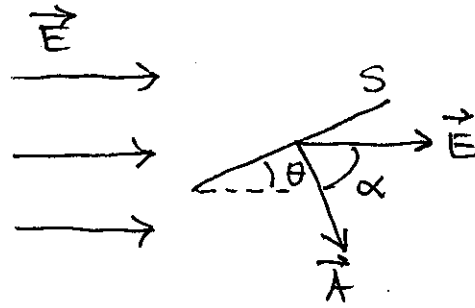Name: _____ ✳ KEY ✳ _____

Quiz 2

Answer each question in 3 lines or less (not counting any displayed equations or drawings).

(1) The electric field in the figure has constant magnitude E = 100 N/C and points to the left. The surface S has an area of 2.00 m^2, and the angle between them is θ = 30°. What is the electric flux through S?

$$\Phi_E = \vec{E} \cdot \vec{A}$$

or $\sin\theta$

$$= E A \cos\alpha$$

$$= 100 \cdot 2.00 \cdot \frac{1}{2}$$

$$= 100 \; (N/c) \cdot m^2 \qquad (4)$$

(2) The three charges in the figure are Q1, Q2, and Q3, left to right. The distance between two neighboring ones is d, and the cube centered around the middle charge has side length L. What is the total electric flux through the surface of the cube?
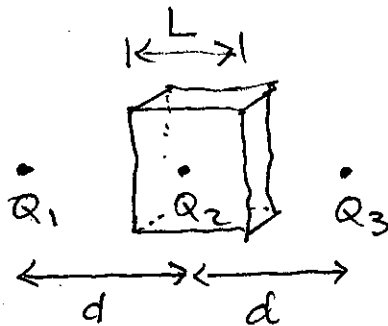
From Gauss' law, The only charge that contributes is Q_2, and

$$\Phi_E = \frac{Q_2}{\varepsilon_0} \qquad (3)$$

(3) A large, flat, square plate of side length L has a charge Q distributed uniformly on it. What is the electric field at a point a distance d (much smaller than L) above the center of the plate?
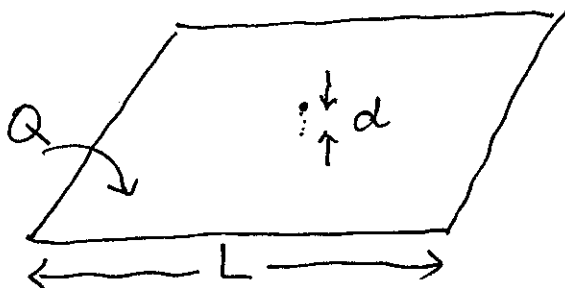
As long as d ≪ L we can use the electric field of an infinite uniform plane of charge,

$$E = \frac{\sigma}{2\varepsilon_0} = \frac{Q}{2\varepsilon_0 L^2}. \qquad (3)$$