26. (a) The pressure (including the contribution from the atmosphere) at a depth of $h_{\text{top}} = L/2$ (corresponding to the top of the block) is

$$p_{\text{top}} = p_{\text{atm}} + \rho g h_{\text{top}} = 1.01 \times 10^5 + (1030)(9.8)(0.300) = 1.04 \times 10^5 \text{ Pa}$$

where the unit Pa (Pascal) is equivalent to N/m^2. The force on the top surface (of area $A = L^2 = 0.36\,\text{m}^2$) is $F_{\text{top}} = p_{\text{top}}A = 3.75 \times 10^4\,\text{N}$.

(b) The pressure at a depth of $h_{\text{bot}} = 3L/2$ (that of the bottom of the block) is

$$p_{\text{bot}} = p_{\text{atm}} + \rho g h_{\text{bot}} = 1.01 \times 10^5 + (1030)(9.8)(0.900) = 1.10 \times 10^5 \text{ Pa}$$

where we recall that the unit Pa (Pascal) is equivalent to N/m^2. The force on the bottom surface is $F_{\text{bot}} = p_{\text{bot}}A = 3.96 \times 10^4\,\text{N}$.

(c) Taking the difference $F_{\text{bot}} - F_{\text{top}}$ cancels the contribution from the atmosphere (including any numerical uncertainties associated with that value) and leads to

$$F_{\text{bot}} - F_{\text{top}} = \rho g \left(h_{\text{bot}} - h_{\text{top}}\right) A = \rho g L^3 = 2180 \text{ N}$$

which is to be expected on the basis of Archimedes' principle. Two other forces act on the block: an upward tension T and a downward pull of gravity mg. To remain stationary, the tension must be

$$T = mg - (F_{\text{bot}} - F_{\text{top}}) = (450)(9.8) - 2180 = 2230 \text{ N} .$$

(d) This has already been noted in the previous part: $F_b = 2180\,\text{N}$, and $T + F_b = mg$.