

Questions for Week 1

1. How many astronomical units are there in 1 light year?

2. How many seconds does it take light to travel one light year?

3. An express train, travelling at a steady speed of 30 m s^{-1} , approaches and passes a station. The train sounds its whistle at a frequency of 500 Hz. The speed of sound in air is 330 m s^{-1} .
 - (i) Calculate the wavelength of the sound waves being emitted by the whistle.

 - (ii) Calculate the wavelength of the sound waves detected by an observer on the station platform as the train approaches.

 - (iii) Calculate the wavelength and frequency of the sound waves detected by the observer when the train is moving away from the platform.

 - (iv) A faster train passes the same station travelling at a constant speed. This train also sounds its whistle at a frequency of 500 Hz. However, the observer on the station detects a sound wave of wavelength 0.78m.
 - (a) In what direction is the train travelling relative to the station when the observer measured this wavelength? Give a reason for your answer.

 - (b) Find the speed of the train.