Exercises Series N°2

Exercise 1:

A uniformly charged rod of length ***L*** and total charge ***Q*** lies along the ***x*** axis as shown in the figure below.

a. **Find** the components of electric field at point ***P*** on the ***y*** axis a distance d from the origin.
b. **What are** the approximate values of electric field components when d>>L ?

Use these constants as necessary: *Q, L, d, k.*

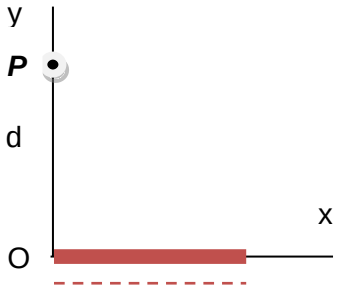


Figure 1

Exercise 2:

Figure.2 shows a uniform ring charge of radius ***a*** and total charge ***Q***.

-Find the electric field at point ***P*** on the ***x*** axis due to the **charge element**.

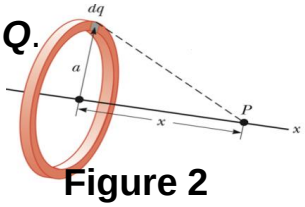


Figure 2

Exercise 3:

The ring has a radius ***R*** and surface charge density of ***σ.***

-Find the electric field and potential at point ***P*** on the ***x*** axis due to the **charge element**.

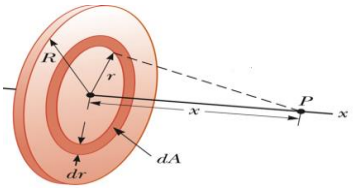


Figure 3

Exercise 4:

A sphere of radius ***r*** has electric charge uniformly distributed in its **entire volume**.

At a distance ***d*** from the centre inside the sphere (d<r) the electric field intensity is directly proportional to:

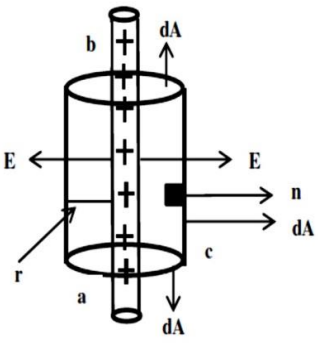
A. 1/d
B. $1/d^2$
C. d
D. d^2

Exercice 5:

There are three charges q_1, q_2, and q_3 having charge *6 C*, *5 C* and *3 C* enclosed in a surface.

-Find the total flux enclosed by the surface.

Figure 4



Exercises Series N°2

Exercice 6:

-Find the electric field at distance ***r*** from an infinite line charge of uniform density ***λ.***

Exercice 7:

A solid conducting sphere of radius carries a net positive charge ***2***
A conducting spherical shell concentric with the sphere carries a net negative charge ***-Q***.

-**Find** the electric field in the regions labelled 2, 3 and 4.

-**Find** the charge Distribution of the shell when the entire system is in electrostatic equilibrium.

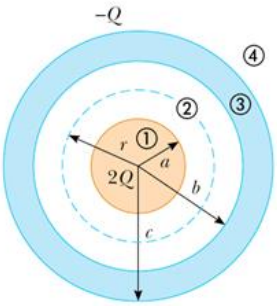


Figure 5

Exercice 8 :

A sphere with centre ***O*** and radius ***R*** is charged in volume with charge density $\rho=\rho_0 .r/R$ (is a constant).

1-**Apply Gauss's theorem** to determine the electric field at any point ***M*** in space.

2- **Deduce** the expression for the potential ***V(r)*** at any point in space.