# CHAPTER 4: Investigating Insulation

## Aim

The aim of this chapter is to introduce children to insulation, and to investigate insulators, and how they work.

## Overview of Chapter

Children explore insulation by looking at how certain materials are good at stopping the movement of heat. Children discuss which materials they think are good and bad insulators. They then plan and conduct an investigation on insulation.

## Working Scientifically Skills

Through discussing, engaging with and reflecting on the investigations in this chapter, the children will be using the following working scientific skills:

- Observing and questioning
- Predicting
- Investigating and developing fair test investigations
- Measuring
- Recording and communicating
- Analysing

## Primary Science Curriculum link

Strand unit: Heat; properties and characteristics of materials

**Lesson link**

Junior and Senior Infants Programme Chapter 4 Lesson 2: Recording temperature

1st and 2nd Class Programme Chapter 4 Lesson 1: Observing a thermometer and Lesson 2: Recording and taking the temperature

# Lesson 1 – Insulation in everyday life

**Resources**

IWB 9 / PowerPoint 9: Clothes for different environments

## Activity type: Discussion

Use IWB 9 / PowerPoint 9 to encourage children to discuss different types of clothes people wear in different countries. IWB 9 / PowerPoint 9 also provide children with opportunities to learn about materials that are good insulators.

### Questions to promote discussion

1. What kind of clothes are the different people wearing?
2. What kind of clothes are the people wearing in sunny, hot, cold and cloudy climates?
3. Why do you think they wear these types of clothes?
4. Is there anything similar about the type of clothes people wear in hot, sunny, cold and cloudy climates?
5. Why might people wear light coloured clothes in hot and sunny climates?

**Extension**

Activity from the book Guzzler Investigates Energy: Insulation (page 22)

Investigation from the book The Energy File: Insulation (page 23)

Lesson plan Don't lose your cool

www.seai.ie/teaching-sustainability/primary-school/resources-for-teachers/

# Lesson 2 – Keeping hot things hot

**Resources**

IWB 10 / PowerPoint 10: Guzzler has a problem keeping his hot chocolate hot

PCM 10: Planning your investigation

PCM 11: Recording your investigation

Per group: 3 cups/mugs/beakers (must all be the same size), hot chocolate powder, spoons, measuring jugs, 1 thermometer, newspaper, bubble wrap, cloth, kitchen paper, scissors, cellotape, lids and elastic bands.

## Activity type: Investigation

**Teacher note:** In this investigation the children make a warm drink and test different materials to see which is best at keeping their drink warm. It is not necessary to use very hot water.

Using **IWB 10 / PowerPoint 10** discuss Guzzler's problem:

Guzzler's hot chocolate drink keeps getting cold very quickly. Can you make a cup cosy that would help keep Guzzler's hot chocolate warmer for longer?

### Investigation question: "Which material will keep Guzzler's hot chocolate warmest for longest?"

In groups the children discuss an investigation they could do to help Guzzler.

Provide the children with the equipment they could use to carry out their investigation. In groups the children discuss ways they could carry out the investigation and record on the planning sheets **(PCM 10).** They carry out the investigation and note their results on the recording sheets **(PCM 11).**

### Questions to promote fair test investigation

1. How are you going to carry out the investigation?
2. What are you going to keep the same? *(the cups, the amount of water, the same starting off temperature of water, lid)*
3. What are you going to change? *(the material)*
4. How are you going to make sure your test is fair?
5. Would it be fair to put less hot chocolate in one cup? Why?
6. Would it be fair to wrap the tinfoil around the cup twice and the bubble wrap once? Why?
7. Would it be fair to use a large piece of cloth and a small piece of newspaper to make the cup cosy? Can you explain why?

**Teacher note:** Encourage children to design their own recording table. A sample is given below.

| Insulator | Time 0 mins | Time 2 mins | Time 4 mins | Time 6 mins | Time 8 mins | Time 10 mins |
|---|---|---|---|---|---|---|
| Newspaper | | | | | | |
| Tin foil | | | | | | |
| Bubble wrap | | | | | | |

After the investigation discuss findings with the class.

### Questions to promote discussion

1. Which material was best at keeping the hot chocolate hot?
2. Why do you think it was the best material? *(it stopped the heat getting out of the beaker)*
3. How do you know? What did you record?

# Lesson 3 – Keeping cold things cold

## Resources

**IWB 11 / PowerPoint 11: Guzzler has a problem keeping his drink cold**

**PCM 10 and 11: Planning and results' sheets**

Per group: 3 small plastic bottles with lids, bubble wrap, newspaper, tinfoil, scissors, ice, cold water, 1 thermometer, scissors, cellotape and elastic bands.

## Activity type: Investigation

**Teacher note:** An insulator is a material that prevents the transfer of heat from a warm environment to a colder environment. Most children will understand that insulators are also good at keeping hot things hot. However, they may not realise that an insulator is also good at keeping cold things cold. Namely because they slow down the movement of heat.

Use **IWB 11/ PowerPoint 11** to discuss Guzzler's problem:

Guzzler has a problem his cold drink gets hot very quickly. Can you make a cosy that would help keep his cold drink cold for longer?

### Investigation question: "Which material is best for keeping Guzzler's cold drink cold?"

**Teacher note:** This investigation can be carried out in a similar manner to the investigation that was carried out in Lesson 2: Keeping hot things hot.

### Questions to promote discussion of Lessons 2 and 3

1. What did both investigations have in common? *(The same materials).*
2. What material was best for keeping the cold drink cold? Was this material the same material that kept the hot drink hot?
3. What does this tell us about insulators? What can they do?

## Extension

Investigation from the book **The Energy File: Insulation (page 23)**

Lesson plan: **Don't lose your cool, investigating hot and cold** which can be downloaded from: **www.seai.ie/teaching-sustainability/primary-school/resources-for-teachers/**