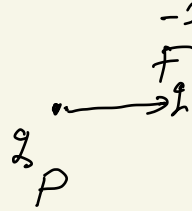


$$\frac{\vec{F}}{q} = \vec{E}$$

$$\frac{\vec{F}}{m} = \vec{a}$$

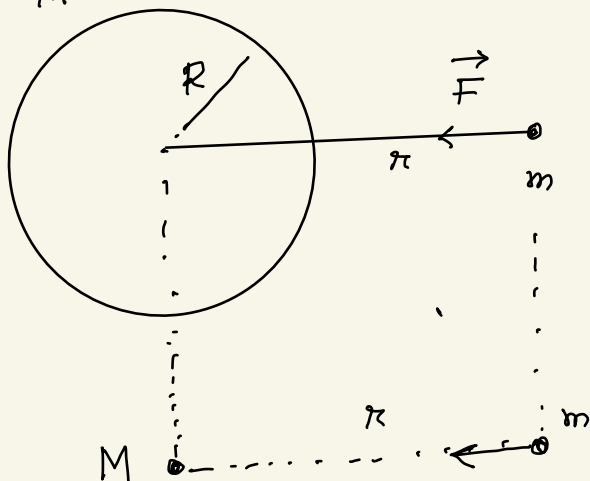


$$\vec{F} = \vec{F}_1 + \vec{F}_2 + \dots + \vec{F}_n \quad \left| \quad \frac{1}{q} \right.$$

$$\frac{\vec{F}}{q} = \frac{\vec{F}_1}{q} + \dots + \frac{\vec{F}_n}{q}$$

$$\boxed{\vec{E} = \vec{E}_1 + \dots + \vec{E}_n}$$

Obs.



$$F = mg$$

rapid folosim
legea lui Newton

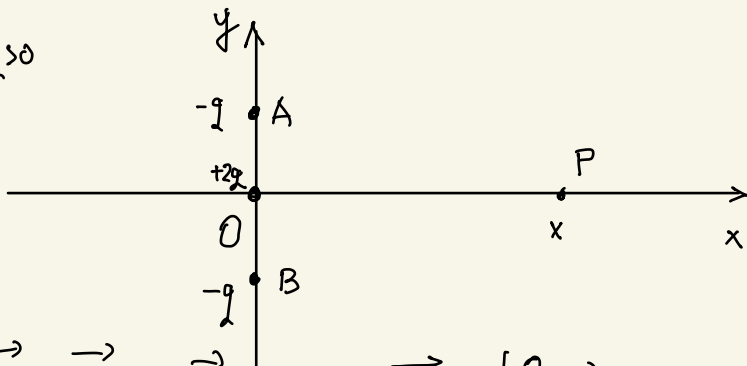
Q $+$ g $\vec{E} = k \frac{Q}{r^3} \vec{r}$ (corpuri punctiforme)



g $\vec{E} = ?$ (corpuri reprezentative)

35/777

$q > 0$



$$\vec{E}_P = \vec{E}_{AP} + \vec{E}_{OP} + \vec{E}_{BP} ; \vec{E} = \frac{kQ}{r^3} \vec{r}$$

$$\vec{F}_P = k \frac{(-q)}{|\vec{r}_{AP}|^3} \vec{r}_{AP} + k \frac{2q}{|\vec{r}_{OP}|^3} \vec{r}_{OP} + k \frac{(-q)}{|\vec{r}_{BP}|^3} \vec{r}_{BP}$$

$$\begin{cases} A(0, d) \\ P(x, 0) \end{cases} \Rightarrow \vec{r}_{AP}(x, -d) \Rightarrow \vec{r}_{AP} = x\vec{i} - d\vec{j}$$

$$|\vec{r}_{AP}| = \sqrt{x^2 + d^2}$$

$$\vec{r}_{OP} = x\vec{i}$$

$$|\vec{r}_{OP}| = \sqrt{x^2} = |x|$$

$$\begin{cases} B(0, -d) \\ P(x, 0) \end{cases} \Rightarrow \vec{r}_{BP}(x, d) \Rightarrow \vec{r}_{BP} = x\vec{i} + d\vec{j}$$

$$|\vec{r}_{BP}| = \sqrt{x^2 + d^2}$$

$$\vec{F}_P = k \frac{(-q)}{|\vec{r}_{AP}|^3} \vec{r}_{AP} + k \frac{2q}{|\vec{r}_{OP}|^3} \vec{r}_{OP} + k \frac{(-q)}{|\vec{r}_{BP}|^3} \vec{r}_{BP} =$$

$$= -kq \frac{x\vec{i} - d\vec{j}}{(x^2 + d^2)^{3/2}} + k2q \frac{x\vec{i}}{|x|^3} - kq \frac{x\vec{i} + d\vec{j}}{(x^2 + d^2)^{3/2}}$$

$$= kq \left[\frac{d\vec{j} - x\vec{i}}{(x^2 + d^2)^{3/2}} + \frac{2x\vec{i}}{|x|^3} - \frac{x\vec{i} + d\vec{j}}{(x^2 + d^2)^{3/2}} \right] =$$

$$= kq \left[\vec{i} \left(\frac{-x}{(x^2 + d^2)^{3/2}} + \frac{2x}{|x|^3} - \frac{x}{(x^2 + d^2)^{3/2}} \right) + 0 \right]$$

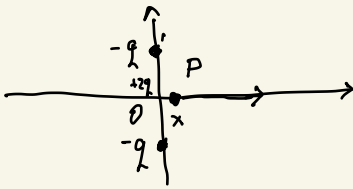
$$\vec{E}_P = kq \left[\vec{r} \left(\frac{-x}{(x^2+d^2)^{3/2}} + \frac{2x}{|x|^3} - \frac{x}{(x^2+d^2)^{3/2}} \right) \right]$$

$$E_{Px} = kq \left(\frac{-2x}{(x^2+d^2)^{3/2}} + \frac{2x}{|x|^3} \right)$$

$$|x| \approx \begin{cases} -x, & x \leq 0 \\ x, & x > 0 \end{cases}$$

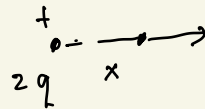
$$E_{Px} = \begin{cases} kq \left(\frac{-2x}{(x^2+d^2)^{3/2}} - \frac{2}{x^2} \right), & x < 0 \\ kq \left(\frac{-2x}{(x^2+d^2)^{3/2}} + \frac{2}{x^2} \right), & x > 0 \end{cases}$$

$$\lim_{x \rightarrow \infty} E_{Px} = \lim_{x \rightarrow -\infty} E_{Px} = 0 \quad (|x| \text{ foarte mare})$$



, x foarte mic ($\neq 0$)

intuitiv: $E_{Px} \approx k \frac{2q}{x^2}$



$$E_{Px} = kq \left(\underbrace{\frac{-2x}{(x^2+d^2)^{3/2}}}_{\rightarrow 0} + \frac{2}{x^2} \right), \quad x \ll d \Rightarrow \frac{x}{d} \ll 1, x > 0$$

$$E_{p_x} \approx k q \cdot \frac{2}{x^2}$$

\mathbb{P}_2 1, 2, 3, 4, 5 / 775.