Heat Lesson 1 | Lesson Outline

Learning intention:
To understand that heat can be transferred between objects, and that this is one of the main science ideas behind how heat pumps and other heating systems work.

Learning Lab

Resources **Introductory Video** – Heating our Homes (4mins 25secs) **Instruction Slides** – Heat Transfer Investigation **Worksheet 1** – Heat Transfer Investigation **Worksheet 1** – Answers **Teacher Instructions** – Heat Charades	**Per group or pupil** 5 ice cubes 5 small bowls Sticky tape Scissors Cooking foil, roughly A4 Water Tea towel/other fabric Plastic carrier bag/bubble wrap

Hook into the lesson

Play **Introductory Video – Heating our Homes.**

The video introduces the topic of heat, focusing on heat pumps, which is a technology that could be used to replace gas central heating systems in UK homes and buildings.

The video asks the following question, giving opportunity to pause and discuss (or pupils could write individual answers):

- **What examples can you think of where heat moves from one thing to another when they come into contact with each other? (2mins 36secs)**

Activity

Pupils will carry out an investigation into the transfer of heat, by melting ice cubes in contact with different materials. They will be introduced to the concept of heat transfer and will answer questions related to the best materials to use in a home heating system.

This activity can be run either as:

- An individual activity, if resources permit.
- A group activity, where the maximum recommended group size is 5.
- A class activity, where 1 or 2 stations are set up at the front, and pupils record their measurements from this set-up.

Give pupils the resources outlined above. Use **Instruction Slides - Heat Transfer Investigation** to guide pupils through the activity.

Give pupils **Worksheet 1 – Heat Transfer Investigation.** Pupils will make notes on the melting of ice cubes insulated by different materials and consider why it's important to understand the properties of materials used in home heating systems.

Pupils will be asked to create a bar graph showing the results of the investigation.

While the investigation is being carried out, facilitate a game of heat charades using **Teacher Instructions - Heat Charades.** Pupils will act out different objects that release heat to their surroundings, and discuss whether the heat is useful, wasted, or both.

Use **Instruction Slides - Heat Transfer Investigation** to explain heat insulators and conductors.

Plenary

Lead a class discussion on the results of the heat transfer investigation, using the following questions:

Q: Why do you think there was an ice cube not wrapped in any material?

A: It acted as a control, allowing us to see what would happen to an ice cube without any material wrapped around it, and compare how well the materials could keep the ice cube cold.

Q: The materials we choose to make things with are important because they change how the object works. Have a look around the room and see what things are made from. Why has it been made using that material?

Q: Homes in the UK are usually well insulated. What effect does this have when temperatures are high during summer?

A: Heat is trapped inside the house, making it very hot inside. People need to use fans to cool down.

Q: What would happen if heat couldn't move from one thing to another?

A: Explore all answers. Example answers below.

We wouldn't be able to:

- *heat homes*
- *cook food*
- *boil water in a kettle*
- *warm up with a hot water bottle or electric blanket*
- *freeze water into ice*
- *keep food cold in the fridge*
- *dry hair using a hairdryer*