

Name \_\_\_\_\_

### Homework Questions

#### Potential + Capacitance #1

1. A positive electric charge is moved at a constant speed between two locations in an electric field, with no work done by or against the field at any time during the motion. This situation can occur only if the:

- (A) charge is moved in the direction of the field
- (B) charge is moved opposite to the direction of the field
- (C) charge is moved perpendicular to an equipotential line
- (D) charge is moved along an equipotential line
- (E) electric field is uniform

2. Calculate the speed of a proton that is accelerated from rest through a potential difference of 134 V.

km/s

3. Calculate the speed of an electron that is accelerated through the same potential difference.

Mm/s

4. Given two 2.20  $\mu\text{C}$  charges at  $\pm 0.800$  m and a positive test charge  $q = 1.33 \times 10^{-18}$  C at the origin (as shown at the bottom of the page):

a. What is the net force exerted by the two 2.20  $\mu\text{C}$  charges on the test charge  $q$ ?

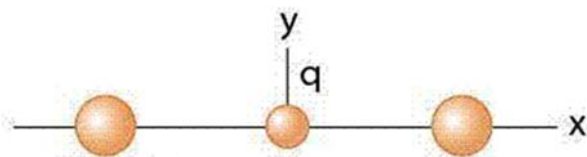
N

b. What is the electric field at the origin due to the two 2.20  $\mu\text{C}$  charges?

N/C

c. What is the electrical potential at the origin due to the two 2.20  $\mu\text{C}$  charges?

kV

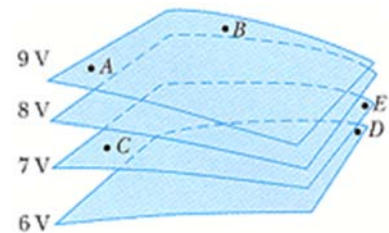


5. How many electrons should be removed from an initially uncharged spherical conductor of radius  $0.400\text{ m}$  to produce a potential of  $4.00\text{ kV}$  at the surface?

electrons

6. The labeled points shown below are on a series of equipotential surfaces associated with an electric field. Rank (from greatest to least) the work done by the electric field on a positively charged particle that moves from  $A$  to  $B$ ; from  $B$  to  $C$ ; from  $C$  to  $D$ ; from  $D$  to  $E$ .

Rank	From ____ to ____
1 (Greatest)	
2	
3	
4 (Least)	



7. On planet Tehar, the free-fall acceleration is the same as that on Earth but there is also a strong downward electric field that is uniform close to the planet's surface. A  $2.00\text{ kg}$  ball having a charge of  $6.00\text{ }\mu\text{C}$  is thrown upward at a speed of  $29.4\text{ m/s}$  and it hits the ground after an interval of  $4.30\text{ s}$ . What is the potential difference between the starting point and the top point of the trajectory?

kV