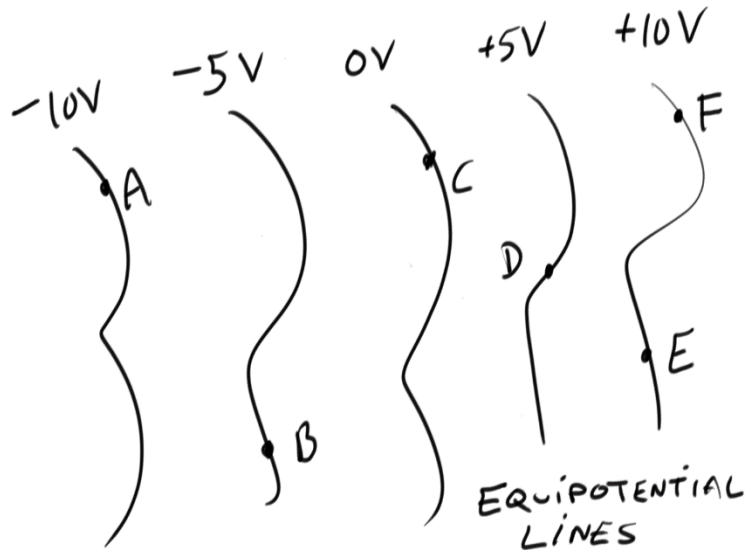


## Physics 2B Quiz Set 3 (Electric Potential, Work, and Energy)

1. Answer the following questions considering the diagram as shown.



1a. If a charge of  $+2C$  moves from D to B, find the increase in its kinetic energy.

1b. If a charge of  $-3C$  slows down by  $20 J$  in going from B to E, how much work did an external applied force do to make this happen?

1c. How much work for an applied force to move a  $+2C$  charge from A to F at constant kinetic energy?

1d. How much work for an applied force to move a  $-10 C$  from E to F?

2. With what initial speed should a positive charge,  $+q$ , of mass  $m$  be given such that if starting infinitely far away from a fixed positively charged nucleus,  $+Q$ , of radius  $R$ , the positive charge is *just* able to get the surface of the positive charge. You should be able to do the problem using energy with a system just being the approaching charge and then the system being both charges.

3. Charges  $+Q_1$  and  $-Q_2$  are held fixed from one another by a distance of  $d$ . Find the work done by an external applied force to move a  $-q$  from a distance  $d$  outside the negative charge (along a line joining the two fixed charges) to a point directly in between the two fixed charges without changing the kinetic energy of the charge,  $-q$ .
4. Three equal charges of equal mass are held fixed forming an equilateral triangle. Two of the three are released while the third is held fixed. Find the speed of one of the released charges when it is infinitely far away. Do this problem using energy methods with as many valid systems as are possible
5. Two conducting spheres of radius  $R_1$  and  $R_2$  are some distance apart from one another and held fixed. Sphere one initially has a charge  $Q_{1i}$  and the second sphere is initially uncharged. The two spheres are then connected by a long thin wire without changing their positions. After a sufficient time, find the final charge on each sphere and the potential of each sphere relative to a zero potential at infinity.
6. Four identical particles, each of charge  $q$  and mass  $m$  are released from rest at the vertices of a square of side  $L$ . How fast is each particle moving when their distance from the center of the square doubles?