ECE 106
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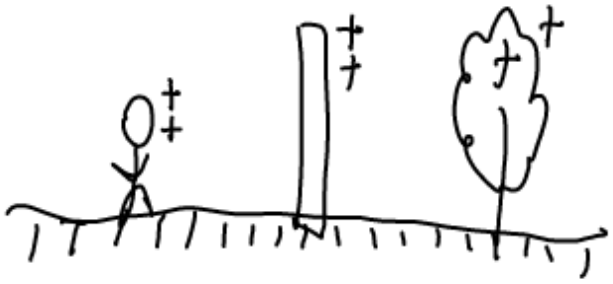
EIT 4154

Tues: 2:30
Thur: 1:30
Fri: 11:30

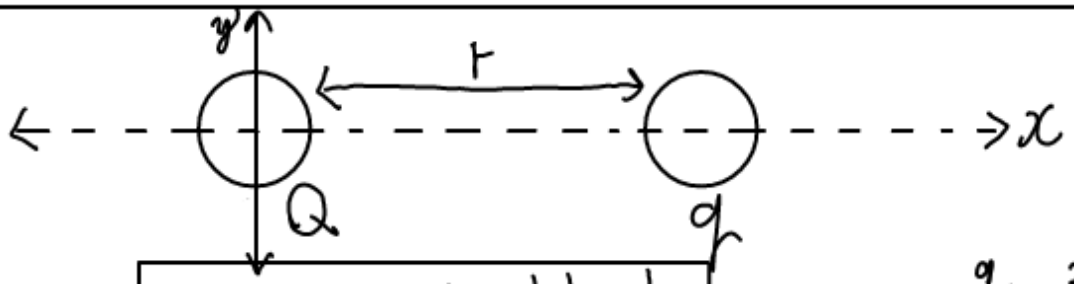


Charges

Forces (Electrostatic)

two charges

multiple charges



Coulomb Law

$$|\vec{F}| = k\frac{|Q||q|}{r^2}$$

$$\vec{F} = k\frac{|Q||q|}{r^2}\hat{a}$$

$k = 9\times10^9\ Nm^2/C$

r - metres

q, Q - coulombs

F - Newtons

Case I

$Q > 0$

$q > 0$

$$\vec{F}_{qQ} = k\frac{|Q||q|}{r^2}\hat{x}\ N$$

↑ Force on q by Q

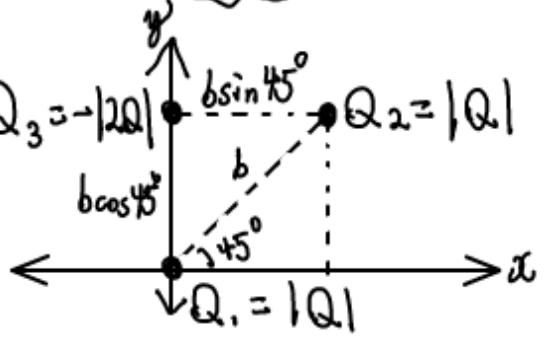
Case II

$Q > 0$

$q < 0$

$(-|q|)$

$$\vec{F}_{qQ} = k\frac{|Q||q|}{r^2}(-\hat{x})$$



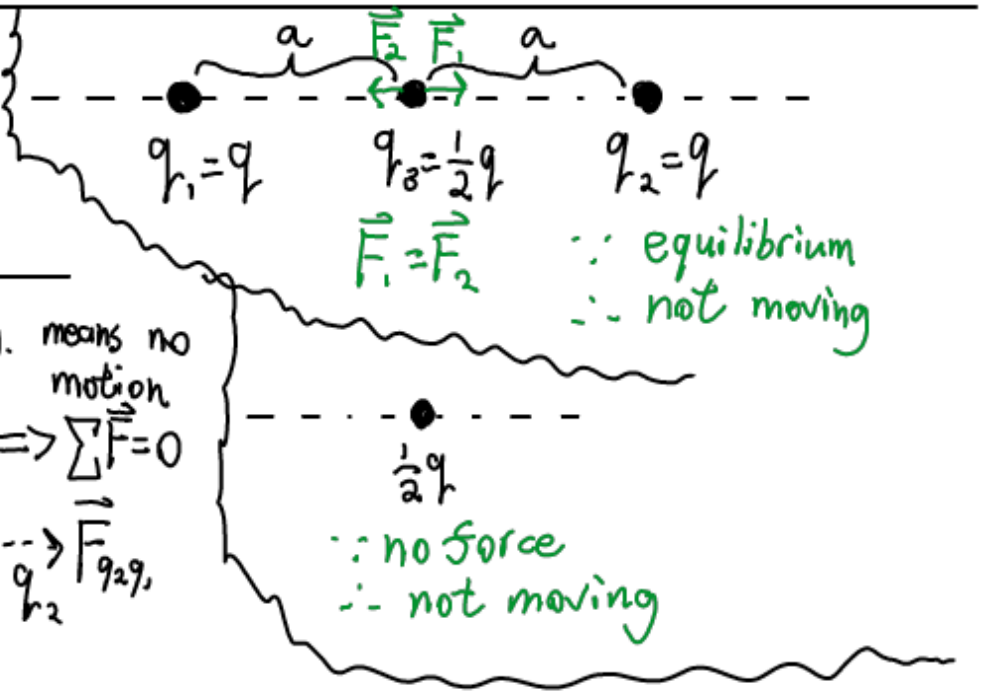
Find net electrostatic force acting on Q_3.

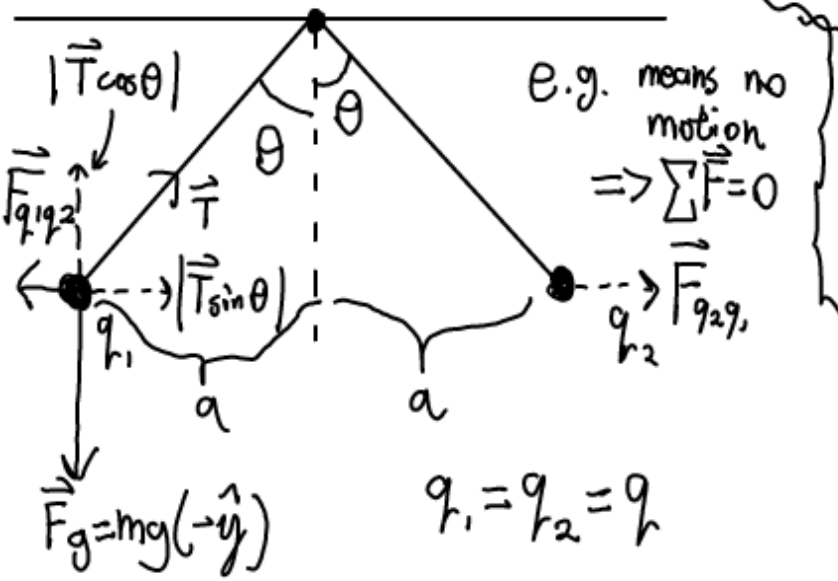
$$\vec{F}_{Q_3Q_1} = k\frac{|Q_1||Q_3|}{(b\frac{1}{\sqrt{2}})^2}(-\hat{y}) = -A\hat{y}$$

$$\vec{F}_{Q_3Q_2} = k\frac{|Q_2||Q_3|}{(b\frac{1}{\sqrt{2}})^2}(\hat{x}) = A\hat{x}$$

$$\therefore \vec{F}_{Q_3} = -A\hat{y} + A\hat{x}$$
$$= A(\hat{x} - \hat{y})$$

Electrostatic Forces
Electrostatic Field

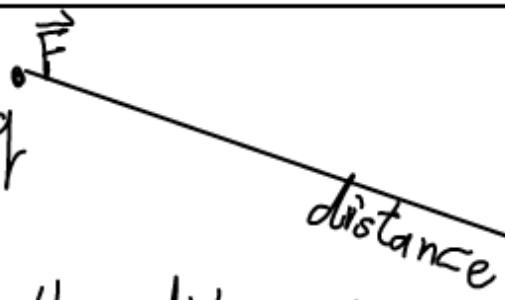




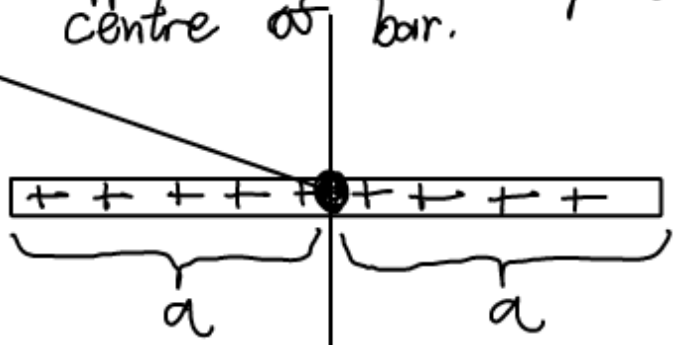
e.g. means no motion
$\Rightarrow \sum \vec{F} = 0$

$q_1 = q_2 = q$

$$\therefore \vec{F}_{q_1q_2} = k\frac{q_1q_2}{(2a)^2}(-\hat{x})$$



iff distance is large, you can approximate force on q by using centre of bar.



whether distance is considered large depends on the ratio of the size.