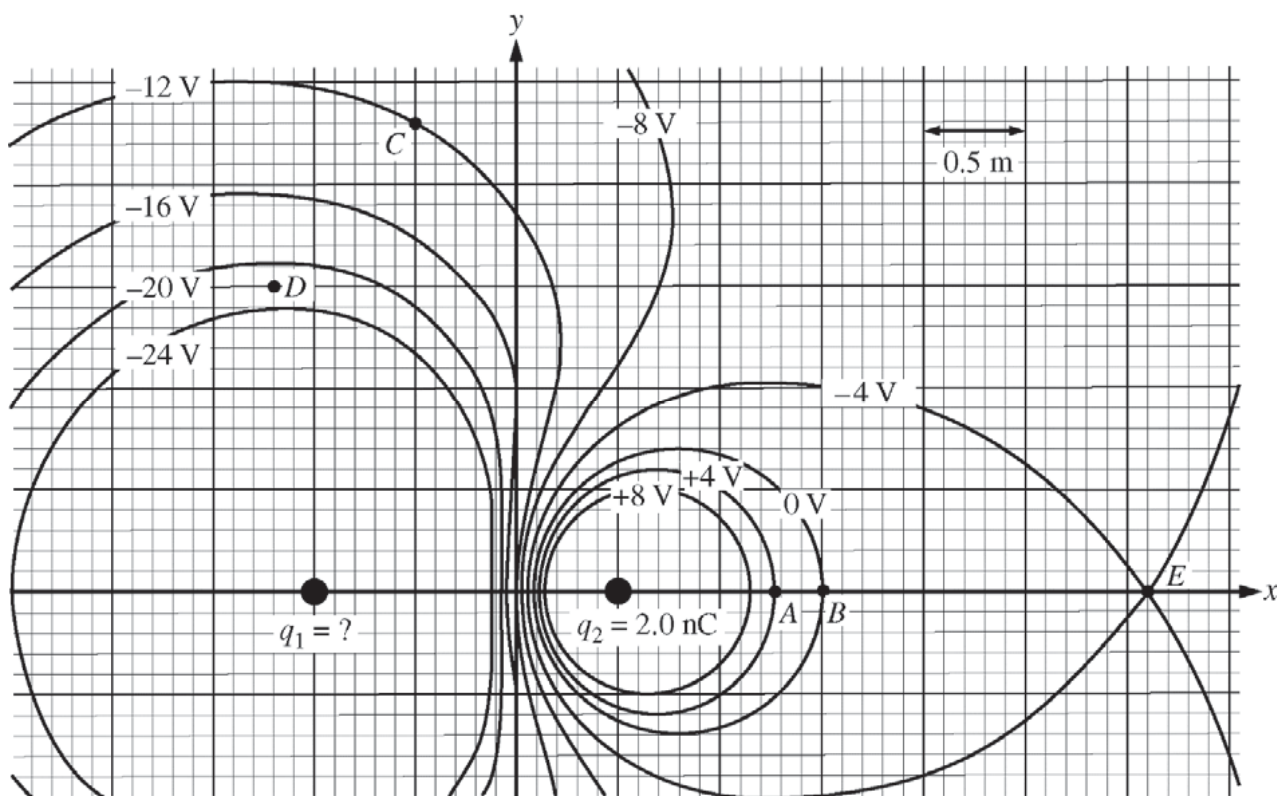


PHYSICS C: ELECTRICITY AND MAGNETISM**SECTION II****Time—45 minutes****3 Questions**

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.

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

- i. Calculate the work done by the electric field on the proton as it moves from point A to point E.
- ii. Calculate 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.