

20. For the first circuit $\omega = (L_1 C_1)^{-1/2}$, and for the second one $\omega = (L_2 C_2)^{-1/2}$. When the two circuits are connected in series, the new frequency is

$$\begin{aligned}
 \omega' &= \frac{1}{\sqrt{L_{\text{eq}} C_{\text{eq}}}} \\
 &= \frac{1}{\sqrt{(L_1 + L_2) C_1 C_2 / (C_1 + C_2)}} = \frac{1}{\sqrt{(L_1 C_1 C_2 + L_2 C_2 C_1) / (C_1 + C_2)}} \\
 &= \frac{1}{\sqrt{L_1 C_1}} \frac{1}{\sqrt{(C_1 + C_2) / (C_1 + C_2)}} = \omega ,
 \end{aligned}$$

where we use $\omega^{-1} = \sqrt{L_1 C_1} = \sqrt{L_2 C_2}$.