## M01E.1—Non-parallel Plate Capacitor

## Problem

Two identical plates of length c and width d are separated by an angular separation of  $\phi_0$  as shown. The plate at  $\phi = 0$  is grounded, and the plate at  $\phi = \phi_0$  is set at potential  $V_0$ .



a) Compute the store energy in the capacitor. Assume that the electrical potential between the plates depends only on  $\phi$ , and ignore fringe fields. (In which limit is this an allowed approximation?)

Now take ten in a cylindrical arrangement, and connect them as follows:



The odd plates are all connected together with a wire. The even plates are also all connected together. There is no direct connection between the odd and even plates. Assume a charge Q is placed on the even plates, and a charge -Q on the odd plates.

b) Compute the total capacitance of this structure.