

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

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

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

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

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