

2. (a) With  $a$  understood to mean the magnitude of acceleration, Newton's second and third laws lead to

$$m_2 a_2 = m_1 a_1 \Rightarrow m_2 = \frac{(6.3 \times 10^{-7} \text{ kg})(7.0 \text{ m/s}^2)}{9.0 \text{ m/s}^2} = 4.9 \times 10^{-7} \text{ kg}.$$

(b) The magnitude of the (only) force on particle 1 is

$$F = m_1 a_1 = k \frac{|q_1||q_2|}{r^2} = (8.99 \times 10^9 \text{ N} \cdot \text{m}^2/\text{C}^2) \frac{|q|^2}{(0.0032 \text{ m})^2}.$$

Inserting the values for  $m_1$  and  $a_1$  (see part (a)) we obtain  $|q| = 7.1 \times 10^{-11} \text{ C}$ .