

## Topic - science Changing materials / Design and technology

Insulation is often wrapped around containers when we need to keep something very cold or very hot. Think about lunch



boxes and how they are often slightly thicker materials; water bottles sometimes have two layers of plastic around them; flasks are made of metal and have an inside container and an outside layer.



### You will need

- a mixture of materials of your own choice.
- A small waterproof container (a small box or a jar that can be wrapped so that the lid can be opened during the experiment)
- four ice cubes
- a timer

<https://sciencing.com/build-not-melt-4-hours-5994104.html> for some ideas of materials that might be useful!

Your challenge is to make an insulated container of any size, that will slow the speed of melting of your ice.

You can wrap the container in anything that you think will protect the ice cubes from heat. Don't forget to insulate the lid as well as the sides and bottom of the container.



When you are ready, take some ice cubes out of the freezer, leave two of them on the side on a plate at room temperature.

Place two into your container and seal them in, though you will need to be able to check regularly to see when they have melted.

Set your timer going.

You will need to keep checking on your ice cubes every few minutes as you are watching to see when they have fully melted.

Complete the table to show your results.

Ice cube location	Time taken to fully melt
On a plate at room temperature	
In my insulated container	

Let us know how long you managed to keep your ice cubes for - this is how scientists and designers begin to find out how to make insulated containers used in our daily lives.

*Challenge: find out which materials are used most often to insulate things we need to keep cold. Pour very cold water into different waterproof containers, leave them for one minute each, then feel the outside of the containers, if they feel very cold the material is not a good insulator.*

### Science Materials - transparent, translucent and opaque and design and technology - understanding properties of materials

**Transparent materials** are clear or see through and we can see detail through them.

**Opaque materials** let no light through at all

**Translucent materials** let a bit of light through, but we can't see details through them.



When designers are choosing materials for new buildings they have to consider how much light will be needed by the people working inside. If for example we want to be able to see in and out of a building we will need **transparent** materials, however if we want light in a bathroom for example we don't want everyone to be able to see in so we would use a **translucent** materials that allows light to get in, but will NOT let people from outside the room, look into it!

You will need

- a selection of different 'flat' materials such as cloths, different types of paper, foil, card and plastics
- a torch (or the light from a phone)
- a book with text in it

Test 1

Hold each piece of material about one hand height over the text. Can you see the text and read it? If you can still read all of the detail, the material is transparent. Place it into one group.



## Test 2

Shine the light and hold each of the remaining materials one at a time above the light. Can you see the light through the material? If you can, the material is translucent. You will notice that the amount of light getting through can vary from very little, to a lot.



*This is something to think about if for example a designer wants to put up curtains in a room. Bedroom curtains are often either opaque or very little light can get through the fabric so that we can sleep even when it is getting light at four o'clock in the morning but during the day we have netting so that light can get in without other people seeing in!*

## Group 3

Any materials that are not letting any light through are known as opaque materials.

Take a photograph of the materials you have sorted, or record your results.

Transparent Lets ALL light pass through	Opaque Lets NO light pass through	Translucent Lets SOME light pass through



*Challenge : make a window using a frame made of card or even wood if you have any. Choose a suitable material for the window then make a set of curtains for your window using another material of your choice.*



Let us know how you have got on, we'd love to see your creations and designs!