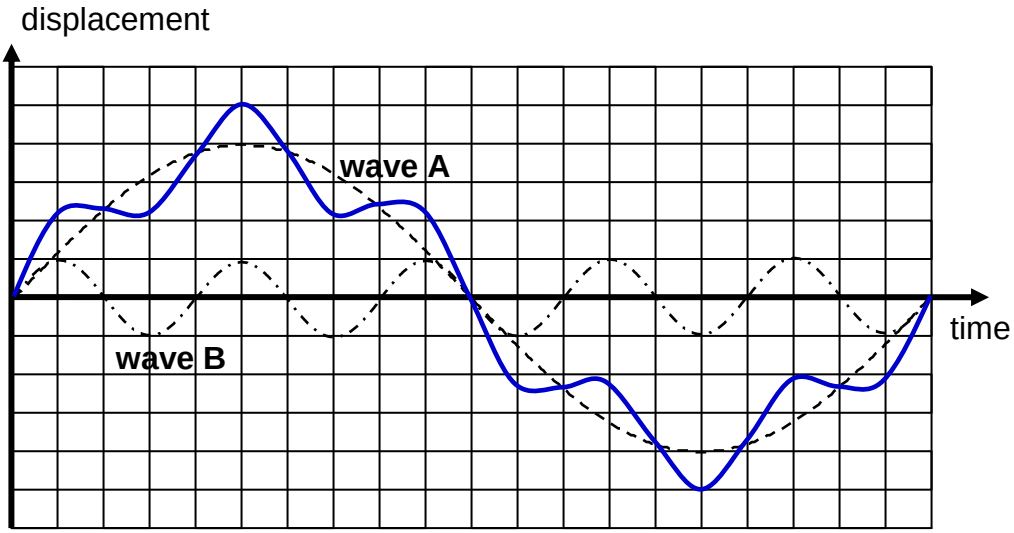
2020 Sec 4 AP1 Superposition

Answers to EX1

1



2 velocity of wave in wire = f λ

$v = 256 (1.000 \times 2)$

$= 512 \text{ m s}^{-1}$

velocity is unchanged due to constant tension

$v = f \lambda$

$f = v / \lambda$

$= 512 / (0.400 \times 2)$

$= 640 \text{ Hz}$

3 **(a)** $v = f \lambda$

$330 = 256 \times (L \times 4)$

$L = 0.32 \text{ m}$ (2 sf)

(b) $v = f \lambda$

$330 = 256 \times (L \times 2)$

$L = 0.64 \text{ m}$ (2 sf)

4 First harmonic: $22.8 = \lambda / 4$

Third harmonic: $68.3 = 3\lambda / 4$

$\lambda / 2 = 68.4 - 22.8$

$\lambda = 91.2 \text{ cm}$

Fifth harmonic:

$5 \lambda / 4 = 5 \times 91.2 / 4$

$= 114 \text{ cm}$ (3 sf)