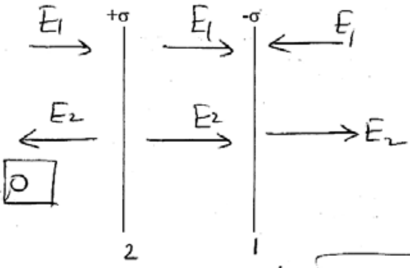
PHYS102.10
Quiz # 7

Name: Key Id#:

Consider two large parallel **conducting** sheets with charge densities +20 μC/m² and – 20 μC/m². Calculate the magnitude and direction of the electric field
(a) to the left of the positive plate
(b) between the plates
(c) to the right of the negative plate.



$$E_1 = E_2 = \frac{\sigma}{2\varepsilon_0}$$

a) left $E_{net} = E_1 - E_2 = \boxed{0}$

b) between $E_{net} = E_1 + E_2 = \frac{\sigma}{\varepsilon_0} = \frac{20\times10^{-6}}{8.85\times10^{-12}} = \boxed{2.26\times10^{6}}$

c) right $E_{net} = E_2 - E_1 = \boxed{0}$

PHYS102.11

Quiz # 7

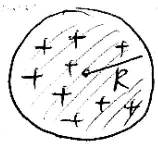
Name: Key Id#:

Consider a solid **non-conducting** sphere of radius 10 cm and charge q = 20 μC. Find the electric field

(a) at r = 5 cm

(b) at r = 15 cm

a) r = 5 cm inside the sphere



$$E = \frac{kq}{R^3} r$$

$$= \frac{9\times10^{9} \times 20\times10^{-6}}{(0.1)^2} \times (0.05) = \boxed{9\times10^{5}\ \frac{N}{C}}$$

b) r = 15 cm outside the sphere

$$E = \frac{kq}{r^2} = \frac{9\times10^{9} \times 20\times10^{-6}}{(0.15)^2} = \boxed{8\times10^{6}\ \frac{N}{C}}$$

PHYS102.12
Quiz # 7

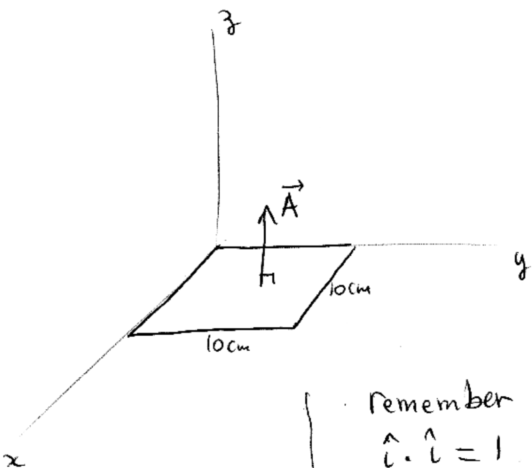
Name: Key Id#:

Consider a square surface of side 10 cm lying in the x-y plane. Calculate the **electric flux** if the electric field is

(a) $\vec{E} = 2\hat{i} - 3\hat{j}$

(b) $\vec{E} = 10\hat{k}$

(c) $\vec{E} = -5\hat{i} - 5\hat{k}$



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

$\vec{A} = (0.10)^2 \hat{k}$

$= 0.01 \hat{k} \, (m^2)$

remember

$\hat{i} \cdot \hat{i} = 1$

$\hat{i} \cdot \hat{j} = 0$

$\hat{i} \cdot \hat{k} = 0$

a) $\phi = (2\hat{i} - 3\hat{j}) \cdot (0.01\hat{k}) = 0$

b) $\phi = 10\hat{k} \cdot (0.01\hat{k})$

$= 0.1 \ \frac{N}{C} \cdot m^2$

c) $\phi = (-5\hat{i} - 5\hat{k}) \cdot (0.01\hat{k})$

$= -0.05 \ \frac{N}{C} m^2$