Module Code: ECEY5005
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Task 1: Take a photograph of an outdoor space which has opportunities for children to explore through play.



Barbara Sliwinska (2025)

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Task 2: Discuss how the environment in the photograph could be used by young children to develop scientific or mathematical concepts and ideas.

As part of our Autumn Walk, the reception team has chosen to take children to a reserved park. Teachers, staff and three volunteers were responsible for looking after the pupils during the exploration. We have planned this activity; our goal is not to eliminate risk, but to weigh up the risk and benefits. We wanted children to develop their fine manipulation skills, for example, picking up objects on the line, in the establishment of their loose parts (Sission and Lash, 2017). It was obvious from the exploratory play that children were confident in using their knowledge of animals taught at school to explore the life cycle of species. I can reassure myself that this trip has helped me analyse what motivates young people, in their early stages of the new curriculum (WG, 2022).



Parenting Without Tears (2025)

As you can see, a group of children are collecting twigs from the ground, and they are using this to create a tent from their natural resources in this area. It is clear that they are wearing layers of clothes, a waterproof jacket, and wellies that is relevant to this outdoor exploration. They seem to be confident in this activity. It is clear from my observation that children have a strong drive to repeat actions – such as picking out twigs from the ground – that enables them to support their brain development. This idea is known as a schema, and whilst this may be seem to be odd for some adults, for children, this is a vital step to understanding the natural world (Welsh Government, 2022).

It is from my knowledge that I know how important schemas are in understanding children's progress in science and mathematics. For example, children may use their gross motor skills – such as stretching, bending, walking and holding objects – to build and develop their own tent independently. This is an invaluable opportunity for them to find out how and why things happen, and in doing so, this can strengthen their neural pathways. I realise that through play, children start to make connections with their outdoor activities and learning from school (WG, 2022). As Piaget has suggested before, children are 'little scientists' who like to experiment and explore their environment (Waters-Davies, 2022). They must test out their emergent thinking skills in their play-led activity. By using those first-hand experiences, I think pupils gain a sense of awe and wonder of the natural world they are surrounded with.

However, I think that building a tent is an invaluable opportunity for children to explore shapes of twigs, leaves and sticks, and their texture and composition, all which underpins the idea of 'connecting and disconnecting.' They gain insight into

the height, speed, and distance of objects, and how things move – a great example of using trajectory in outdoor play. I believe that this activity is important for children to forge strong relationship with others – a key aspect that is embedded in the New Curriculum for Wales (WG, 2022).

Throughout the course of this day, children were fortunate enough to see a lot of living creatures – such as woodlice, spiders, butterflies and many more! It was a great learning experience for most of them.

Whilst I was observing children at the park, I heard a conversation from Lily, Sophie and Ezra:

Lily: Guys, look, look! It is a butterfly!

Ezra: Can you see another one?

Sophie: I saw one on the green leaves.

Lily: Oh, where do they come from?

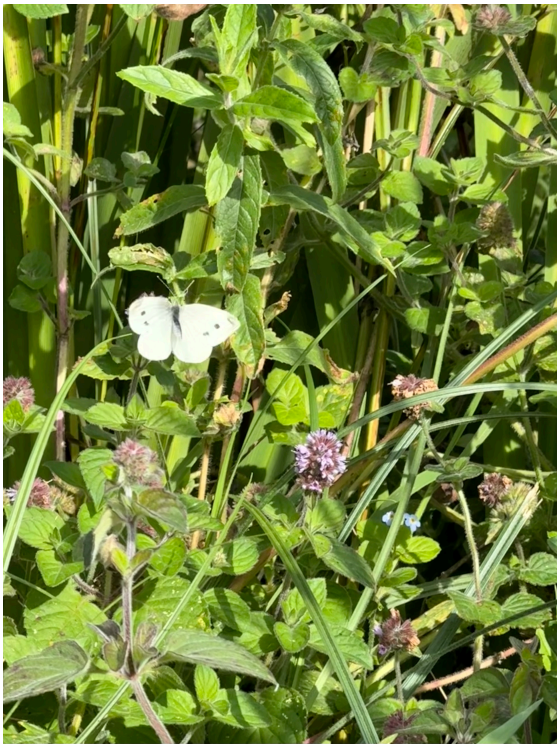
Ezra: From the skies!

Sophie: Don't be silly! They are from the hungry caterpillar.

Ezra: Ha, ha, ha!

Lily: Mrs Barbara, where does the butterfly come from?

Me: This is a great question! We will talk about this with your class.

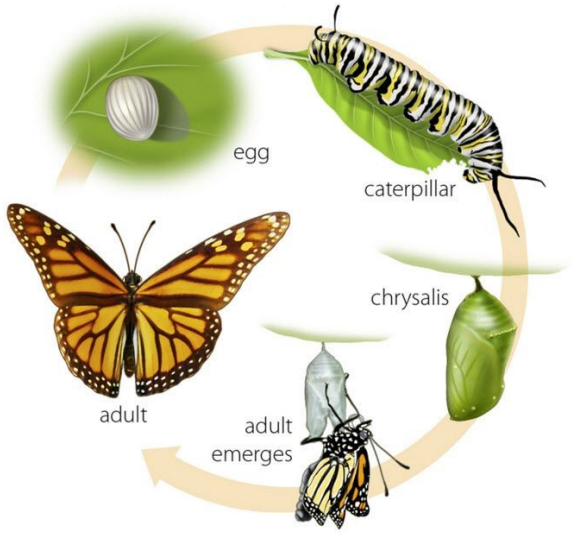


Barbara Sliwinska (2025)

What I find interesting to note is how children can perceive things differently by using their creativity and imagination skills. It was through observation that I realised how important it is that children start to raise questions about their senses, sound, or sight in an outdoor learning environment. They should use this to build on their learning experiences and cultivate a sense of awe and wonder in exploratory play. I was hoping that children would talk about life cycles of insects, as because this is a topic that we have been recently studying at school.

However, as a professional undertaking this role, I realise how important it is that we use observation in our daily practice. According to the WG (2022), professionals

must be grounded with the knowledge of child development, and that it is the child who should be at the forefront of this process. I understand how effective observation can help us analyse and see what motivates children in an outdoor setting. I am able to use this to inform my future curriculum planning in the classroom. It is my firm belief that using observation will allow me to create an effective pedagogy, that is deeply embedded with relationships of others, to realise the plans of the curriculum. I want to create a safe environment that is responsive to the needs of pupils.



The Zoo LouisVille (2017)

As part of this exploration, children were given the opportunity to learn more about the life cycle of a butterfly. They were naturally curious about it and asked plenty of questions. They were probing this topic in great detail.

I was able to employ the principles of Sustained Shared Thinking (SST) in this discussion. I created some intellectual conversations with pupils regarding this topic. I used open ended questions to see and analyse what motivates children especially when they are being taught new concepts. I believe that it is vital for practitioners, like me, to support children's learning within their 'zone of proximal development,' a model that was proposed by Vygotsky (Siraj-Blatchford, 2009).

I think that the concept of 'life cycles' is essential for children in understanding the way living creatures go from birth to its death, as part of scientific knowledge. They can identify the different stages that insects, like butterflies, have to go through in it is life cycle (Welsh Government, 2022). In this way, children are becoming ethical, informed citizens who recognise and value the rights of living creatures, as diverse members of society (Tinney, 2023).

Lastly, prior to leaving our destination, the groups have collectively met up together by the logs and stones to discuss about our exploration. We have asked pupils regarding their opinions on this trip, and on the whole, they were exposed to a wide range of feelings. Some pupils liked seeing the bugs, some felt a little scared of going into the woods. The sound was eerie! Just before we left, I noticed a boy who climbed up on the logs, and proclaimed, "Look, how tall I am," and his good friend ran next to him, saying, "I'll catch you if you fall!."

The children lined up single file. Every pupil was there. We have safely arrived back to school once we departed from the park.

On the other hand, I believe that this collective meeting was necessary to identify, capture, and to reflect on student's progress. I used this as a baseline for seeing how each student might develop outside of the classroom environment. I gained a better understanding of the child's emotional, social, physical and cognitive state through their shared experiences in this discussion. I think it is vital that children are provided with rich, authentic contexts, to build on their holistic development in all areas of the curriculum. We must recognise this, and "allow for a variety of diversions, stops and spurs in a child's learning journey" (WG, 2022).

In conclusion, I believe that the principles of observing and assessing children are necessary in realising the ambitions of each pupil. I noticed that children have a drive to repeat actions and learn new things, which is a key skill required in life. I am confident that in this exploratory play, children will become more independent in their settings and make progress in their future learning.

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Task 3: Produce a risk-benefit assessment for the outdoor space provided in your photograph.

Risk Benefit Assessment

Location of Visit: Porthkerry Park **Date(s):** 22/09/2025

Assessment carried out by: Barbara Sliwinska **Reviewed by:** Natasha Young

Outdoor learning experience:	How will pupils benefit from this activity?	Hazard:	Risk:	Who is exposed to this risk?	How can we mitigate those risks?	Residual Risk Taking:	✓
Children start to familiarise themselves with objects like twigs, leaves, or logs.	Children are embedding their gross and motor skills into practice – they explore quantities from one place to another.	Twigs and logs can be uneven, slippery or unstable. Dry twigs or broken logs can have jagged edges and rough surfaces. Splinters are quite a common injury, especially if children are climbing or sitting in logs.	Twigs can cause scratches, wounds, and splinters, with a particular risk of eye injury if used carelessly. Logs can cause splinters, falls, and entrapment, and biological hazards such as allergic reactions to woods.	Children	Children may wish to improve on their gross and motor skills, to avoid these mitigating risks. Pervious and ongoing assessment and health and safety requirements must be maintained at site.	Medium	✓

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Student Number: 2406598
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Children start to build strong connections with living creatures in the outdoor play.	Children begin to explore relationships between living species, and their environments.	Children are at risk of receiving disease transmission – passed from animals to humans. Children may have physical injuries from bites, scratches or being knocked over accidentally.	Pets lying close to a child's face may pose a suffocation risk. Children are more likely to be bitten or scratched by living creatures on the premises. They are unpredictable and may see children's behaviour as overwhelming or threatening.	Children	Teach children to be at a safe distance from living creatures, at least several meters. Always actively supervise children at the premises where animals might be present. Staff need to reinforce a message to parents or carers of pupils that they must wear long sleeves, long shorts, and closed-tie shoes.	Medium	✓
Children may be exposed to different weather conditions in this exploratory play.	Children can listen to the pitter patter sound of the rain – this creates an authentic and a purposeful	Children may face higher surface area to mass ratio. By doing so, they could be dehydrated or feel heatstroke and heat exhaustion.	They have severe problems with health – like organ damage or fatal outcomes. Children are at risk of increased	Children	Ensure that staff have a list of contact details regarding parents or carers of that child, if they are not feeling well from the temperature.	Low-Medium	✓

	learning experience.	Should children be exposed to cold weather, then they might be susceptible to hypothermia, frostbite and other infections.	respiratory infections and other problems, when they are exposed to cold weather.		Children must wear several layers of warm clothes – like coats, jackets or waterproof shoes – and have other accessories with them just in case.		
Children get to experience bee hives in the woodlands, as part of their exploratory play.	Teaching children about bees can shape their perceptions of the important role that animals play in our wildlife.	Children may be unsupervised when they are close to the beehives. If bees feel threatened, then they may potentially sting children and cause extreme pain or swelling. Some bees may be attracted to sweet smells, and children wearing these may unintentionally provoke the bees.	Allgeric reactions may be responded by some pupils if they are exposed to a bee sting. If children are startled by bees, then they may get panicked, leading to secondary injuries.	Children	Component staff who have got their first aid training must undertake this duty or responsibility. Ensure students who have got allergies carry with them EpiPens – as prescribed. Children will need to wash hands if they have accidentally touched the bees – to prevent any contamination and diseases.	Low-Medium	✓

Children navigate through some of the activities independently, like for example, matching pairs.	Children start to explore shapes, properties of size, and volume of shapes, through their enclosed space.	Children may make unsafe decisions due to immaturity or lack of awareness – risk of climbing structures or entering restricted areas. Without guidance, children were at risk to trip, fall or misuse equipment. They can get hurt while climbing, running or using sharp objects.	Children may be exposed to 'stranger danger' during the site, and this could evoke a feeling or insecurity or anxiety. Peer conflict may cause emotional distress or physical altercations can occur. Children may wander off, get lost or feel unsafe in the impetus of their outdoor learning environment.	Children.	Ensure that children have got high vis jacket to see them in a large open space, and especially in a reserved park. Adult-to-child ratios must be appropriate on the site. In this case, the staff may wish to implement a 1:6 ratio for the younger children. Utilise a buddy system where two peers are paired to work together – avoiding any risks of losing them.	Low	✓
Children will travel with staff by a motorised vehicle, such as a coach.	Children are presented with the opportunity to gain a deeper understanding of their cultural diversity, thus	In the case of breakdowns, accidents or fire, children may panic or do not know	Teachers may not properly count number of students who are sitting in the bus.	Children, but adults may be exposed to that risk as well.	Pre-trip planning: Conduct a risk assessment to identify any hazards related to transport,	Medium	✓

	instilling a sense of cyfenin.	where the evacuation site is. Children may be exposed to sickness or fatigue when they are travelling a place that is a far from the school community. Children standing up when the vehicle is in motion.	Children may not be wearing seatbelts or cause disruptive behaviour that can distract the driver or injure others. Children may trip or fall when entering the bus.		like busy roads, congestion. Assing specific staff members to specific groups of children. Line up children away from the traffic and moving vehicles. Board one at a time, whilst being supervised by a staff or volunteer.		
During lunchtime or breaktime, children will be advised to go to the toilet on their own.	Children start to become independent learners who can go confidently to the toilets by their own.	Children may be separated from the group and feel lost in the site. There is a potential risk that children could be stuck in the cubicle and accidentally lock themselves.	Potential separation from the staff and the entire group – if they are going to the toilet on site. The toilet conditions may be poor or inadequate for the children.	Children	A member of school staff must supervise the territory at all times. Children must remember to wash their hands regularly if they are going to the toilet – as part of the health and safety procedures. Agree on a specific point that groups	Medium	✓

					can meet up, if the children are going to the toilet - they can establish rendezvous points.		

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Task 4: With reference to theory and research, evaluate how working adults with early years children support and encourage children to engage with mathematical and scientific concepts in an outdoor environment.

In the Early Years Curriculum, the adult's role is to create an environment where they "support, sustain and validate" children's holistic development in all areas of their learning and progression (Waters-Davies, 2022). During play, children want to be free from adult interruptions and to develop a sense of awe and wonder and ignite their curiosity of the world around them (WG, 2022). We as practitioners should use these contexts for children to build on their exploration of the natural world and to gain confidence in their problem-solving skills (Trina *et al.*, 2024). These experiences are important to pupils in realising their development of Mathematics and scientific thinking – an asset that is required for all areas of life (WG, 2019). However, we can also argue that adult's role in play is rather complex, as they are the ones who sensitively observe children's activity (White 2011). The purpose of this essay is to critically analyse what practitioners might do to motivate children in using their Maths and Science skills in an outdoor learning environment.

One of the ways that working adults might support children to use their scientific knowledge is to give them loose parts, as these open-ended materials encourage the pupils to tackle problems creatively and intuitively. In his theory, Nicholson argued that if we wanted children to become more independent and creative in their settings, then adults must provide plenty of objects that can be "moved, carried, combined, redesigned, lined up and taken apart in multiple ways" (Kable, 2010, cited by Sission and Lash, 2017). Therefore, it is vitally important that practitioners offer children authentic learning experiences that are tailored to their needs. They should also be encouraged to work independently, and be receptive to risk, challenge and prospects of growth in their learning journey (National Day Nurseries Association, 2022). The experiences that the child makes must promote their holistic development, in helping them make strong connections with their own learning environment (WG, 2022; Ernst, and Tornabene, 2012). Similarly, according to Piaget (White 2011), children are driven to learn about the world around them by using their movements – through which he calls it 'thought in action.' During their exploration, children are presented with the opportunity to explore heights of objects, and how things move either vertically or horizontally in their trajectories. They are also starting to be connecting and disconnecting shapes and materials together, by joining things together and taking them apart (WG, 2022). This motivates them to incorporate aspects of spatial understanding, muscular control, and proprioception (Craft, 2002, cited by White, 2011). It is the practitioner's responsibility to ensure that these types of schemas are being promoted holistically during the outdoor environments, so that children can develop on their scientific and mathematical knowledge (Dixbury, 2018).

This is also evident in the scenario proposed by Tinny (2023) where a boy climbed to a tree developed his self-esteem, linguistic skills, physicality, such as his fine or gross motor skills, and social skills. The skills embedded in this case are relevant to aiding our understanding of how a child may develop their science and mathematics in a wider curriculum framework over time from professional adults. In essence, it is obvious that loose parts are pivotal as it gives children the ability to foster their creativity and divergent thinking in the curriculum (Gull *et al.*, 2022).

Furthermore, professionals undertaking this role may wish to employ the principles of Sustained Shared Thinking (SST) to encourage children to use their scientific and mathematical thinking skills in their outdoor settings. This is a collaborative process where two or more individuals, often represented by an adult and a child, work closely with each other to tackle complex problems. They try to collate information together to reach conclusions. It gives working adults the right knowledge required to better know that child in their learning process (Tucker, 2014). For example, in his work, Vygotsky was convinced that children have an intellectual capacity to achieve a lot of things in the future, through the assistance of adults in this environment. He emphasises the need for professionals to work in collaboration with children; so that they can have a zone of shared thinking with each other. This is called ‘zone of proximal development’ and it is a vital process for children to realise a new stage of development in their own learning progression (Qualifications and Curriculum Authority, QCA, 2008; Siraj-Blatchford, 2009). Unlike Piaget who believed that the child’s ability to learn is dependent on their stages of development, Vygotsky held in this notion that learning is a continuous process on the spectrum. He believes that creativity is a crucial part of the curriculum, as it is pertinent to technology and scientific knowledge (Vygotsky, 2004). To illustrate this point further, we shall use two case studies, the first case was provided by the EPPE team regarding on the implementation of ‘scaffolding’ in the curriculum, the second case looked at the use of STEM-based approaches in an outdoor learning environment. A large scale, multi-disciplinary study was conducted in the first case, and it turns out that SST occurs when adults work alongside with children to solve problems, clarify a concept, and to critically evaluate an activity. They gained a better understanding of how children’s emergent thinking skills were seen in these interactions with adults when splitting up a larger task into smaller, feasible tasks (Qualifications and Curriculum Authority, QCA, 2008). However, the evidence proposed in the second case shows that pupils taking part in outdoor nature play, such as tipping over containers, or emptying contents on the floor, are more likely to exhibit STEM characteristics that those who do not spend time indoors (Campell and Speldwinde, 2022, cited by Trina *et al*., 2025). The evidence validates this perception that adults who are using the principles of SST are more likely to see pupils becoming more independent, critical thinkers in

their environments. Using their scientific knowledge to abstract concepts such as volume, gravity or friction in concrete ways through play. We should use this to encourage children to take calculated risks and to be able to challenge themselves when experimenting outdoor.

On the other hand, some may argue that it is vitally important for working adults, like practitioners to use observation in their daily practice to highlight what progress children have made in their outdoor learning environment. According to WG (2022), effective observation allows us to see what motivates, interests or engages young children. We have a better perceived understanding of children's involvement in the activity, their levels of emotional state and their competencies. During exploratory play, teachers can observe student's processes of analysing and collecting data and use this to acquire key scientific knowledge discussed in their studies (Gold *et al.*, 2020). Similarly, in the curriculum for New Zealand, Te Whariki emphasises the need for professionals to build on children's dispositions and theory though cultivating authentic experiences in the outdoors. They are embedding their Maths skills into the goals and learning outcomes of the Curriculum and Exploration strands, like, in this case, teachers must provide children with the opportunity to develop their spatial awareness; through understanding how 2 and 3 dimensional objects can be fitted in together like in maps, diagrams and drawings (MOE 2009, pp 74-88, cited by Anderson *et al.*, 2014; Te Tahuhu o te Matauranga, 2017). In contrast, a Froebelian approach to this is that through observation, adults can see what fascinates or inspires children to engage in outdoor settings. They can help children build on their autonomy and self-discipline within a framework that is considerate, and respectful for others. Today, Frobel's idea of unity and interconnectedness remains an important part of contemporary issues of ecology and sustainability. It is vital that adults offer children experiences in an outdoor environment, such as sieving soil or writing labels close to the garden plants, so that they are exposed to the natural world as part of their scientific discovery (Tovey 2012; Robson 2017; Frobel Trust, 2025). It is therefore important that children have an innate curiosity to discover science and Maths through an inquiry-based, social-constructed approach. Instead of direct, blunt instruction, children learn through experimentation, questioning and predicting, with adults acting as "facilitators" in their Maths-led contexts. This is a Reggio Emilia approach, and it is fundamental that staff use this method to observe how each child develops in their context (Waller *et al.*, 2017; Wilen, 2011; and WG, 2022). Enabling a rich environment where working adults support children's scientific thinking and reasoning skills in an outdoor space.

Lastly, they key principles required for holistic learning for all children start with skilful, and competent working adults, who provide meaningful learning experiences in effective environments (WG, 2022). According to the National Foundation for

Educational Research learning (Duxbury, 2018), it is crucial that professionals are grounded with the knowledge of how to promote children's creativity, and discovery in an outdoor learning setting. By developing a science curriculum that employs different contexts, both indoors and outdoors, solitary or collaborative play, then professionals have tailored their learning to the needs of individuals so that science can be taught in an authentic way. We should use this as a catalyst for pupils to ensure that they are being equipped with the right scientific knowledge required to know the uses and implications of science in our wider society (Department of Education, 2013).

However, central to realising the ambition of the curriculum is that adults must actively encourage pupils to use problem-solving, and reasoning skills in outdoor environments by creating opportunities for exploration (Douglas *et al*., cited by Lynn *et al.*, 2020). It was clear from the research proposed by Numicon Maths that pupils must develop their spatial awareness as part of their number relationships. It is vitally important that staff use a multi-sensory teaching approach, where tactile, hole-filled, brightly coloured plastic pieces are used to represent numbers 1 to 10. This effectively allows pupils to visualise number concepts and to make connections like which integer is one less than another number, odd or even numbers and place values (Caniglia, 2005). This is an efficient process that allows pupils to learn abstract concepts through tangible ways in an outdoor environment (QCA, 2010). Similarly, in the work of Bruner, he has focused on the development of knowledge as a vital component of pedagogy in the Early Years Curriculum. He found three models of mathematical representations: the enactive, the iconic and the symbolic. This is a transition that signals how adults might teach Maths to pupils from complex concepts to more real-life, feasible problems in an outdoor experience. (Gombo, 2024). In the enactive mode, pupils begin to learn Maths through concrete, physical objects. For example, staff might ask questions like: "What happens if I put three mega blocks in the tin? If I take two mega blocks away from the tin, how many are there left?" within their outdoor settings. In the iconic mode, pupils may wish to use images or drawings to manipulate their previous experiences or their objects. This can be done in the outdoors, as it provides rich opportunities for pupils to simulate their senses. In the symbolic mode, the pupils represent the concepts in abstract, subtle ways. Knowledge is enclosed through abstract symbols, primarily language, letters, and signs (Open Learn, 2025; Harvard University, 2025). The implications of this are that through these shared experiences, children gain a better conceptual understanding of Maths and what is its relevance to our world by using the outdoor environment to aid their learning and progression in the curriculum.

In conclusion, the evidence is clear that working adults can support children's scientific inquiry and Mathematical thinking in a variety of ways. They may wish to

employ the principles of Sustained Shared Thinking in their practice. They can, also, use loose parts to encourage pupils to think about how to resolve a problem using creativity and ingenuity. Alternatively, observation may be relevant to see how every pupil progress in the curriculum as independent citizens. All of these techniques can be used by professionals to better understand how our curriculum may be deeply embedded in rich, authentic experiences, both in indoor and outdoor play.

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Confirmation Statement – Use of Generative AI:

I confirm that I have not presented any AI generated text as my own word. I confirm I have copies of my own drafts, notes and resources that I have previously used before, and after the use of AI tools which I may be asked to provide in evidence.

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Module Code: ECEY5005
Student Number: 2406598
Word Count: 4448

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