

Quiz 8

Name: _____ Student Number: _____

CALCULATORS ALLOWED.

1. (2 marks) An astronomer observes an asteroid striking the moon. Calculate how long it takes before the explosion be heard on the Earth? Earth Moon Distance = 3.8×10^5 km

Earth & Moon separated by vacuum that does not transport sound.

2. (4 marks) Consider the wave $\psi = A \sin(kz + \omega t)$. Find the values of k and ω if:
- Wave travel sin +z direction.
 - Frequency is 6 Hz.
 - Speed of wave is 2 m/sec.

$$\omega = 2\pi \nu = 12\pi \text{ rad/sec.}$$

$$\text{Speed } v_p = \frac{\omega}{|k|} = 2 \text{ m/sec.}$$

$$|k| = \frac{\omega}{2} = 6\pi \text{ m}^{-1}$$

$$\text{Direction of wave: } kz + \omega t = \text{const.}$$

$$k \frac{dz}{dt} + \omega = 0.$$

$$\frac{dz}{dt} = -\frac{\omega}{k}.$$

$$\text{If } \frac{dz}{dt} > 0 \Rightarrow k = -6\pi \text{ m}^{-1}.$$

3. (4 marks) Derive an expression for the distance between 2 neighbouring dark interference fringes observed on a screen for a wave incident on a double slit.

See notes.