

**Problem 302B**

Air ( $R = 280 \text{ m}^2/\text{s}^2 \text{ K}^\circ$ ,  $\gamma = 1.4$ ) at a temperature of  $30^\circ\text{C}$  flows down a duct at a velocity of  $30 \text{ m/s}$ . The flow then proceeds through a compressor into a smaller duct where it travels at  $200 \text{ m/s}$ . If the rate of work done on the air by the compressor per unit mass of the air flowing through it is  $40 \text{ kW s/kg}$  what is the temperature of the air in the duct downstream of the compressor ?

(Note:  $1 \text{ watt} = 1 \text{ kg m}^2/\text{s}^3$  ;  $1 \text{ kW} = 1000 \text{ watts}$ )