

A Play: How Did the Frog Jump Across the Road?

Directions: Assign each role to a member of your group. Note that one member will need to play two roles (Assistant and Ms. Luigi) in Scene I then play Mr. Frog in Scene II. Read aloud the two scenes then answer the questions on the "Play: Follow-up Questions" worksheet.

Scene I, Act I: Galvani, Volta, and the Mystery of Twitching Frog Legs

The year is 1791. The scene is set in the laboratory of Luigi Galvani. The room is filled with a collection of laboratory equipment. There is a knock at the door.

Luigi: Enter!

Alessandro: Hi, Luigi. I just read about your experiments with frog legs. Please tell me more.

Luigi: Yes, my friend. My assistant and I were working in our laboratory during an electrical storm.

Assistant: The lightning was fierce!

Luigi: I touched the legs of a dissected frog with a scalpel and they twitched! I was so surprised, I nearly dropped my scalpel. Then, the same thing happened several days later.

Ms. Galvani: Really Luigi, it was not the same thing. There was no storm. The second time you had an electric generator running. You must be precise if Mr. Volta is to understand the situation.

Alessandro: Please show me exactly what you were doing. I want to see if we can repeat the situation.

Luigi: Well, I was holding the tools like so. And cutting the fresh frog leg, this way.

Alessandro: Alessandro: The legs are not twitching. Assistant, please turn on the generator.

Alessandro: Okay, the electricity is on. I see the sparks.

Alessandro: Okay, now let's try again. Luigi, please start at the beginning again, thank you.

Luigi: You see, when I touch the frog leg here and here with my metal tools, the leg twitches. Clearly, the frog leg contains electricity. Bodies must make electricity just like that generator. Then my hypothesis is that the electricity is the life force that keeps us alive!

Alessandro: Luigi, I must disagree with you. I do not think the body makes electricity. I think the twitching comes from electricity flowing through the frog leg from one of your metal tools to the other metal tool.

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Scene II, Act I: Galvani and Volta Interview Mr. Jumping Frog

It is still 1791. This scene is set at a frog pond. Enter Luigi and Alessandro. Luigi is explaining something to Alessandro as they walk toward the pond.

Alessandro: Hello, Mr. Frog. We came to ask you about jumping.

Luigi: Mr. Frog, we know why the Chicken crossed the road. What we want to know is how you jumped across the road.

Mr. Frog: Good question, Luigi. I think about jumping and then all of a sudden I am jumping. My brain sends a signal to my legs. My leg muscles move to push against the ground and I leap through the air. Wheee! It's fun.

Alessandro: Mr. Frog, how would you describe the signal from your brain to your legs?

Mr. Frog: That's a tough question. I thought you and Luigi were the experts. It works like this...I think, "Jump!", and my brain sends chemical signals along my spinal cord to nerve cells. The nerve cells connect to muscles. The chemical signals pass from the nerve cells to the muscle cells telling them to contract.

Luigi and Alessandro: You said, "chemical signals" not "electricity"?

Mr. Frog: That's right. The body uses chemical signals to communicate.

Luigi: Chemicals, not electricity! I really must get back to the laboratory and look into this.

Alessandro: So, Mr. Frog, you're saying there is no electricity in your body.

Mr. Frog: Not exactly. The body does not use electrical currents like a light bulb, which Thomas Edison won't invent until 1879! But, when muscles contract they produce small amount of electrical activity that can be measured. You know, scientists will finally figure out how to measure that in 1900s then they will come up with medical tools like pace makers and EKG—electrocardiogram—to measure the electrical activities in heart!