

# Distance and volume

Outstanding Science Year 4 - Sound - OS4D008

## National Curriculum Statutory Requirements

**4D5** - recognise that sounds get fainter as the distance from the sound source increases; **LKS2W3** - making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers; **LKS2W5** - recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables; **LKS2W7** - using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions;

### Learning Objective



I can investigate the relationship between distance and volume.

Me:   

Teacher:   

### Scientific question

How loud does a sound need to be to be heard from far away?

### You will need:

- Access to the school yard
- A partner
- A metre ruler
- A basketball or football

### Method

Work with a partner. Get your partner to stand 10 steps away, facing away from you. Predict the height the ball will need to be dropped from in order to be heard by your partner. Drop the ball from a height of 10cm. If your partner cannot hear it, raise it to 20cm. On the table, record the minimum height at which your partner can hear the sound from 10 steps away.

Get your partner to move another 10 steps away. Drop the ball, again starting at 10cm. Record the minimum height at which your partner can hear the sound. Repeat until your partner is 50 steps away.

Figure 1. How to set up the investigation



Child drops ball from measured height

Measured distance (steps)

Partner faces away and raises hand if they can hear



### Fair testing

We are trying to keep our test fair. We are only going to change one thing.

The thing that we are changing (the variable) is:

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The thing that we are measuring is:

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We are trying to keep everything else the same, including:

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Table showing the minimum height at which a ball needs to be dropped to be heard at different distances

	Minimum height at which the ball needs to be dropped to be heard (cm)	
	Prediction	Observation
10 steps		
20 steps		
30 steps		
40 steps		
50 steps		

### Completing the line graph

Line graphs are useful to show changes over time. They are also useful to show the relationship between two numbers, in this case the height and the distance. Use your observations to complete the line graph. Add 5 small crosses and connect them using straight lines drawn with a ruler to form one long line.

### Discussion

Were your predictions accurate?  
 Is there a pattern to your results? Can you explain it?  
 What happens to the minimum height needed to make a sound as the distance increases?  
 How does dropping the ball from higher up affect the sound?  
 How does being far away affect how well you can hear the sound?

Line graph showing the minimum height at which a ball needs to be dropped to be heard at different distances

