Consider an electrostatic situation. A parallel plate system has a plate charge \( +Q \) on the left-hand plate and a plate charge \( -Q \) on the right-hand plate. Each plate has an area \( A \).

Determine the electric field \( E_{gap} \) at \( P \), within the gap.

A) \( \vec{E} = \frac{Q}{\epsilon_0 A} \), to the right.

B) \( \vec{E} = \frac{Q}{\epsilon_0 A} \), to the left.

C) \( \vec{E} = \frac{2Q}{\epsilon_0 A} \), to the right.

D) \( \vec{E} = \frac{2Q}{\epsilon_0 A} \), to the left.
The areal charge density is $\sigma = \frac{Q}{A}$, therefore

$$E_{gap} = \frac{\sigma}{\epsilon_0} = \frac{Q}{\epsilon_0 A}.$$ 

Answer A.

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