Supplemental Instruction Planning Sheet – Winter 2017

SI Leader: Natalija Miller Course: PH 201

Chapter/ Pages: Vectors, Average Quantities Week of the Term: 2

List any materials needed (including any handouts/pre-made documents):

1. 10 mini white boards
2. 10 dry erase markers
3. Tennis Player Activity hand-out
4. 3-4 large whiteboards

Learning Outcomes: What will students DO to demonstrate they understand specific concepts?

(E.g., "Students will be able to list and explain the steps for solving net force-acceleration problems and correctly solve sample problems.")

1. Students will be able to identify concepts discussed in pre-lecture assignments, lecture, homework and lab; such as, vector quantities and equations.
2. Students will be able to apply these concepts towards solving a challenging practice problem.
3. Students will be able to evaluate the importance of certain concepts, their thought processes, and approaches to tackling physics.

**What** study skill will you recommend? **When** will this study skill be discussed?

­­­­­­­­ I will recommend students work in groups and practice, practice, practice. I will introduce this study group in the ice breaker, where I offer it as a study habit. I will then address it further in activity 3 when we practice working on a difficult problem in groups.

**Why** is this skill important and effective? **How** does it help students learn?

Practicing in groups is an important and effective skill because it helps students identify and fill in gaps in their understanding. This technique helps students learn physics by preparing them to solve problems. It also will help them make connections and draw inferences that they otherwise might not have.

**Remember to thank students for coming to study tables at the start of your table!**

***N.B.*:** For each activity, please provide step-by-step, detailed notes about the activity’s structure and facilitation. Please number or bullet point within the boxes to make the process easier to follow.

Opening Activity

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| Name of Activity: What Moves You? | Time Needed: 8 minutes |
| Rationale for the activity: This activity will help everyone learn each other’s names and understand some of their personality traits. We will then apply these traits to study habits. |
| Level of Bloom's Taxonomy: n/a for icebreakers |
| List the steps in the activity. Be sure to include your actions to facilitate as well as student actions.1. A mini whiteboard and Expo marker will be handed to each student
2. Each student will be asked to draw a form of transportation that can be used to define a few characteristics about themselves
3. I will share them my example of an airplane: free-spirited, relatively safe, aids many people, “head in the clouds”, carry a lot of stress, etc.)
4. Students will have 2 minutes to draw their transportation on their whiteboard and to identify characteristics
5. After the 2 minutes are up, students will be asked to come up with a study habit and how one of their characteristics applies to the study habit (e.g. I like to study in groups because they help keep me grounded so I spend less time daydreaming and can be held accountable)
6. Each student will then share their form of transportation, their characteristics, and their study habit
7. As students share their study habits, I will write them on a large white board
8. Once all the study habits are written where every student can see, we will briefly discuss the benefits of identifying these habits and their value in physics
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| What do you want to remember for your interaction with students? For example, are the moments you might encourage students, ask specific questions, prompt to change groups, etc.? 1. Students will be encouraged to first come up with some characteristics and then try to identify a form of transportation
2. Students can collaborate to come up with ideas during any part of the process (i.e. identifying characteristics, drawing transportation and/or purposing a study habit)
3. I will first ask for volunteers to share. If there are no volunteers, I will ask a student, by name, to share and we will continue around the table from there
4. I will prompt students to think about why these habits are valuable, and welcome any testimonials students have about how they approach studying – if they bring up how they study best, we can briefly evaluate the efficacy of their approach
5. I do not want to spend too much time on this, as we can talk about these study habits for the full 50 minutes, so I will be watching the time closely
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Second Activity

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| Name of Activity: Speaking the Language | Time Needed: 8 - 12 minutes |
| Rationale for the activity: Physics is a language. If we are going to practice physics and apply it to the world around us, we must be able to interpret the variables, equations, and words associated with it. In this activity, students will be asked to define quantities we have been using in class, homework and in pre-lecture videos before we begin practicing problems. This activity will set the students up to solve the problems later in the table, and the term.  |
| Level of Bloom's Taxonomy:X Knowledge X Comprehension 🞏Application 🞏Analysis 🞏Synthesis 🞏Creation |
| List the steps in the activity. Be sure to include your actions to facilitate as well as student actions.1. Each student will be given a small piece of paper with a prompt or question for each student to answer: define a vector and scalar, name the vector quantities we have worked with thus far, define magnitude and how we can manipulate it, what is meant by ‘delta’ (vectorially, mathematically and pictorially), how does KC define direction and what use do we have for knowing it, what is displacement and how is it different then distance travelled, what is velocity and how is it different than speed, why do we want to have a defined coordinate system, how and when do we apply SOHCAHTOA in relation to vectors?
2. Students will use their mini white boards to write everything they can think of in relation to their prompt in 2-3 minutes.
3. Students will be encouraged to work independently for about a minute, but then to discuss with a neighbor for another minute or so.
4. After 3 minutes, each person will share what they wrote and why
5. I will summarize their thoughts on a large whiteboard, where everyone can see it
6. Students will be asked to share any additional thoughts they might have to add
7. Equations and variables will be written in conjunction with their definitions
8. I will then pose the question: “why did I have you do this?”, and ask them to take a minute to discuss the reasons with their neighbor
9. We will then come together and discuss briefly (for no more than 2 minutes) on why we need to understand the variables to practice physics
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| What do you want to remember for your interaction with students? For example, are the moments you might encourage students, ask specific questions, prompt to change groups, etc.? 1. I will be watching the clock to ensure we have time to start practicing a problem in the next activity
2. Students will be encouraged to consider variables and equations relevant to their prompt to ensure we get the most information provided in our summary
3. Students will be asked if they would be willing to collaborate if I see they are not, but will be cautious not to put too much pressure on them
4. I will help facilitate the discussion by asking students to consider how we approach solving a physics problem and what elements constitute a clear understanding
5. I do not have full registration for each of my tables, so students may have multiple prompts to answer. I will plan our time accordingly, and may ask them to work in pairs to expedite the process.
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Third Activity

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| Name of Activity: Match, Set, Point | Time Needed: 15 minutes |
| Rationale for the activity: This practice problem is a challenging one. It will get students exposed to solving a problem with two unknowns, and help them get comfortable using multiple equations – a skill they will need to develop throughout the entire year-long series. It will also be highly collaborative, which will help students engage with the material. |
| Level of Bloom's Taxonomy:X Knowledge X Comprehension X Application X Analysis 🞏Synthesis 🞏Creation |
| List the steps in the activity. Be sure to include your actions to facilitate as well as student actions.1. Students will be asked to work in pairs of 2 or 3
2. Each student will be given a copy of the practice question (see attachment at the end of the planning sheet)
3. Students will work around 3 or 4 of the large whiteboards to solve the problem
4. Students will be expected to draw a physical representation, identify the knowns and unknowns, label the diagram, and determine which equations they will use
5. Students will take turns writing and calculating
6. Once each group has an answer, I will ask for a group to volunteer to go through their approach to the problem
7. Students will be invited to ask any questions or concerns they have about the problem
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| What do you want to remember for your interaction with students? For example, are the moments you might encourage students, ask specific questions, prompt to change groups, etc.? 1. I will ensure each student is actively engaging with their group
2. I will check to make sure each student can identify the question that is being asked of them
3. I will remind students to write out their thought-process (see #4 above for elements)
4. I will periodically check in with each group to discuss their progress
5. Students will only have about 10-12 minutes to solve the problem, so I will be sure to update them every few minutes
6. If students are unsure of where to start, I will happily urge them to the concepts discussed in pre-lecture videos and lecture
7. I will remind students that they can use any resources they might need to solve the problem (e.g. notes, one another, myself, homework, book, etc.)
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Closing Activity:

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| Name of Activity: Name a Take Away | Time Needed: 5 minutes |
| Rationale for the activity: Identifying the most important concept or new understanding will give students a chance to evaluate and reflect on what they’ve learned. It will also help them identify what has been the most challenging or beneficial to their learning up to this point, and how they can grow from here. |
| Level of Bloom's Taxonomy:X Knowledge X Comprehension X Application X Analysis 🞏Synthesis 🞏Creation |
| List the steps in the activity. Be sure to include your actions to facilitate as well as student actions. 1. Students will be asked to write, on their mini white board, what they think is the most important thing we have covered in physics 201 thus far
2. Students will be given 2-3 minutes to compose their thoughts
3. Students will then be asked to share their important concept or understanding
4. If there is enough time, students will be asked to evaluate how these ‘take home’ thoughts or ‘big ideas’ can be organized and relate to one another
5. Students will be encouraged to add to these big picture concepts, refine them, and make future connections to them – because the course is structured to continuously build upon the material taught before it
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| What do you want to remember for your interaction with students? For example, are the moments you might encourage students, ask specific questions, prompt to change groups, etc.? 1. I will ask that students do write their thoughts independently, and to remain quiet until everyone has finished
2. I will make sure students are not acting inappropriately when other students share (i.e. no mocking, scoffing, eye-rolling or any other inappropriate behaviors)
3. I will explain the value of reflection to the students, and remind them to continually reflect throughout the term, year and throughout their careers
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**TO CONSIDER:**

What will you do if your activities take more or less time than expected? What will you do if fewer people attend than you were expecting? How will you still accomplish the learning outcomes?

**Remember to thank students for coming to study tables at the end of your table!**

Define a vector and scalar.

Name the vector quantities we have worked with thus far.

Define magnitude and how we can manipulate it.

What is meant by ‘delta’ (vectorially, mathematically and pictorially)?

How does KC define direction and what use do we have for knowing it?

What is displacement and how is it different then distance travelled?

What is velocity and how is it different than speed?

Why do we want to have a defined coordinate system?

How and when do we apply SOHCAHTOA in relation to vectors?

A tennis player serves the ball at position 1, hits it back at position 2 and 3, then returns to where they started. The first displacement vector is at an angle of 32º above the negative x axis. The second displacement vector points along the positive y axis. The final displacement vector has a magnitude of 31.7 ft and points in a direction 22.1º from the negative y axis. What were the magnitudes of the displacement for the first two stages? Report your answers in meters (m). *Note: 1 ft = 0.3048 m.*

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