TOYS & PLAY - Part 3 - Science

Objectives

L.O:

To Understand And Apply The Scientific Method.

The Scientific Method

MAIN TEACHING – The Scientific Method (10 minutes)
On the whiteboard write **'Observe'**, **'Question'**, **'Hypothesis'**, **'Test & Record'**, and **'Conclusion'**. Ask the class if they are familiar with some or all of these words, allow pupils to volunteer definitions and then clearly define each word for the class:

- **Observe:** Gather information, sometimes through senses like touch or hearing.
- **Question:** Ask a question about your observation.
- **Hypothesis:** Guess an answer to your question.
- **Test & Record:** Experiment to see if your hypothesis is correct and record the results.
- **Conclusion:** Look at the results of the experiment, compare them to your hypothesis and share what has been learnt.

Tell them that these terms represent the steps required to accurately record an experiment and that these steps are called **'The Scientific Method'**. When the class is comfortable with each of these terms, tell them that they will be using The Scientific Method whilst experimenting the sounds they can make from materials.

MAIN TASK – (15 minutes)
Activity Breakdown:

1. Make a table with each of the steps in the scientific method in order as the heading (as in the table below).
2. Lay a ruler flat on the table, slide half of it off the table lengthwise and, while pressing the ruler firmly against the table, flick the end of the ruler hanging off the table.
3. Under **'Observe'** describe what was seen or heard. (What noise did it make? How did it move?)
4. Under **'Question'** write 'How will the sound change if less of the ruler is hanging off the table?'
5. Under **'Hypothesis'** guess what you think will happen to the ruler if you apply your question (e.g. I think the ruler will make a lower pitch noise - vibrate slower - if there is less of the ruler hanging off the table).

Extra Information

Materials Required:
- Sheets of aluminium foil
- Glasses filled with water
- Metal forks
- Rulers
- Whiteboard/IWB

Key Words:
- Observe
- Question
- Hypothesis
- Test
- Analyse
- Prove
- Disprove
- Extrapolate
- False
- Negative
- Positive

Success Criteria:
- I can list the steps involved in The Scientific method.
- I can identify the steps of The Scientific Method in an experiment.
- I can form a hypothesis and apply The Scientific Method to prove/ disprove it.

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The Scientific Method

6. Lay the ruler flat on the table as in step 2, this time only hang a quarter of the ruler off the table and flick the end of the ruler hanging off the table, being careful to use the same force as before.

7. Record the results of this experiment under 'Test & Record'. (Did the noise change? Did it move differently? How?')

8. Now under 'Conclusion,' compare your hypothesis with the results of this experiment (Did you prove or disprove your hypothesis? What can you learn from this result?)

Observe	Question	Hypothesis	Test & Record	Conclusion

Mini-Plenary:
After the class has completed the activity and formed their conclusions, ask a few of them to share their results with the class. Ask if their hypothesis was right or wrong. Some may feel nervous or upset that they got their hypothesis wrong; take the time to explain that disproving something is just as important as proving something in science.
Tell them that not every hypothesis can be correct and we can still learn from a disproved hypothesis. Take an incorrect hypothesis for the experiment that was just done as an example (e.g. a lower pitch noise from a shorter hanging ruler) and ask the class what we can extrapolate from this result.

Lead them to the idea that we can use this new observation to form a new hypothesis (e.g. that there will be a lower pitch noise if there is more of the ruler hanging off the table).
Ask them to use the table again but this time under **'Observation'** write *'When there is less of the ruler hanging off the table it vibrates faster and makes a higher pitch sound'* and under **'Question'** write *'What happens when there is more of the ruler hanging off the table'*.
Ask them to each come up with a new hypothesis for this new question and to repeat the experiment with three-quarters of the ruler hanging off the edge of the table.
Once this has been completed have the class discuss their results and make sure they were comfortable with each step of the process.

Extra Information

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SECONDARY TASK – (25 minutes)
Activity Breakdown:

1. Take a fork, a sheet of aluminium foil and a glass filled with water.
2. Try to make a noise with these objects (e.g. strike the fork on the table, wobble the foil sheet, gently tap the side of the glass with a pencil).
3. Form at least one **'question'** that may affect the sound made for each object (e.g. what happens when you strike the other end of the fork? what happens if the sheet is cut in half? what happens if you remove some of the water?).
4. Once you have picked your favourite question for each object, make one **'hypothesis'** and perform one test for each of them, recording results and forming **'conclusions'**, recording everything in the table used in the previous experiment.

Mini-Plenary:
Have the class discuss some of their conclusions for each of the objects. Ask them why they think it's important to share and discuss conclusions in science.
Explain that two scientists doing the same experiment may interpret the results differently. One might think that because the noise was louder than the pitch must be higher and the other might disagree, so after discussing their conclusions they may agree to perform another experiment, working together to get better results.
Explain that there are also cases of false-positives and false-negatives, where the results of the experiment are false, possibly due to faulty equipment or poor test conditions. In these cases, it's useful to have other scientists repeat the experiment to verify the first experiment, which wouldn't be possible without open sharing and discussion in science.

PLENARY – (10 minutes)
Ask them if they can think of applications for the experiments they have done today. Acknowledge any that mention further understanding the materials.
Explain that every material has physical properties, and experiments such as these can help us understand those properties.

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	Explain that because we weren't accurately recording our results (e.g. the exact frequency, number of vibrations a second, of the ruler) the results of our experiments couldn't accurately define those properties. But there are often unforeseen uses that can come out of experiments, and so it is always worth sharing results even if your results aren't 100% accurate or seem obvious. Ask the class if they have ever heard of a Foley artist. Explain to them that Foley artists create almost every sound they hear on tv and movies, for example using coconut halves knocking together to make the sound of the hoof steps of a horse, or wobbling sheets of metal to make the sound of thunder. Tell the class that Foley artists follow the scientific method when they look for these sounds, **observing** a sound they want to recreate, asking the **question** of how to make or record a certain sound, **hypothesising** how they could then make the sound and then performing **tests** and **recording** and **sharing their results**. If there is time, play a game with the class, asking them how they think certain common sounds are made for television, using the following list: ▶ **Bones breaking =** Celery being snapped in half ▶ **Rain =** Bacon frying in a pan ▶ **Walking on grass =** Shredded newspaper in a plastic bag ▶ **Kiss =** Kissing your own forearm ▶ **Swing Set =** Rusty hinge	