Workbook

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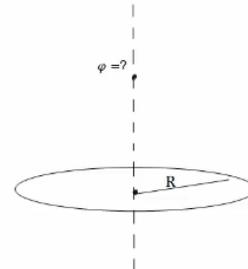
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# Electrostatic Pressure

Electrostatic Pressure

Questions

1) A Finite wire has charge Q evenly distributed along its length, L. Calculate the potential along the axis perpendicular to the wire. The origin is located at the midpoint of the wire.
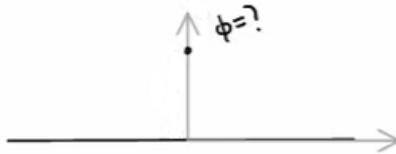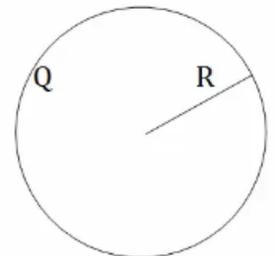

2) Calculate the potential along a ring's axis of symmetry.
   The ring has radius R and charge density per unit length λ.

3) a. What is the potential? What is the charge distribution?
   b. How much work is needed to bring a charge of 5C from infinity to 1.5R?
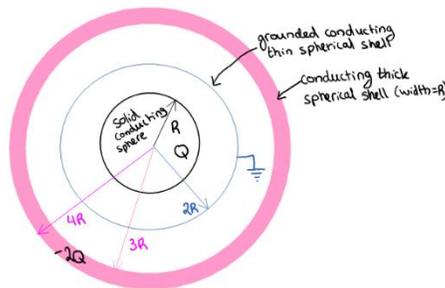

4) Find the potential of the spherical shell of radius R, which has a charge Q.
   The charge is uniformly distributed throughout.

5) A conductive cylinder, of radius R and length L, has a charge of $-Q$. A thick conducting shell surrounds the cylinder. The inner radius of this shell is $2R$, the outer radius is at $3R$, and the length of this shell is also L. The thick shell has charge $-4Q$. Around the thick shell is a thin, grounded conducting shell, of radius $4R$ and length L. We are told that $L \gg R$.

   a. What is the charge distribution of the system?
   b. What is the potential?
   c. A proton of mass m_p and charge $|e|$ is released from rest at a distance $r = 2R$.
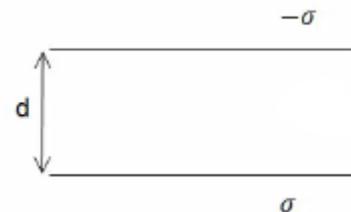   What is the proton's velocity after a distance of R?
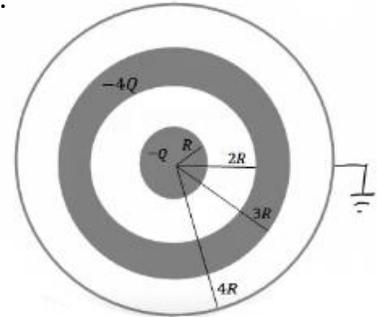
6) A full sphere of radius R has uniform charge density per unit volume ρ.
   Calculate the electric field and the potential at each point.
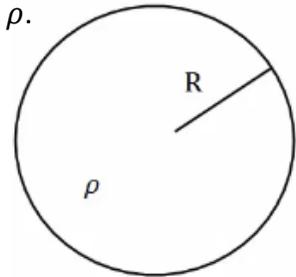
7) An infinite plane has charge per unit area σ.
   A distance d above the plane there is a conducting sphere of radius R and charge Q.
   what is the potential difference between the plane and the sphere?
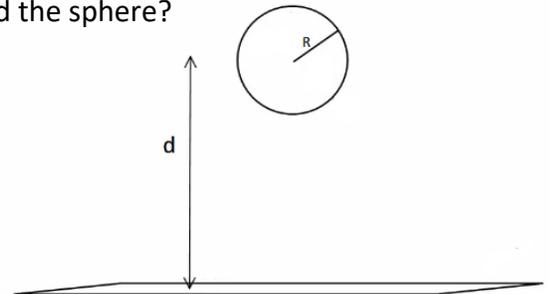
8) Calculate the potential difference between the two planes.
   One plane has uniform charge density σ, the other has uniform charge density $-\sigma$.
   The planes are a distance d from one another and their area A is significantly larger than the distance between them: $A \gg d$.

*For the solutions go see the videos

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