

# The Mechanical Universe

## POTENTIAL AND CAPACITANCE 15



Read the following questions before the video begins. Answer them while the video is in progress. To complete this assignment successfully, you must listen carefully to the narration. Do not get distracted by the visual effects. Unless the instructor tells you otherwise, do not ask others for answers or copy answers from other people's sheets since doing so is cheating.

1. A Leyden jar was a device used to store electric charge.

2. Franklin described the dangers of electricity after shocking himself fairly seriously. The symptoms he described included (select all that apply)

**A. Soreness in the breastbone.**

**B. Arms and back of neck numbed.**

**C. Violent, quick trembling in the trunk.**

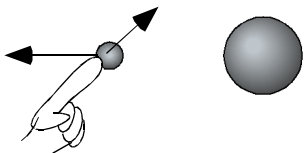
**D. Universal blow throughout the body.**

**E. Swelling raised on the hand**

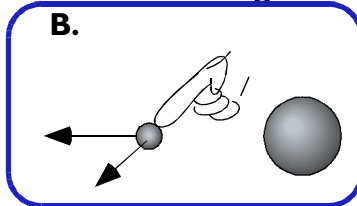
**F. Loss of consciousness.**

3. Which of the diagrams below shows negative work being done on the small charged body

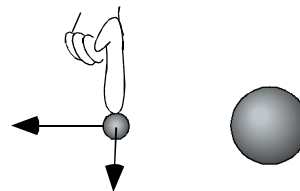
A.



B.



C.



4. A hundred years before Faraday discovered the electric field, Franklin saw it as the...

*electric atmosphere*

5. In Franklin's fluid model of electricity, an object became charged positively if it...

*absorbed too much electric fluid*

6. All object's in the universe contain ? charge.

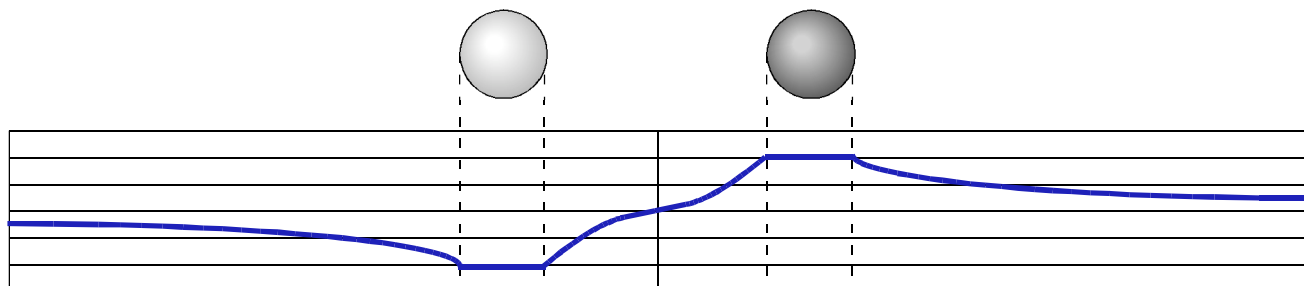
**A. positive only**

**B. negative only**

**C. both positive and negative**

**D. neither positive nor negative**

7. Sketch the plot: how does the electric potential vary between opposite charges? (The axes are potential vs. distance.)



8. If the voltage of a capacitor is held constant by a battery, the charge and capacitance vary (select all that apply)

A. proportionally with the distance between the plates

B. inversely with the distance between the plates

C. proportionally with the area of the plates

D. inversely with the area of the plates

9. When capacitors are connected in series, the capacitance is

A. increased

B. decreased

C. unaffected

10. As a scientist, Ben Franklin was the greatest of the \_\_\_\_\_ *natural* \_\_\_\_\_

\_\_\_\_\_ *philosophers* \_\_\_\_\_.

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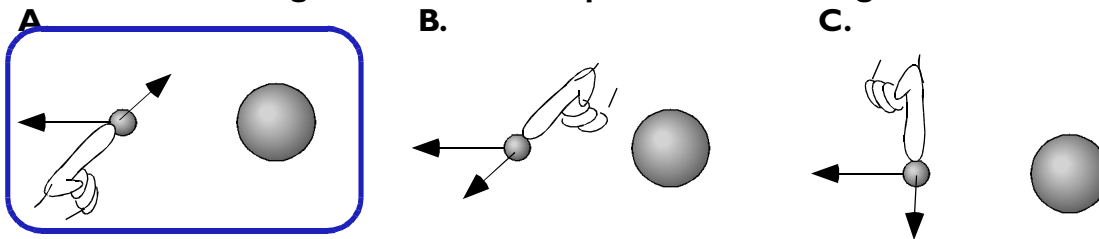
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1. When Franklin tried to cook a turkey by electrocuting it, he almost managed to...  
*electrocute himself*

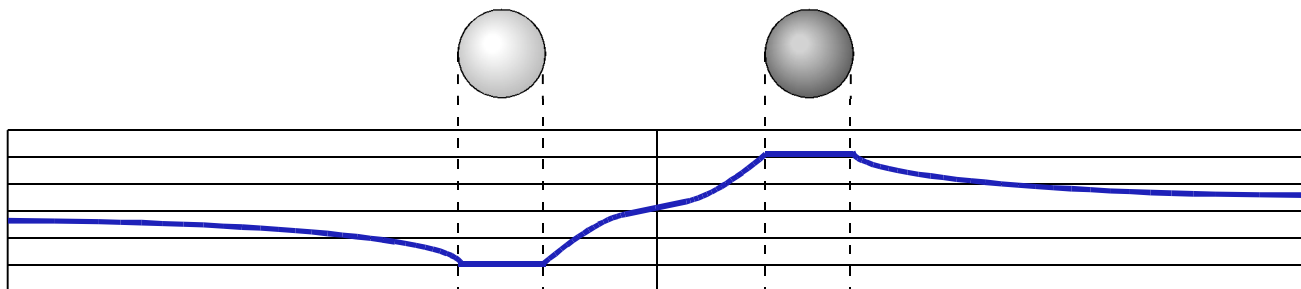
2. Which of the diagrams below shows positive work being done on the small charged body?



3. Franklin's electric atmosphere consisted of a(n) electric fluid.

4. In Franklin's fluid model of electricity, an object became charged negatively if it...  
*lacked electric fluid*

5. Sketch the plot: how does the electric potential vary between opposite charges? (The axes are potential vs. distance.)



6. The charge transferred is proportional to the voltage applied. The constant of proportionality, C, is called the capacitance.

7. If the voltage of a capacitor is held constant by a battery, the charge and capacitance vary (select all that apply)

- A. proportionally with the distance between the plates
- B. inversely with the distance between the plates
- C. proportionally with the area of the plates
- D. inversely with the area of the plates

8. Franklin realized that when a Leyden jar is charged,

- A. large amounts of electricity are being added to it.
- B. charge was moving from the conductor on the inside to the conductor on the outside.
- C. large amounts of electricity are being taken from it.
- D. charge was moving from the conductor on the outside to the conductor on the inside.

9. When capacitors are connected in parallel, the capacitance is

- A. increased
- B. decreased
- C. unaffected

10. In Philadelphia, Ben Franklin established the first (select all that apply)

- A. fire department
- B. newspaper
- C. public library
- D. public school
- E. post office
- F. public hospital