Physics 201 - Lecture 1

Question : What is physics?

Lots of answers !!

1. "physics" → from Ancient Greek
                → "nature"

    (i) nature = everything in the natural universe.

    (ii) nature = the underlying structure or workings of something.

PHYSICS ≡ the nature of nature

... of physics allows us

2. The study of phys... ...
to understand the make-up of the
universe (what it is made if) and
how the things in the universe
interact with one another.

3. Physics comprises the mathematical
answers to questions that we
ask about the universe.
ONE EQUATION

So, let's create a universe!

Step 1: create a place for it.
→ space → "length" → $\boxed{m}$
...ut stuff in it.

Step 2:   put

→ matter → "mass" → $\boxed{kg}$

Step 3:   let it evolve.

→ time → $\boxed{s}$

Step 4:   let it heat up.

→ temperature → $\boxed{K}$ (Kelvin)

For physics 201 (classical mechanics)

THAT's IT!

Every other physical quantity in
the universe (Force, energy, momentum
density, viscosity, ...) can be
expressed in terms of these four

exp

basic quantities → m, kg, s, K

base units ↗

Examples:

mass
────
volume

speed → m/s

density → kg/m^3

energy → $\dfrac{kg \cdot m^2}{s^2}$ (= 1 J

⋮

etc.

What is the process of doing physics? (science)

Step 1 : Ask a question.

(Ex. how does the speed of an object change as it is dropped

from a tall building)

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Step 2 :   Do an <u>experiment</u> to

"Given"   collect data.

(Ex.   measure the time that it
takes for an object to fall to
the ground from different height

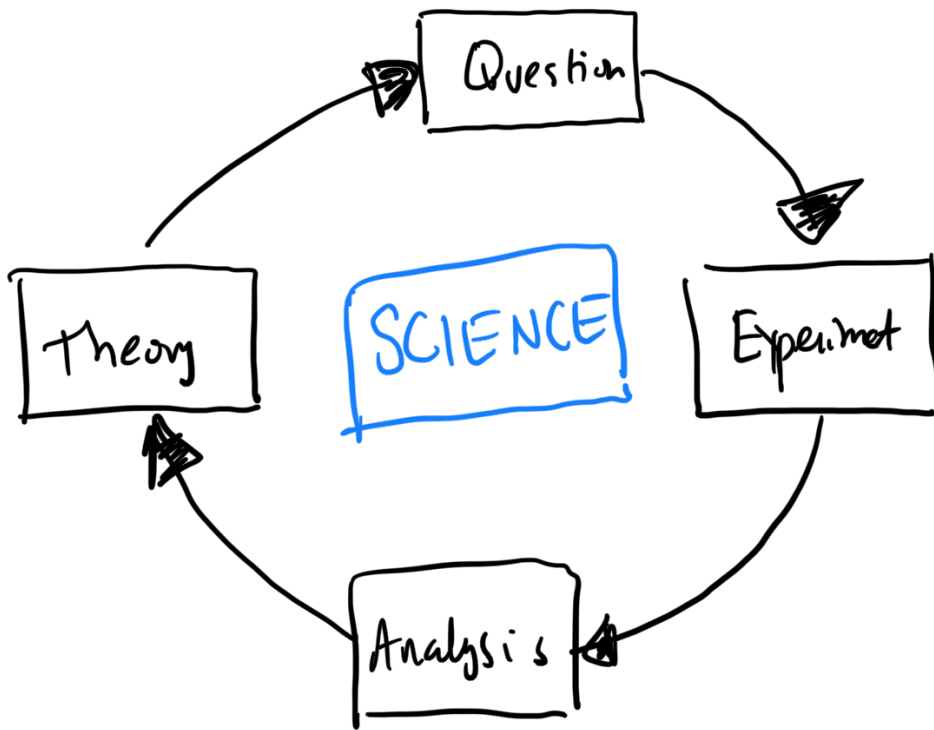Step 3 :   <u>Process</u>, <u>graph</u>, <u>analyze</u> the

↑PHYS 201   data.
HW

(Ex.   make a plot of
? t vs. h , or t^2 vs. h , or
THEORY $\sqrt{t}$ vs. h , ...   to look
for trends)
(1 + 2 + 3 = EXPERIMENTAL PHYS

Step 4 :   Develop a <u>model</u> that

can be used to predict and understand the system.

(THEORETICAL   PHYSICS)

Notes :   REJECT NULL HYPOTHESIS , FAIL TO REJECT

① We can never prove a theory, we can only disprove it.

② Theories are never right, they are just <u>not wrong</u>, yet.

③ The job of a theorist is to describe the available data, and make predictions.

④ The job of an experimentalist is to test predictions, and collect and analyze data which challenges the theory.

②