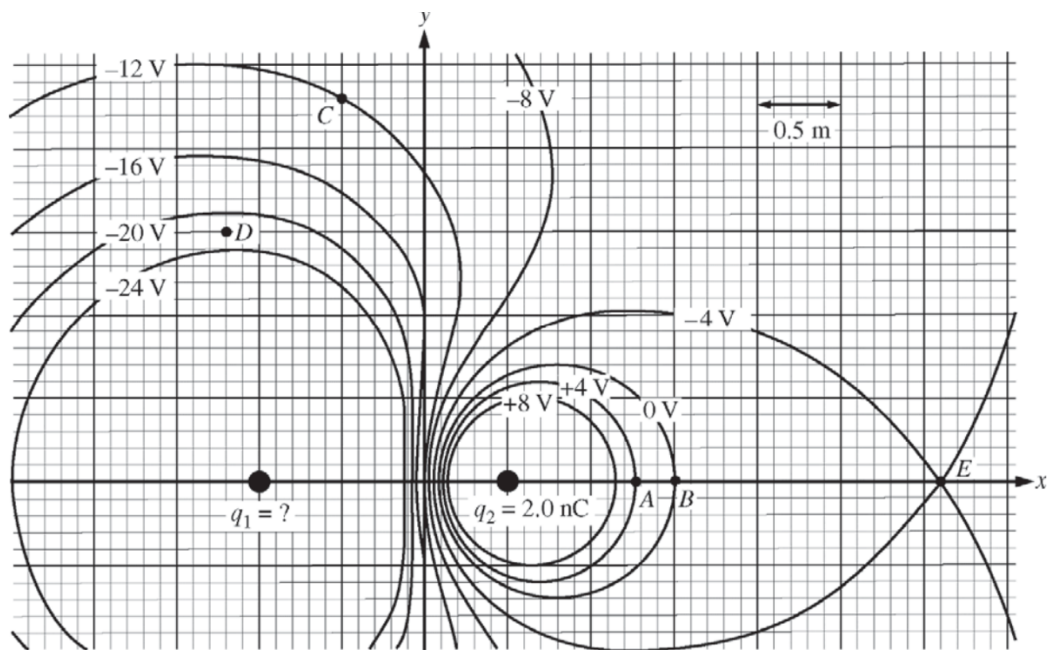Two point charges, q_1 and q_2, are fixed in place on the x-axis at positions $x_1 = -1.00$ m and $x_2 = +0.50$ m, respectively. Charge q_2 has a value of +2.0 nC. Values of electric potential are illustrated by the given equipotentials in the diagram shown above, which is drawn to scale.

a) Describe in words how you would calculate the value of q_1.

b) Describe the direction of the electric at point C on the diagram. Explain your response.

c) Describe how you would calculate the magnitude of the electric field at point D on the diagram.

d) The equipotential labeled 0 V is the cross section of a nearly spherical surface. Which charge (s) contribute to the electric flux for this surface? Explain your response.

e) A proton is placed at point A and then released from rest.

   a. Is the work done on the proton by the electric field positive, negative, or zero as the proton moves from A to point E? Justify

   b. How would you determine the speed of the proton when it reaches point E?

f) An electron is released from rest at point B. Which of the following indicates the direction of the initial acceleration, if any, of the electron?

   _____ Up   _____Down
   _____Left   _____Right
   _____Into the page   _____Out of the page
   _____The direction is undefined since the acceleration is zero.

Justify your answer