# Wave Speed

## The two wave speed formulas

**In words** _____

**In symbols** _____

*Write the unit of each quantity*

v _____ f _____ λ _____

**In words** _____

**In symbols** _____

*Write the unit of each quantity*

v _____ s _____ t _____

**KEY VARIABLES**

| | |
|---|---|
| ☐ Wave speed | v |
| ☐ Frequency | f |
| ☐ Wavelength | λ |
| ☐ Distance | s |
| ☐ Time | t |

## Example — a water wave




The frequency of this water wave is **5 Hz**. Calculate its speed in **m/s**. Give your answer to **2 significant figures**.

**Careful:** everything on the graph is in **cm**. Change to metres before you use the formula.

1 **Wavelength =** _____ cm

2 **In metres =** _____ m

3 **v = f × λ =** _____

4 **Wave speed =** _____ m/s

## Exam-style question — echo off a cliff

A group of girls sing a note on a beach. The note has a frequency of **425 Hz** and a wavelength of **0.80 m**.

**(a)** Calculate the speed of sound in air. **[2]**

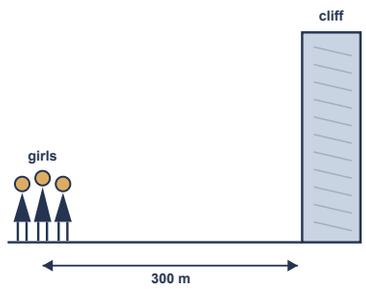
**(b)** The girls stand **300 m** from a cliff and hear an echo. Sound waves are longitudinal. Explain what causes the echo. **[1]**

**(c)** Draw a ray diagram of the sound wave. **[1]**

**(d)** Calculate the time between the girls singing and hearing the echo. **[3]**

**(Total for question = 7 marks)**

**(C) DRAW A RAY DIAGRAM OF THE SOUND WAVE**




**ANSWER**

**HINTS** 1 Part (a): use **v = f × λ**. 2 The sound goes **to the cliff and back**. What distance is that? 3 Rearrange **v = s ÷ t** to find **t**.