













Topic: Investigating physical changes to materials

Consolidating properties and purpose

Lesson concepts

-   Everyday materials can be physically changed in a variety of ways
-  Science involves asking questions and describing changes
-  People use science in their daily lives
-   Questions can be responded to, posed and predictions made
-   Investigations can explore and answer questions
-  Information can be sorted
-  Observations can be compared with others
-   Observations and ideas can be represented and communicated

Today students will:

- ▶ understand that the physical changes we can make to a material, and what we use the material for, are affected by its properties.

Resources

Digital

Sheet 10 — Investigation: Containing water

Find and prepare

Mug

Challenge 1 — piece of fabric (approx. 30 × 30 cm), 2–3 pieces of cardboard (food packages or scrap), 2–3 sheets paper (A4 or bigger, any type), 15–20 iceblock sticks, 10 pipe-cleaners, 2 m wool, scissors

Challenge 2 — piece of fabric (approx. 30 × 30 cm), sheet of paper (A4 or bigger, any type), 2 m wool, scissors, clay and/or waterproof modelling clay (a 5–7 cm ball), sheet of aluminium foil (approx. 30 cm long), piece of air-filled packaging (for example: bubble wrap), water bottle with water

Key terms

flexible, material, observe, physical change, property, waterproof

For definitions and explanations of terms, please see the [Glossary](#).

Learning alerts

Be aware of students using materials without being able to explain what properties make it suitable.

Suggested next steps for learning

Suggest substitutions of unsuitable materials to focus student attention on the properties of suitable materials.

Lesson

Consider a material's ability to hold its shape

1. Display a mug.

Say to students

‘ In this Science lesson you are going to have some fun completing some challenges using your knowledge of materials and physical change. Look at this mug which has been made by a variety of physical changes. ’

Focus questions

Q. *What words would you use to describe this object and what material it is made from?*

A. For example: It is a mug. It is smooth and shiny. It's blue. It has a handle and it's bigger at the bottom. It has curved sides. It's made of clay.

Q. *If this (for example: mug) was made from a solid piece of (for example: clay), what changes do you think were made to the clay?*

A. For example: The clay was cut into two pieces — a small piece for the handle. The big piece was rolled and a hole pushed into it. Then the sides were squeezed. The handle was rolled and pressed on the side. It was dried and painted blue.

2. Explain Challenge 1 to student.

Say to students

‘ The first challenge is about a material's ability to hold its shape. The challenge is to make a structure from a **single** material which will stand up by itself. You may make physical changes to the material (for example: cut, bend, roll, curl, twist, fold) but you may not use adhesive tape, staples or glue. It only needs to be about 20 cm high but it must stand up by itself without you holding onto it. ’

- a. Provide the selection of materials (fabric, cardboard, paper, iceblock sticks, pipe-cleaners, wool).

- b. Allow time for students to explore and make physical changes.
- c. Students choose a single material to make a structure by making physical changes.
- d. Discuss student's choice and why the material was best suited to hold shape and what its properties are.

Investigate a material's ability to contain water

3. Explain Challenge 2 to students.

Say to students

“ In Challenge 2, you will explore a material's ability to contain or hold water. You will need to think about the materials and whether they are waterproof or not waterproof. Remember, a **waterproof** material is one which does not let water go in or through it.

You will need to examine the materials and choose a single material to make a cup or bowl which can contain water. You may make physical changes to the material (for example: cut, bend, roll, curl, fold) but you may not use sticky tape, staples or glue. ”

- a. Display **Sheet 10** — [Investigation: Containing water](#).
- b. Provide the materials (paper, wool, fabric, air-filled packaging, clay or waterproof modelling clay, aluminium foil).
- c. Explain that students can select from any of the materials but can only use one type of material to make the bowl or cup which can contain water.
- d. Circle the material chosen.
- e. Ask students to predict whether the material is suitable and record student response on **Sheet 10**.
- f. Allow time for students to explore and make physical changes.
- g. Ask students to list action words to describe the changes made (for example: roll, fold, mould, shape) and to draw their container on **Sheet 10**.
- h. Give students the water bottle to fill and test their cups/bowls and record student responses about results on **Sheet 10**.
- i. Share observations about which materials are best suited to the purpose and identify their properties.

Consolidate learning

Say to students

“ We have looked at how everyday materials can be physically changed for a purpose. People use their knowledge about materials, their properties and the changes that can be made to materials in their daily lives. Can you think of an example? ”

Focus questions

Q. *What are the properties of the (for example: clay) which allowed it to be changed into a (for example: mug)?*

A. For example: The clay is flexible and soft to start with. It holds its shape when you make it into something. It dries hard and can be painted. Then it can hold tea and coffee.

Q. *What properties make a container suitable to hold water? Why? (Think about the properties of the material.)*

A. For example: Something waterproof so it can go in the water.

Q. *What sort of clothing is good to wear when it is raining?*

A. For example: A raincoat because it is made of a waterproof fabric and the rain won't get through.