Board Meeting Beta:

Points of CHARGE

Physics 204
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I. Board Meeting PROCEDURES.

A) Take at least one large white board for each group.

With as much clarity, completeness, color, vivacity and verity as possible,

On group white boards, respond to all the PROBLEMS.

You may certainly use more than one white board per group.

B) Leave AT LEAST 45 minutes to 1 hour for the following:

Gather in an approximate circle, all Boards facing in.

Discuss the Boards. Note that the Instructor, however, will play a noticeably minimal role. Whenever s/he is silent and whenever you wonder what to discuss, do the following:

i. Begin by attempting to identify and reconcile disagreements among boards,

ii. Freely but respectfully follow whatever conceptual/conversation paths emerge from the attempt to reconcile boards.

iii. Emphasize Depth over Breadth:

Once the class discovers that it is disagreement or confusion over a particular and fundamental point~~

whether or not this point was originally intended for discussion~~

STICK WITH THE CONCEPT UNTIL YOU GROW EMOTIONAL INVESTED, BUT

iv. Do ***not*** interrupt colleagues.

II.
That which must be

CONSIDERED,
SOLVED & RESOLVED
via
DISCUSSION:

I. Simple is not easy.

The property or quality or characteristic known as 'mass' is as common and familiar as common gets, but

using a language like English or Arabic or Korean (etc) to express precisely what this property is or how it entered the universe or why objects have it is. . . not easy, if it all possible.

Any object that appears to demonstrate or possess this property known as 'mass', is often called 'a mass' or 'the mass'. That is, the term 'mass' can and WILL – in this class – function as a very concrete sort of noun and refer to any object that is massive. We get used to picturing and analyzing such items (masses) because they are often visible and/or tangible:

A 'MASS' is, in our terms, a manifestly 'thingy' thing. It occupies space and time, but is constrained by the two conditions by which all 'thingy' things (particles) are constrained:

II. WHAT ARE THE TWO Space/Time CONSTRAINTS that govern ALL PARTICLES? ILLUSTRATE these constraints, do not just verbalize them.

III. What are TWO SEPARATE EQUATIONS that might be used to DEFINE a MASS?

Is one truly a definition and the other not? Are they both right? Both wrong? Both necessary?

Differently right for different contexts? COMPARE their advantages and disadvantages.

IV. Now assume that CHARGE is also a thingy-thing.

How many equations can you come up with that might be used to define CHARGE? (Feel free to use the web, your memory from chemistry class, etc.)

Hint: The answer is 1.

Note that there are 2 fundamental equations for mass, but 1 for charge.
This seems to suggest a contrast. Note the mathematical form for the 1 equation that governs charge. This seems to suggest a comparison. Just sayin'.

V. As graphically as possible, depict a situation that expresses a Qualitative relationship between charge and mass. That is, somehow describe and convey a situation that involves both mass and charge interacting at the same time: If thoughtfully invented and described, this situation should ultimately highlight some important similarities and some important distinctions between the two.

VI. Now, do the same as (V), above, but focus on the QUANTITATIVE relationship. Feel free to use any fundamental constants and values you find in reputable sources, including the whiteboard.

One clear and directed way to think about this question: What if two electrons were near by each other and there were nothing else around for miles and miles and miles? What would happen? What other conditions would you need to specify? Be as specific and precise as possible.

VII. IFF you finish and finish all the above everything quickly, then take the most recent questions to this extremely concrete and 'particular' level:

a. Assume that you have a mole of water molecules in a red cup. It is 5 meters away from another mole of water molecules. The second mole of water is in a blue cup.

i. What is the net gravitational force that the water in the red cup exerts on the water in the blue cup?

ii. What is the net gravitational force that the electrons in the red cup exert on the electrons in the blue cup?

iii. What is the net electrostatic force that the water in the red cup exerts on the water in the blue cup?

iv. What is the net electrostatic force that the electrons in the red cup exert on the electrons in the blue cup?

v. For the rest, assume that the blue cup is on a frictionless surface, but the red cup is somehow nailed down. There are no other things in the universe. (Except love… Of physics…)

1. At what rate would the blue cup accelerate toward the red cup?

2. If the amount of water in the blue cup were tripled, what would happen to its acceleration (Increase? Decrease? By what factor? Stay constant? For what reason?)

3. If the number of electrons BUT NOT PROTONS in the blue cup were tripled, what would happen to its acceleration?

b. What's with the inverse-r squared?! Coincidence? Annoyance? Any conjectures? Even if you 'cheat' and go on the web and run into some claims about sphere surface areas, why do they enter the discussion? What do gravity, electricity, and sphere surface areas have to do with another?