

63. (a) We rewrite the formula for work  $W$  (when the force is constant in a direction parallel to the displacement  $d$ ) in terms of pressure:

$$W = Fd = \left(\frac{F}{A}\right)(Ad) = pV$$

where  $V$  is the volume of the chocolate cylinder. On a per unit mass basis (utilizing the equation for density  $\rho = m/V$ ) we have

$$\frac{W}{m} = p \left(\frac{V}{m}\right) = \frac{p}{\rho}.$$

- (b) If  $p = 5.5 \times 10^6$  Pa and  $\rho = 1200$  kg/m<sup>3</sup>, we obtain  $W/m = p/\rho = 4.6 \times 10^3$  J/kg.