

MACBETH

YEAR 3 AND YEAR 4 SCIENCE: POTIONS AND DISSOLVING

These sequence of lessons will cover the following national curriculum objectives:

Working scientifically:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

YEAR 3 AND YEAR 4

SCIENCE: POTIONS AND DISSOLVING

CONTEXT

Double, double toil and trouble;
Fire burn and cauldron bubble.

Fillet of a fenny snake,
In the cauldron boil and bake;
Eye of newt, and toe of frog,
Wool of bat, and tongue of dog,
Adder's fork, and blind-worm's sting,
Lizard's leg, and howlet's wing,
For a charm of powerful trouble,
Like a hell-broth boil and bubble.

Double, double toil and trouble;
Fire burn and cauldron bubble.

Act 4, Scene 1

After seeing the ghost of Banquo in Act 3, Macbeth is frightened. At the beginning of Act 4 he visits the witches to try and learn more about his future. The three witches are making potions and casting spells.

This sequence of lessons is designed to help the witches find substances which can dissolve in water to help them create the spells they need to predict the future.

YEAR 3 AND YEAR 4

OVERVIEW POTIONS; DISSOLVING

LESSON 1:

L.I. To plan an experiment

National Curriculum links

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests

YOU WILL NEED

- pencils, large paper, sugar, water, transparent plastic cups, spoons

LESSON 2

L.I. To predict and record results

National Curriculum links

- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

YOU WILL NEED

- transparent plastic cups, spoons, water, food colouring, salt, white sugar, brown sugar, sand, pepper, flour, coffee, powder paint, plaster of Paris, recording table, pencils, stopwatch

LESSON 3

L.I. To write a conclusion and present the findings

National Curriculum links

- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

LESSON 4 AND 5

L.I. To present information

National Curriculum links

- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

IN ORDER FOR CHILDREN TO MAKE MAXIMUM PROGRESS IN THIS LESSON THEY SHOULD BE GIVEN 2 HOURS- EITHER AS ONE BLOCK OR TWO, ONE HOUR BLOCKS

LESSON 1

L.I. TO PLAN AN EXPERIMENT

NATIONAL CURRICULUM LINKS

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests

YOU WILL NEED

- pencils, large paper, sugar, water, transparent plastic cups, spoons

WHOLE CLASS TEACHING

1. **Slide 1/2** - Audience/purpose: Explain to the children that the 3 witches have lost their cherished potion book and need help finding substances that dissolve in the cauldron. The witches just feel that substances that don't dissolve just don't have the same mystical effect! The 3 witches from Macbeth have recently had problems and have asked for the pupils help to find a list of substances which dissolve well. Explain to children that today they will plan an experiment to help the witches understand which substances dissolve well in water and which don't.
2. Question children to understand prior knowledge, i.e. what is dissolving? What is a solid? What is a liquid? Can you give an examples of something which dissolves and something which does not dissolve? What happens to sugar if you put it in water? etc.
3. Allow children in partners or small groups to ask questions about dissolving. They can then feedback to the rest of the class as the teacher scribes questions/ideas onto a large sheet of paper/whiteboard. The teacher should ensure that they find time to answers all questions/ correct any misconceptions during the course of the learning journey.
4. So that pupils with no prior knowledge can observe the process of dissolving before planning the experiment, put a table spoon of white sugar into a transparent container of water and stir. Explain that when a substance dissolves, it looks like it has disappeared but in fact it has just mixed with the water to make a transparent (see-through) liquid called a solution.
5. In talk partners, children discuss, 'what do we need to think about when planning a science experiment?' Feedback to the class and teacher to 'top-up' any missing ideas by showing the relevant headings that the children will use: question/hypothesis, what you will need, variables, fair test, method, and prediction.
6. **Slide 3** - Discuss what each heading means and what should be written under each and how the class will conduct the experiment. Children can be given a prescriptive list of substances which they will test in coloured water: salt, white sugar, brown sugar, sand, pepper, flour, coffee, powder paint, plaster of Paris (teachers can change this list as necessary).

MAIN INDEPENDENT ACTIVITY

Activity sheet 1 - Children to plan the experiment using the headings: question, what you will need, variables, fair test, and method.

The planning of the experiment may be led in different ways:

- Teacher may model a section of the planning, stop for children to apply, model, stop etc.
- If the class are inexperienced in planning an experiment, the teacher may wish to complete the plan as a shared write.
- If the some of the class are confident in planning an experiment, they could be given the headings while less confident children partake in a guided write with an adult.

PLENARY

Question: what is predicting? What information can we use to make a good prediction?

Write a high-quality prediction together – shared writing.

ACTIVITY SHEET 1: L.I. TO PLAN AN EXPERIMENT. PAGE 1



DATE:

QUESTION:

EQUIPMENT:

METHOD

ACTIVITY SHEET 1: L.I. TO PLAN AN EXPERIMENT. PAGE 2



VARIABLES:

FAIR TEST:

PREDICTIONS:

LESSON 2

L.I. TO PREDICT AND RECORD RESULTS

NATIONAL CURRICULUM LINKS

- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

YOU WILL NEED

- transparent plastic cups, spoons, water, food colouring, salt, white sugar, brown sugar, sand, pepper, flour, coffee, powder paint, plaster of Paris, recording table, pencils, stopwatch

WHOLE CLASS TEACHING

1. Give children an opportunity to talk to a partner about their plan so that they are confident in conducting the experiment. Have a good example plan from a child's book on the IWB or visualiser.
2. Model how to test a substance and record the findings. Show the water (with a touch of food colouring as witches only work with coloured liquids!) again add a table spoon of sugar and stir. Show the children the solution and explain that because the sugar looks like it has disappeared (although it's still in there!). Model how to record this as a finding in the table.

MAIN INDEPENDENT ACTIVITY

3. **Activity sheet 2** - Pupils to make a prediction as to whether they think each substance will dissolve or not.
4. **Activity sheet 2** - Children carry-out the experiment in groups recording the results in the table as they go. Pupils tick/cross next to an image of each substance. Pupils could also time how long each substances that dissolves takes to dissolve.

PLENARY

5. Look carefully at findings together and discuss. What did you find out? Which substances dissolved? Which didn't? (put this information into the table in **Activity Sheet 2**) What surprised you? Why?
6. Explain that the next lesson will involve writing a conclusion about the experiment and presenting the findings of how many seconds it took each substance to dissolve. Together create a poster of scientific vocabulary and discuss meanings. This poster can be displayed during the next lesson.

ACTIVITY SHEET 2: RESULTS TABLE

SUBSTANCE	PREDICTION	RESULT TICK OR CROSS	TIME TAKEN TO DISSOLVE	OBSERVATIONS
SALT 				
WHITE SUGAR 				
BROWN SUGAR 				
SAND 				
PEPPER 				
FLOUR 				
COFFEE 				
POWDER PAINT 				
PLASTER OF PARIS 				

ACTIVITY SHEET 2: CONCLUSIONS

SUBSTANCES WHICH DISSOLVED

SUBSTANCES WHICH DID NOT DISSOLVE

WHAT HAVE YOU FOUND OUT THIS LESSON

LESSON 3

L.I. TO WRITE A CONCLUSION AND PRESENT THE FINDINGS

NATIONAL CURRICULUM LINKS

- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

WHOLE CLASS TEACHING

1. Using questioning recap prior learning: explain the experiment to me..., what did you find out? Was it a fair test? How do you know?
2. In talk partners, discuss 'what is a conclusion?' Feedback ideas to the rest of the class.
3. Discuss with children that a conclusion may include: What did you see? Was it what you expected? Can you see any patterns in what you saw or what you measured? What have you found out? Can you explain what you have found out? If you did the experiment again would you do anything differently? Could you make it more accurate? Ultimately, the conclusion will answer the main question or prove/disprove the hypothesis.
4. Model writing a conclusion.

INDEPENDENT ACTIVITY

5. Children to write their own conclusion. For some groups, this may be done using adult support or a scaffold. All children should use the scientific language poster created last lesson.
6. Children to read their conclusions to their partner. Verbal peer-feedback – partners to give a strength and an improvement.

WHOLE CLASS TEACHING

7. Explain to children that a very important part of conducting an experiment is presenting the data.
8. **Slide 4** - Model creating a bar chart using the results from the experiment.

INDEPENDENT ACTIVITY

5. **Activity sheet 3** - Children to create a bar chart using the data from last lesson (how long each substance took to dissolve).
LA – to use scaffold with labels and scale going up in steps of 2 seconds.
MA – to use scaffold with minimal labels and scale going up in steps of 10 seconds.
HA – to create their own bar chart and use a scale of their choice that reflects the best way to present the time.

PLENARY

Using a large piece of paper, ask children to think of interesting questions about the data, for example: Which substance dissolved the fastest? Why do you think this was? Did all white substances dissolve? Etc.

ACTIVITY SHEET 3: BAR CHART

L.I. TO PRESENT DATA IN A BAR CHART

Don't forget to create a title and labels for the bar chart

10										
9										
8										
7										
6										
5										
4										
3										
2										
1										
	SALT 	WHITE SUGAR 	BROWN SUGAR 	SAND 	PEPPER 	FLOUR 	COFFEE 	POWDER 	PLASTER OF PARIS 	

LESSON 4 AND 5

L.I. TO PRESENT INFORMATION

NATIONAL CURRICULUM LINKS

- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

WHOLE CLASS TEACHING

1. Show the large piece of paper with questions on from last lesson. Explain that today children are going to answer the questions.
2. Explain to children that children will be put into four groups and each group has a very important job to do – they need to present their data to a different audience. These can be given to pupils, drawn out of a hat or groups can negotiate for which they'd prefer to do. Examples of this could be:
 - a. An oral presentation to rest of class/another class/in assembly and this should contain a powerpoint.
 - b. A presentation appropriate for the school website/blog/youtube etc.
 - c. A computer generated leaflet for parents or to the witches.
 - d. A computer generated presentation for display in classroom or corridor.
3. **Slide 5** - Discuss how the presentation may vary depending on the audience and create a list of success criteria. Model language to use when presenting.
4. There is the option of turning this task into a competition, which could be judged by a member of SLT.

INDEPENDENT ACTIVITY

5. In groups, children to complete their specific presenting task. Depending on computing equipment in the school, this lesson may work better in a computing suite or in the classroom if there is access to Ipads/laptops.
6. Adults to support printing/uploading etc. where needed.

PLENARY

7. Each group to present their mini-project with an oral presentation.
8. Score cards could be used for peer-assessment and others (SLT/parents etc.) could be invited to watch the presentations.