

9. a) momentum Before = momentum after

$$0.02 \times 400 \times 10^2 = 2.02 \times v$$

$$v = \frac{0.02 \times 400}{2.02}$$

$$= \underline{\underline{3.96 \text{ m/s}}}$$

b) impulse = change in momentum.

$$= 3.96 \times 2.0 - 2.0 \times 0$$

$$= \underline{\underline{7.92}}$$

c) $\frac{1}{2}mv^2 = \frac{1}{2}mv^2 + mgh$

$$\frac{1}{2} \times 0.02 \times 400^2 = \frac{1}{2} \times 2.02 \times 3.96^2 + 2.02 \times 10 \times h$$

$$1600 = 15.834 + 20.2h$$

$$20.2h = 1600 - 15.834$$

$$\frac{20.2h}{20.2} = \frac{1584.166}{20.2}$$

$$h = \underline{\underline{78.42 \text{ m}}}$$