

EOT 2 ITEMS

ITEM 1

An engineering trainee was provided with a box containing similar rods and required to separate those insulators and conductors. Luckily, he is in possession of a plastic ruler, wool, and Gold leaf electroscope but not sure of what to do.

Later that day, the trainee was to work on a communication tower with two small charged components:

- **Charge 1 (Q_1):** $4\mu\text{C}$ located at Point A
- **Charge 2 (Q_2):** $3\mu\text{C}$ located at Point B

The distance between A and B is 6m. The trainee is required to place the signal antenna at a point P, which is located between the two charges where the Electric field intensity is zero as to avoid its malfunctioning.

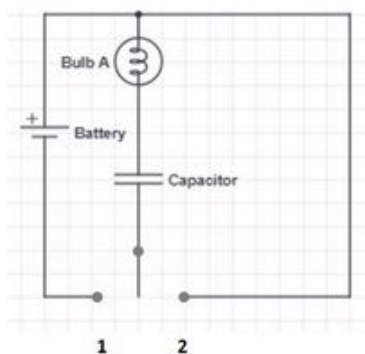
Task

As a physics student,

- a) Guide the trainee on how to separate the rods
- b) assist the trainee to determine the required point.

ITEM 2

During a school science fair, a student designed a circuit containing a capacitor of 100 cm^2 , with plate separation of 1 cm and a 100V source. The observers were surprised by the working of the design especially when the switch was connected to the contacts 1 and then 2.



The student further mentioned that the capacitor stores energy that can be increased when an insulator of relative permittivity 7 is inserted between the plates. This left the observers still not convinced.

HINT

Permittivity of free space, $\epsilon_0 = 8.85 \times 10^{-12} \text{ Fm}^{-1}$

Task

As a physics student

- a) Explain the observations made when the switch is at different contacts
- b) Confirm to the observers that the students statement is true