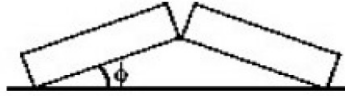


D 1

Two identical concrete slabs lie flat and in contact with each other as shown in the figure. If the temperature increases by 40°C , the lower edges opposite the contact edges remained fixed in position, and the lower edges of the contact side remain in contact, at what angle will the slabs be tilted? The coefficient of thermal expansion of the concrete is $10 \times 10^{-6} \text{ K}^{-1}$.



D 2

A solid concrete wall 4.0 m by 2.4 m and 30 cm thick, with a thermal conductivity of $1.3 \text{ W}/(\text{m}\cdot\text{K})$, separates a basement at 18°C from the ground outside at 6°C . Under steady state conditions, how much heat flows through the wall in one hour?

D 3

17.94 • CP A capstan is a rotating drum or cylinder over which a rope or cord slides in order to provide a great amplification of the rope's tension while keeping both ends free (Fig. P17.94). Since the added tension in the rope is due to friction, the capstan generates thermal energy. (a) If the difference in tension between the two ends of the rope is 520.0 N and the capstan has a diameter of 10.0 cm and turns once in 0.900 s , find the rate at which thermal energy is generated. Why does the number of turns not matter? (b) If the capstan is made of iron and has mass 6.00 kg , at what rate does its temperature rise? Assume that the temperature in the capstan is uniform and that all the thermal energy generated flows into it.

Figure P17.94

