A spherical steel ball is placed near a large circular plate so that the centre of the ball lies along the axis of the plate. A **positive charge** is placed on the ball, while an **equal negative charge** lies on the plate.

1/ Where is the charge is located on the each?

1. 

2. 

3. 

4. 

5. None of the above
2/ Using field lines, approximately what does the field look like?

1. 

2. 

3. 

4. 

5. None of the above
3/ Approximately what do the equipotential surfaces look like?

1.

2.

3.

4.

5. None of the above
4/ A small **negative** test charge is brought between the two objects. How does this object’s *potential energy* vary as it is moved from A to B?

1. 
2. 
3. 
4. 

5. None of the above
5/ A is solid conducting sphere of radius $R$ has an excess charge $Q$. The electrical potential at the surface of the sphere is

$$V = \frac{Q}{4\pi\varepsilon_0 R}$$

A second *uncharged* conducting sphere $B$ of radius $R/2$ is brought to a distance $>> R$ from the first sphere.

The two spheres are connected by a fine wire. What can you say about the electrical potential of each of the two spheres now they are connected?

1. Both potentials are zero.
2. Potential of $A$ is *twice* the potential of $B$.
3. Potential of $A$ is *half* the potential of $B$.
4. Potential of $A$ is *equal to* the potential of $B$.
5. None of the above
What can you say about the relative magnitude of the charges on the two spheres?

1. Both charges are zero.
2. Charge on A is twice the charge on B.
3. Charge on A is half the charge on B.
4. Charge on A is equal to the charge on B.
5. None of the above
Answers:

1/ answer = 4
2/ answer = 3
3/ answer = 2
4/ answer = 5
   approx. shape
   2 is obviously close

5/ answer = 4
6/ answer = 2 potentials at surface equal then formula
   implies half R needs half Q