Teaching Primary Science Outdoors

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Primary Science Quality Mark

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Action Planning

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Ideas					
	Action Plan				
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Learning Outcomes

The session will include:

- Characteristics of effective outdoor learning.
- Managing children in an outdoor setting.
- Making links between Working Scientifically curriculum objectives and Outdoor Learning.
- Exploring how Subject Knowledge curriculum objectives can be taught in the outdoor setting.
- Exploring assessment in the outdoor setting.





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What is Outdoor Learning?

Learning Outside the Classroom (LOtC) is the use of places other than the classroom for teaching and learning. It is about getting children and young people out and about, providing them with challenging, exciting and different experiences to help them learn.



Council for Learning Outside the Classroom

Outdoor learning is that which takes place beyond the four walls of the traditional classroom environment. Association for Science Education (ASE)









PSQM Science Subject Leadership Criteria

Science is valued and improved through the development of effective processes for subject leadership:

- A. There is a clear vision for science, created and implemented by teachers and children, through principles for teaching and learning.
- B. Strategic support for subject leadership is provided and includes:
 - Focussed CPD for subject leader
 - Regular release time
 - Resources to facilitate development in science.
- C. There is a monitoring cycle, including pupil voice, that informs actions taken and the development of science.







PSQM Science Teaching Criteria

Subject leadership responds to development needs in science teaching:

- A. There is provision and signposting of relevant internal or external professional development and support with which staff engage.
- B. Teachers are supported to use a range of effective strategies for teaching science which challenge and support the learning needs of all children.
- C. Resources are audited annually, well-organised and accessible, so that children can regularly and safely use appropriate practical and digital resources, information texts and the outdoor environment.







PSQM Science Learning Criteria

Subject leadership develops teachers' practice:

- A. Children are taught to use different enquiry types to answer scientific questions about the world around them, through the use of scientific enquiry skills.
- B. A range of strategies and processes for formative, summative and statutory assessment are used, which reflect a shared understanding of the purposes of assessment in science and current best practice.
- C. Initiatives that encourage all children to think that science is relevant and important to their lives, now and in the future, are supported and promoted.







PSQM Wider Opportunities Criteria

Children's experiences of science are enriched:

- A. Curriculum planning links science to other areas of learning.
- B. There is participation in some external initiatives, topical science events and family learning.







Padlet and Break Out Rooms

How is your school managing learning taking place outside?

- What is going well?
- What challenges do you face?
- What questions do you have?











Why go outside anyway?











5 Characteristics of Effective Outdoor Learning

- 1. one that supports children in making the transitions from within the classroom to beyond it
- 2. one where there is both regular and frequent use of the outdoor setting.
- 3. fully prepares children for working in the outdoors by addressing the basic psychological and physiological needs of the children before leaving the classroom
- the teachers manage the transition back to the classroom as consciously as they manage the move to the outdoor setting
- 5. a shift to weaker framing

HOATH, L. (2015).





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Health & Safety in Primary Science...

CLEAPPS <u>www.cleapss.org.uk</u>

There is an annual password which can be found on the latest newsletter. Email <u>membership@cleapss.org.uk</u> to check if you are a member.





Be Safe book <u>www.ase.org.uk</u>

Any advice given by your LA must be considered







Activity - Exploring materials for a pixie house

Before lesson – check for lítter especíally near bench

Resources needed

In an ideal world, this lesson would take place in a forest area, where there are lots of sticks, leaves and other natural materials around. Additional materials should include different types of cloth (cotton, felt, etc.), plastic carrier bags or cling film, cardboard and paper towel.

What to do

John to work with TA Take Abby's epi pen (wasps)

Prepare the materials you want the children to work with.

Discuss what children already know about the materials available to them.

Explain your health and safety rules. These might include the area that the children are allowed to work in and the things they can and cannot pick up.

If possible, put the lesson into a context, such as a story or topic.

Set the task – Can you make a house for a pixie? Discuss what the requirements are for your pixie... Does the pixie need to be warm, dry, protected from predators? You can adapt this depending on the context and the materials available.

Give the children time to explore with the materials available to them and to build a shelter for their pixie.

Children should then carry out simple tests to find out whether the requirements set were met. This is likely to include whether the pixie house is waterproof, warm or windproof.

Ensure that children wash their hands thoroughly after working outdoors.

Go from the fence to the wall. Do not píck the orange berríes.







Materials

Images © Millgate House Publishing 'Teaching Primary Science Outdoors' by Helen Spring











Definitely outdoors....

Images © Millgate House Publishing 'Teaching Primary Science Outdoors' by Helen Spring









Could be outdoors....

Images © Millgate House Publishing 'Teaching Primary Science Outdoors' by Helen Spring









Planning for Outdoor Learning

- Take a copy of the curriculum
- Highlight the obvious opportunities for outdoor learning in your year group (eg – identifying trees)
- In a different colour, highlight the less obvious opportunities for outdoor learning
- Choose one objective and plan how you will teach it outdoors.
 What barriers need to be overcome in your context?







Plants – Year 3

Pupils should be taught to:

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal







Plants Y3



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Plants Y3



Image © Millgate House Publishing 'Teaching Primary Science Outdoors' by Helen Spring









Plants Y3













Forces – Year 5

Pupils should be taught to:

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.









Image © Millgate House Publishing 'Teaching Primary Science Outdoors' by Helen Spring









Age range - 9 - 10 years Enquiry type - Pattern seeking

23. Forces

Conceptual knowledge

In this activity, children recognise that some mechanisms including levers allow a smaller force to have a greater effect.

Working scientifically

In this activity, children report and present findings from enquiries using appropriate scientific language.

Assessment

Children meeting both the conceptual knowledge objective and the working scientifically objective will be able to say or write that it is easier to lift a weight if you push down on the end of a lever.



Activity - Investigating levers

Resources needed

Plank(s) of wood (The seesaw plank must be strong enough for the loads that will be put on it. The wood needs to be smooth so it doesn't cut or splinter a child.) Something to use as a fulcrum or pivot (small log for example) Things to use as a weights

🕑 What to do

Ask the children about their experience of levers in everyday life. Examples might include using a spoon to open a tin of paint, sitting on a see saw, cranes and wheelbarrows.

Ask the children how levers benefit us. They change the direction of force, and if you move the pivot or fulcrum, more or less force is needed.

Give the children the opportunity to explore levers for themselves. Provide them with small planks of wood and objects, such as bricks that they can lift with the levers. Then ask them to explore what happens when they move the fulcrum or pivot.

Next provide the children with a longer strong plank of wood and a log to use as a seesaw. Do ensure that this is supervised closely by an adult. Ensure that planks are kept low to minimise risk.

Challenge them to lift a heavier person (such as the teacher).

Children do not need to understand mechanical advantage at this age, but should be able to work out that less effort is required if the distance from the fulcrum, where the force (effort) is applied, is increased.

The children should report or present their findings using vocabulary such as lever, force and effort. This might take the form of a verbal presentation, or might be written up more formally.

Ensure children wash their hands thoroughly after working outdoors.



Assessment for Learning

Challenge the children to lift an adult! Can the smallest child lift the adult? Ask them what they would need to do to use less force to lift a heavy weight.



Science Capital

Ask the children where they see or use levers in their everyday lives (e.g. screwdriver or spoon to open a can of paint; nutcracker etc.) Find out if the people they live with work with levers. Discuss jobs that involve levers, such as mechanic, engineer and architect.

Support

Give the children a frame in which to reporting their findings (see downloads).

Extension

To add extra challenge for more able children, ask them to choose how to record their findings; ask them to make measurements to contribute towards what they report (for example, they could measure what length of lever is required to lift a particular weight).

Follow up

Ask children to annotate a picture of a lever in action to show how levers allow a smaller force to have a greater effect.



Key vocabulary

Force, mechanisms, simple machines, levers, pivot, fulcrum, effort, load.



























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- To identify the effects of water resistance.
- To use a timer to take repeat readings.

Do rafts with different size fronts take different amounts of time to cross a bowl and why?

Results

Table to show how long the raft takes to travel from one end of the bowl to the other

Surface area	Time taken – 1 st reading	Time taken – 2 nd reading	Time taken – 3 rd reading	Mean time taken
60 cm	2.03	3.16	4.56	3.25
132 cm	9.72	10.97	12.00	6.89

Conclusion

The mean time it took for the raft with a front surface area of $\frac{60 \text{ Cm}^2 \text{ cm}^2}{2} \text{ cm}^2 \text{ was } \frac{3 \cdot 25}{2}$ seconds. The mean time it took for the raft with a front surface area of $\frac{32}{2}$ cm² was $\frac{10 \cdot 89}{2}$ seconds.

Can you explain your findings

The tapper ract Lixkot Crow braer Smi or unont roof hitting took with alarger ront Si more making it cross source







Animals, including humans – Year 1

Pupils should be taught to:

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense







Can you fill this sensory memory box?













Assessment

- A system for assessing Working Scientifically
- A system for assessing conceptual understanding

ΤΑΡS

 A good tracking system

many Science Quality Mar

YEAR 3 SCIENCE ASSESSMENT RECORD

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To judge that a pupil is working at the expected standard in science, teachers need to have evidence which demonstrates that the pupil meets all of the 'working scientifically' statements and all of the 'science content' taught in the final year of the key stage. Where possible, teachers should draw on assessments that have been made earlier in the key stage to make their judgement against this framework.

Working Scientifically: working at the expected standard (LKS2 NC requirements)

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				
reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions				
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				
Science Content: working at the expected standard (Y3 NC requirements)				
identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers (Y3 Plants)				

identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers (Y3 Plants)				
explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant (Y3 Plants)				
investigate the way in which water is transported within plants (Y3 Plants)				
explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal (Y3 Plants)				





Assessing Conceptual Understanding



Planning for assessment



Assessing Working Scientifically



Primary science enquiry outdoors



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Learning outdoors is a key part of primary science. The Teacher Assessment in Primary Science (TAPS) project has created a wide range of activities to support Working Scientifically. Many of these can take place outside and examples are listed below, with hyperlinks directly to the TAPS plan.

	Possible skills focus	Examples of science learning which can be done outdoors	Examples of science learning about the outdoors
Age	- Ask questions	How could we make the best shelter? Incy spider shelter R	How can we sort the things we have found? Scavenger sort R
4-7	- Perform simple tests	What happens to the ice? Frozen balloons R	Do all leaves look the same? Leaf look Y1
	- Observe closely	Which materials can we see light through? Transparency Y1	What parts does this plant have? Plant structure Y1
	- Gather and record data to	Which objects do we think will float/sink? Float & sink Y1	What colours/shades can we find? Shades of colour Y1
	answer Qs	Which material made the best boat? Boat materials Y2	What season is it now? Seasonal change Y1
	- Identify and classify	How do we get the character out of the ice? Ice escape Y2	What does a plant need to keep healthy? Plant growth Y2
		What materials can we find? Materials hunt Y2	What living things can we find nearby? Nature spotters Y2
		How do we test which material is the most waterproof?	Is this alive? Has this ever been alive? Living & non-living Y2
		Waterproof Y2	How many daisies are in each area? Daisy footprints Y2
			Where do woodlice live? Woodlice habitats Y2
Age	- Plan different types of	Which kind of materials make shadows? Making shadows Y3	How much water do plants need? Measuring plants Y3
7-11	enquiry to answer Qs	Which rock is the most hard-wearing? Rocks report Y3	How can we help our local environment? Eco action Y3
	- Take measurements	How can we package the egg? Egg drop Y3	What living things can we find? Local survey Y4
	- Gather, record and	Which area is hottest/coldest? Adapt Measuring temp Y4	Making a classification key for our area, e.g. Outdoor keys Y6
	classify data	How do we find out the best conditions for drying? Drying Y4	
	 Report findings 	Which is the best material for the job? Adapt Champion	Plus:
	- Use results to draw	tapes Y5	Woodland Trust spotter sheets and activities
	simple conclusions	How can we compare our planes? Paper planes Y5	Growing plants website guide for each month of the year
	- Evaluate degree of trust	How far can we make a spinner travel? Spinners Y5 (link to	Dr Katherine Forsey's detailed plans for
	in results	seed dispersal)	pond/bush/minibeast/rock pool hunts

The full set of enquiry lesson plans can be found under the 'Focused Assessment plans' tab, including many others which could take place outdoors: https://pstt.org.uk/resources/curriculum-materials/assessment

The majority of plans can be adapted for any age group or situation, so the above are only suggestions.





Resources to support outdoor learning and science







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Action planning

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	Ideas			
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