6.30 This problem calls for the computation of ductility in both percent reduction in area and percent elongation. Percent reduction in area is computed using Equation 6.12 as

$$\%RA = \frac{\pi\left(\frac{d_0}{2}\right)^2 - \pi\left(\frac{d_f}{2}\right)^2}{\pi\left(\frac{d_0}{2}\right)^2} \times 100$$

in which d_0 and d_f are, respectively, the original and fracture cross-sectional areas. Thus,

$$\%RA = \frac{\pi\left(\frac{12.8\ mm}{2}\right)^2 - \pi\left(\frac{8.13\ mm}{2}\right)^2}{\pi\left(\frac{12.8\ mm}{2}\right)^2} \times 100 = 60\%$$

While, for percent elongation, we use Equation 6.11 as

$$\%EL = \left(\frac{l_f - l_0}{l_0}\right) \times 100$$

$$= \frac{74.17\ mm - 50.80\ mm}{50.80\ mm} \times 100 = 46\%$$