

James Amidei
Transcription of Student Interaction

Context: This interaction is from an in-class group work session. The students were given a problem where an electron starts from rest and then accelerates due to a defined voltage difference up to some undefined speed. I sat with a group of two students and attempted to guide them through how they would go about finding the electron's velocity given information provided to them in the problem and via in-class resources.

[0:03] James: Ok, so what problem are we looking at?

[0:06] Student 1: Just problem one up on the board. We're not really sure how to get started to be honest.

[0:11] Student 2: Yeah, do we just use that the change in potential energy is equal to the change in kinetic energy.

[0:20] James: Yeah, that definitely seems like a good place to start, but that's not quite right. Do you have the equations sheet up?

[0:27] Student 1: Yeah, here.

[0:28] James: Ok, so which one relates the change in potential and the change in kinetic energies?

[0:33] Student 2: This one, the change in potential energy plus the change in kinetic energy equals zero?

[0:39] James: Yeah, sweet.

[0:41] James: So, what does that tell you about how they relate to each other? Specifically with regard to their signs.

[0:52] Student 2: The change in potential energy equals the negative change in kinetic energy?

[0:57] James: Exactly, yeah.

[0:59] Student 2: Oh, ok.

[1:04] Student 2: So then, the change in voltage equals the negative change in kinetic energy over q ?

[1:12] James: I agree, what do you think? Does that sound right to you?

[1:16] Student 1: Yeah, makes sense.

[1:18] James: Dope, so then how do you use that to find the velocity of the charge given the change in voltage? First off, what is the charge?

[1:28] Student 2: An electron.

[1:30] James: Sweet, so that means it has a defined mass and magnitude of charge, right? So how do you use that information to find the velocity from the kinetic energy? Like what is the equation for kinetic energy?

[1:45] Student 2: Is it one half the mass times the velocity squared?

[1:50] James: Sound right?

[1:52] Student 1: Yeah.

[1:53] James: I agree. So, now what?

[2:01] Student 2: Do you just say this?

[2:04] James: Say what?

[2:06] Student 2: The change in the voltage is equal to one half the mass times the velocity squared over q ?

[2:13] James: Yeah, that seems right.

[2:19] James: And then you want to speed, right?

[2:20] Student 2: Right.

[2:22] James: Which is just a bunch of algebra. So, do you two think you know where to go from here? Like do you know the magnitude of the charge and the mass of an electron?

[2:34] Student 2: I think so. The charge is negative 1.6 times 10^{-19} and the mass is...

[2:49] James: It should be on the constants sheet if either of you have that up as well.

[2:55] Student 1: Here, it's 9.11×10^{-31} kilograms.

[2:58] James: Yeah, that sounds right. Ok sweet, so how are you two feeling? Like, you feel like you can take it from here?

[3:08] Student 1: Yeah, I think so.

[3:10] Student 2: Yeah.

[3:12] James: Alright, sick. Let me know if you have any other questions.

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