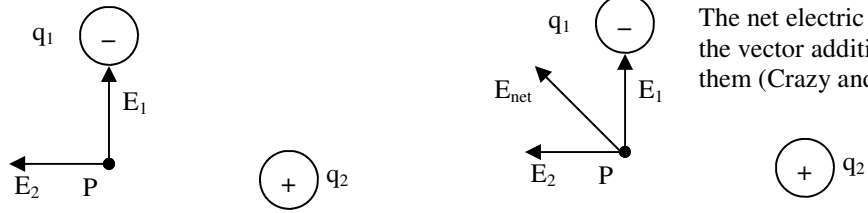


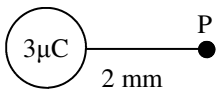
2010 PreAP Electrostatics 7

Remember that electric fields (E) point away from +’s and toward -’s

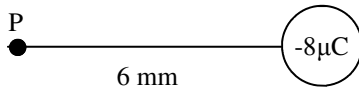


The net electric field is the vector addition of them (Crazy and Lazy).

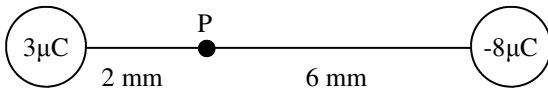
<p>If vectors are parallel they are just added and subtracted.</p> <p style="text-align: center;">Individual forces</p> <p style="text-align: center;">← 3N [M] 4N →</p> <p style="text-align: center;">$F_{\text{net}} = +15 - 12 = +3\text{N}$</p> <p style="text-align: center;">Net force [M] → $F_{\text{net}} = 1\text{N}$</p>	<p style="text-align: center;">3N ↑</p> <p style="text-align: center;">[M] → 4N</p> <p style="text-align: center;">3N ↑</p> <p style="text-align: center;">[M] → 4N</p> <p style="text-align: center;">$F_{\text{net}} = 5\text{N}$ $3^2 + 4^2 = 5^2$ $\theta = \tan^{-1}(3/4)$ $\theta = 36.9^\circ$</p> <p>The same vectors at right angles must be added with Pythagorean theorem and inverse tangent.</p>
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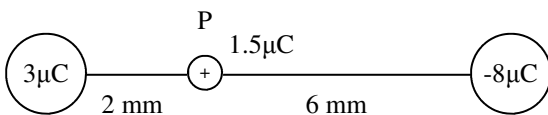
- Calculate the four electrostatic quantities at point P for the first diagram. Be sure to give direction for vectors. Some may be zero.



- Calculate the four electrostatic quantities at point P in the second diagram.

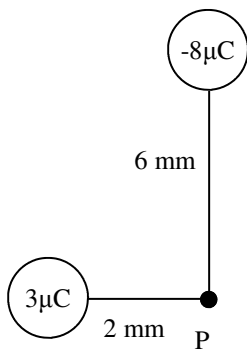


- Now put the two previous problems together. Using the numbers you found in Q1 and 2, find the four electrostatic quantities for point P due to both charges.



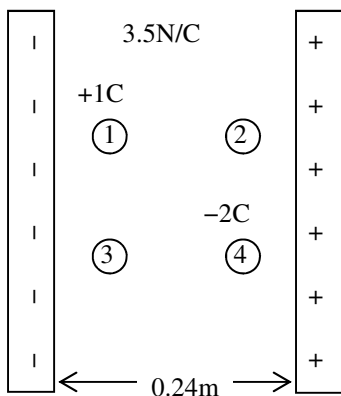
- A $1.5\mu\text{C}$ charge is then brought to point P from infinity.
 - Again, using your previous numbers, calculate the four electrostatic quantities for this charge at point P.

- How much work was done to move the charge to point P from infinity?



5. Now let's move the negative charge to the positive y-axis. Using the same individual numbers you calculated in Q2 and Q3, calculate the four quantities at point P.

6. On the diagram at the right points 1 and 3 are the same distance from the negative plate as points 2 and 4 are from the positive plate.



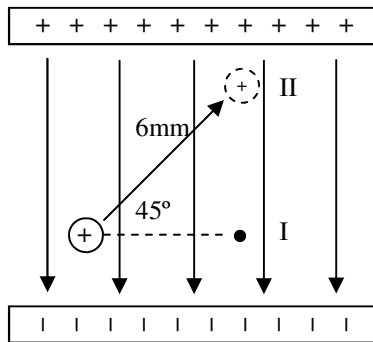
- Are the electric field lines parallel or radial between the capacitor plates?
- At which point will the electric field strength be greatest?
- Which charge feels the greatest magnitude of force?
- How would the force on the positive charge change if it were moved to position 2?
- Would the positive charge gain more PE if moved to 3 or 2?
- Would the positive charge gain more PE if moving to 2 or 4?
- Which charge has a greater voltage?
- If the electric field strength is 3.5N/C , what is the force (magnitude and direction) on the negative charge?

- Remembering the other units for electric field (or use "Understanding the Electrostatic Equations"), what is the potential difference (voltage) from the negative plate to the positive plate?

- If the plates are pulled farther apart, how would the electric field change?

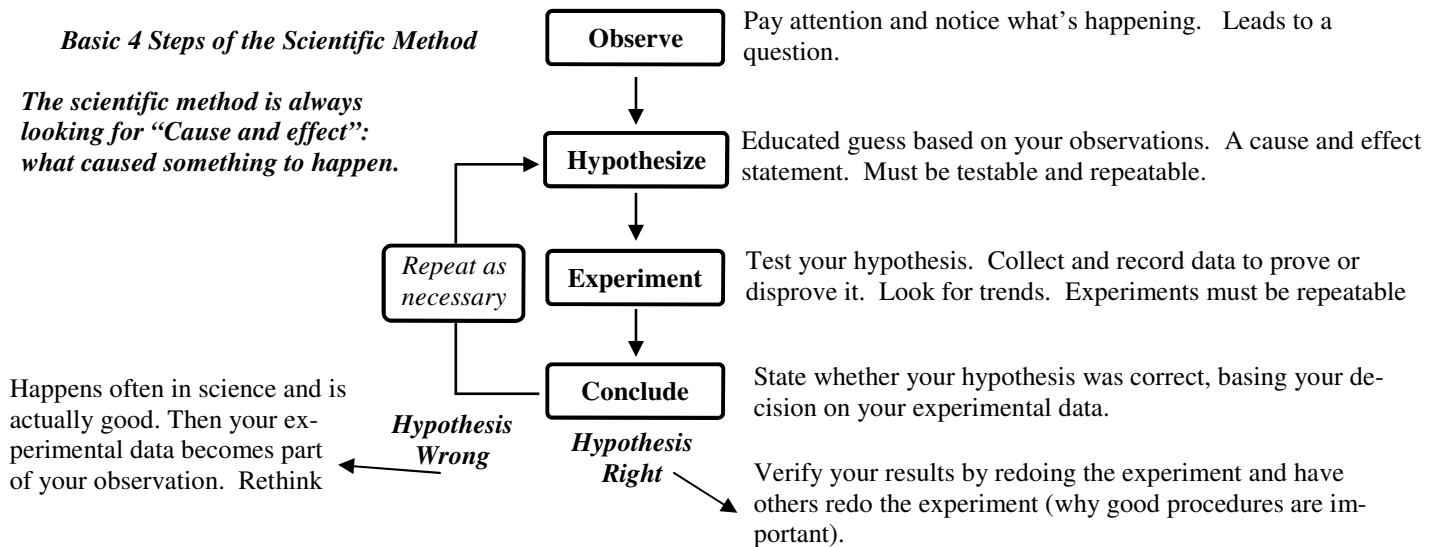
- If the plates are pulled apart, how would the voltage change?

7. A 30N/C field is pointing downward. A $4\mu\text{C}$ charge is moved 6mm between the two positions shown. (See "Potential Electric Energy" notes)



- How would the object's potential energy change if it is moved to point I?
- When it is moved to point II, which quantities are —: E, Q, or D?
- Calculate the change of PE when the charge is moved to II.
- How much work was done to move the charge?

TAKS next page.



8. Which part of the scientific method?

- A. _____ A scientist measures the amount of acid necessary to dissolve a certain amount of magnesium.
- B. _____ You believe your car won’t start because you are out of gas.
- C. _____ You notice that a ball rolls farther up a hill depending on how fast it was going.
- D. _____ You decide that adding salt to ice water allows the ice water to get colder than water alone.

9. Theory, Hypothesis, or Guess? Remember: an hypothesis comes from observations that can be tested in an experiment. A Theory is an hypothesis that has had been successfully tested so that it is considered scientific fact.

- A. _____ You think that a person is going to come late to the bus because they were late yesterday.
- B. _____ You think that some plastic water bottles may not be healthy because you can taste the plastic in the water.
- C. _____ The earth revolves around the sun. The sun does not revolve around the earth.
- D. _____ You think that adding salt to water allows it to have a higher boiling point (it boils at a higher temperature).

Liquid	Color	Burns?	Volume	Density
A	Clear	No	35 mL	1 g/mL
B	Pale Yellow	Yes	12 mL	.94 g/mL
C	Clear	No	46 mL	1 g/mL
D	Blue	Yes	88 mL	.99 g/mL

10. The data was collected about 4 unknown liquids. What can you conclude from this experiment and why?

11. Hypotheses must be testable, repeatable, and verifiable thru facts. What is wrong with the following hypotheses?

- A. A plant is happier when it is given distilled water.
- B. People like Milkman Mac and Cheese better than Cheesehead Mac and Cheese.