

Echoes and Speed of Sound

KS3 Physics · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Sound travels 680 m in 2 s. What is its speed?

Step 1 · Speed = distance ÷ time

$$680 \div 2 = 340 \text{ m/s.}$$

Answer: 340 m/s

Check: This is the usual speed of sound in air.

2. Now try one with the steps

You shout at a cliff and hear the echo 2 s later. How far away is the cliff?

Step 1 · Total distance

Step 2 · Halve it

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. What is an echo? [1]

2. Do hard or soft surfaces reflect sound best? [1]

3. What is the approximate speed of sound in air, in m/s? [1]

4. Why do concert halls and recording studios have soft panels on the walls? [1]

5. Sound travels 680 m in 2 s. What is its speed, in m/s? [1]

6. How far does sound travel in air in 3 s, in metres? [1]
- _____
- _____
7. An echo from a cliff returns 2 s after a shout. How far away is the cliff, in metres? [2]
- _____
- _____
8. A sonar pulse returns after 0.4 s. Sound travels at 1500 m/s in sea water. How deep is the water, in metres? [2]
- _____
- _____
9. Thunder is heard 6 s after a lightning flash. How far away is the storm, in metres? [2]
- _____
- _____
10. Explain why you see lightning before you hear the thunder. [1]
- _____
- _____
11. Students 51 m from a wall time 20 claps (each one in step with the echo) as 6.0 s. What speed of sound do they find, in m/s? [3]
- _____
- _____
- _____
12. A bat hears the echo from a moth 0.02 s after its squeak. How far away is the moth, in metres? [2]
(Speed of sound in air = 340 m/s.)
- _____
- _____
13. Explain how ultrasound is used to make a picture of an unborn baby. [2]
- _____
- _____
14. Explain why sound travels faster in water than in air. [2]
- _____
- _____

4. Before you hand it in

Forgetting to halve the echo distance.

Distance to object = (speed × echo time) ÷ 2.

Using 340 m/s for sonar in water.

Use the speed given for the medium (about 1500 m/s in water).

Timing a single clap's echo with a stopwatch.

Time many echoes in a row and divide, or use two microphones and a fast timer.