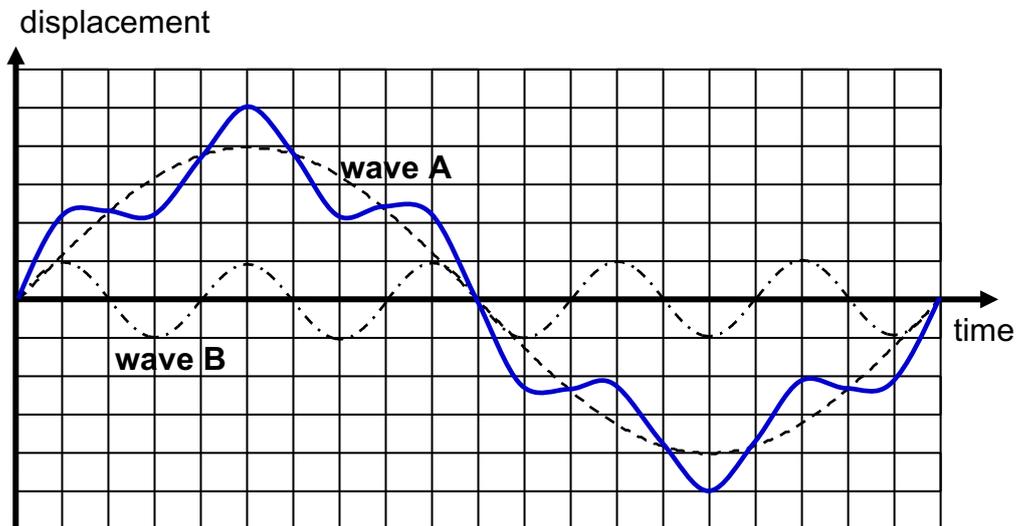




2025 Sec 4 AP1 Superposition
Answers to EX1

1



2

$$\begin{aligned} \text{velocity of wave in wire} &= f \lambda \\ v &= 256 (1.000 \times 2) \\ &= 512 \text{ m s}^{-1} \end{aligned}$$

velocity is unchanged due to constant tension

$$\begin{aligned} v &= f \lambda \\ f &= v / \lambda \\ &= 512 / (0.400 \times 2) \\ &= 640 \text{ Hz} \end{aligned}$$

3

$$\begin{aligned} \text{(a)} \quad v &= f \lambda \\ 330 &= 256 \times (L \times 4) \\ L &= 0.32 \text{ m (2 sf)} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad v &= f \lambda \\ 330 &= 256 \times (L \times 2) \\ L &= 0.64 \text{ m (2 sf)} \end{aligned}$$

4

$$\begin{aligned} \text{First harmonic: } 22.8 &= \lambda / 4 \\ \text{Third harmonic: } 68.3 &= 3\lambda / 4 \end{aligned}$$

$$\begin{aligned} \lambda / 2 &= 68.4 - 22.8 \\ \lambda &= 91.2 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Fifth harmonic:} \\ 5\lambda / 4 &= 5 \times 91.2 / 4 \\ &= 114 \text{ cm (3 sf)} \end{aligned}$$