AFRICA



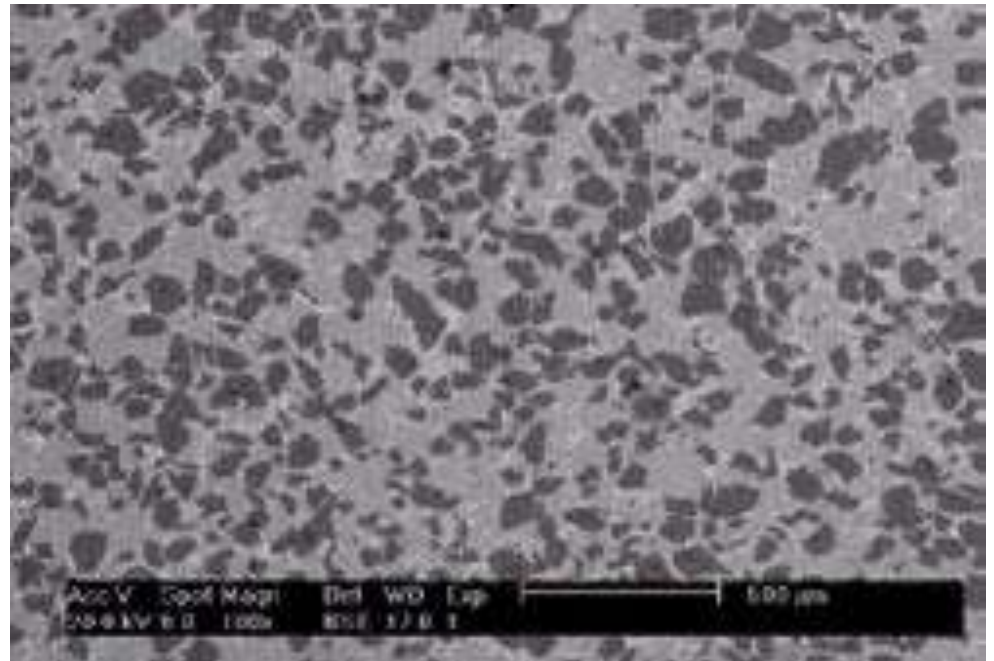
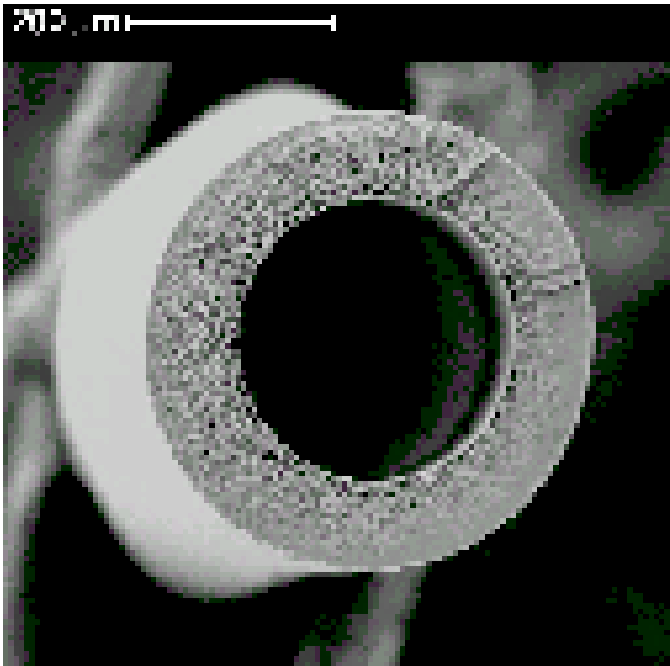
Cheap Efficient Water Filters

Project Goal



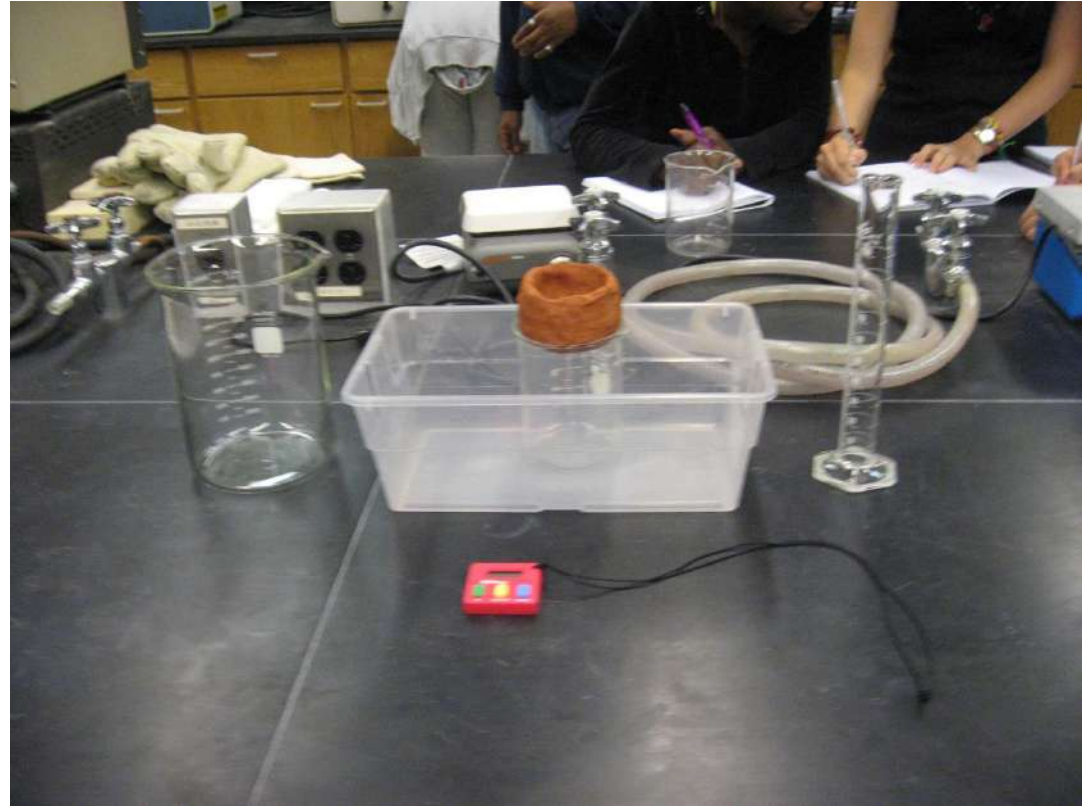
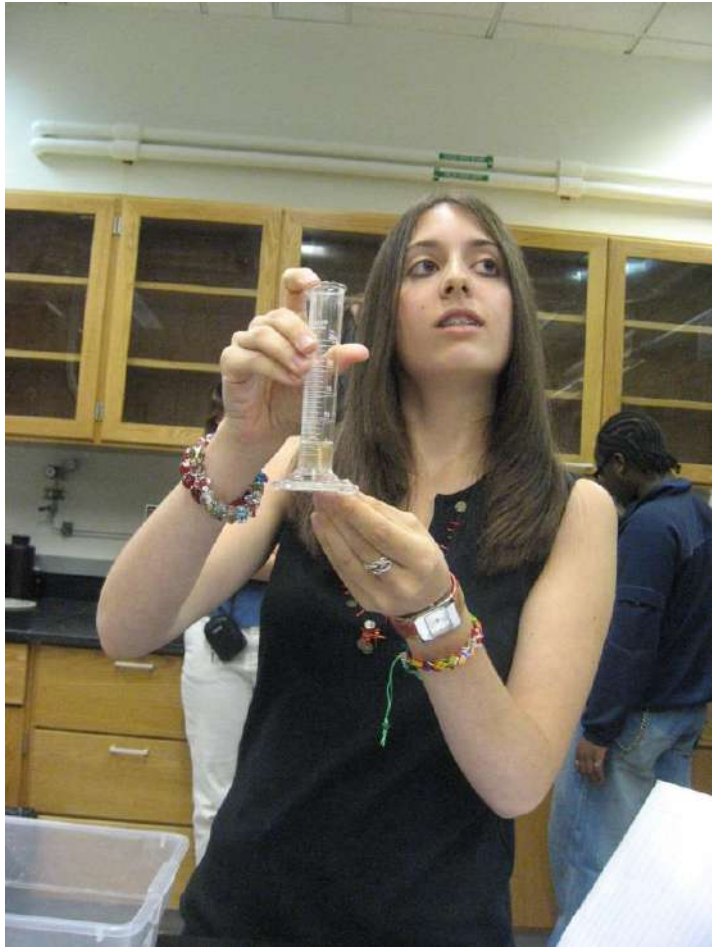
Ratio of Clay to Sawdust

Ceramic “Nano” Pores





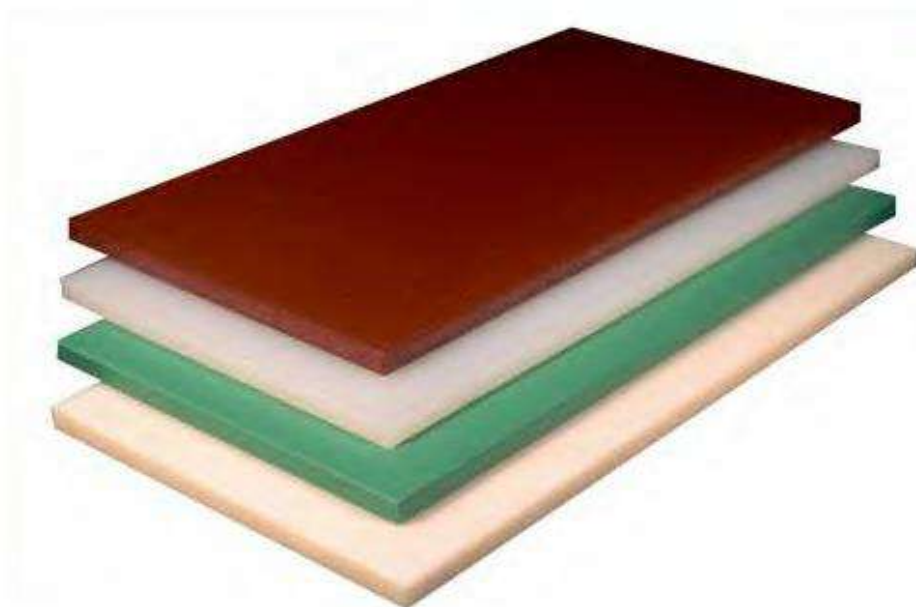




Testing Ceramic Filters

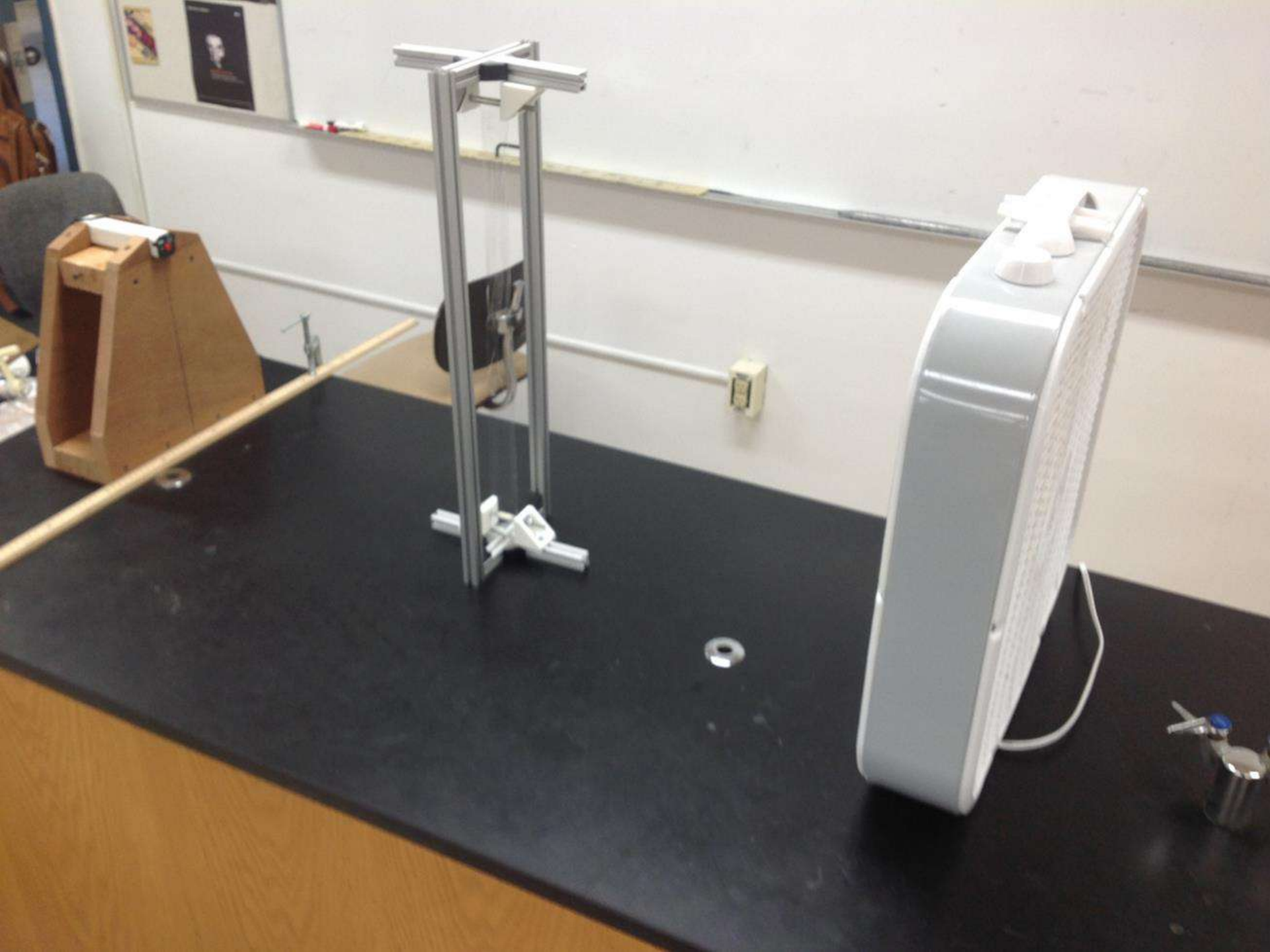


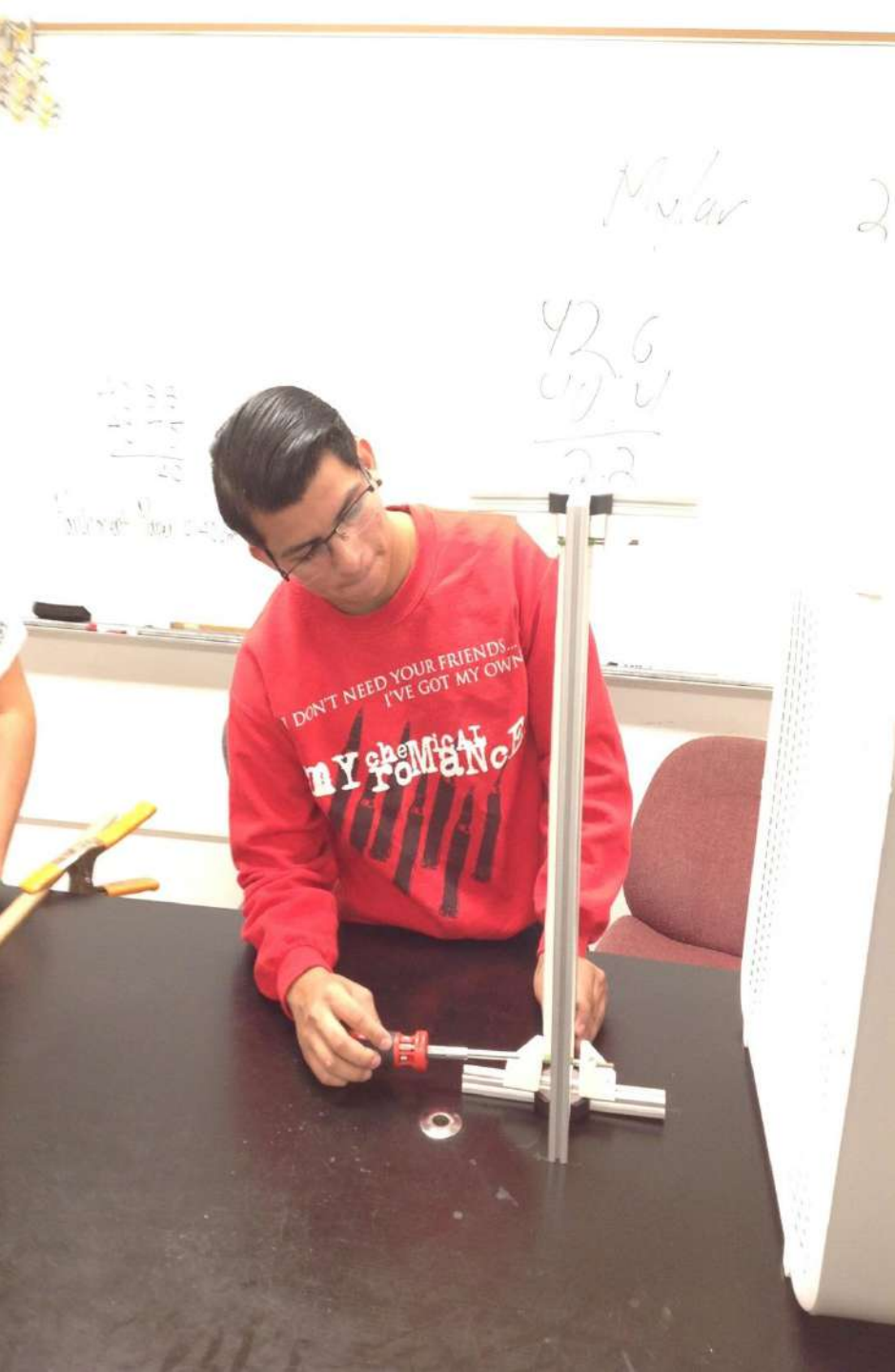
Polymers

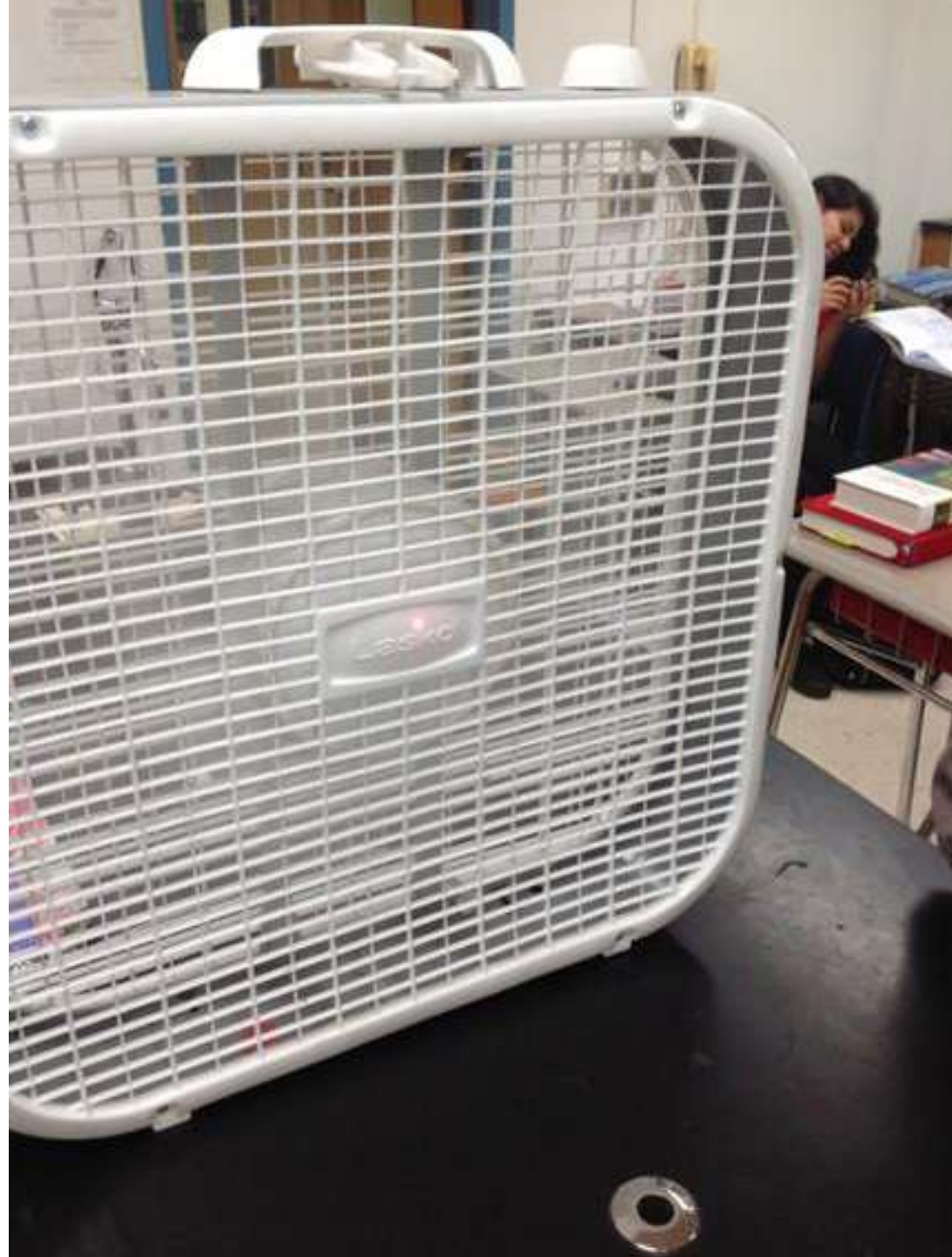




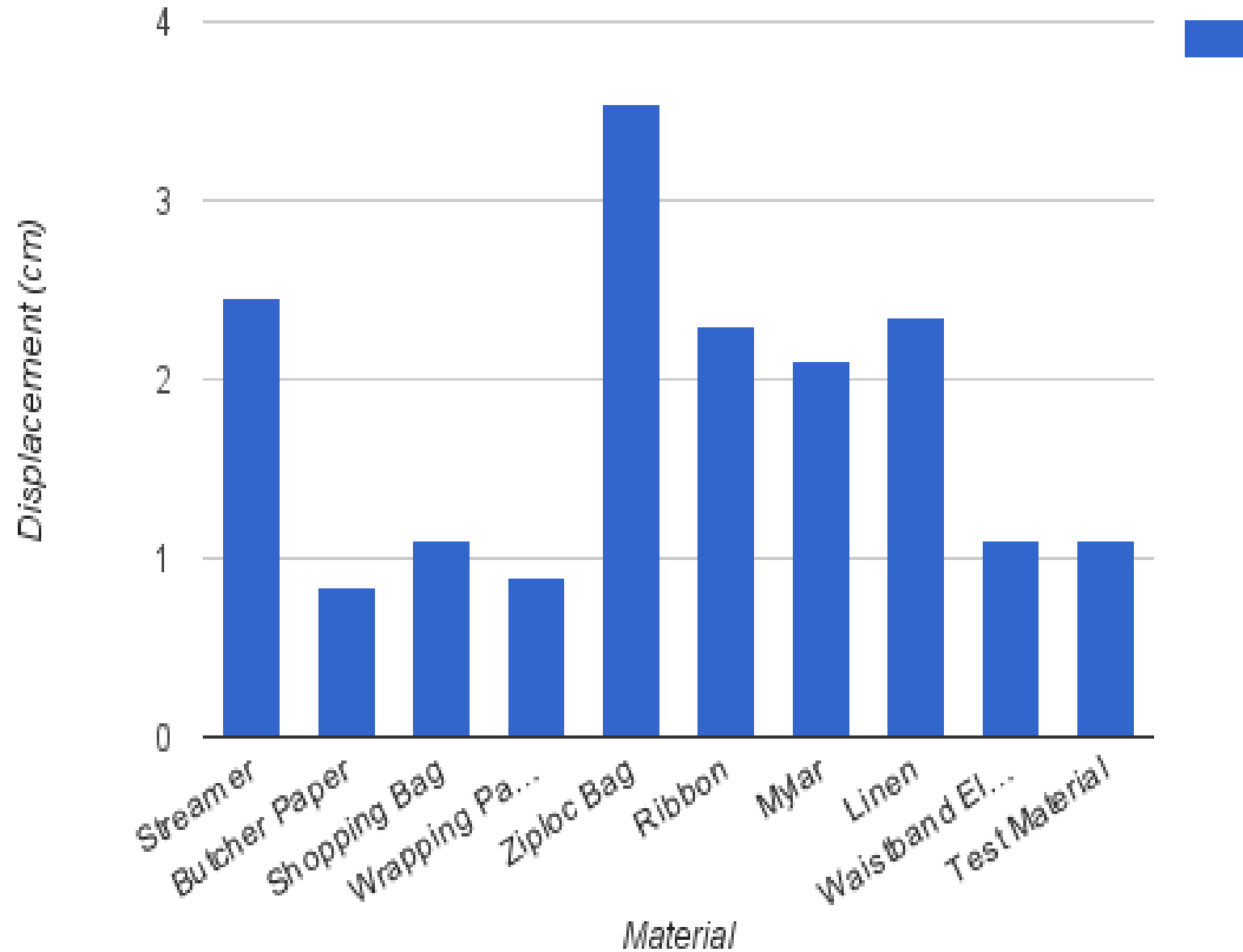
**Professor Aaron
Mazzeo PhD.**







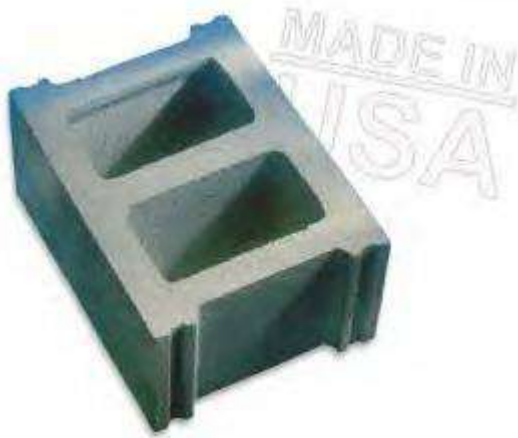
Material Displacement



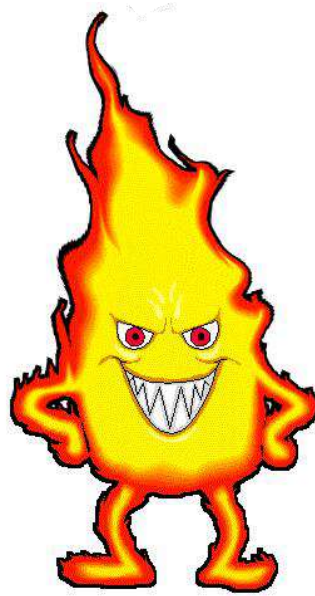
Semiconductors

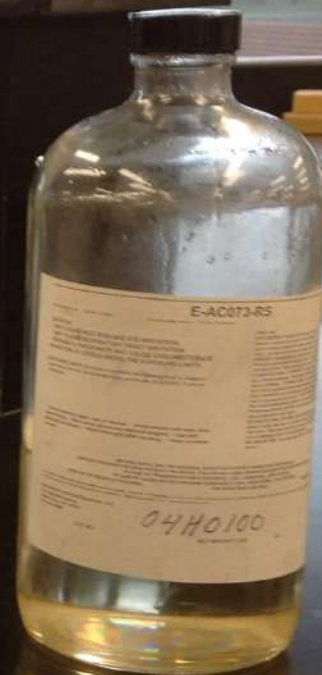
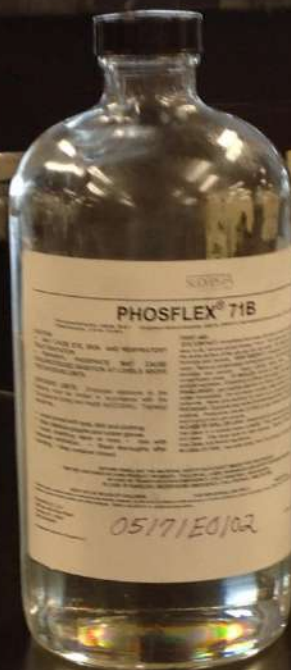


Composites



Flame Retardency







HONOR
SOCIETY
MHS
NATIONAL
HONOR SOCIETY
2016





A photograph showing two hands reaching up from a green field towards a bright light source, creating a starburst effect. The background is a blue sky with white clouds. The text "Sustainable Energy" is overlaid in the center.

Sustainable Energy



I'm right
97% of the time.
Who cares about
the other
4%

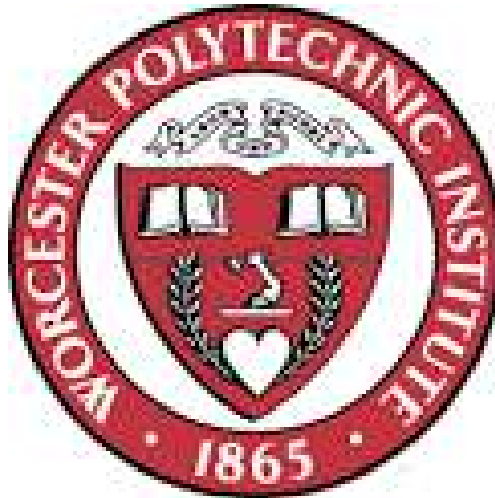




Class Website

<http://material-science.middlesex-highschool.groupfusion.net>

THANK YOU



Question

