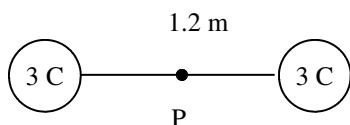
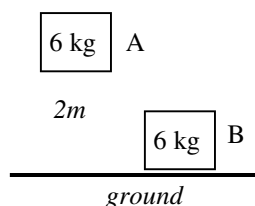


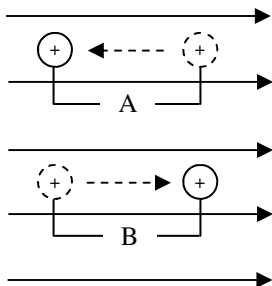
2010 PreAP Electrostatics 6



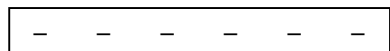
1. Two 3C charges are 1.2m apart.
 - A. Calculate the four electrostatic quantities at a point half way in between the charges.
 - B. What quantities are zero?
 - C. To move a charge to point P from ∞ , does it require work?
 - D. A charge is then brought to the midpoint from ∞ . What quantities are zero, now?



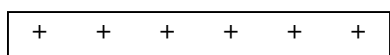
2.
 - A. What is the force of gravity on the 6kg object when it is above the ground?
 - B. What is the force of gravity on the 6kg object when it is on the ground?
 - C. Close to the earth are the gravitational field lines parallel or do they go out radially (like spokes of a tire)?
 - D. In which position is the gravitational field greatest?
 - E. In which position is the gravitational force greatest?
 - F. In which case is the potential energy greatest?
 - G. In which case is the gravitational "voltage" greatest?
 - H. If object A is moved to the right parallel to the ground, how would its PE change?



3. The lines at the left show a constant electric field of 15 N/C. The charges have the same magnitude.
 - A. Electric field lines show the direction a _____ charge would move.
 - B. Which letter shows the direction the positive charge would naturally move, if released?
 - C. Which letter's motion would require work?
 - D. Which letter shows the charge gaining potential energy?
 - E. Which charge feels a greater force in its final position?
 - F. If the field is between parallel plate capacitors, which side is the + plate?
 - G. Is the electric field's direction positive or negative?
 - H. Which letter shows a negative d?
 - I. If A travels 8 mm and has a charge of $5\mu\text{C}$, calculate its change of potential energy. (See notes "Electric Potential Energy")



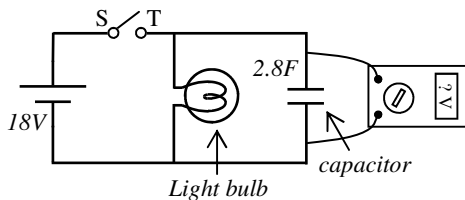
- +1C (A) (C)
- (B) (D) -1C



4.
 - A. Draw the electric field between the plates.
 - A. Which charge fields the greatest electric field?
 - B. If the positive charge is moved from point A to point C, how does its PE change?
 - C. If the positive charge is released and moves because of the electric field, how will its PE change?
 - D. Which charge has a greater magnitude of PE?
 - E. If the positive charge is moved to letter B, how will the force on it change?

5. E, V, F, PE, C, Q (q), A, or d?

- | | |
|--|------------------------------------|
| A. _____ Measured in coulombs. | G. _____ Area of capacitor plates. |
| B. _____ Capacitance | H. _____ Measured in Newtons |
| C. _____ Distance between capacitor plates | I. _____ Measured in Joules |
| D. _____ Measured in N/C | J. _____ Measured in J/C |
| E. _____ Potential difference | K. _____ Measured in C/V |
| F. _____ Measured in Farads | L. _____ Are vectors. |



6. A battery, light bulb, and capacitor are placed in a circuit as shown. A volt meter reads the voltage across the capacitor. The capacitor is neutral to begin with.

- If the switch is closed for just a brief moment, is the voltage of the capacitor equal to 0V, 18V, or less than 18V?
- If the switch is left closed, the light comes on. After a few seconds the capacitor will be fully charged and have a voltage of:
- How much charge is held on one plate of the capacitor?

- How much total charge does the capacitor have?
- How much potential energy does the capacitor have?

F. The switch is then opened (lifted up). Does the light bulb go off?

G. What does happen to the light bulb?

H. What happens to the voltage of the capacitor?

The capacitor is eventually fully discharged.

I. What happens to the light bulb?

J. What is the final voltage of the capacitor?

K. What is a faster way of discharging the capacitor?

L. If the battery's voltage is doubled, how will the capacitance of the capacitor change?

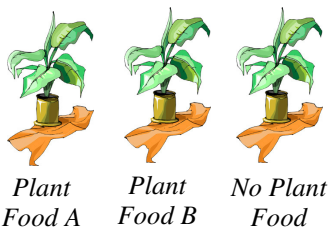
M. If the plates are square and 4cm on a side, calculate their separation distance.

Notes for "How to Setup Good Experiments" liked up on the website.

7. Control, Experimental, or Responsive Variable?

- _____ What you are studying in the experiment.
- _____ There are many of these in a good experiment.
- _____ What happens in the experiment.
- _____ There is only one of these in a good experiment.
- _____ What you record in an experiment.

8. Why do good experiments have control setups? (*Explain completely.*)



Start	10 cm	10.1 cm	9.8 cm
week 1	11.1 cm	12.2 cm	11.8 cm
week 2	12.7 cm	14.5 cm	13.2 cm

9. A) What is the control setup for this experiment?
 B) What is the experimental variable for this experiment?
 C) Give two possible control variables for this experiment.
- D) Which plant food is better?
 E) What does the “No plant food” setup tell you about plant food A?

10. A pharmaceutical company has developed a new acne drug. To get this new drug approved, they need to do scientific trials to prove effectiveness. What would be the control setup for this drug?

11. Which of the following statements could be supported by the scientific method and why?
- A) “Come to Willarby Auto Store—the best car dealership in town.”
 B) “Try Dry-Toes Powder. A recent independent research company proved Dry-Toes Powder kept feet dry up to 30% longer than any other foot powder.”
 C) “Acorn Powder helps you live longer and stronger. 89 year old Ethyl Krumke swears by Acorn Powder. ‘I take my Acorn Powder every day, just like my mother!’ ”