

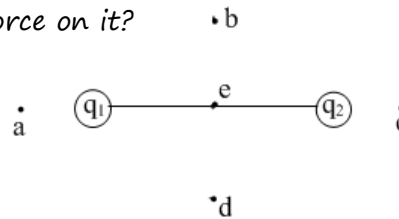
## Physics 122

### Rewrite Assignment

1. Four identical charged spheres are arranged in a perfect square. The direction of the resultant force on the one in the upper right hand corner
- a) depends on the charge      b) 45 degrees      c) 225 degrees      d) zero

2. In the diagram, if  $q_1$  and  $q_2$  are negative, where could a positive charge be placed and have a vertically upward net force on it?

- a) a      b) b      c) c      d) d      e) e



3. Two bodies of equal mass are separated by a distance  $r$ . If you reduce the distance between them by half the the new gravitational force will be
- a) twice the old force      b) half the old force      c) four times the old force      d) one fourth the old force
4. Two bodies of equal mass are separated by a distance  $r$ . If you double each mass the new force will be
- a) twice the old force      b) half the old force      c) four times the old force      d) one fourth the old force
5. A negative test charge is placed in an electrostatic field and feels a force to the left. The direction of the field is:
- a) Left      b) right      c) inward      d) outward
6. If the mass of the Earth was quadrupled but nothing else changed  $g$  would change by a factor of:
- a) 4      b) 2      c)  $\frac{1}{2}$       d)  $\frac{1}{4}$

### Problems

1. A small sphere is given a charge of  $-35 \mu\text{C}$ , and a second identically sized sphere is given a charge of  $+17 \mu\text{C}$ . If the two spheres are 20 cm apart determine the force between them. The two spheres are then allowed to touch and then separated back to 20cm apart, what force will exist between them now?
2. A force of 100N is found to exist when two identical charges are placed 500mm apart. Determine the magnitude of the charges.

3. Three charged spheres are placed in a vertical line. The distance between each pair is 35cm. The first sphere has a charge of  $12\mu\text{C}$ , the second has a charge of  $20\mu\text{C}$  and the third has an unknown charge. The resultant force is  $+6\text{N}$ . What is the charge of the unknown sphere?
4. A negative test charge of  $2.80\mu\text{C}$  experiences an electrostatic force of  $1.12 \times 10^1\text{N}$  to the left. What is the magnitude and direction of the electric field intensity at the location of the charge?
5. Determine the electric field intensity at a point 80pm from the center of the Nitrogen ion. What is the direction of the field? (pm is picometers)
6. What is the field intensity and direction directly in the middle of two charged sources that are 50cm apart? The left side source has a charge of  $-60\mu\text{C}$  and the right side source has a charge of  $+60\mu\text{C}$ . What do you notice about the resultant field intensity compared to each individual field intensity? What would be the resultant field intensity if the right side was changed to a  $-60\mu\text{C}$  instead?
7. Saturn has a gravitational field intensity of  $10.4\text{N/kg}$ . a) What is the mass of an object that weighs 800N on the surface of Saturn? b) What would be the mass of the same object on Earth? c) What force would it feel on the surface of Earth?
8. If the gravitational field intensity at a distance of 800km above an unnamed planet is  $18\text{N/kg}$  and the mass is  $5.67 \times 10^{26}\text{ kg}$ , what is the radius of the planet? What force would a 200kg mass feel at this point?
9. Which would have a greater effect on the force between charged spheres, reducing the distance between them by half or tripling the charge on the second sphere? Support your answer. If the scenario were applied to masses instead of charges would the results still be the same? Explain