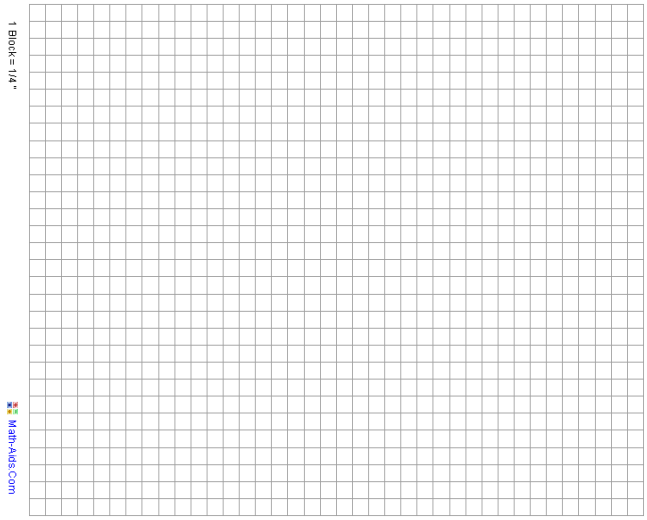
UCONN Physics
Electrostatic Worksheet III
Equipotential Surface Problems:

Name: _____
Date: _____ Period _____

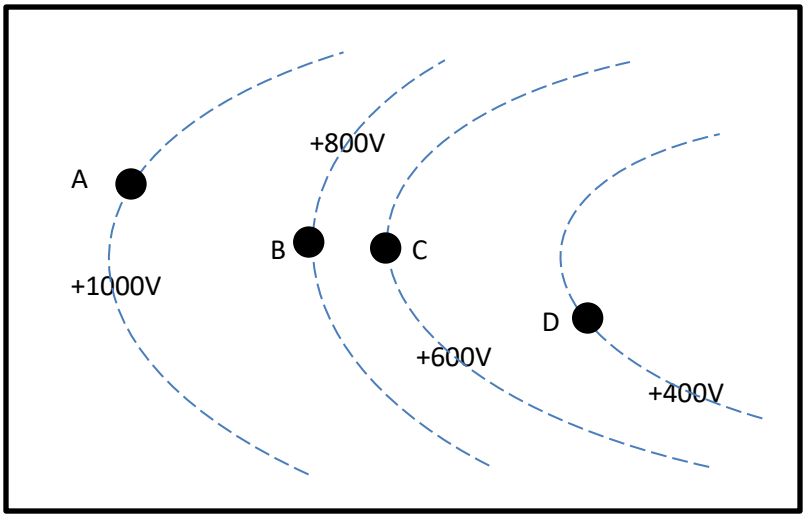
1. (I) A charge particle (q= 1.4 mC) moves 0.4 m along an equipotential surface of 10 volts. How much work is done by the field during this motion, explain? [Work = 0.00 J]

2. (II) Two 1.0 C charges are at rest in a coordinate system. The first is negative and the second is positive. Their respective positions are (1.0 m, 1.0 m) and (1.0 m, 2.0 m). Determine the shape of an equipotential surface of which the points (1.0 m, 1.5 m) and (1.5 m, 1.5 m) are a part. Also determine the magnitude of the potential on this surface. [on graph paper] (Use Phet program on charges and fields to help draw diagram)



3. (II) A positive particle (q = 1.0 C) is moving in a uniform E-field (E = 100 v/m) such that it speeds up. The particle started from rest on an equipotential plane of V = 50 volts. After t = 0.0002 seconds the particle is on an equipotential plane of V = 10 volts. Determine the distance (d) the particle moved. [0.4 m]

4. (II) Answer the questions below based on your interpretation of the equipotential map shown below.



a. Which position, A or C, has a greater E-Field? Explain. [C>A]

b. Show the direction of the E-field at all four positions. Explain the reason for your answers. [electron field is in direction of lower potential]

c. If a proton was released from rest at position B, Would it move toward the equipotential line of position A or position C? Explain ["C"]

d. Repeat the previous question except assume the proton is now an electron.
   a. Would the electron gain or lose potential energy, explain? [lose]

   b. Would the electron gain or lose electric potential, explain ? [gain]

e. If a charged particle (q = 2 C) was moved by an external agent from position D to position B, calculate the work done by the agent and the work done by the field. Assume that the particle starts at rest and ends at rest. [-800 J]