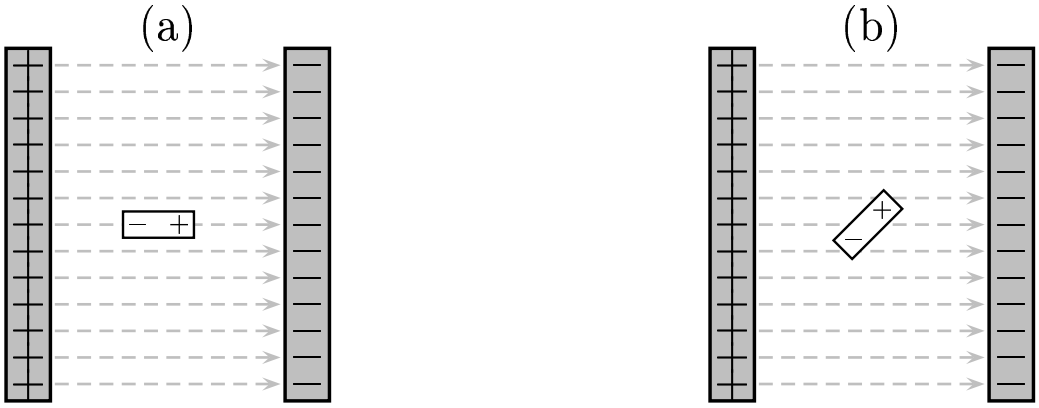
A dipole (electrically neutral) is placed in an external field.



For which situation(s) shown above is the net force on the dipole zero?

A) (a) only
B) (b) only
C) Both (a) and (b)
D) Neither (a) or (b)

Basic Concepts: Field patterns of point charge and parallel plates of infinite extent.

The force on a charge in the electric field is given by

$$\vec{F} = q\vec{E}$$

$$\Delta\vec{E} = \frac{k\Delta q}{r^2}\hat{r}$$

$$\vec{E} = \sum \Delta\vec{E}_i \, .$$

Symmetry of the configuration will cause some component of the electric field to be zero.

Solutions: The electric dipole consists of two equal and opposite charges separated by a distance. The electric fields are uniform for situations both Figs. (a) and (b). The force will be largest where the field is the strongest, but both ends of the dipole will have the same field strength. Consequently, there will be NO net force on (a) or (b).

Answer **C**.