

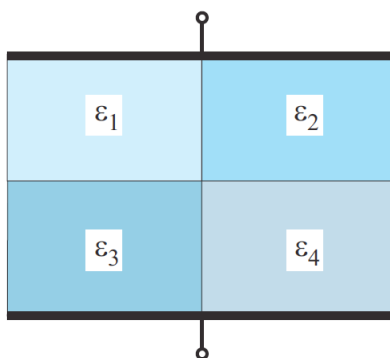
---

*Parallel-plate capacitor with a dielectric in four parts.* A parallel-plate capacitor is filled with a dielectric composed of four parts, of permittivities  $\epsilon_1$ ,  $\epsilon_2$ ,  $\epsilon_3$  and  $\epsilon_4$ , as in Fig. Q2.9. Assuming that the capacitor is charged, that the electric field in each of the pieces is uniform, and that no surface free charges exist on dielectric-dielectric boundaries, consider the following four statements:

- (a) if  $\epsilon_1 = \epsilon_2$  and  $\epsilon_3 = \epsilon_4$ , then vector  $\mathbf{E}$  is the same in all the pieces;
- (b) if  $\epsilon_1 = \epsilon_2$  and  $\epsilon_3 = \epsilon_4$ , the vector  $\mathbf{D}$  is the same in all the pieces;
- (c) if  $\epsilon_1 = \epsilon_3$  and  $\epsilon_2 = \epsilon_4$ , then vector  $\mathbf{E}$  is the same in all pieces;
- (d) if  $\epsilon_1 = \epsilon_3$  and  $\epsilon_2 = \epsilon_4$ , then vector  $\mathbf{D}$  is the same in all pieces;

Which of the above statements are true?

- (A) Statements (a) and (b).
- (B) Statements (c) and (d).
- (C) Statements (a) and (d).
- (D) Statements (b) and (c).
- (E) None of the statements.



**Figure Q2.9** Parallel-plate capacitor filled with four dielectric pieces; for Question 2.22.

*Solution:* (D)

*Answer:* (D)