

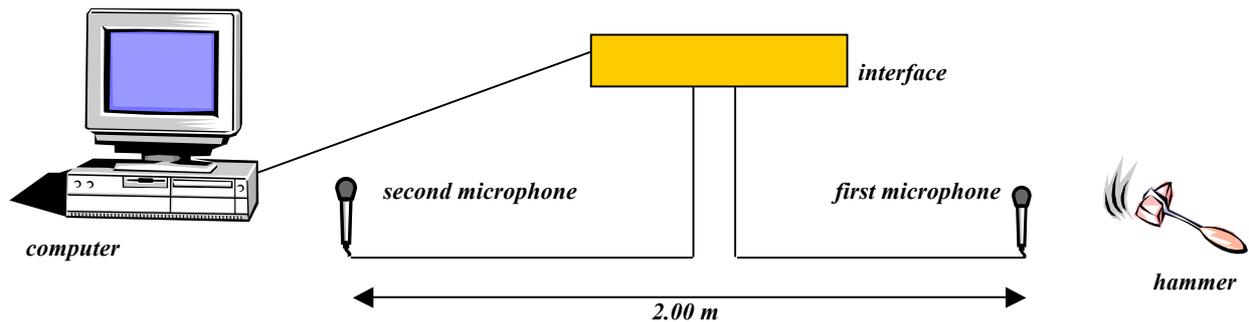
TELECOMMUNICATIONS

Homework Exercises

Homework 1

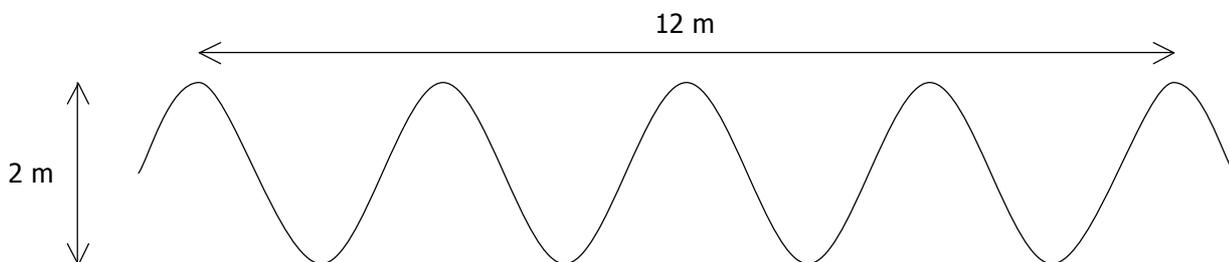
Answer these questions in your homework jotter and hand in no later than **Monday 19th September**.

1. A pupil reads about an experiment that can be carried out to measure the speed of sound in air. When the hammer hits the metal block a sound wave is produced. The computer is used to measure the time it takes for the sound wave to travel from one microphone to the other. The computer will display the time taken for the sound to travel this distance or it can be used to calculate the speed of sound directly.



The pupil carried out the experiment, and the time measured was 0.006 s.

- (a) What other information does the computer need to calculate the speed of sound for her?
(b) Find the speed of sound using the pupil's results.
(c) The pupil found that the speed was not calculated properly when the experiment was done close to a wall. Suggest a reason for this.
2. You see a flash of lightning, and then hear the thunder 6 seconds later. How far away (roughly!) is the thunderstorm? Take the speed of sound to be 340 m/s.
3. The questions below refer to this diagram.

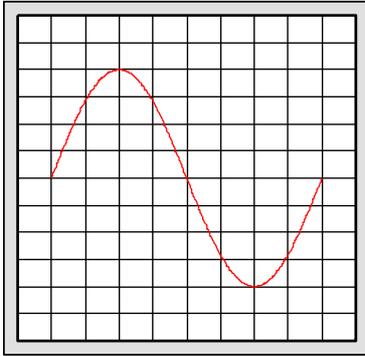


- (a) Calculate the wavelength of the waves shown.
(b) If the waves took 6 seconds to travel this distance, what is their frequency?
(c) What is the amplitude of these waves?
(d) Use the **wave equation** to calculate the speed of the waves.

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4. Look at this diagram of a sound signal pattern displayed on an oscilloscope. Describe what would happen to its **frequency** and **amplitude** in each of the following situations:



- (a) The volume of the sound is increased.
- (b) The pitch is increased, but the volume isn't changed.
- (c) The pitch is decreased and the volume is decreased.