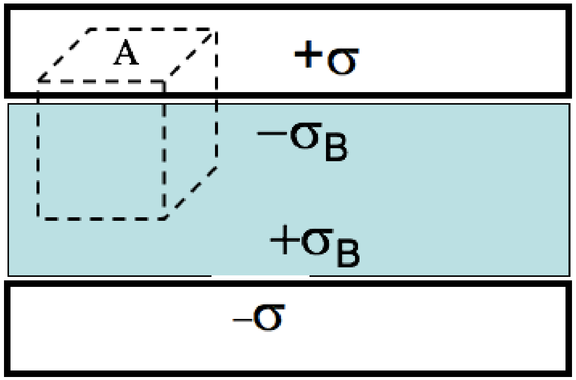
An ideal (large) capacitor has charge Q. A neutral linear dielectric is inserted into the gap. We want to find $\mathbf{D}$ in the dielectric.

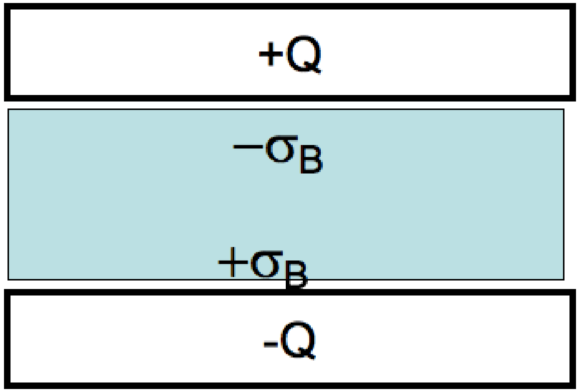


$$\oint \mathbf{D} \cdot d\mathbf{A} = Q_{free}$$

What is $|\mathbf{D}|$ in the dielectric?

A. σ
B. 2σ
C. $\sigma/2$
D. $\sigma + \sigma_b$
E. Something else

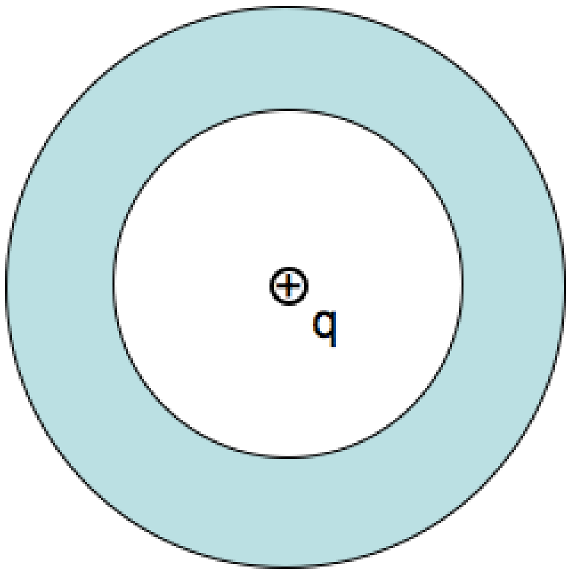
An ideal (large) capacitor has charge Q. A neutral linear dielectric is inserted into the gap. Now that we have $\mathbf{D}$ in the dielectric, what is $\mathbf{E}$ inside the dielectric?



A. $\mathbf{E} = \mathbf{D}\varepsilon_0\varepsilon_r$
B. $\mathbf{E} = \mathbf{D}/\varepsilon_0\varepsilon_r$
C. $\mathbf{E} = \mathbf{D}\varepsilon_0$
D. $\mathbf{E} = \mathbf{D}/\varepsilon_0$
E. Not so simple! Need another method

A point charge $+q$ is placed at the center of a neutral, linear, homogeneous, dielectric teflon shell. Can $\mathbf{D}$ be computed from its divergence?

$$\oint \mathbf{D} \cdot d\mathbf{A} = Q_{free}$$

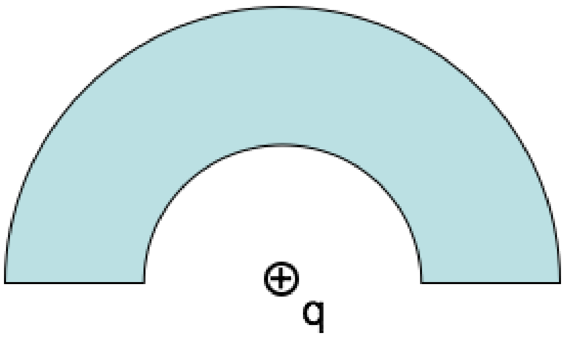


A. Yes

B. No

C. Depends on other things not given

A point charge $+q$ is placed at the center of a neutral, linear, homogeneous, dielectric **hemispherical** shell. Can $\mathbf{D}$ be computed from its divergence?



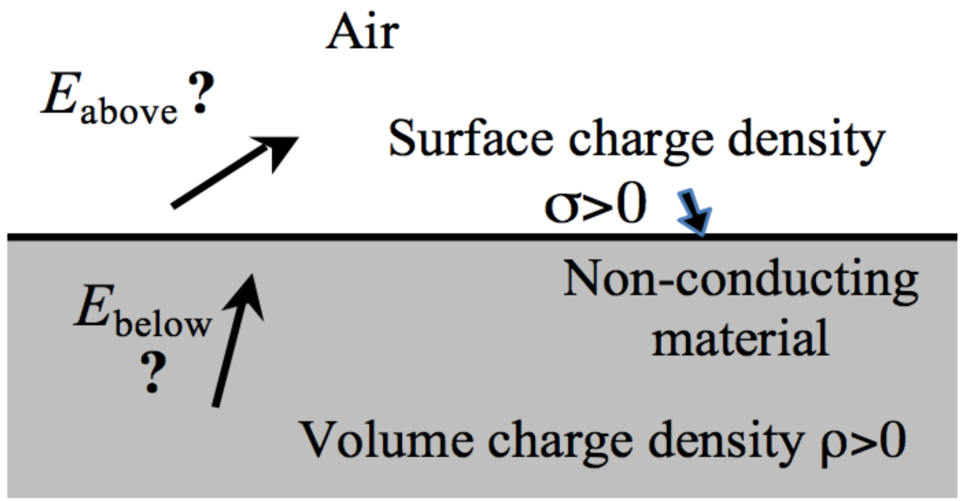
$$\oint \mathbf{D} \cdot d\mathbf{A} = Q_{free}$$

A. Yes

B. No

C. Depends on other things not given

BOUNDARY CONDITIONS



WHY ARE THESE BOUNDARY CONDITIONS USEFUL?