



TEACHER'S NOTES

STAYING WARM
& KEEPING COOL

OVERVIEW

Aimed at **key stage 2** (7-9 years)

(Prep time 10 mins/Class time 40 mins)

Learners investigate a range of materials in the classroom, touching them to identify whether they are thermal conductors or thermal insulators. They then work individually to plan the appropriate clothes to pack for hot and cold destinations, and in pairs to categorise everyday objects as conductors or insulators.

LEARNING OBJECTIVES

- To understand the terms thermal conductor and thermal insulator
- To categorise materials as thermal conductors or thermal insulators

CURRICULUM LINKS

- Scientific and technical understanding: explore and observe in order to collect data and describe and compare their observations and findings
- Scientific and technical understanding: sort, group and identify familiar living things and materials according to observable features and properties

you will NEED

- An **Expedition kit worksheet** for each learner
- A **Conductors and insulators worksheet** for each pair
- Pens, pencils, scissors and glue

Activity

- Start by talking about objects in the classroom and whether they feel hot or cold. Ask learners to feel the top of their desk, the glass in a window, something made of metal (for instance a filing cabinet or door handle) and something made of fabric (for instance a curtain or item of clothing). Does each material feel hot or cold?
- Explain that some materials let heat travel through them (known as thermal conductors). This means that they may feel hot or cold. Other materials do not transfer heat (known as thermal insulators), and feel neither hot or cold. From the materials the learners touched, which do they think might be good insulators or conductors?
- Metal is a thermal conductor. Glass, wood, cotton, nylon and wool are thermal insulators. We use materials like cotton, nylon and wool in clothes, because they do not take the warmth away from our bodies. The same materials can be used to keep food or drinks cold, because they do not transfer warmth from the air to the food.
- Give each learner an **Expedition kit worksheet** and ask them to draw the clothes they will pack for each destination. Do any of them choose the same clothes for different adventures? Even though one destination is hot and one is cold, some clothes might be useful for both destinations. For example, a vest worn under other clothes could help you stay warm in Antarctica, or cool in the tropics.

Ask learners to get into pairs and give each a **Conductors and insulators worksheet**. Learners should cut out the different objects and place them on the scale according to whether they think they are good thermal conductors or good thermal insulators.



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Activity

continued

- Based on the thermal conductivity of the materials, the objects should appear in the following order (starting with good thermal conductors): copper kettle, aluminium foil around a turkey, stainless steel spoon, concrete building block, sawdust hamster bedding, wool scarf, paper coffee cup, felt cap, cotton shirt, plastic spoon. If learners wrongly categorised any object, question them about what the purpose of the object is, and whether they would want heat to travel through the material or not.

EXTENSION

- Design an experiment to test the insulation properties of materials using a hot or chilled cup of water. Wrap the cup in different materials (for instance, bubble wrap, brown paper, silver foil or cotton wool) and take regular measurements with a thermometer to see which material keeps the water warm or cool the longest.

FURTHER information

- This multiple choice quiz about keeping warm can be used on a whiteboard:
www.bbc.co.uk/apps/ift/schools/ks2bitesize/science/quizengine?quiz=keepingwarm&templateStyle=science
- This video provides a quick introduction to wetsuits and drysuits, and how they keep people warm:
www.bbc.co.uk/learningzone/clips/drysuits-wetsuits-and-insulation/2169.html

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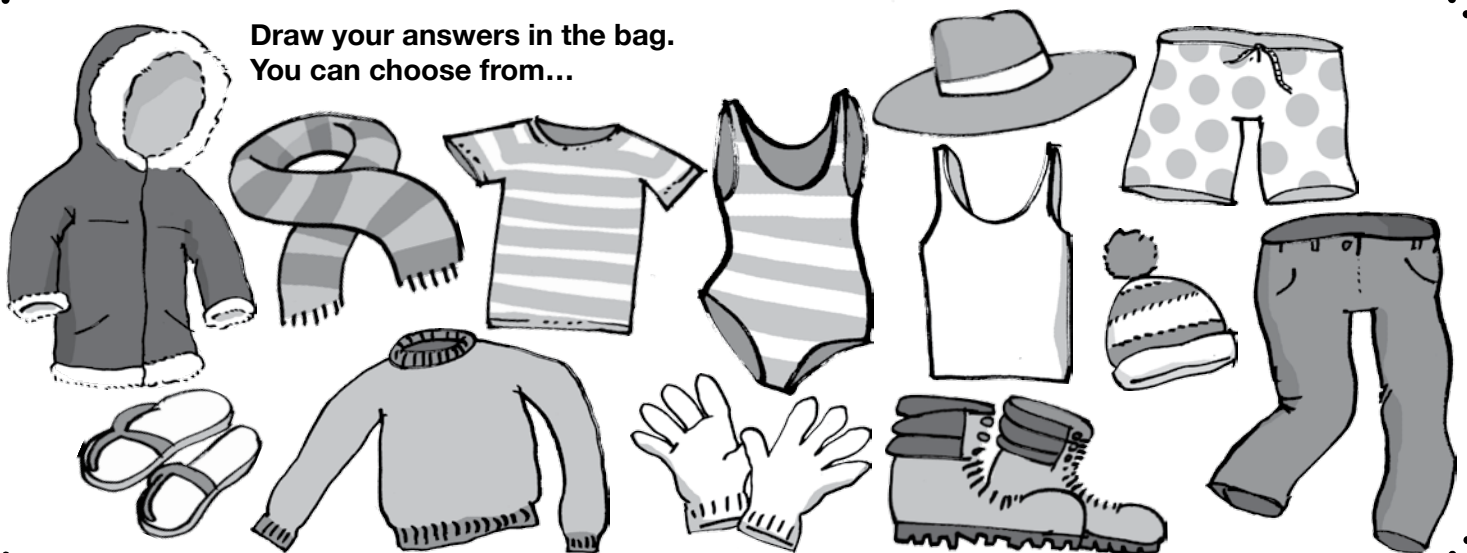
EXPEDITION KIT

ICE ADVENTURE

You are going on an expedition to the Antarctic and need to pack your bag. What clothes will you take?



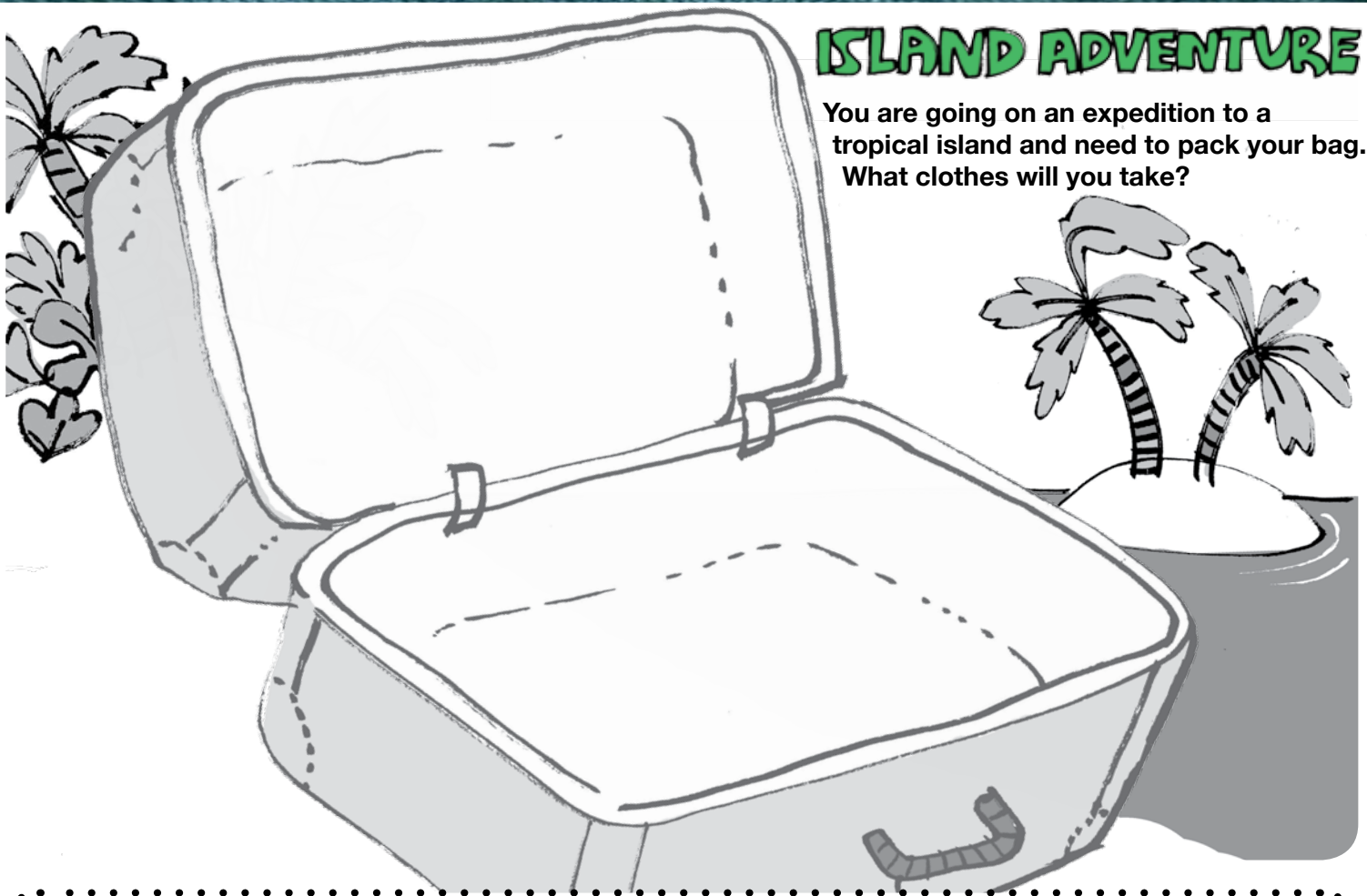
Draw your answers in the bag.
You can choose from...



EXPEDITION KIT

ISLAND ADVENTURE

You are going on an expedition to a tropical island and need to pack your bag. What clothes will you take?



Draw your answers in the bag.
You can choose from...



Why did you choose the clothes you did? _____

Did you choose to pack any of the same clothes for both adventures? _____

If so, why? _____

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CONDUCTORS & INSULATORS

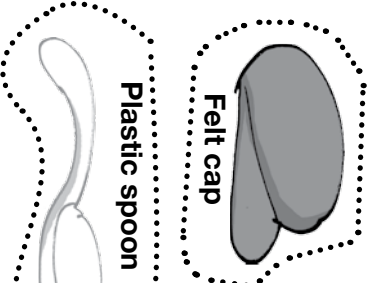
PUPIL WORKSHEET

Some materials let heat travel through them. These are known as thermal conductors. Other materials do not transfer heat. These are known as thermal insulators.

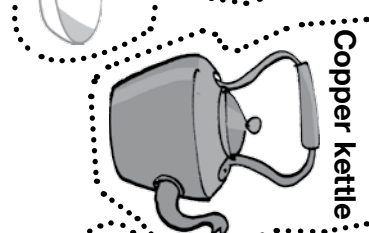
Knowing whether a material is a conductor or an insulator can help us decide what to use it for.

Can you cut out the objects below and stick them in the right place on the scale?

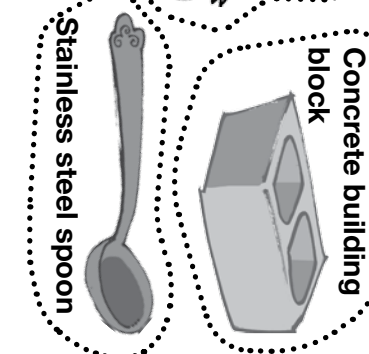
Think carefully about whether you want heat to travel through the object or not...



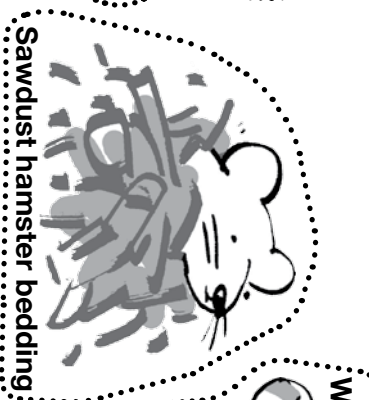
Felt cap



Copper kettle



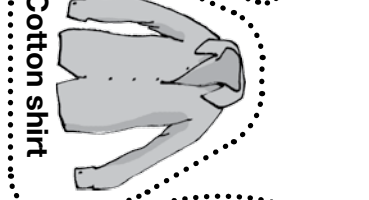
Concrete building block



Stainless steel spoon



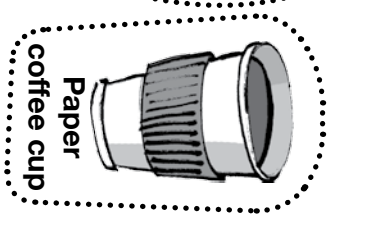
Sawdust hamster bedding



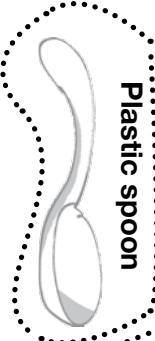
Wool scarf



Aluminium foil around a turkey



Paper coffee cup



Plastic spoon

Good thermal conductors

Bad thermal conductors

