Mazur Clip 3 Transcript

STUDENT: I have a question.

ERIC MAZUR: Yes?

STUDENT: So does it depend more on the direction or the length of the Q or the charge of the electrical field?

ERIC MAZUR: So the question is, does it depend more on the direction of the electric field or the charge of the particle? Really good question. Thank you for asking that.

Imagine I had taken a negatively-charged particle. I'll erase this, this plus here. Well, I erased the whole charge. I'll put it back here. I get one that's negative here.

So now the force that is exerted on that negative particle points in which direction? It points towards the left, right? It wants to get away from those negative-charged particles on-- let me actually put this in a way that you can see it. I should enlarge it a little bit.

Anyway, so the electric field points towards the right. This negatively-charged particle, if it's close to A, wants to move away from A because there's all that other negative charge around. So the electrostatic work that is exerted on the negatively-charged particle is not negative but positive.

However, this is the beauty of potential. When we determine what the potential is, we divide by the charge. So now we have a positive electrostatic work that we divide by a negative charge. And we end up with exactly the same potential difference.

So thank you for asking that question. Because what it shows is that potential is independent of whatever charge you use to measure it, whether it's a positive charge of one coulomb or a positive charge of two coulomb or a negative charge of one micro-coulomb, it's always the same. You always get the same, consistent answer. OK?

You may want to run this over in your mind when you have more time to think after class. Yes?

STUDENT: Can you verify the work would still be negative? Or would it be positive?

ERIC MAZUR: Which work? The electrostatic work?

STUDENT: I think it's the same question, but a negative particle.

ERIC MAZUR: Yeah. So if you have a negative particle, then the work is positive rather than negative. If you have a positive particle, then the work is negative, which was the answer to the question that we were answering because it asked for a positive particle.

But if you have a negatively-charged particle, then the work would be positive. But that would not affect our answer for the potential, which is why it's so much better to talk about potential than about work.

Any other questions? They were both really good questions. I'm glad that this question triggered those two good questions. OK. Good.