Notes Term 1 Unit 1 Day 1

SCIENCE & THE SCIENTIFIC METHOD

What is SCIENCE? My own Definition: (Student write down their own definition).

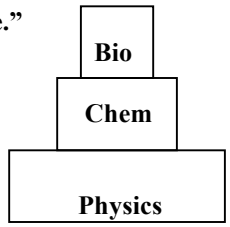
Teacher's Definition: **attempt to obtain truth through observations and experiments.**

What is PHYSICS?

PHYSICS: **Physics is about forces, motion, and energy. "Foundation Science."**

CHEMISTRY: **Chemistry is the science of atoms. "Central Science."**

BIOLOGY: **Biology is the science of living organisms. "Peak Science"**



History of Science:

	PHASE	WHO	WHEN/ WHERE	DESCRIBE
1.	**Superstition**	Ancient Man	Everywhere	**Used magic and religion to explain everything.**
2.	**Philosophy**	**Aristotle**	**Greece 384 BC**	**Used logic. Based on ideas instead of experiments. Influenced Europe for 2000 yrs.**
3.	**Scientific Revolution**	**Galileo**	**Italy 1564**	**Used experiments and observations to generate theories. (Father of science).**
4.	**Mathematics**	**Newton**	**England 1642**	**Used math formulas to describe natural patterns.**
5.	**Modern**	**Einstein**	**Germany/ USA 1879**	**Tries to explain WHY the universe is the way it is.**

TREND:

Aristotle = Greece = Greek Empire
Galileo = Italy = Roman Empire

Newton = England = British Empire
Einstein = America = current superpower

Political power and science are linked. Whatever country rules science rules the world.

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Scientific Method:

Observation: **open your eyes and look around**.

Question: **ask yourself a question about what you see.**

Hypothesis: **educated guess about what the answer might be.**

Experiment: **design a way to test your hypothesis**.

Variables: **things that change during the experiment**.

Constants: **Something that you purposely keep the same.**

Data Collection: **record your results.**

Quantitative: **Any data that can be written as a number.**

Qualitative: **Any data that uses adjectives.**

Data Analysis: **figure out what the data means.**

Conclusion: **answers the question, "Was my hypothesis right?" declare the overall results of your experiment.**

Evaluation: **answers the question "Do I trust my results?"**

Keep An Open Mind: **willing to accept new evidence when seen.**

Scientific "PROOF"

- **Proving something is TRUE is hard!**
- **Proving something is FALSE is easy!**
- **Therefore, scientists do NOT try to prove something is true. Rather, they try to prove it is false. If they can't, then it is accepted as a theory.**

VARIABLES

Independent variable = **What we change** **Dependent Variable** = **What we measured**

In a data table it goes **on the Left** In a data table it goes **on the Right**

In a graph in goes **on the x - axis** In a graph it goes **on the y - axis**

Data table columns should ALWAYS include **Labels** and **Units**.

Both graph axes should ALWAYS include **Labels** and **Units**.

Write them like: Label (Units)

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Read the following scenarios. Identify the independent & dependent variable and sketch what the data tables & graphs would look like. (Just their labels.)

Lucia has noticed when she swims in the lake that the water at the top always feels warmer. So she designs an experiment. She ties a thermometer to a string and sinks it six inches in the water. Then she records the temperature. She repeats this process at a depth of 12 inches and 18 inches.

Independent Variable = **water depth**

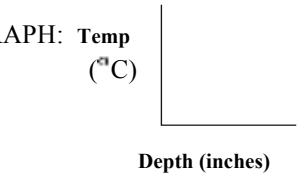
Dependent Variable = **temperature**

Possible Constants = **using the same thermometer, measuring in the same lake, same time of day.**

DATA TABLE:

Depth (inches)	Temp (°C)

GRAPH:



Matsuko is building a pinewood derby car to race. He thinks that adding some weight to the car with modeling clay might help it go faster. First he races the car by itself. He records the time it takes to reach the bottom of the ramp. Then he adds 50 grams of modeling clay and races it again. He repeats the process with 100 grams and 150 grams.

Independent Variable = **adding modeling clay**

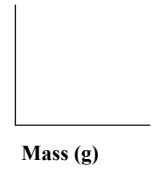
Dependent Variable = **time it takes to reach the bottom of the ramp**

Possible Constants = **using the same derby car, the same ramp.**

DATA TABLE:

Mass (g)	Time (s)

GRAPH:



Rachel commutes a long way (on the freeway) to work every day. Gas is expensive. Design an experiment that would allow Rachel to see if there is a connection between how fast she drives (speed) and her fuel efficiency (how far she can drive on one tank of gasoline).

Describe the experiment in words:
Rachel will pick a speed and keep the same speed and record the millage when she refills. Then she will change to a new speed and repeat the experiment several times.

Independent Variable = **speed**

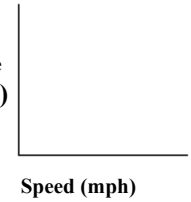
Dependent Variable = **millage**

Possible Constants = **same car, same route.**

DATA TABLE:

Speed (mph)	Millage (miles)

GRAPH:



Steven plays basketball. He knows that a flat ball doesn't bounce very well. But he notices that an overly filled ball is also hard to bounce. He is curious how much air is the perfect amount. Design an experiment that would allow Steven to test the connection between air pressure and bounce height.

Describe the experiment in words:
Steven will inflate the ball to different pressures and bounce the ball and record the height at the different pressures.

Independent Variable = **air pressure**

Dependent Variable = **height the ball bounces**

Possible Constants = **use the same ball, same temperature, same surface it bounces on.**

DATA TABLE:

Air Pressure (psi)	Height (m)

GRAPH: