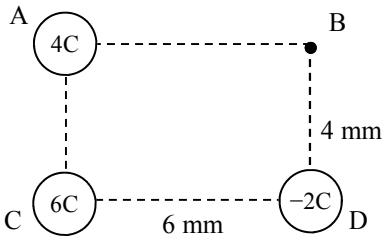
A-Day Due Fri., Jan 21
B-Day: Due Mon., Jan 24

2011 PreAP Electrostatics 5

Be sure to do the TAKS homework, too.
Cover up the answers on the right side of the page.



1. Three charges are situated as shown at the left.
   A. What produces the net electric field at point B?
   B. What produces the net electric field at point D?
   C. Set up the equation for the electric field at point C from point A (don't solve):
   D. Simplify your expression.
   E. Calculate "r " for the electric field at point B due to point C.
   F. What is the direction of E_{net} at point A (roughly)?

1.

A. The charges at A, B, and C (the 3 charges)

B. Charges at A and C

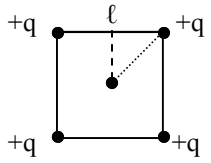
C. $E = k\frac{4}{4^2}$

D. E = k/4

E. Pyth theorem using 4 and 6.

F. 4th Q

2. Four positive charges are placed at the corners of a square of length "l".



   A. Draw the direction of E_{net} at the upper left hand corner.
   B. What is the length of the dashed vertical line (from the top line to the center)?
   C. Now that you have a right triangle, calculate the distance (r) from the center of the square to the corner.
   D. Write an expression for the electric field at the center due to one of the corner (and simplify).
   E. Calculate the net electric field at the center of the square.

2.

A. 2nd Q (the other +q's all push)

B. ℓ/2

C. $r = \sqrt{\left(\frac{\ell}{2}\right)^2 + \left(\frac{\ell}{2}\right)^2}$

D. $r = \sqrt{2\left(\frac{\ell}{2}\right)^2} = \frac{\ell}{2}\sqrt{2}$

$$E = \frac{kq}{\left(\frac{\ell}{2}\sqrt{2}\right)^2} = \frac{kq}{\left(\frac{2\ell^2}{4}\right)}$$

$$E = \frac{kq}{\left(\frac{\ell^2}{2}\right)} = \frac{2kq}{\ell^2}$$

3. Simplify the following.

A. $= \sqrt{7k^2q^4}$

B. $= \sqrt{36kq^2}$

C. $= \sqrt{\frac{16}{25}k^8q^4}$

D. $= \sqrt{\frac{7}{9}\left(\frac{kq}{r^2}\right)^2} =$

A. $= kq^2\sqrt{7}$
The 7 isn't a perfect square

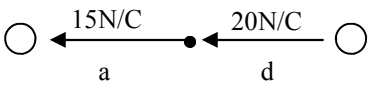
B. $= 6q\sqrt{k}$

C. $= \frac{4}{5}k^4q^2$

D. figure it out.

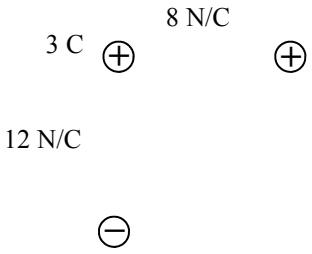
4. What are the two ways you could increase the electric field emanating from a charge?

4. increase q or decrease r



5. A. Label the signs of the charges in the circles.
   B. If the two charges have equal magnitudes, how is it that the right electric field is stronger?

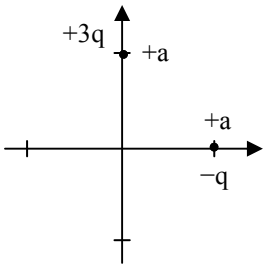
   C. Calculate the net electric field.



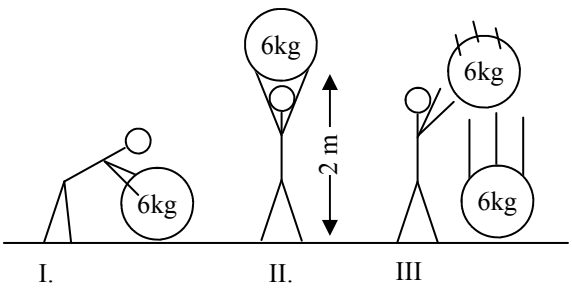
6. The individual electric fields shown are on the 3 C charge.
   A. Draw the directions of the electric fields.
   B. Calculate the magnitude and direction of the net electric field on the 3 C charge.

B. Pyth theor of 8 and 12
Dir. Inv tan

   C. Calculate the force on the 3C charge.



7. Write an expression for the net electric field on the origin for the example at the left.



8. Ever eager, Slim Jim helps us with an energy demo.
   A. How energy does the ball have in picture I?
   B. What kind of energy does the ball have in picture II?
   C. How much energy does the ball have in picture II?
   D. How much work what necessary to lift the ball up?
   E. How much kinetic energy does the ball have just before it hits the ground?
   F. How fast is the ball moving at the ground?
   G. So the amount of potential energy equals the amount of _____ done on it and equals the amount of _____ _____ after it is let go.

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