BOARD MEETING
Alpha

PHYSICS 203, FALL 2017
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I. *HOW TO* HOLD A BOARD MEETING: METHOD AND MINDSET.

A. Preparing the Boards

1. As a quiet group of individual readers, carefully read the set of problems and/or questions which is labeled '***II. THE PROBLEM SET***' and which begins on page 6.

2. As individuals, write things as you read:
   Make individual attempts at solving the problems.
   At this stage, it is vital that you restrict all thinking to your own mind and to your own paper.

3. After quietly reading and individually considering, then come together as a group to discuss.

4. Make sure you have *at least one* large white board and a slew of multi-colored (working) markers. At this stage, it is vital that you restrict all discussion to within your own group.

5. *In response to the problems* you find on the following pages, and
   As a group, design and execute a plan for creating your board(s).
   In creating a board, you will heed the following.

B. Creating the Boards

1. Using the board, ***your group will create a visually expressive PUBLIC PRESENTATION*** *(similar in some respects to a Science Research Conference Poster).*

2. Your *group's board will* ***not tell, explain nor expound;*** *Your group's board will, rather,* ***<u>SHOW</u>*** *the group's*

   UNDERSTANDING, MINDSET, TREATMENT, MENTAL MODEL' and/or PERSPECTIVE (etc)

   regarding select features of the problems discussed.*

   ** No board is required to present solutions to all problems nor questions. Selections for inclusion in the board are made by the group according to D(1) and D(2), below.*

3. Your board will quite noticeably demonstrate a maximum of ***clarity, personality, persuasion, excitement, illustration, color, vivacity, voracity and authenticity;***

4. Your board, in other words, will 'POP'.

5. ***Your board, in other words, will NOT resemble a data log, ticker tape, receipt*** *or otherwise dry record of personal thoughts.*

6. *Your board WILL demonstrate the extent to which any and all conceivable steps were taken in order to* ***make something which other people WANT TO LOOK AT.***

7. EACH member of your group member ***WILL CLEARLY WRITE HIS/HER OWN FULL NAME*** *somewhere on the board.*

C. What ***NOT*** to do with Boards

1. ***DO NOT*** fill your board with dense solutions, computations and/or text;

2. ***DO NOT*** make a board which looks like part of an exam blue book;

3. ***DO NOT*** make a board which looks like part of a completed hw assignment (even if you recognize a problem or question from hw);

4. ***DO NOT*** rush to answer every question nor to get 'to the end' of the problem set;

D. What ***TO DO*** with Boards

1. **** DO*** focus on ***at least one section*** about which your group seems to have strong and specific feelings -- of either agreement or disagreement. On the board, provide especially deep, detailed and thoughtful illustration, graphics, demonstration, example (etc.) for this section.

2. **** DO*** focus on at least section about which your group seems to feel especially uncertain, confused or concerned. Again, use the board to provide especially deep, detailed and thoughtful illustration regarding the details of your question, confusion or concern. The phrase *'I have no idea'* is meaningless. And false. And not permitted.

3. ***DO*** devote sufficient time and thought to (e) and (f), above, so that you do NOT panic about completing anything or everything else.

4. ***DO*** be fine with the fact that you ***will finish your board***, while ***your board will not 'finish' solving the problem***.

E. Configuring the Meeting

1. You will preserve and allot AT LEAST THE LAST HOUR AND TWENTY MINUTES OF LAB for a meeting of the full class, conducted according to the instructions below.

2. The discussion will make use of the Boards and all students.
   This discussion is the '*Board Meeting*' itself; it is the ultimate purpose for which the Boards were created. It is born from the boards, but can and should take on its own life.

3. Unless fully investigated and logistically impossible, a classroom other than the lab must be used. Everyone will take their things and commute down the hall to an unoccupied classroom on the 3rd floor (a room which will have been scouted and arranged during the first half of lab by the lab technician).

4. Gather in a very careful and real circle: all students must be essentially equidistant from a center. Every student must be in a chair, and at essentially the same height as everyone else. No one is excused from the arrangement nor entitled to inhabit some kind of distinct location.

5. Each group will sit with its board in front on the floor, facing inward. The boards will be approximately edge to edge and therefore form an inner concentric circle. There will be a minimum of extra space among boards/groups. There will certainly be no unoccupied chairs.

F. Conducting the Board Meeting: Doing the Thing Itself)

1. Before making any comments,
   everyone will take a
   quiet, individual and considered look
   around the circle at all the boards.

   All boards will be visible.
   All boards will invite the eye.
   All boards will be seen.

   All participants will make mindful attempts
   to decipher and discern all board's contents
   from top to bottom.

2. After a few such minutes,
   the discussion will open.
   The discussion will open
   when somebody takes the initiative
   to open it,
   to wit:

3. One individual will raise a question or observation
   regarding some content toward the top of some board
   that seems somehow inconsistent or in tension with
   some related content found on some other board.

4. The individual who notices an apparent inconsistency
   will ask one of the relevant groups
   to explain the relevant part of their board.

G. Managing the Meeting

1. No group is expected nor permitted
   to offer an unmotivated monologue about its board;

   each board will speak for itself
   until it is asked to defend the way
   in which it seems to speak against another board.

2. If two or more differing issues are raised at once,
   then whichever issue seems to arise earlier in the
   problem set
   will take precedence.

3. Once asked, every member of the group in question
   will contribute to the offering of an explanation
   of the thinking behind
   the part of their board in question;

   not all parts of the board need be discussed.

4. The explanation offered by a group might satisfy the
   questioner and/or it might lead another group to
   modify its thinking.

   If at any point a group wishes to change its thinking,
   it can and will modify its board accordingly.

   A question might will generate further questions.
   The discussion will proceed from there.

5. Debate will be allowed, encouraged and respected.
   Challenges will be promoted. Ideas will battle, but not
   people. Impassioned arguments will be enjoyed --
   always and only insofar as they in unfold in pursuit of
   collective clarification.

6. A particular idea might will sit under group scrutiny
   for a while. If a particular person finds him/herself at
   the center of attention for a noticeable period of time,
   then something has been mishandled in the discussion
   and the instructor will intervene.

H. Optimizing the Meeting

1. The goal of discussion is to reconcile inconsistencies and/or disagreement. The means of reconciliation is debate.

2. In an ideal discussion unbounded by time, a class would ultimately reach full consensus (resolution, agreement, clarity, uniformity) regarding all aspects of all boards.

3. The endeavor to converge as closely as possible to satisfying consensus on central ideas forms the purpose and pursuit of any board meeting.

4. Given the realities of finite time and interest, emphasis is shifted toward partial achievements of consensus and approximate achievements of resolution.

5. In maintaining a productive flow of topics, and an equitable distribution of dialogue, one hard choice after another will be made. Some choices will motivate; some choices will backfire.

6. Very few choices of any kind will be made nor enforced by the instructor.

7. Straw votes will be strongly encouraged.

8. Similarly, very few physics errors of any kind will be identified or corrected by the instructor, save for the closing minutes of lab.

9. When in doubt, depth will be prioritized over breadth.

I. The Meaning of Meeting

1. Debates, questions and confusions will be nurtured –
   as long as they point toward general ideas,
   and away from particular facts.

2. Apparent 'tangents' will take over as main ideas –
   as long as they expose or scrutinize
   possible areas of misconception.

3. When in doubt, a conversational step 'backwards'
   (a shift of focus toward basic definitions or premises)
   will be favored above a step 'forward'
   (a shift of focus toward the end of a problem set).

4. Hands will not be raised;
   the instructor will not call on people.

5. A SINGLE person will speak at a time.
   S/he will address all; all will listen.
   Any who cannot hear will say so.

6. In the event that two people start to speak at once,
   deference will be granted to whomever has said less.

7. At all times, the discussion's driving goal
   will remain: the reconciling of inconsistencies,
   ambiguities and/or contradictions.

   i. Impassioned disagreement will not be repressed;

   ii. Neither interruption nor abuse will be tolerated.

8. The trail toward consensus will be blazed
   by the airing of contradictions.

   i. We will try little to reach the bottom of a sheet;
      We will try very hard to get at the bottom of
      misconception.

   ii. We will stop striving to cover material;
      we will try instead to uncover misunderstanding.

II. The Problem Set (For Today):

A. ***Read, Recall & Refresh***

Recall the thought experiment
known as '*Train of Thought*'.
Recall the actual place
known as *Planet Earth*.
Recall any informative similarities
or connections between the two.

Recall Galileo's Principle of Relativity:

i. Form 1:

The Laws of Physics are the same
at all constant velocities.

ii. Form 2:

No experiment can be designed nor performed
to measure the exact or certain velocity
of a single object through Earth's atmosphere.

iii. Form 3:

Velocity is a relation between two objects;
it is not a meaningful property of any single object.

iv. Form 4:

$$\vec{V}_{aa} \equiv 0$$
$$\vec{V}_{ab} \equiv -\vec{V}_{ba}$$
$$\vec{V}_{ac} \equiv \vec{V}_{ab} + \vec{V}_{bc}$$

B. ***Repair***

Four Forms for ***Galileo's Principle of Relativity***
are presented above.
Exactly one of them, however, is presented erroneously:
Though there are a number of different and equally
legitimate ways to phrase any of these forms, one of them
is written in a manner that is wrong enough to make a
real difference.

i. Of the four forms presented above,
find and identify the one
that somehow conveys a misunderstanding
or violation of Galileo's Principle.

ii. In the form you chose,
make as few changes as possible,
make each change as small as possible;
in so doing, correct the form and render it
a correct and/or consistent
expression of the Principle.

(Take ***GPR*** – in all 4 of its correct forms – as given.)

C. ***Evaluate: The Peter/Teresa Scenario***

Peter stands on a subway platform.
The subway platform is stuck to a ground
which is (ultimately) stuck to the surface of Earth.
Peter has a ruler and a stopwatch.
He makes careful measurements.
According to Peter's measurements,
both the platform and he are stationary.

Peter observes a train pass by.
Again, he makes careful measurements.
According to Peter's measurements,
the train moves at an essentially constant speed of 40 m/s
in a straight line toward the East.

On the train sits Teresa.
She sits comfortably in a standard seat
and has with her a ruler and stopwatch.
She makes careful and continued measurements.

Given Galileo's Principle of Relativity (as true),
Assess each of the following statements
as TRUE or FALSE:

i. According to Teresa's measurements, Teresa is stationary.

ii. According to Teresa's measurement, Teresa's seat moves to the East.

iii. According to Teresa's measurements, Peter moves at 40 m/s.

iv. According to Teresa's measurements, Peter's platform moves toward the West.

v. According to Teresa's measurements, Peter's meter stick is stationary.

vi. Compared to Teresa's measurements, Peter's measurements are characterized by smaller margin of error.

vii. Compared to Peter's measurements, Teresa's measurements are characterized by larger fractional uncertainty.

viii. Compared to Teresa, the Earth's surface moves to the West at 40 m/s.

ix. If their equipment included telescopes (etc) and allowed for astronomical measurements, Teresa and Peter would measure two different velocities for the sun.

D. ***Add 1-D Velocity Vectors***

Assume that all the above facts and figures
(regarding Peter, Teresa, etc.) continue to hold true.

In addition, however, Teresa observes a soda can roll
along the floor of her subway car.

It rolls from the front of the subway towards the rear.

According to Teresa's measurements,
the soda can rolls at a constant speed of 15 m/s
in a straight line (toward the subway rear) –
perfectly parallel to the length of the subway.

i. Determine the velocity of the soda can,
according to Peter's measurements
(i.e.: in Peter's 'reference frame').

1. In Peter's 'reference frame'
(i.e.: according to Peter's measurements,
whether or not he literally makes any):

The SPEED of the soda can is
_____?

2. In Peter's 'reference frame'
(i.e.: according to Peter's measurements,
whether or not he literally makes any):

The DIRECTION of the soda can is
_____?

ii. Let $\vec{v}_{ps}$ stand for the velocity of the platform
according to the soda can's reference frame, i.e.:

$\vec{v}_{pc} \equiv$ velocity of platform 'relative to' can

1. Find the magnitude $\vec{v}_{ps}$.
2. Find the direction of $\vec{v}_{ps}$.

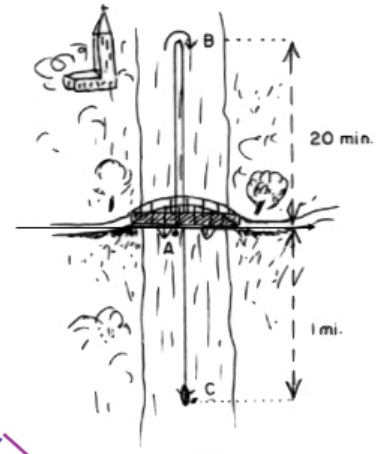
E. ***Add 2-D Velocity Vectors***

Assume all the above facts and figures
regarding Teresa and Peter continue to hold true,
except for the one change below:
According to Teresa's measurements,
the soda can rolls along the floor
at a constant speed of 15 m/s
but in a direction of 20^0 North-West.
According to Peter, the *train* continues
to head in a straight line due East at 40 m/s.
Under the above described conditions, compute

$\vec{v}_{cp} \equiv$ velocity of can 'relative to' Peter.

F. ***Consider the Classic***

A man in a boat travels upstream (Fig. VI-5) on a river, and there is a half-empty bottle of whisky standing on the stern of the boat. While the boat was passing under the bridge, a wave reflected from the bridge's pillars shook the boat, and the bottle fell into the water without the man's noticing it. Now for 20 minutes the boat continues upstream while



'relative to shore'

FIG. VI–5.
Recovery problem of a dropped bottle.

the bottle floats downstream. At the end of 20 minutes, the man notices that the bottle is gone, turns the boat (neglect the time necessary for that operation), and moves downstream with the same velocity in respect to water as before. He picks up the bottle a mile below the bridge. The question is: what is the velocity of the river?