Note: Figure not drawn to scale.

2002B5B. Two parallel conducting plates, each of area 0.30 m², are separated by a distance of 2.0 × 10⁻² m of air. One plate has charge +Q; the other has charge –Q. An electric field of 5000 N/C is directed to the left in the space between the plates, as shown in the diagram above.

a. Indicate on the diagram which plate is positive (+) and which is negative (–).
b. Determine the potential difference between the plates.
c. Determine the capacitance of this arrangement of plates.

An electron is initially located at a point midway between the plates.

d. Determine the magnitude of the electrostatic force on the electron at this location and state its direction.
e. If the electron is released from rest at this location midway between the plates, determine its speed just before striking one of the plates. Assume that gravitational effects are negligible.