Module 2: Quizzes and short questions

1. Q: Waves at frequencies $\omega_1$ and $\omega_2$ are incident on a non-linear crystal. What is the velocity of the nonlinear polarization generated at the frequency $\omega_3 = \omega_1 + \omega_2$?
Answers of module 2 Quizzes and short questions:

A1: The nonlinear polarization generated at the frequency \( \omega_3 \) would have a space and time dependence of the form

\[ e^{i[(k_1 + k_2)z - (\omega_1 + \omega_2)t]} \]

Hence the velocity of the nonlinear polarization would be

\[ v = \frac{\omega_3}{k_1 + k_2} \]