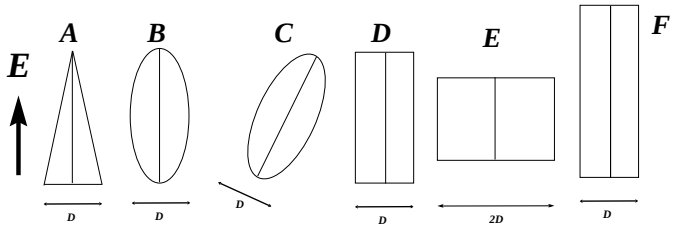
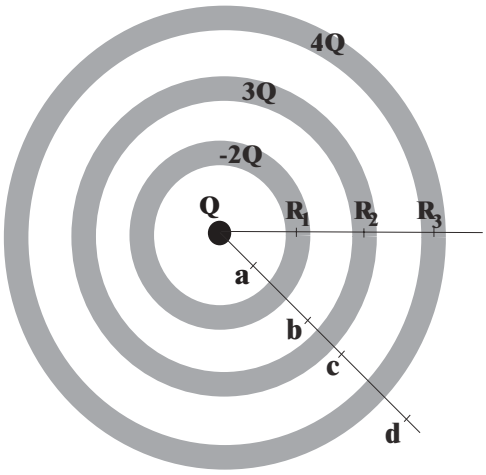
1. The axial symmetric shapes shown below (They are symmetric with respect to an axis shown within each shape) are located in a uniform electric field as shown. Select the correct statements:



   (a) The number of ingoing field lines are the same for all 6 shapes.
   (b) The number of ingoing field lines into B and C are the same.
   (c) The number of ingoing field lines into F is bigger than into D.
   (d) The number of ingoing field lines into E and F are equal.
   (e) The number of ingoing field lines into E is twice as big as into D.
   (f) The number of ingoing field lines into A is smaller than into B.
   (g) The number of ingoing field lines into A, B, D, and F are equal.
   (h) The above statements are also valid for outgoing field lines.

   Calculate the flux through each of the six shapes.

2. Consider the following arrangement of conducting hollow spheres with a point charge Q at the center. The total charge on each sphere is also indicated:



   Insert the correct charge for the following equations for the electric field:

$$E(a) = \frac{1}{4\pi\epsilon_0}\frac{\quad}{a^2}$$

$$E(b) = \frac{1}{4\pi\epsilon_0}\frac{\quad}{b^2}$$

$$E(c) = \frac{1}{4\pi\epsilon_0}\frac{\quad}{c^2}$$

$$E(d) = \frac{1}{4\pi\epsilon_0}\frac{\quad}{d^2}$$

   Calculate the surface charge density at the inner surfaces of the three spheres (neglect the thickness of the spheres):

$$\sigma_{R_1}^{inner} = \frac{\quad}{4\pi r_1^2}$$

$$\sigma_{R_2}^{inner} = \frac{\quad}{4\pi r_2^2}$$

$$\sigma_{R_3}^{inner} = \frac{\quad}{4\pi r_3^2}$$

   Calculate the surface charge density at the outer surfaces of the three spheres (neglect the thickness of the spheres):

$$\sigma_{R_1}^{outer} = \frac{\quad}{4\pi r_1^2}$$

$$\sigma_{R_2}^{outer} = \frac{\quad}{4\pi r_2^2}$$

$$\sigma_{R_3}^{outer} = \frac{\quad}{4\pi r_3^2}$$