3. A small conducting sphere of mass $5 \times 10^{-3}$ kilogram, attached to a string of length $2 \times 10^{-1}$ meter, is at rest in a uniform electric field $E$, directed horizontally to the right as shown above. There is a charge of $5 \times 10^{-6}$ coulomb on the sphere. The string makes an angle of $30^\circ$ with the vertical. Assume $g = 10$ meter second squared. ($\sin 30^\circ = \frac{1}{2}$, $\cos 30^\circ = \frac{\sqrt{3}}{2}$, $\tan 30^\circ = \frac{\sqrt{3}}{3}$)

(a) In the space below, draw and label all the forces acting on the sphere.

(b) Calculate the tension in the string and the magnitude of the electric field.

(c) The string now breaks. Describe the subsequent motion of the sphere and sketch on the following diagram the path of the sphere while in the electric field.