

67. (a) We use  $m_e g = eE = e\sigma/\varepsilon_0$  to obtain the surface charge density.

$$\sigma = \frac{m_e g \varepsilon_0}{e} = \frac{(9.11 \times 10^{-31} \text{ kg}) (9.8 \text{ m/s}^2) \left( 8.85 \times 10^{-12} \frac{\text{C}^2}{\text{N} \cdot \text{m}^2} \right)}{1.60 \times 10^{-19} \text{ C}} = 4.9 \times 10^{-22} \text{ C/m}^2 .$$

(b) Downward (since the electric force exerted on the electron must be upward).