

Consider the superposition of two traveling waves

1. $y_1 = A_0 \sin(kx - \omega t)$.

2. $y_2 = A_0 \sin(kx + \omega t)$.

The amplitude vanishes only at which of the following values of kx

A) $kx = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \dots$

B) $kx = \frac{\pi}{2}, \frac{5\pi}{2}, \frac{9\pi}{2}, \dots$

C) $kx = 0, \pi, 2\pi, 3\pi, \dots$

D) $kx = 0, 2\pi, 4\pi, \dots$

Using

$$\sin \alpha + \sin \beta = 2 \sin \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2},$$

$$y = y_1 + y_2 = 2 A_0 \sin kx \cos \omega t.$$

The zeros of the amplitude function occurs at $kx = 0, \pi, 2\pi$ etc.

Answer **C**