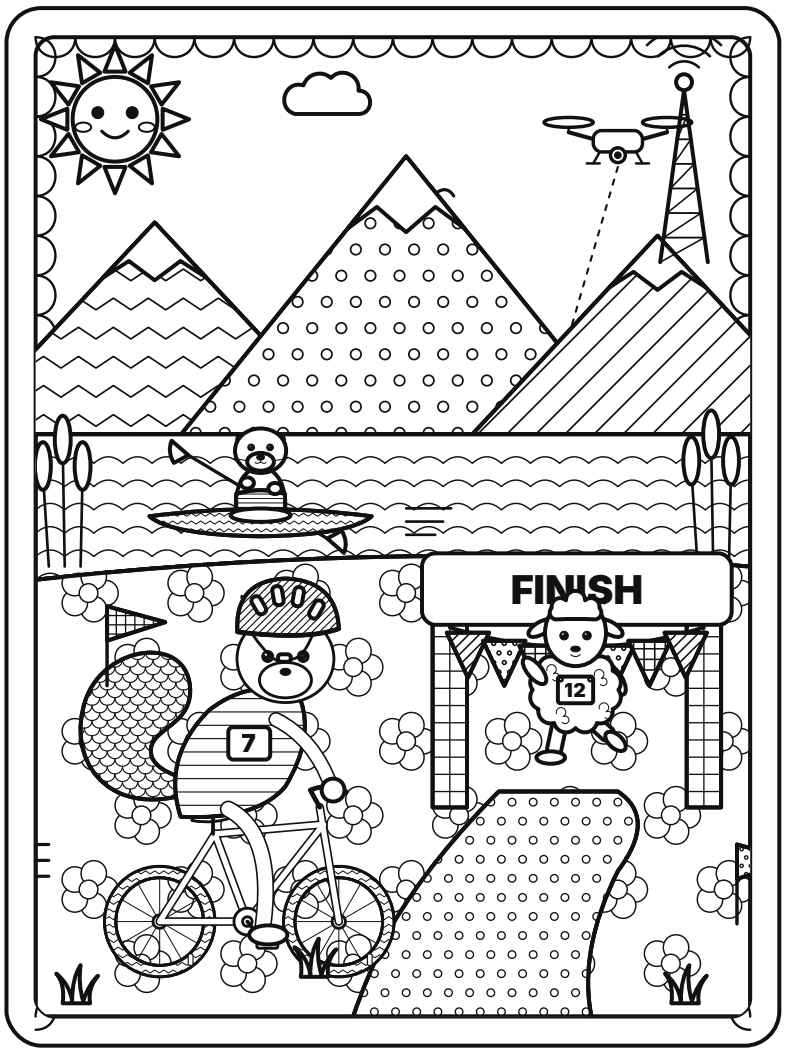
REAL-LIFE SCIENCE

Applications of Science

Workbook for National 3 Science

Unit: Applications of Science



C. Blewis

Blewis LEARNING

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How to use this book

This book is about science in everyday life: how we send messages around the world, the new materials we make and use, and how science helps us spot and reduce risk. Each topic follows the same pattern, so you always know what comes next.

EACH TOPIC HAS

Opener	the story for the topic, what you will learn and the key words
Learn pages	short explanations with diagrams, and questions to try
Practical	You follow the method, record your results, draw a graph, and say what you found.
Brain break	a calm puzzle or colouring page
Check-up	a few questions to show what you know, and a checklist

PRACTICAL WORK: STAY SAFE

- Only start a practical when an adult says it is OK.
- Read the whole method and the Stay safe table first.
- Tell your teacher about anything that might affect you, like asthma or an allergy.
- Stop and tell an adult if you feel unwell or something goes wrong.

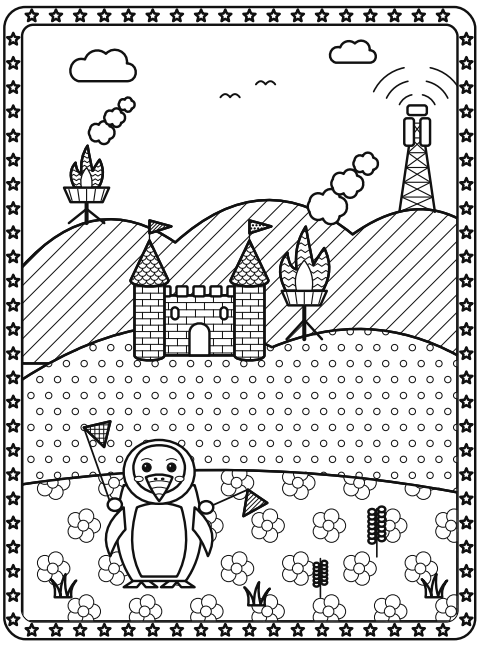
NO LAB TODAY?

Every practical has a set of example results. If you could not do the experiment, use these to finish the results, graph and conclusion.

DOODLE CORNERS

Some pages have a doodle corner. Colour it or doodle in it when you need a short break.

Sending signals



A text can reach the other side of the world in under a second. Long ago, a message travelled only as fast as a horse, or a fire lit on a hilltop.

Theme: beacon night. Glen Arrin lights the old beacon on Carn Beag every autumn. This year Isla and Finn are helping the history group, and want to find out how messages were sent before phones, and how they travel now.

IN THIS TOPIC YOU WILL LEARN TO

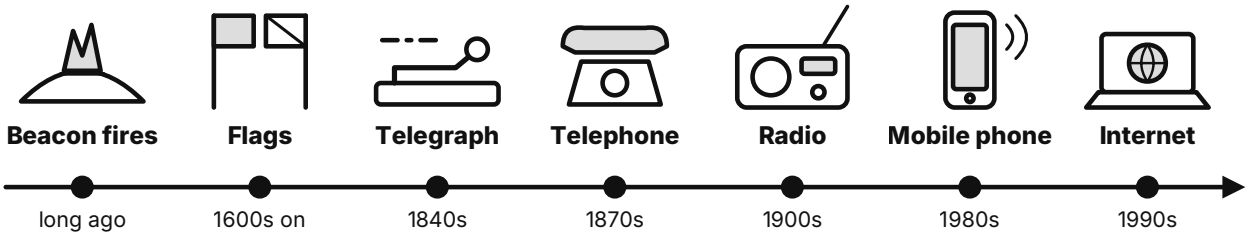
Skill 1	describe some ways people have sent messages, from beacon fires to the internet
Skill 2	say that signals can travel as sound or as electromagnetic waves, like radio and light
Skill 3	test how well a string telephone carries a message

KEY WORDS

Signal	a message sent from one place to another
Sound wave	a vibration that travels through air, water or solids
Radio wave	an invisible wave that carries signals through the air and space
Digital	a signal made of on and off pulses (1s and 0s)
Morse code	a code of short and long signals: dots and dashes

❶ From beacon fires to the internet

People have always needed to send messages. Long ago, a fire lit on a hill could warn the next village. Later people used **flags**, then **electric wires**, then **radio**. Today a **mobile phone** can send words, pictures and video almost instantly.



KEY FACTS

Long ago	messages could only carry a little information, like 'danger!'
Today	messages carry lots of information and reach anywhere in the world in seconds

1 Which way of sending messages is the **oldest** on the timeline?

Answer: .....

2 Circle the right word.

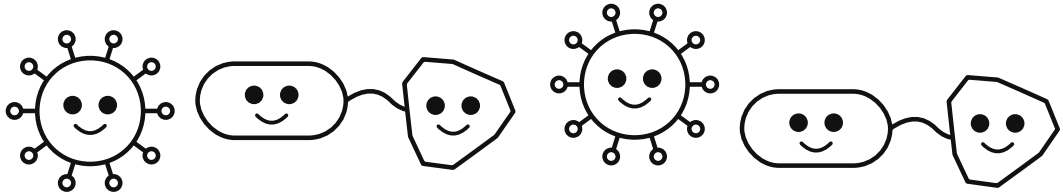
A beacon fire can send (lots of) / (only a little) information.

A mobile phone can send pictures (in seconds) / (in days) .

3 Write **two** ways you send messages to friends or family.

Answer: .....

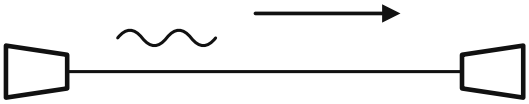
DOODLE CORNER



❷ Sound or radio?

A signal must travel from the **sender** to the **receiver**. Some signals travel as **sound waves**. Sound is a vibration, so it needs something to travel through, like air, water or a string. Other signals travel as **electromagnetic waves**: **radio waves**, **microwaves** and **light**. These can even travel through space, and they are much, much faster than sound.

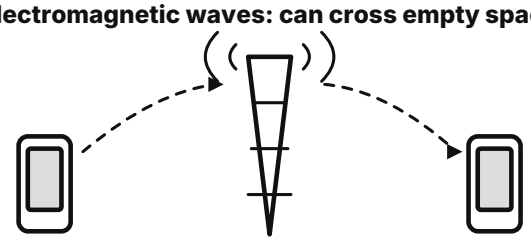
Sound: needs something to travel through



vibrations travel along the string

about 340 m/s in air

Electromagnetic waves: can cross empty space



radio waves and microwaves

300 000 000 m/s

DID YOU KNOW?

Light and radio waves travel about **a million times faster** than sound. That is why you see lightning before you hear the thunder.

1 Circle the right words.

A string telephone sends the message as (sound) / (radio waves) .

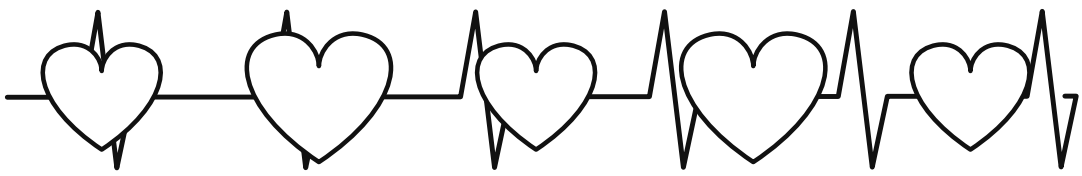
A mobile phone sends the message as (sound) / (radio waves) .

Sound (can) / (cannot) travel through empty space.

2 Which is faster, sound or light?

Answer: .....

DOODLE CORNER



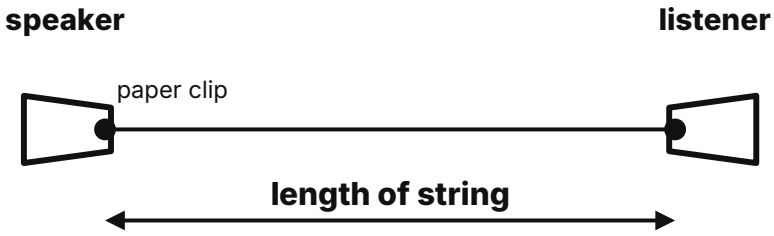
PRACTICAL 1

How far can a string telephone reach?

AIM To find out how the **LENGTH OF THE STRING** affects how many words the listener hears correctly.

WHAT YOU NEED

- Two paper cups
- 10 m of string
- Two paper clips
- Tape measure
- Word cards
- A partner



keep the string tight and not touching anything

Stay safe

Read each hazard. Write how you will stay safe. The last one is done for you.

Hazard What could cause harm?	**Risk** What could happen?	**Control** How will I stay safe?
String stretched across the room	Someone trips over it or walks into it	
Pulling the string very tight	The cup pulls out of a hand and hits someone	
Sharing cups	Spreading germs	Use your own cup for speaking. Do not put it in your mouth.

Method

Do each step in order. Swap jobs halfway through if you like.

1. Make a small hole in the bottom of each cup. Push the string through and tie it to a paper clip inside each cup.
2. Stand **2 m** apart. Measure with the tape. Pull the string tight. It must not touch anything.
3. The speaker reads **10 words** from a card into the cup in a normal, quiet voice.
4. The listener holds the cup to their ear and writes down each word they hear.
5. Count how many words were heard correctly. Write it in the table.
6. Move apart to **4 m, 6 m, 8 m** and **10 m**. Use a new word card each time.

Results

Length of string	Words heard correctly (out of 10)
2 m	
4 m	
6 m	
8 m	
10 m	

FAIR TEST

The speaker uses the **same voice** each time, and the string is always **tight**. Only the length changes.

NO LAB TODAY? USE THESE RESULTS

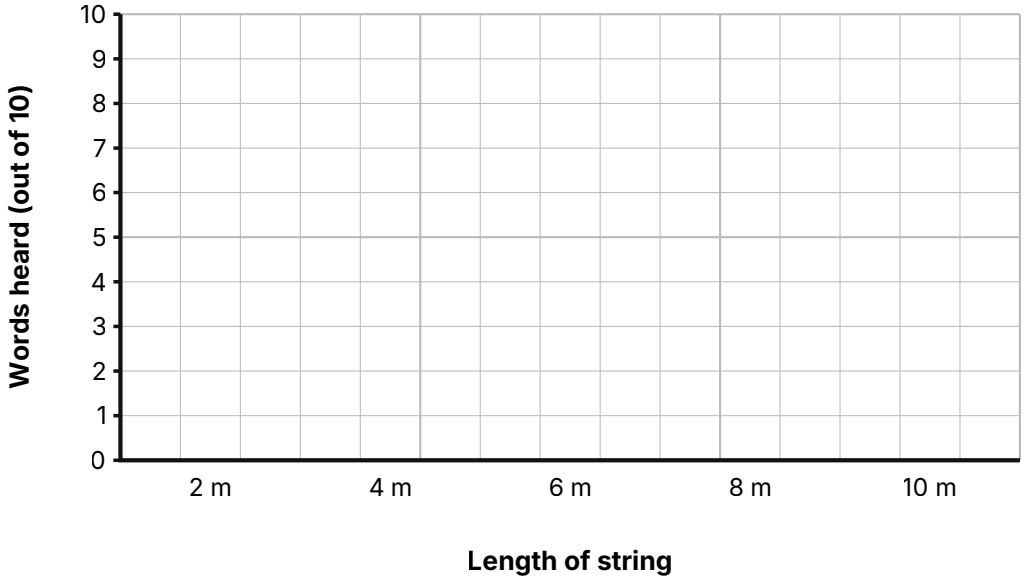
Length of string	Words heard correctly (out of 10)
2 m	10
4 m	9
6 m	7
8 m	6
10 m	4

These results are from Mia and Owen.

What did you find?

1 Draw a bar chart

Draw a bar for each length of string.



2 Conclusion

Circle the right words.

The longer the string, the (more) / (fewer) words were heard correctly.

3 Why does this happen?

The sound travels along the string as (vibrations) / (electricity) . In a longer string, more energy is lost, so the sound is (quieter) / (louder) .

4 How could we make it better?

Tick **one** idea and say why it would help.

- ☐ Repeat each length three times and find the average
- ☐ Record the words so they are said the same way each time
- ☐ Do the test in a quiet room

It would help because .....

FREE SAMPLE

Applications of Science (N3 Science)

This sample shows a few pages. The full printed workbook is available from Amazon.

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