A charged cloud system produces an electric field in the air near the Earth's surface. A particle of charge $-2.8 \times 10^{-9}$ C is acted on by a downward electrostatic force of $3.0 \times 10^{-6}$ N when placed in this field.

(a) What is the magnitude of the electric field?

(b) What are the magnitude and direction of the electrostatic force exerted on a proton placed in this field?

(c) What is the gravitational force on the proton?

(d) What is the ratio of the magnitude of the electrostatic force to the magnitude of the gravitational force in this case?