# Makey Makey boards

Please refer to the online lesson plan on the DT Hub to access all website links and additional resources.

## Learning hook

At the start of each sequence of learning we wish to hook the learners and pique their curiosity about the learning to come. This learning hook can come in many forms, it could be a short video, a question, an image, a puzzle or any other prompt which promotes thinking and curiosity.

1. Begin the lesson by introducing the Steady hand tester or the Buzz wire game . This is a section of wire shaped into a series of bends. The game tests the steadiness of their hand by moving a small looped wand along the wire. If they hit the wire a buzzer goes off. The aim of the game is to move the wand from start to finish as fast as possible without making the buzzer sound.
2. Show the first part of either video and discuss how the game works. Note: This discussion should mention the idea of electricity and circuits. The game uses circuits and works by making a sound when the circuit is complete; touching the wand on the metal wire closes the circuit.
3. Provide students with the *KWHL chart*. Ask students to spend some time filling in the ‘knowledge’ section of the chart, listing as many ideas they have about electricity and circuits. Remind students that they do not need to worry if they have minimal information to fill in, as this is only the beginning of this learning sequence.

## Learning map and outcomes

Once we have engaged the learners with our learning hook, which starts to help them understand what and why they are learning, we need to reinforce the what and why by looking at our learning map. Our learning intentions help to contextualise the learning in the bigger picture of our progress and also give us specific outcomes for today’s sequence of learning.

1. Briefly discuss the learning intention of the lesson with students. State the aim of today’s lesson:
	* We are going to examine some components of digital systems and see how they may connect together to form networks to transmit data.
	* We are going to be investigating the scientific principles behind circuits and testing various materials for their conductivity.
2. Now that students understand what the learning intention of this lesson is, ask students to spend some time filling in the ‘wonderings’ and ‘how’ section of the KWHL chart. Before sending them away to complete the table, have a quick discussion about the ‘how’ section of the table, asking students about ‘What makes a good question?’

Note: If students have not used a KWHL chart previously, you may like to brainstorm the ‘wonderings’ and ‘how’ ideas as a whole class to model how to use these sections of the chart.  At this point it may be useful that curiosity is a mindset that we can adopt when developing wonderings.

## Learning input

Once learners understand what and why they are learning, there may be some learning input which will provide new knowledge. This could be a teacher or student modelling to the whole class how to create a simple algorithm in Scratch before the learners attempt this themselves. It could equally be a video tutorial, peer learning or exploration. The core commonality is that the learners acquire new knowledge which they will be able to use to construct deeper understanding. (We will explore different approaches to this in the individual pedagogical practice examples).

1. Show students the short video about circuits called ‘Explaining an electrical circuit’. Provide an opportunity for students to ask questions if they have any.
2. Introduce the Makey Makey Board to students. Explain to students that the board is an invention kit that enables people to interact with their computers by using everyday objects as a replacement for keyboards and mice. For detailed information that students can discuss, refer to *Information to discuss with students about Makey Makey* PDF with students.
3. Model on the interactive whiteboard how you can make the Makey Makey controller direct the arrow keys to complete the *Scratch Maze Starter.*
4. Introduce the investigation to students – that they will be choosing various materials to test their conductivity with the Makey Makey boards.
5. As a whole class, work through the ‘Preparation for Investigation’ section. Although students will have had experience with documenting scientific experiments previously, revisit what the following terms: aim, hypothesis, variables, fairness.

## Learning construction

Learning input should always be paired with learning construction. This is time when learners are actively constructing their understanding by doing. This is an opportunity to play with new knowledge, experiment, push boundaries, fail and retry, and it is essential in creating connections between new knowledge which is the foundation of genuine understanding. An example of learning construction may be ‘sandpit time’ where learners are allowed a period of time to simply play and build using the software they are learning.

1. In this section of the learning sequence, students are going to use the Makey Makey boards as a conductivity tester.
2. Before sending students off to do this, discuss different ways to record their data. What is a good method for collecting data? How could you create a data table? What different headings would you need in your data table? What is another method for displaying your data? (Graphing, pictorial representation.) Refer to *Example of student results* for an example of students results.
3. Ask students to use their conductivity tester to test a range of materials as conductors or insulators.
4. As a whole class, discuss the ‘Findings and analysis’ section of the Investigation Report. Suggested questions: What is a good way to summarise your findings? What is meant by ‘Was this a fair test?’ When we talk about challenges, what could this mean?
5. **Fast finishers**: If students have finished the activity ahead of others, you may like to provide them with the opportunity to complete the *Blobz Guide to Electric Circuits*. This is a self-paced online learning activity about electricity and circuits.

## Learning demo

In order to make their learning explicit, we should provide all learners with the opportunity to participate in a learning demo where they demonstrate their understanding of the knowledge set we determined in the learning outcomes. This is important not only for the learner to have the opportunity to share what they know, but also for you as a teacher to gather data on progress and make decisions about the next steps in learning.

1. As a whole class, discuss what has been discovered during the scientific investigation. Discuss the results and ask whether students predicted them correctly, or if they were surprised by the results.
2. Provide students with small pieces of paper on which they can write or draw the materials they tested.
3. Ask students to see if they can group the materials that have proved to be conductive/non-conductive. Discussion questions: What categories can you place the materials in (e.g. metal, wood etc.)? What patterns can you identify?
4. Introduce a few new materials to the list that have not been used in this session (Refer to *List of Conductive and Non-Conductive Materials* if you need ideas). Ask students to predict whether each material is a conductor or an insulator. For example, if they found that tin foil and copper wire were good conductors, which of the two options do they think a paper clip would be? Encourage students to record their predictions and learnings on their KWHL chart.

## Learning reflection

Ask students to reflect on their learning from this lesson. Provide some time for students to fill in the ‘learning’ section of the chart, listing as many things that they have learnt throughout this learning sequence as possible. Encourage students to make comment on the accuracy of their predictions.

If time permits, you may like to enable students to share some of their learnings with the whole class.
Collect KWHL chart as a record of their learning.

## Curriculum links

| Links with Digital Technologies Curriculum Area |
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| Strand | Content Description |
| Knowledge and Understanding | Examine how digital systems form networks to transmit data (AC9TDI6K02). |
| Processes and Production Skills | Investigate needs or opportunities for designing, and the materials, components, tools, equipment and processes needed to create designed solutions (AC9TDE6P01). |

| Links with other Learning Areas |
| --- |
| Learning Area | Strand and Content Description |
| **Science – Year 5** | **Nature and development of science**Examine why advances in science are often the result of collaboration or build on the work of others (AC9S5H01 )**Questioning and predicting**Pose investigable questions to identify patterns and test relationships and make reasoned predictions (AC9S5I01 )**Planning and conducting**Plan and conduct repeatable investigations to answer questions, including, as appropriate, deciding the variables to be changed, measured and controlled in fair tests; describing potential risks; planning for the safe use of equipment and materials; and identifying required permissions to conduct investigations on Country/Place (AC9S5I02 )Use equipment to observe, measure and record data with reasonable precision, using digital tools as appropriate (AC9S5I03 )**Processing and analysing data and information**Construct and use appropriate representations, including tables, graphs and visual or physical models, to organise and process data and information and describe patterns, trends and relationships (AC9S5I04 )Compare methods and findings with those of others, recognise possible sources of error, pose questions for further investigation and select evidence to draw reasoned conclusions (AC9S5I05 ) |
| **Science – Year 6** | **Physical sciences**Investigate the transfer and transformation of energy in electrical circuits, including the role of circuit components, insulators and conductors (AC9S6U03 )**Nature and development of science**examine why advances in science are often the result of collaboration or build on the work of others (AC9S6H01 )**Questioning and predicting**Pose investigable questions to identify patterns and test relationships and make reasoned predictions (AC9S6I01 )**Planning and conducting**Plan and conduct repeatable investigations to answer questions including, as appropriate, deciding the variables to be changed, measured and controlled in fair tests; describing potential risks; planning for the safe use of equipment and materials; and identifying required permissions to conduct investigations on Country/Place (AC9S6I02 )Use equipment to observe, measure and record data with reasonable precision, using digital tools as appropriate (AC9S6I03 )**Processing and analysing data and information**Construct and use appropriate representations, including tables, graphs and visual or physical models, to organise and process data and information and describe patterns, trends and relationships (AC9S6I04 )Compare methods and findings with those of others, recognise possible sources of error, pose questions for further investigation and select evidence to draw reasoned conclusions (AC9S6I05 ) |

## Assessment

What can be used to assess the extent and quality of the learning?

1. KWHL chart: This chart can be used as a complementary assessment to the Investigation Report for this unit of work.
2. Makey Makey Investigation Report: This report can be used to assess the Digital Technologies content descriptions and the other content descriptions listed in the ‘Links with other Curriculum Areas’ section.