Board Meeting Gamma

Physics 203: Profs. Bean, Walters, Martens Yaverbaum
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Make certain to read THESE procedures BEFORE beginning to solve problems.

1) 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 below the CONCEPTUAL BACKGROUND.

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

2) We will leave AT LEAST 45 minutes to 1 hour for the following:

   Gather in an approximate circle, all Boards facing in.

   Discuss the Boards with respect to and for any leading questions posed by the Instructor.

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

   a) Begin by attempting to identify and reconcile disagreements among boards,

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

   c) 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 *PAST* THE POINT OF FRUSTRATION & SEEMING 'CIRCLES'.

   d) Do not interrupt colleagues.

1. Qualitative Graphs

A woman is pushing a heavy object across a horizontal floor. The object starts out at rest.

As the woman pushes, she gets tired and her force grows **steadily weaker**: with every meter (or cm or mm or etc.) she travels, the woman gets **same constant amount** weaker.

There is kinetic friction between the object and the floor. Initially, the woman is **twice as strong as** the force of friction on the object. After she has pushed the object a distance of 5 meters, her strength is **equal** *t*o the force of friction. She continues to push, and continues to grow weaker.

Below are six graphing questions. You will not be able to graph points, since you basically don't have any numbers for the y-axis. Just try to get the ***general shape*** of the graph right.

Don't try to label any numbers on your y-axes ***except for zero—do*** include zero in each graph. And ***do*** label the y-axis with the appropriate variable for each graph.

Do label 0 m and 5 m on your x-axes. After you answer question G below, you may discover that there is one other number that you can add to the x-axis on each graph.

For each graph, ***explain your reasoning***: why did you choose the shape you chose? Use words, diagrams, equations, etc.

- **A.** Draw a graph of the magnitude of the woman's force as a function of distance.
- **B.** Draw a graph of the ***total work*** done by the woman so far as a function of distance.
- **C.** Draw a graph of the magnitude of the force of friction as a function of distance.
- **D.** Draw a graph of the total kinetic energy of the object as a function of distance.
- **E.** Draw a graph of the speed of the object as a function of distance.
- **F.** Draw a graph of the acceleration of the object as a function of distance.

- **G.** At what distance will the object stop moving? Explain your reasoning.

- **H.** Draw a graph of the ***position*** of the object as a function of ***time***. Label key points on your y-axis. Label only the zero point on your x-axis.

2. Asteroid's Path

A small asteroid with unknown mass comes flying through our solar system. At a certain moment, it is found to be 6,000,000 m from Earth's surface, moving at a velocity of 8000 m/s relative to earth, in a direction perpendicular to the line connecting it to Earth's center of mass. The earth has a mass of approximately 6×10^{24} kg.

Draw the approximately path of the asteroid after this moment.

Use equations, algebra, and English to explain why you chose the path you chose.