WATMO: How scientists test what they can't see

This document is an overview of one of the WATMO activities we bring into schools. If you would like some more activities to try yourself, click here.

If you would like to book a free WATMO activities day to come to your school, click here.

Activity 1: What's in the box?

Learning objectives

Curriculum: Working scientifically	• asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions
Curriculum: Materials	• distinguish between an object and the material from which it is made • identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • describe the simple physical properties of a variety of everyday materials
Scientific takeaways	• That sometimes looking at an object isn't enough to know everything about it. Scientists need to use different and creative ways to find out certain things about materials • How the touch-based tests the children did form the basis for probes that investigate things too small to see

Activity overview: background

Watch Alex's video here, or read the below content for context to this activity

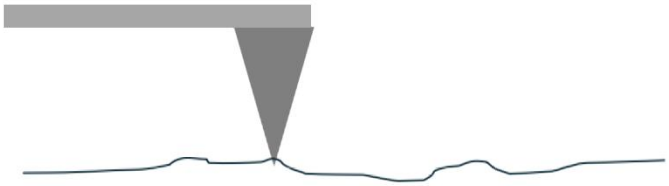
- Scientists sometimes work with objects that are so small no normal microscope can help you see them.
- Looking at objects doesn't tell you everything you need to know about them. For example, by looking at a rubber band, how will you know its stretchy before actually picking it up and stretching it?
- This means that sometimes scientists must find other ways to investigate objects. One way we can do this is by touch.

Experiment

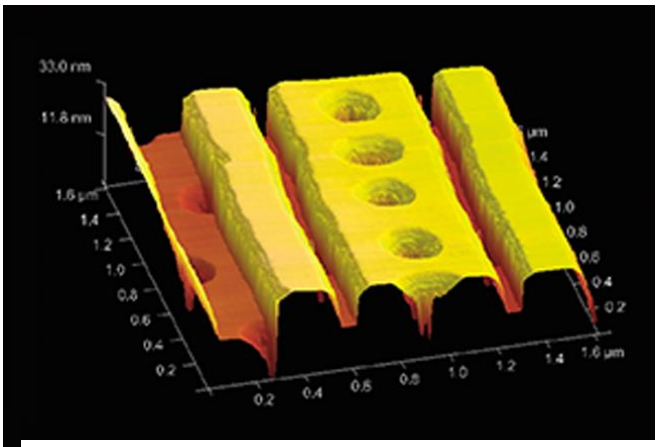
- The children are presented with a box with a secret object inside.
- They are encouraged to put their hands inside the object and feel it.
- The children then consider some key questions:
  - What shape is the object?
  - What properties does it have? Is it hard, stretchy, rough, etc?
  - How many different properties can you right down?
  - Can you tell what the object is made of?
  - What do you think the object is?
  - Can you draw the object based on what you felt?
- Once all the children have felt the object remove it from the box and have them review what they thought when they felt it.
  - How close was your drawing?
  - Were you right about what the object was?
  - Did feeling the object make it easier or harder to identify?
  - In what ways was touching the object better than looking at it?
  - What did feeling it tell you that seeing it does not?
  - In what ways was feeling worse than seeing the object?

Exercise 2: The pencil probe

- Some objects are so small scientists can't see them at all, even with microscopes.
- For these objects we use something called a probe. A probe is like a very small needle, that is so small it can feel all the small dips and changes in a objects shape.
- When a probe runs along an object, it tells a computer where it is and if it is touching anything. This is fed back to a computer, which turns it into information we can understand and paints a very zoomed in picture of what the probe found.



As the probe moves over a bumpy material it moves up and down: a bit like how you can feel when you go over speed bumps when you're in a car!



A picture of a tiny object made by a probe

Experiment

- The children are presented with clay tiles with small words etched into them that are difficult to see.
- The children will place a page over the tiles and run a pencil gently back and forth across the page. For best results use the pencil lightly and almost parallel with the page.
- Have them do this until the words slowly start to become readable.
- This is exactly how a probe works: the pencil is small and thin, so can detect the small bumps in the tiles.