

Physics 102
Quiz # 5
Chapters 22&23

Name: Solution

Id: _____

Sec. #: _____

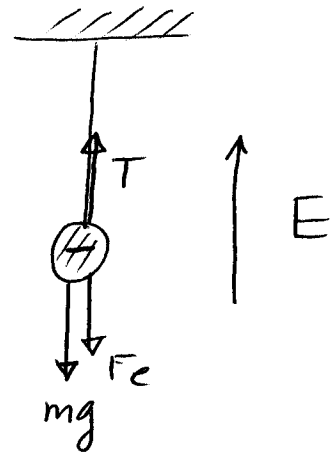
A negatively charged 0.20-g metallic ball hangs from an insulating string in a 3000 N/C electric field which is directed vertically upward. What is the magnitude of the charge on the ball if the tension in the string is 0.0040 N?

The electrostatic force
on the ball is

$$\vec{F}_e = q \vec{E}$$

$$\vec{F}_e = -|q| \vec{E}$$

The electrostatic force is
opposite in direction to the
electric field



$$\Rightarrow T = mg + |q| E$$

$$T - mg = |q| E$$

$$\Rightarrow |q| = \frac{T - mg}{E} = \frac{0.0040 - 0.2 \times 10^{-3} \times 9.8}{3000}$$

$$|q| = 6.8 \times 10^{-7} \text{ C}$$