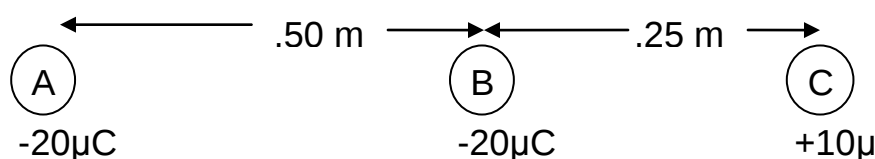


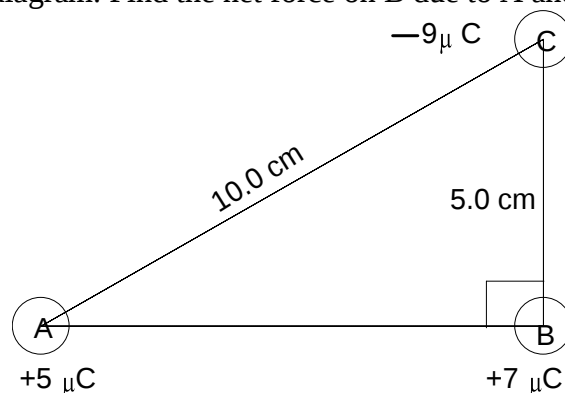
Physics 3204 – Assignment For Retest

1. One aspect of the Law of Electric Charges is that charged objects can attract neutral objects. Briefly elaborate on the process. How is it that this force is always attractive and never repulsive?
2. If you charge a pocket comb by rubbing it with a silk scarf, explain using a diagram, how you can determine the charge on the comb?
3. A student rubs a balloon with her hair.
 - a) What happens to the balloon and why does it stick to an uncharged ceiling. Ensure to use diagrams in your explanation?
 - b) Why does the side of the balloon that does not get rubbed, not stick to the ceiling?
4. Briefly elaborate on the difference between conductors and insulators. Your discussion should include the molecular level differences that can account for the difference in properties
5. A small ball of paper is suspended from a thread and a charged acetate rod is brought near. You note that the ball is attracted to the rod, touches it momentarily and then is repelled. Using a series of diagrams, suggest an explanation for the observations
6. An electroscope cannot be “charged” by friction but there are three other ways that can create charge imbalance on the device, two of which cause a residual charge. Name the three processes and briefly describe how each can be used to create the imbalance.
7. If a negatively charged rod is brought near the knob of a positively charged leaf electroscope, what happens? Why? Use diagrams to help show what happens.
8. Explain how an electroscope of known charge can be used to determine the nature of an unknown charge.
9. Here is some good advice to heed during a lightning storm: Use physics to explain the advice.
 - (1) If you are in your car, stay inside.
 - (2) If you are on a hill, get downand (3) DON'T take shelter under a tree.
10. If the force between two charged objects was 2.0 N but the charge on each object doubles, what will be the new force between the objects?
11. The force between two charged objects was 2.0 N but the charge on one object doubles while the distance between them becomes half of what it was initially. Determine the new force between the two objects?
12. How many electrons are required in order to give a charge of 2.9 μC ?
13. Two objects, one with a charge of + 4.25 μC and the other with a charge of – 3.50 μC are placed 12.0 cm apart. What is the electrostatic force between them?
14. Two objects, one with a charge of 15.0 μC and the other of unknown charge, are placed 3.00 cm apart. If the force of repulsion between them is 0.0040 N, what must be the charge on the second object?

15. Two identically charged objects are placed 2.5 cm apart and the force of attraction between them is 3.2×10^{-3} N. What will be the new force of attraction in each case?
- The charge on one object is tripled and the charge on the other object is reduced to $\frac{1}{2}$. The distance is unchanged.
 - The charges are unchanged and the distance between the objects is changed to 10 cm.
 - The charges are unchanged and the distances between the objects is changed to 0.5 cm.
 - The charge on one object is doubled and the distance between the objects is changed to 5.5 cm.
16. Three charged objects are aligned as in the diagram. Compute the net force on object B as a result of the position of objects A and C.

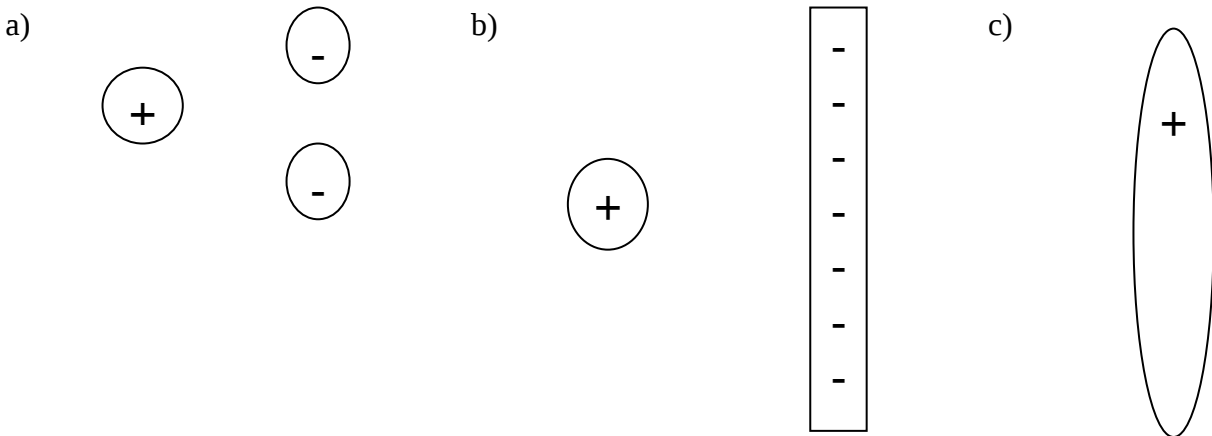


17. Three charged objects are situated as shown in the diagram. Find the net force on B due to A and C. State the magnitude and direction.

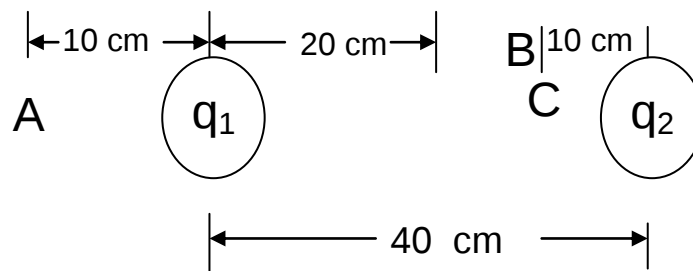


18. Given your awareness of the charge distribution on hollow metal conductors explain why, if a live wire falls across your car, you are best off to stay inside your car.
19. An insulated rod has a charge of $+q$ at one end and $-q$ at the other end. What will the rod tend to do when placed inside a uniform electric field that is oriented
- parallel to the rod?
 - perpendicular to the rod?
20. A single point charge of $+3.0 \times 10^{-6}$ C creates an electric field with radiating field lines.
- Draw a simple sketch of the electric field. Which way are the field lines pointing in relation to the charge?
 - What is the field strength 2.0 cm to the right of the field creating charge? 4.0 cm? 6.0 cm? How is field strength related to distance away?
 - What force does a point charge of 1.0×10^{-6} C experience if placed 8.0 cm to the right of another point charge of 3.0×10^{-6} C?

21. a) What force is exerted on a charge of $-1.0 \times 10^{-6} \text{ C}$ in a field of strength $1.7 \times 10^6 \text{ N/C}$ [right]?
 b) What force is exerted on a charge of $+1.0 \times 10^{-6} \text{ C}$?
 c) What happens to the force on the charge in part (a), if the field strength is doubled?
22. Draw the electric fields around the following objects and collections of objects.



23. Two test charges are placed as shown in the diagram below. $Q_1 = +1.0 \times 10^{-6} \text{ C}$ and $Q_2 = -2.5 \times 10^{-5} \text{ C}$. What is the field strength at points A, B and C? Careful, the field at all points is affected by both charges!



24. The work done on a test charge of magnitude $q = +1.0 \times 10^{-6} \text{ C}$ in moving it a distance against an electric field is $5.0 \times 10^{-5} \text{ J}$.
- a) What is the change in electric potential energy of the charge for this displacement?
 b) What is the potential difference between these two positions?
25. A positive test charge of $1.5 \times 10^{-6} \text{ C}$ is placed in an electric field 10 cm from another charge of magnitude $-5.0 \times 10^{-6} \text{ C}$ that is anchored in place.
- a) What is the electric potential energy of the test charge?
 b) What is the electric potential 10 cm away from the negative charge?
 c) What is the potential difference between the test charge's initial position and a position 5.0 cm closer to the negative charge?