Solution:
Condition for the maximum reinforcement can be written as

$$2dn - \frac{\lambda_k}{2} = k\lambda_k\,, \ \text{for } k = 0, 1, 2, \dots\,,$$

i.e.

$$2dn = (2k+1)\frac{\lambda_k}{2}\,, \tag{13}$$

with d being thickness of the layer, n the refractive index and k maximum order. Let us denote $\lambda' = 1150$ nm. Since for $\lambda = 400$ nm the condition for maximum is satisfied by the assumption, let us denote $\lambda_p = 400$ nm, where p is an unknown integer identifying the maximum order, for which

$$\lambda_p(2p+1) = 4dn \tag{14}$$

holds true. The equation (13) yields that for fixed d the wavelength λ_k increases with decreasing maximum order k and vise versa. According to the

assumption,
$$\lambda_{p-1} < \lambda' < \lambda_{p-2} \,,$$
i.e.
$$\frac{4dn}{2(p-1)+1} < \lambda' < \frac{4dn}{2(p-2)+1} \,.$$
Substituting to the last inequalities for $4dn$ using (14) one gets
$$\frac{\lambda_p(2p+1)}{2(p-1)+1} < \lambda' < \frac{\lambda_p(2p+1)}{2(p-2)+1} \,.$$
Let us first investigate the first inequality, straightforward calculations give us gradually
$$\lambda_p(2p+1) < \lambda'(2p-1) \,, \quad 2p(\lambda' - \lambda_p) > \lambda' + \lambda_p \,,$$
i.e.
$$p > \frac{1}{2}\frac{\lambda' + \lambda_p}{\lambda' - \lambda_p} = \frac{1}{2}\frac{1150+400}{1150-400} = 1. \ldots \tag{15}$$
Similarly, from the second inequality we have
$$\lambda_p(2p+1) > \lambda'(2p-3) \,, \quad 2p(\lambda' - \lambda_p) < 3\lambda' + \lambda_p \,,$$
i.e.
$$p < \frac{1}{2}\frac{3\lambda' + \lambda_p}{\lambda' - \lambda_p} = \frac{1}{2}\frac{3 \cdot 1150+400}{1150-400} = 2. \ldots \tag{16}$$
The only integer p satisfying both (15) and (16) is $p = 2$.

Let us now find the thickness d of the air layer:
$$d = \frac{\lambda_p}{4}(2p+1) = \frac{400}{4}(2 \cdot 2 + 1)\ \text{nm} = 500\ \text{nm} \,.$$
Substituting d to the equation (13) we can calculate λ_{p-1}, *i.e.* λ_1:
$$\lambda_1 = \frac{4dn}{2(p-1)+1} = \frac{4dn}{2p-1}.$$
Introducing the particular values we obtain
$$\lambda_1 = \frac{4 \cdot 500 \cdot 1}{2 \cdot 2 - 1}\ \text{nm} = 666.7\ \text{nm} \,.$$

Finally, let us determine temperature growth Δt. Generally, $\Delta l = \alpha l \Delta t$ holds true. Denoting the cube edge by h we arrive at $d = \alpha h \Delta t$. Hence
$$\Delta t = \frac{d}{\alpha h} = \frac{5 \cdot 10^{-7}}{8 \cdot 10^{-6} \cdot 2 \cdot 10^{-2}}\ {}^\circ\text{C} = 3.1\ {}^\circ\text{C} \,.$$