

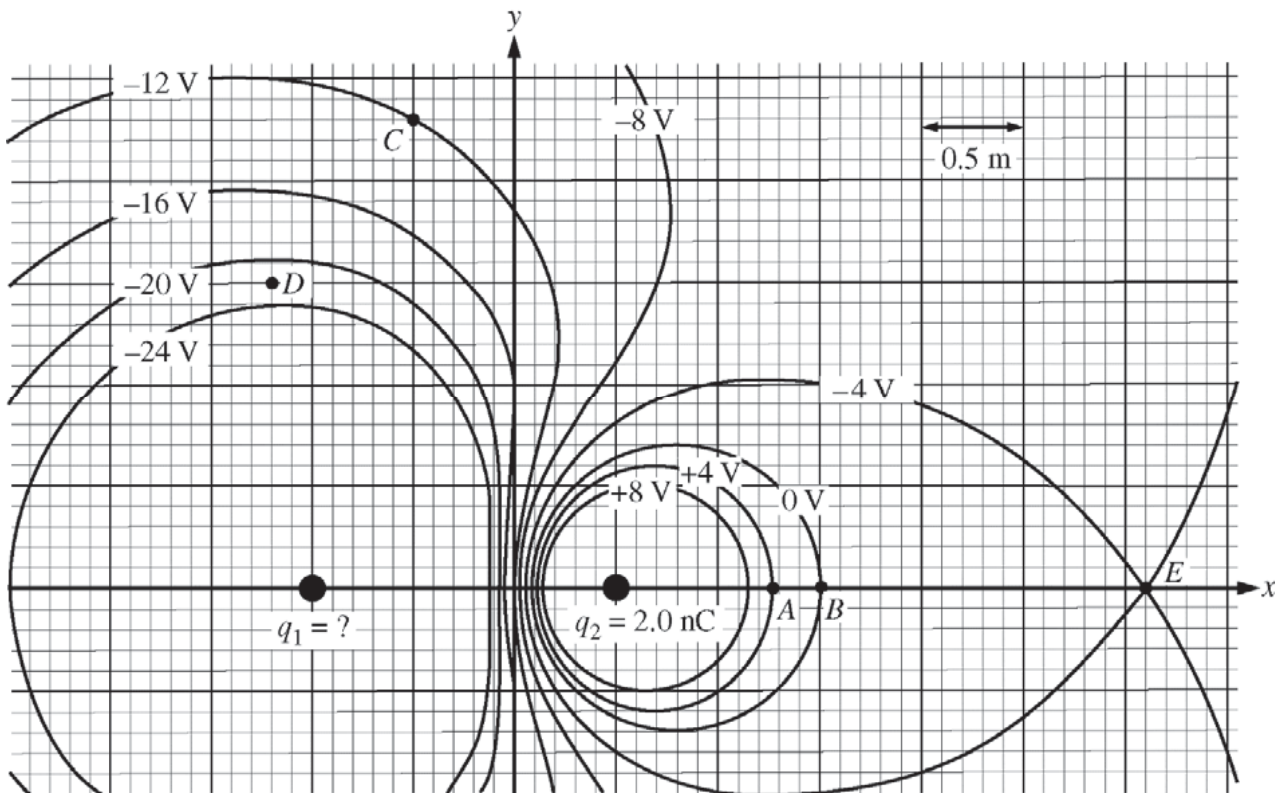
PHYSICS C: ELECTRICITY AND MAGNETISM

SECTION II

Time—45 minutes

3 Questions

Directions: Answer all three questions. The suggested time is about 15 minutes for answering each of the questions, which are worth 15 points each. The parts within a question may not have equal weight. Show all your work in this booklet in the spaces provided after each part.



E&M.1.

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.

- Calculate the value of q_1 .
- At point C on the diagram, draw a vector representing the direction of the electric field at that point.
- Calculate the approximate magnitude of the electric field strength at point D on the diagram.
- The equipotential labeled 0 V is the cross section of a nearly spherical surface. Calculate the electric flux for this surface.
- A proton is placed at point A and then released from rest.
 - Calculate the work done by the electric field on the proton as it moves from point A to point E.
 - Calculate the speed of the proton when it reaches point E.
- 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.