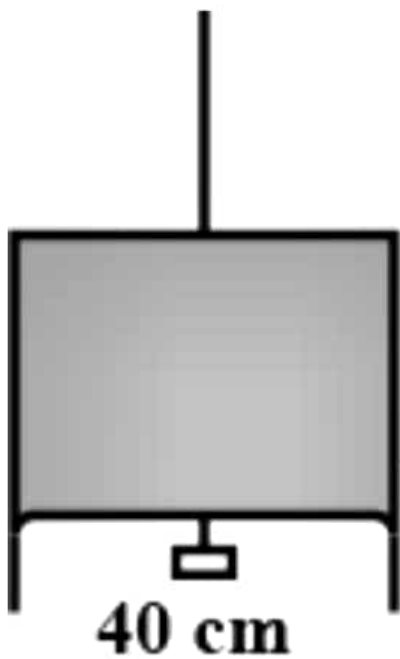
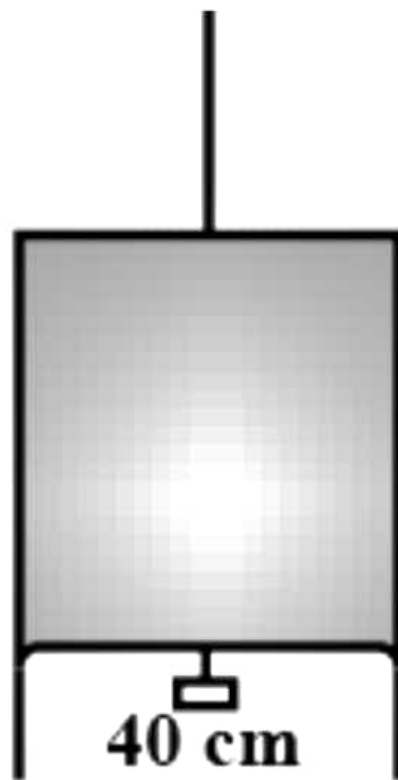


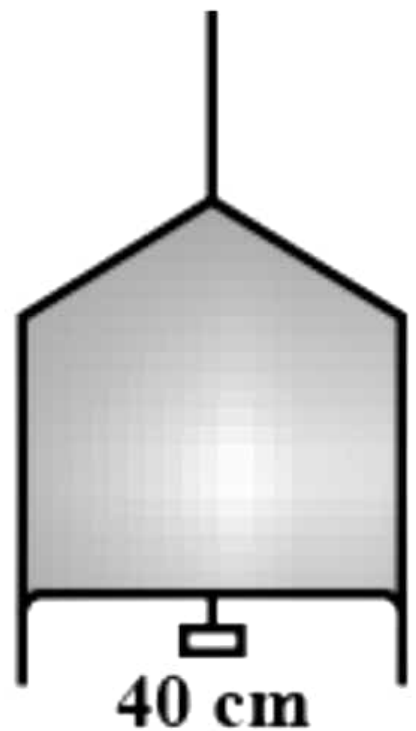
Figure (a) shows a thin liquid film supporting a small weight $= 4.5 \times 10^{-2} \text{ N}$. What is the weight supported by a film of the same liquid at the same temperature in Fig. (b) and (c)?



(a)



(b)



(c)

Ans) Take case (a): The length of the liquid film supported by the weight, $l = 40 \text{ cm} = 0.4 \text{ m}$

The weight supported by the film,

$$W = 4.5 \times 10^{-2} \text{ N}$$

A liquid film has two free surfaces.

$$\text{Surface tension} = W/2l$$

$$= 4.5 \times 10^{-2} / (2 \times 0.4) = 5.625 \times 10^{-2} \text{ N/m}$$

In all the three figures, the liquid is the same. Temperature is also the same for each case. Hence, the surface tension in figure (b) and figure (c) is the same as in figure (a), i.e.,

$$5.625 \times 10^{-2} \text{ N/m}.$$

Since the length of the film in all the cases is 40 cm, the weight supported in each case is

$$4.5 \times 10^{-2} \text{ N}.$$