13. (a) The charge on the surface of the sphere is the product of the surface charge density σ and the surface area of the sphere (which is $4\pi r^2$, where r is the radius). Thus,

$$q = 4\pi r^2 \sigma = 4\pi \left(\frac{1.2\,\text{m}}{2}\right)^2 \left(8.1 \times 10^{-6}\,\text{C/m}^2\right) = 3.66 \times 10^{-5}\ \text{C} .$$

(b) We choose a Gaussian surface in the form of a sphere, concentric with the conducting sphere and with a slightly larger radius. The flux is given by Gauss' law:

$$\Phi = \frac{q}{\varepsilon_0} = \frac{3.66 \times 10^{-5}\,\text{C}}{8.85 \times 10^{-12}\,\text{C}^2/\text{N}\cdot\text{m}^2} = 4.1 \times 10^6\ \text{N}\cdot\text{m}^2/\text{C} .$$