Name _____

PHY2049C, Practice Quiz 3

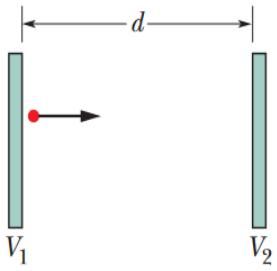
A- Read all the quiz once, or twice, before beginning to write. Make sure to comprehend all questions and start with those you feel most confident.
B – Be clear and concise. There are no extra points for being verbose or writing extra.
C –Only use the white pages that I will provide. You have 50 minutes to answer the quiz.

Problem 1

Four spotted cows and three brown cows give as much milk in five days as three spotted cows and five brown cows give in four days. (a) Which kind of cow is the better milker, spotted or brown? (b) What is the ratio between their daily milk production

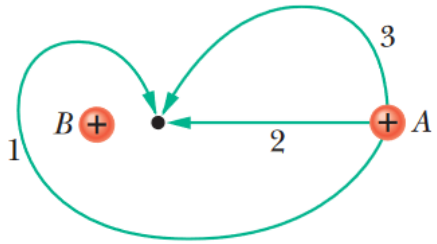
Problem 2 (Halladay, Resnik, Walker)

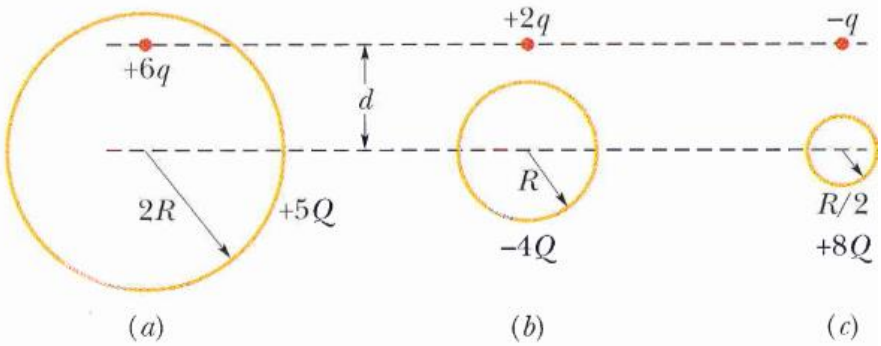
In the figure, a charged particle (either an electron or a proton) is moving rightward between two parallel charged plates separated by distance d= 2.00 mm. The plate potentials are V1 = -70.0 V and V2 = -50.0 V. The particle is slowing from an initial speed of 90.0 km/s at the left plate. (a) Is the particle an electron or a proton? (b) What is its speed just as it reaches plate 2?



Problem 3 (Halladay, Resnik, Walker)

The figure below (left) shows three paths along which we can move the positively charged sphere A closer to positively charged sphere B, which is held fixed in place. Rank the paths according to the work our force does, greatest first



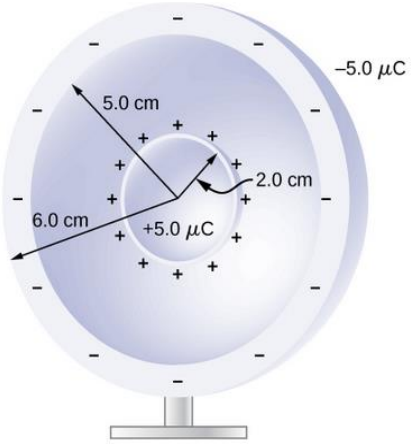


Problem 3.5 (Halladay, Resnik, Walker)

The figure above shows three situations involving a charged particle and a uniformly charged spherical shell. The charges are given, and the radii of the shells are indicated. Rank the situations according to the magnitude of the force on the particle due to the presence of the shell, greatest first.

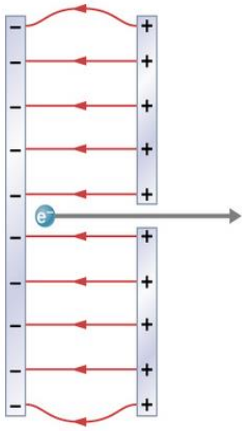
Problem 4 (Extra)

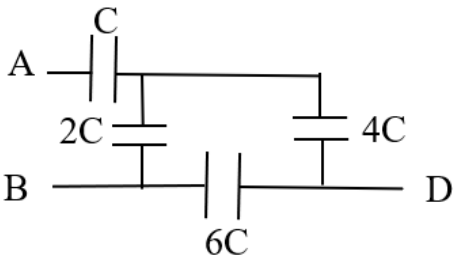
A metallic sphere of radius 2.0 cm is charged with +5.0-μC charge, which spreads on the surface of the sphere uniformly. The metallic sphere stands on an insulated stand and is surrounded by a larger metallic spherical shell, of inner radius 5.0 cm and outer radius 6.0 cm. Now, a charge of -5.0μC is placed on the inside of the spherical shell, which spreads out uniformly on the inside surface of the shell. If potential is zero at infinity, what is the potential of (a) the spherical shell, (b) the sphere, (c) the space between the two, (d) inside the sphere, and (e) outside the shell? (f) what is the Capacitance of this arrangement? (g) Does it change due to the presence of the -5.0μC charge?



Problem 5 (Extra, OpenStax)

A simple and common technique for accelerating electrons is shown in the figure, where there is a uniform electric field between two plates. Electrons are released, usually from a hot filament, near the negative plate, and there is a small hole in the positive plate that allows the electrons to continue moving. (a) Calculate the acceleration of the electron if the field strength is 2.50×104N/C. (b) Explain why the electron will not be pulled back to the positive plate once it moves through the hole.





Problem 6 (extra)

The circuit above shows an arrangement of 4 capacitors connected to an external circuit at points A and B. The capacitance C is 10 μF. The charge of the capacitor with capacitance C is 30 μC (a) What is the magnitude of the potential difference between A and B? between B and D?