A soap bubble of radius R is surrounded by another bubble of radius 2R. Take surface tension S. What will be the pressure inside the smaller bubble in excess of atmospheric pressure?

Solution: According to the Laplace equation, excess pressure, created with surface tension of the spherical surface of the liquid is equal to $\Delta p = \frac{2S}{R}$. In case of soap bubbles, the excess pressure of air inside them is doubled due to the presence of two interfaces, one inside and one outside: $\Delta p_b = \frac{4S}{R}$.

Excess pressure of the air inside the bigger bubble will be: $\Delta p_B = \frac{4S}{2R} = \frac{2S}{R}$;

Excess pressure of the air inside the smaller bubble will be: $\Delta p_S = \frac{4S}{R};$.

Air pressure difference between the smaller bubble and the atmosphere will be equal to the sum of excess pressures inside the bigger and the smaller bubbles: $\Delta p = \Delta p_B + \Delta p_S = \frac{2S}{R} + \frac{4S}{R} = \frac{6S}{R}$.

Answer: $\frac{6S}{R}$.