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Part 1

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Part 2

The photograph above shows an outdoor area where children can explore the natural world and to also have scope to investigate the world around them whilst using mathematical and scientific skills. Within this area is also opportunity for free play for the children to enhance their social and communication skills.

Within the Forest School area were a group of children whom I have chosen to participate in some outdoor exercises to enhance their mathematic skills through counting leaves, trees, and conkers either in succession or in multiples of 2,5 and 10 dependant on their ability. I have will also ask them to sort them from smallest to largest and thinnest to thickest.

Regarding science, there is a station where there are natural materials for the children to discover measuring by tipping and pouring and determine how to volume changes when solid materials are added to the liquid. Additionally, there is an exercise including small parts to show the effects of gravity and the ability for the children to determine which small parts travel faster or slower than others.

The children were split into groups in a carousel style giving each child the chance to experience each station.

During an afternoon session in the Autumn, a mixed group of 6-year-old pupils were invited to join me in the Forest School area, where there are opportunities for them to discover and question the outdoor area available to them.

Before venturing outside, I explained the exercises to the children. “Today we are going to visit our Forest School area to discover what we can see, do you know what we can find in our Forest School area?” Many hands were raised in excitement. Child A responded, “There are logs and trees.” “Yes,” I replied. I prompted further, “What happens to the leaves on the trees during Autumn?” Child B replied, “The leaves fall off the trees.” “That’s right” I responded, “Shall we see how many leaves we can count together?” I asked. Each child was excited to visit out Forest School area.

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(Source: Fakher, 2026).

Once in the Forest School area, I asked the children to join me within the Fire Circle, reminding them of the safety rules. “Remember, walk around the outside of the Fire Circle, never through it, why do we do that?” Child A replied, “We don't know if there has been a fire that may still be hot which can be dangerous as we can burn ourselves.” “Correct” I reiterated to the rest of the group.

I asked, “What can you see in this area around us?” Each child within the group answered, “Leaves,” “Stones,” “Conkers” came the replies. I then divided the children into different groups to begin exploring.

The first station was the children collecting and counting the different natural materials. I asked them, “Can you collect some natural materials that can be found in out Forest School area.” Each child within the group collected their materials and brought them back to me. One child asked, “How many do we need to collect?” I replied, “Can you count how many you already have?” Each child then proceeded to count the items they had returned with. Child A had collected 8 leaves, Child B had collected 11 leaves, I asked Child B, “How many more do you have than Child A?” This gave the children the time to work out the correct answer. Child B replied “I have 3 more than Child A.” I then asked Child A, “How many more leaves do you need to collect to have the same as Child B?” I gave them time to think of the answer. Child A replied, “I need to collect 3 more leaves, then we will have the same amount”.

Children within the same group who are known to have a higher ability were counting their conkers in 2s. I asked, “Are you able to count them in 5s?” By grouping the conkers into piles of 5, the children were able to count on by 5 up to the 20 conkers they found. They were also able to think about different ways that they could group the conkers. I asked, “How many different ways can you group your conkers?” I gave them opportunity to consider the different options available to them. They identified that they could group the conkers into 1 group of 20, 2 groups of 10, 10 groups of 2 and 4 groups of 5. One of the children in the group asked, “Why do the conkers have spiky shells?” “What an excellent question” I replied, “Does anyone know why conkers have spiky shells?” I gave the children the opportunity to think about the answer. One of the children said, “is it to help them grow?” “Good idea” I replied. Another child raised their hand and offered “Is it because animals try to eat them?” I responded, “Yes that's right, the spiky shells are there to protect the seed inside” I showed the children an opened conker that was found and discussed the differences between the two.

(Source: Fakher, 2026a).

We then proceeded to move onto the next station where there was an assortment of sticks. I asked the group, “Can you see all of these different sticks, how can we sort these?” I stood back and gave the children opportunity to discuss the different ways in which they could sort through the sticks. Child A was able to identify that the sticks were different in length. “We can sort them by size!” she exclaimed. As a group they then sorted the sticks from smallest to largest. Child B within the group found other materials within the area that would match the same size as the sticks that were found. I prompted them further by asking “what other ways can we sort the sticks?”

Again, I stood back to allow the children time to think and discuss how they could sort the sticks. Child B replied, “We can sort them from thinnest to thickest” “Great idea” I encouraged. The children then proceeded to organise the sticks into different thickness.

(Source: Fakher, 2026b).

Following the Curriculum for Wales area of learning for Mathematics, the children within these groups can demonstrate that they can represent and compare relationships between number and quantities within progression step two which is suitable for their age whilst also developing the skills that they have already used in progression step one (Welsh Government, 2020).

(Source: Fakher, 2026c).

For the next exercise, I led the children to the mud kitchen area. I asked, “What can you see in this area?” The children replied one by one, “Lemons,” “Oranges,” “Water,” “Saucepans,” “Jugs,” “Shells.” “That’s right” I responded with encouragement. I explained to the children that I wanted them to pour the water into

the saucepans and to see what happens when the fruit and shells were added. I stood back to allow them to proceed with their experiment. One of the children had filled their saucepan with water and once they added some shells, the water overflowed. “It’s gone over!” she exclaimed excitedly. “Why do you think that has happened?” I asked. After some time to think, the group responded, “There was too much water in the saucepan and not enough room for the shells.” “How can we change that for next time?” I questioned. Again, I gave them some time to consider their answer. Child A offered, “Why don’t we add the shells into the saucepan first then add in the water, so it doesn’t overflow?” “A fantastic idea!” I exclaimed. The children then proceeded to repeat the experiment by adding the shells into the saucepan first then added the water so that it would not overflow this time around. Once they had finished, I explained the concept of volume and how adding solid to liquid can affect the volume within the container

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(Source: Fakher, 2026d).

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(Source: Fakher, 2026e).

The final exercise was using the slide to demonstrate gravity. I gave the children a basket containing a variety of small parts including a toy car, a stone, a cube, and a piece of paper. I asked the children, “Which item do you think will go down the chute the fastest?” After some deliberation, the children thought that the toy car would go down the chute the fastest. “Let’s see” I said enthusiastically. Each child within the group took turns to place each item at the top of the chute and let it go down. They were extremely excited watching each object travel down. Once they had let each item travel down the chute, they were delighted that their prediction was correct and that the toy car did go down the chute the fastest. I offered, “Why do you think the car was the fastest down the chute?” After some consideration, Child A said “Isit because it has wheels?” “Yes!” I replied, “because of gravity, the car was able to move the fastest down the chute” I further explained that gravity is a force that allows items to fall to the ground and heavier objects can fall faster.

By following the Curriculum for Wales area of learning for science, by being curious and searching for answers is essential to understanding and predicting phenomena, the children were able to enhance their understanding of the scientific principles outlined in progression step two which is suitable for their age of learning (Welsh Government, 2020a).

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Part 3

RISK BENEFIT ASSESSMENT

Location / Activity:	Forest School/Mathematics and Science Activity. Exploring the environment around us and addressing mathematics and science in the outdoors	**Date:**	10th September 2026
Assessor:	Natasha Morgans	**Review date:**	10th October 2026

Activity	**How will young people BENEFIT from this activity?**	**Hazards and associated risks**	**Who is at risk?**	**PRECAUTIONS in place to reduce the risk of injury**	**Overall risk after precautions RATING: L/M/H**
Meeting at the Forest School entrance	Outdoors environment to establish learning through play.	• Trip hazards via the hill towards the Forest School area	Adults and Children	• Ensure sturdy shoes are worn to avoid slips • Appropriate clothing is required such as waterproof clothing and wellies.	High

Fire Circle	Allowing the children and adults to experience fire and fire safety. A normal childhood experience.	• Hot fire embers with the potential of burns. • Residual heat with the potential to cause burns • Slips, trips, and falls	Adults and children	• Check that no fires have been lit prior to the children arriving. • If there is a fire, make sure children are kept at a safe distance from the fire. • Walk around the outside of the fire circle only • Reminder of no running in any forest school area. • Adult supervision at all times	High
Slippery Leaves	Allowing the children to collect and experience natural materials	• Slips ad falls • Allergic reactions • Ingestion	Adults and children	• Clear rules to establish behaviour requirements • Adult supervision to ensure safe practice • Careful walking to mitigate any falls • Gloves if needed to prevent reactions	Low

				• Medical checks for children with any allergies	
Conker shells	Allowing to the children to experience natural materials and their uses.	• Cuts • Allergic reactions • Ingestion	Adults and children	• Clear rules to establish behaviour requirements • Adult supervision to ensure safe practice • Choking hazard • Gloves if needed to prevent reactions • Medical checks for children with any allergies	Moderate
Small Parts	Allowing the children the opportunity to experience using small parts in the	• Choking • Cuts • Allergic reactions • Slips and falls	Adults and children	• Clear rules to establish behaviour requirements • Adult supervision to ensure safe practice • Choking hazard • Gloves if needed to prevent reactions	Moderate

	outdoor environment			• Careful walking to mitigate any falls	
Sticks	Allowing the children to use sticks to sort and measure to enhance their mathematics skills	• Splinters • Cuts • Eye injuries	Adults and children	• Inspect sticks for sharp points to prevent injury • Model safe behaviour for the children to copy • Keep area tidy to limit any injuries	Moderate
Mud Kitchen – Water, Mud, Fruit, Shells	Allowing the children to use a range of materials to help enhance their mathematics skills. Enhances gross motor skills when	• Slips • Contamination • Illness • Cuts • Allergic reaction	Adults and children	• Limit water to reduce the risk of slips • No tasting rule to prevent illness • Supervise pouring to prevent slips • Handwashing to ensure cleanliness • Medical checks for children with any allergies	Moderate

	lifting and pouring. Exposure to build immune system				
Overfilling	Allowing the children to experiment using volume and mass	• Slips • Spills • Contamination • Illness	Adults and children	• Demonstrate safe pouring to demonstrate correct procedure • Handwashing to ensure cleanliness • Clean materials where possible to prevent illness • Use clean water where possible to reduce the risk of illness	Moderate
Incorrect climbing	Children have the opportunity to climb to enhance their gross motor skills	• Falls • Impact injuries • Minor injuries • Cuts	Adults and children	• One child to climb at a time to prevent falls • Stand back from the chute exit to prevent any collisions • Supervise closely to mitigate any risks	Moderate

Insects	Children have the opportunity to explore the natural world around them	• Bites • Stings • Skin irritation	Adults and children	• Children to view insects from afar • Do not touch any insects • First Aid Kit to treat any injuries	Moderate
Group Management	Children have the opportunity to explore the natural area around them	• Collisions • Behaviour • Slips	Adults and children	• Walking only rule to ensure safe practices • Turn taking to promote wellbeing behaviours • Maintain ratios to ensure all children are supervised appropriately	Moderate
Hygiene – dirty hands, contaminated water	Children have the opportunity to feel and experience the natural world physically	• Illness • Infection	Adults and children	• Handwashing to ensure cleanliness • Sanitiser available to sanitise hands quickly • Adult Supervision to ensure safe practice	Moderate

Handwashing	Children have awareness of good hygiene practices	• Wet floor • Slips • Falls	Adults and children	• Provide a handwashing station outside • Awareness of slip hazards • Nonslip shoes	Moderate
Washing up utensils and crockery	Children have a sense of safe practice and ownership	• Injury from sharp utensils	Adults and children	• Utensils and crockery to be washed and dried and left in an airy environment to dry fully • Stored safely to prevent injuries	Moderate

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Part 4 – How adults working with early years children support and encourage children to engage with mathematical and scientific concepts in an outdoor environment.

The outdoor classroom can provide a dynamic and sensory rich landscape where scientific and mathematical principles can be discovered on a larger scale as opposed to a traditional classroom setting. These principles can be enhanced by practitioners to scaffold prior knowledge and to also give children the opportunity to explore nature and the world around them. Learning through this approach can enhance a child's ability to learn and by moving away from a more managed and deliberate method of schooling into having a more encouraging desire to open up to innovative ideas and experiences in an outdoor setting (Waite, 2011).

In more recent years, children are leading a more sedentary lifestyle with the introduction to more accessible technology and media. According to a survey by Dodd and Hesketh (2024), children spent nearly 800 hours (about 1 month) playing at home, compared to just over 100 hours (about 8 days) in green spaces per year. Whereas 48% of five- to seven-year-olds have access to tablets and 54% of children in the same age range have access to games consoles (Statista, 2025). By encouraging outdoor play and learning can nurture children's growth and their innate curiosity by giving them rich, hands-on opportunities and learn through direct experience (Welsh Government, n.d.).

There are many theorists who have made observations on the importance of learning in the outdoor environment and its benefit for the holistic development of children. One theorist to consider would be Fredrich Froebel. He viewed children as energetic, inquisitive, and imaginative learners. He believed they learn most effectively through self-initiated activity, first-hand experiences, problem-solving, play and conversation. Their development flourishes when they feel emotionally secure, joyful, and connected to others. Some of his key ideas included that everything links through wholeness and connectedness which can be interpreted to mean that a child can pick up a stick and imagine it to be a range of things from a magic wand to a sword, using the child's ability of imagination to encourage play (Tovey, n.d.). Bruce (2012), details that a rich experience is nurtured by attentive, knowledgeable adults who can recognise significant moments, judge when to step in, and when to allow

the child space and autonomy. This gentle, unobtrusive guidance reflects a distinctly Froebelian approach. This approach could be considered being utilised in the Curriculum for Wales (2020), allowing each learner to make progress at a pace that is suited to them, providing the correct level of challenge and guidance along the way.

Piaget's theory that children build their understanding actively, behaving like “little scientists” who learn through direct exploration rather than simply absorbing information. They fit new experiences into what they already know, and they adjust their thinking when those experiences do not match their existing ideas. Through his research, his concept of the four stages of cognitive development; schemas, where a child's mental frameworks for organising knowledge are established; assimilation, adding in more information to existing schemas; accommodation, changing the schemas to accommodate the new information and equilibration, which balances the assimilation and accommodation. These four stages could be considered to be 'self-taught' and a more systematic approach to learning (Brodie, 2026).

In contrast to Piaget, Vygotsky (1978) places greater emphasis on the role of social interaction, particularly language, in supporting children’s learning and development. His social constructivist perspective highlights the importance of interactions with both peers and adults, as these experiences enable children to understand their surroundings and develop meaning through shared experiences. Vygotsky’s concept of the ‘zone of proximal development’ refers to the gap between what a child can achieve independently and what they can accomplish with support from a ‘more knowledgeable other.’ Collaborative play can create such zones by providing children with meaningful and motivating social experiences through which learning can take place. In mathematics education, Vygotsky’s ideas have encouraged teachers to connect mathematical learning to children’s everyday experiences and to promote discussion and communication about mathematical concepts (Tucker, 2014).

Tucker (2014a) considers that using a wide range of physical objects that children can find interesting can enhance their mathematical skills and also gives them the opportunity to explore the equivalence of number and counting in 2s, 5s, and 10s for example can prepare their knowledge for place value. The practitioner can plan

effectively ensuring the outdoor learning environment can provide a stimulating and meaningful mathematical learning experience.

According to the Outdoor Education Advisors Panel (2026), outdoor learning has the opportunity for children to achieve a multitude of outcomes such as acquiring a range of activity skills, being able to demonstrate greater motivation and enthusiasm for learning and improve their overall achievement across all areas of their education.

Within Nordic school systems, there is an important focus on outdoor learning, specifically through forest school settings. Having the ability to discover mathematical and scientific principles through outdoor learning such as witnessing the seasonal changes, can enable children to be naturally curious and calm. Forest schools emphasise learning through the body, the senses, and real-life encounters, rather than through abstract, purely cognitive instruction. Their focus is on meeting the world directly – getting to know the people, objects and places that form the basis of what children are learning (Olsen, 2026).

Other international approaches to consider would be te wharaki in New Zealand where children learn through doing, asking questions, and engaging with others. These attitudes learned from an early age can continue to influence them in their learning in later life. One of the principles of learning is exploration where learning strategies for thinking and reasoning along with developing working theories for making sense of the natural, social, physical, spiritual, and human-made world around them. Through these skills, a child can adopt principles that can enable them to look for patterns, use trial and error, compare, classify and solve problems, all of which can be considered as mathematical and scientific principles (Ministry of Education New Zealand, 2026).

Additionally, Simon Nicolson's article on the theory of loose parts argues that there was no evidence that creativity or inventiveness is something only some people are born with. Instead, he highlighted children’s natural drive to build, experiment and explore—to work with materials like fluids, water, fire or living things, and to engage with anything that feeds their curiosity and offers the joy of discovery and invention (Nicholson, 1971).

Similarly, White (2011), offers that materials can be physically manipulated to encourage children to use their creativity and imagination to move around items and can allow a child to create their own learning environment.

Some of the loose parts that can be considered for mathematical and scientific learning can be natural resources such as straw and pinecones for counting and naturally occurring phenomena such as water, ice and shadows can be highlighted for scientific discussions regarding melting, freezing and light movement (Play Scotland, n.d.).

In addition to Nicholson's loose parts theory, it may be prevalent to consider Gibson's affordance theory where children can perceive different objects to be used in a variety of ways. Outdoor learning can afford a child more opportunities to become more creative and use their imagination. A stick can be interpreted as a magic wand or a sword depending on the child's affordance of that object. Within the classroom setting, there are fewer opportunities for a child to allow this imagination to flourish (Moodle, 2023). Using this theory has enabled the Welsh Government to include its ideas into providing a range of resources and materials which can help to encourage a child's holistic development, several types of play and enable environments both indoors and outdoors (Welsh Government, n.d.(a)).

In regard to adults working with children in the outdoors, being alert to how children's behavioural patterns emerge and change enables practitioners to gain deeper insight into the ways children think. By demonstrating language and what they do correctly can help children address their learning and development through schemas (Atherton, 2014). Schemas or repeated patterns of behaviour can help adults understand the importance of repetition in children's learning. Athey (2007 cited in Birth to 5 matters, 2021), describes a schema as a repeatable pattern of behaviour through which children take in new experiences, gradually linking and coordinating these patterns. Over time, these co-ordinations develop into more advanced and powerful schemas. In relation to mathematical and scientific skills, initial schemas can be enhanced to include throwing items therefore measuring distance and also filling and emptying containers therefore discovering mass and measuring. By having an adult available to cater and nurture this interest can be valuable to progress a child's learning.

As part of the Curriculum for Wales guidance adapted in 2026, adopts six areas of learning encompassing 4 main purposes. Two of the six areas of learning are Mathematics and Numeracy and also Science and Technology. To ensure the progression of learners in Mathematics and Technology, conceptual understanding, communication using symbols and logical reasoning are examples of considerations to be made when designing a curriculum. These examples can be addressed in an outdoor environment such as making mathematical symbols with sticks, stones, and other natural materials. For Science and Technology, being curious and searching for answers to understand and predict phenomena can lead to children asking questions about the world around them. This can be adapted to the outdoors by asking questions such as "why are the leaves turning brown?", which in turn can lead the child to make investigations of their own (Welsh Government, n.d.(b)).

To summarise, the role of the adult in supporting a child in outdoor learning can be considered as a more supportive and scaffolding role as opposed to being more involved with the child's learning. Allowing a child to have flexibility, space and time to encourage their natural curiosity and confidence can enable the child to feel more supported.

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