

# Resistant Materials in our Environment

## Lesson 1: Sorting materials

### Learning Objectives:

For pupils to:

- know the names and identify the materials used in common products and the environment;
- know the source of these materials;
- understand that there are a variety of ways that materials can be classified ie by source, properties, use and disposal.

### Resources:

- A wide range of containers designed to carry drinks eg a cup, mug, glass, paper cup, plastic reusable beaker, polystyrene disposable cup, aluminium can, milk bottle, wine bottle, resealable glass bottle, plastic bottle, insulated flask, drinks cartons, plastic sauce bottle, etc. Make sure each container comes complete with lid, cork etc.
- White board.
- Photocopy of Activity Sheet 1 for each pair of pupils.
- Enlarged copy of Activity Sheet 1 to be used as a visual aid.

### Activity:

This lesson consists of two distinct activities.

Tell the pupils that they are going to take part in a series of lessons called 'Resistant Materials in our Environment'.

Explain that they will:

- consider how the choice of materials we use effects the environment;
- eventually design and make something to improve the environment;
- firstly they'll revise their knowledge of materials.

Ask the pupils what they think a *resistant material* is. (*A material that is durable, that stays in the same condition for a long time.*) Show the pupils the collection of containers designed to carry drinks. Explain that these are all made of resistant materials. Ask the pupils to suggest materials that would not be resistant if used to make drinks containers (*eg ice, soil, sawdust, salt*).

Now tell the pupils that they are going to take part in two activities. Firstly you are going to challenge the class. Show pupils the set of drinks containers. Tell them that you are going to select containers with a common characteristic. Ask the pupils to identify the characteristic and to suggest any other containers that could fit in the selected set. Explain that there at least five ways the containers could be *sorted* or *classified*. List the words *materials, properties, uses, origin* and *disposal* on the white board.

As you make a selection indicate which of these criteria you are using.

Firstly select containers containing a similar material (glass, plastic, metal etc.). Encourage pupils

to look closely at the selected containers. You may need to draw attention to less obvious components such as the lids or inner linings of some containers.

Now select containers made of materials with similar properties (transparency, strength, flexibility, etc.).

Progress to containers with similar uses (ie containers that are designed to be: resealed when opened, disposed after a single use, insulated for hot or cold liquids, reusable after cleaning etc).

Now select containers that contain materials of similar origins ie they are principally made of materials that were: quarried or mined, grown on trees and other plants.

Finally select a set of containers with a common method of disposal (they are designed to be thrown away, recycled or reused).

Select pupils to challenge the class. Encourage the pupil to identify the criteria for their selection.

Now progress to the second activity. Give each pair of pupils a copy of Activity Sheet 1.

Tell the pupils that they are going to work together and share knowledge to complete the first question.

Using the enlarged copy of the worksheet select a material to demonstrate how to complete this question.

Select an *aggregate* material such as plaster or asphalt as aggregates may not have been identified in the first activity.

Material and where it is used: *Plaster on the walls of the classroom. Asphalt on roads.*

Why has it been used? (use and properties): *Plaster is smooth, strong and hard wearing in a dry situation. Can be decorated with a variety of finishes some of which are reflect light and are easy to clean. Asphalt provides a smooth and hard wearing surface.*

Where did the material come from? *Plaster is a quarried material, made from a crystalline rock called gypsum that has been crushed and heated to drive off the water. When it is prepared for use, water is added again and it re-crystallises, producing a smooth finish. Asphalt is made from a combination of 'fines' (little pieces of rock) plus aggregate (bigger pieces of rock) which are heated together with oil and spread. It goes hard when cool.*

Give the pupils time to complete the first question then bring the class together and discuss their answers.

List the different materials they have identified on the white board and discuss which are *renewable* and which are *finite*.

Establish why it might be preferable to use renewable materials in preference to finite materials when considering the needs of the environment (*renewable materials can be replaced; finite materials will be exhausted at some time in the future*).

Now focus on the second question on the activity sheet.

Ask the pupils to carefully consider the materials listed on the white board. Ask what will happen to them when they are no longer needed for their current purpose. Discuss the four possible outcomes: *reused, recycled, composted, thrown away and either dumped in landfill or incinerated*. Give the pupils a short time to discuss and complete the task.

In the final plenary session discuss the pupils' answers.

Explain that reusing, recycling or composting are all usually environmentally preferable to either landfill or incineration when disposing of used materials.

Establish that when considering the needs of the environment pupils need to look at the complete life cycle of the material ie from origin to disposal.

# Resistant Materials in our Environment

1. Work with a partner. Look around the classroom and through the windows. Identify at least three different materials that have been used in the school and complete this table.

Material and where is it used?	Why has it been used? (uses and properties)	Where did the material come from? (origin)

2. Think about the materials in the school environment. What will happen to them when they are no longer needed? (disposed of). Write their names in the correct column.

These materials will probably be			
Reused in another environment	Recycled into similar material	Composted	Thrown away or incinerated