



Design and Technology Curriculum

Spring Term

Spring Term

Year 1

Learning Sequence		
1.	Exploring Moving Picture Books	<p>What is a mechanism? A mechanism is the parts of an object that move together as part of a machine. Explain that they may have seen a mechanism before when reading – we can find mechanisms in moving picture books! Provide a range of moving picture books for children to explore. What is it? Who is it for? What is it for? Encourage children to evaluate what they like, what they think works well. Introduce Mrs Harris’s dilemma and her design criteria. Explain that each child will design and make a moving picture book. The completed pages will then be joined together to make a book for the library.</p>
2.	Exploring Sliders	<p>Recap Mrs Harris’s dilemma and her design criteria. Recap what a mechanism is. Introduce children to a slider mechanism. Explain that a slider mechanism is a rigid bar which moves backwards and forwards along a straight line. Explain that we are going to practise making a slider. Guide children through step by step process.</p> <ol style="list-style-type: none"> 1. Cut paper strip to desired length, this will be the rigid bar which moves backwards and forwards along a straight line. 2. Attach character who is going to move along the page to the paper strip. 3. Take background paper and draw two dots either side not too close the edge. 4. Using a ruler draw a straight line between the two dots, this is the line your slider will move along. 5. Fold the piece of paper in half and cut along the line from the fold to the dots. 6. Pop the slider in and see how well it works.
3.	Exploring Levers	<p>Recap what a slider mechanism is. Introduce children to a lever mechanism. Explain that a lever mechanism is a rigid bar that can move around a pivot. Explain that we are going to practise making a prototype lever. Guide children through step by step process.</p> <ol style="list-style-type: none"> 1. Cut paper strip to desired length, this will be the rigid bar that can rotate about a fixed point called a pivot. 2. Attach character who is going to rotate about a fixed point on the page. 3. Take background paper and draw a dot where you want the pivot to be. 4. Take some blue tack and a pencil. Put the blue tack behind the paper where the dot is and poke the pencil through to make a hole. 5. Repeat for the bar that will rotate about a fixed point. 6. Match up the holes and push a split pin through, make sure to split it the other side.
4.	Exploring Wheel Mechanisms	<p>Recap what a slider and lever mechanism are. Introduce children to a wheel mechanism. Explain that a wheel mechanism is a simple mechanism consisting of a wheel attached to an axle so that these two parts rotate together. Explain that we are going to practise making a prototype wheel. Guide children through step by step process.</p> <ol style="list-style-type: none"> 1. Cut out wheel. 2. Attach character to wheel x3 (getting bigger each time). 3. Cut out part of background where character will move towards. 4. Take background paper and draw a dot where you want the fulcrum to be. 5. Take some blue tack and a pencil. Put the blue tack behind the paper where the dot is and poke the pencil through to make a hole. 6. Repeat for the wheel that will rotate about a fixed point behind the background. 7. Match up the holes and push a split pin through, make sure to split it the other side.

Learning Sequence		
5.	Designing	Recap slider, lever and wheel mechanisms. Recap Mrs Harris's dilemma and her design criteria. Model the design process for children. Discuss and create non-negotiables together as a class i.e. what the design must have and the materials and equipment that we will need to make them. Model using knowledge from the exploration stage to create their ideas using card and paper.
6.	Making and Evaluating	Children to use their design to make their product. Model following their design to ensure the product made looks like the one that they designed. Throughout the making process children should be encouraged to evaluate their product as they are developing it and identify strengths and possible changes they might make. Model how to use simple finishing techniques to improve the appearance of a product. Once children's products are finished model how to evaluate them by discussing how well it works in relation to the purpose and by asking questions about what they have made and how they have gone about it.

Spring Term

Year 2

Learning Sequence		
1.	Evaluating Dips	<p>What do you know about dips? Can anyone name some dips? Does anyone have a favourite dip? Explain that today they will be tasting some dips and evaluating them. Have a selection of different dips on a table. For each dip ask: What is the dip called? On what occasion might it be eaten? E.g. snack, party etc. Discuss where some dips originate and when and how they might be eaten in that country, e.g. Raita – India, Guacamole – Mexico, Hummus – Greece. Explain that next they will taste the different dips. Children discuss how they might describe the different dips. Encourage the children to think about the key words: ingredients, dips, evaluate, senses, taste, texture, smell, appearance. Children use the Dip Evaluation Proforma to help them describe a range of different dips when they taste them. <i>(For this lesson they will only use bread sticks as a dipper as next lesson they will be evaluating different dippers. Children who have wheat/gluten allergies can use a vegetable stick or a spoon instead.)</i> Children discuss their findings as a class. Ensure all children are using the key vocabulary. Bring into the discussion what they think makes a nice, tasty dip and encourage them to compare one dip to another. Introduce Chartwell's dilemma and their design criteria. Explain that each child will design and make a healthy dip and dipper snack for the snack menu.</p>
2.	Exploring Dippers and Dips	<p>Recap Chartwell's dilemma and their design criteria. Recap last lesson. Explain that a dipper is the accompaniment to a dip. What dipper did we use last lesson? As a group discuss different foods that might work well to use as a dipper. Explain that because you want them to really focus on evaluating the dipper you will use the same base ingredient as a dip. This base ingredient will be Greek/natural yoghurt. Give out the dippers for the children to evaluate. Explain that as a class they are going to create a shared sensory vocabulary. Children will add any words they can think of to describe the dipper as they taste it. Children taste the different dippers, discuss them as a group and then add on their proforma any sensory vocabulary to describe them such as crunchy, dry, hard, sweet and juicy.</p>
3.	Exploring Food Groups	<p>Explain that foods can be sorted into 5 groups. Use the Food Groups Display Poster to help explain the groups. Explain that the size of the different sections represents which ones we should eat more of and which ones we should eat less of. Allow time for children in partners to discuss the ingredients in hummus (nut free recipe as stated on design criteria). Children start to think about where the ingredients belong on the Eatwell Plate. Using the pictures help the children identify which groups the ingredients belong in. Invite children to move the images to the correct place on the plate. Re-cap the need to eat a balance and variety of foods from the different food groups in order to stay healthy. Repeat the activity above using the ingredients for the guacamole dip and raita. Discuss the three dips they have looked at today. Which would they consider to be the healthiest and why?</p>
4.	Modelling Dips and Dippers	<p>Discuss and demonstrate the food hygiene rules e.g. tie back long hair, aprons on, clean surfaces. Demonstrate safety procedures when using equipment throughout the next activity. Model how to make Guacamole (recipe on next page). Use the making vocabulary when describing your actions. During the demonstrations encourage the children to think about different ingredients that could be added to dips such as chopped pepper, cheese. Allow some children to join in. Work together to investigate the creative ways in which a dip could be presented, e.g. layered, blended or marbled. Move on to modelling how to cut the dippers in a safe way. Work closely together in small groups with an adult to practice some of the skills demonstrated and experiment with producing some different dips and dippers. Children should be encouraged to mix a variety of ingredients together to explore different taste combinations.</p>

Lesson Sequence

5.	Designing	<p>Recap Chartwell's dilemma and design criteria. Discuss who will be the intended eater of the dip and dipper. How could they make it appealing for this person? Model with the children how they could design their dip. Talk the idea through first then develop a method through illustrations and notes. Talk through as you develop your plan all the considerations such as ingredients, equipment and method. When adding the ingredients to the plan for your dip and dipper re-cap the different food groups using the Eatwell Plate. Ask which food groups are represented in the demonstration dip. Remind children of the previous work undertaken looking at different dips and dippers. Use the design proforma provided to record a plan of what they will do to make their dip and dipper. They need to think about ingredients, method and equipment (<i>you may want to provide the children with a list of ingredients available to them next week, to limit the amount of resources needed for next session</i>). Children make modifications to a basic recipe. They may find it easier to talk their recipe ideas through with a partner. Make a simple list of the ingredients and draw ideas retrospectively next week once they have made their dip. Discuss ideas and refer back to the original design criteria when explaining things they have done well in their design. Other children should also give their opinions and suggestions for improvements.</p>
6.	Making and Evaluating	<p>Recap Chartwell's dilemma and design criteria. Can you remember what we must do before we prepare food? Use a child to clearly model someone following the rules one at a time and then the whole class copying. This will ensure everyone is ready at the same time to start making the dips and dippers. Re-cap the necessary safety cutting techniques. Help children to get organised for their making. Encourage them to follow the plan they made by choosing the ingredients and equipment they planned to use. Children need to carefully follow their plans however, they should be encouraged to use a clean spoon to taste their dip and make adjustments to their designs accordingly. They should note any changes on their plans. Children should continuously evaluate their dip as it is developed, identifying strengths and possible changes they might make. Children evaluate their work and explain what they did and talk about what went well and what could have been improved. Have they met the original design criteria?</p>

Spring Term

Year 3

Learning Sequence		
1.	Exploring Shell Structures (Existing Products)	Provide a collection of different shell structures including packaging for pupils to investigate for e.g., cereal boxes, chocolate boxes, plastic packaging etc. Use questions to develop children's understanding of shell structures and to introduce and develop the use of technical vocabulary for e.g. What is a shell structure? - A shell structure is a hollow structure made from a thin outer layer. What is the purpose of this shell structure - protecting, containing, presenting? What materials is it made from? How has it been constructed? Are the materials recyclable or reusable? How has it been stiffened - folded, corrugated, ribbed, laminated? What size/shape/colour is it? What information does it show and why? How attractive is the design? Model disassembling packaging, identifying and discussing parts of a net including the tabs - How are the different faces of the package arranged? How are the tabs used to join the 'free' edges of the net? Children work in small groups to disassemble and evaluate a range of existing products to determine which designs they think are most effective. Provide opportunities for children to assess the suitability of the shell structures for their intended users and purposes. Introduce Smiggle's dilemma and their design criteria. Explain that each child will make a sustainable lunchbox for children of a similar age.
2.	Exploring Shell Structures (2D Shapes)	Recap what a shell structure is and what its purpose is. Explain that today children will be exploring assembling nets out of card. Have a range of 2D shapes cut out in card on the floor. Discuss in relation to shape (2D - face of 3D). How could these 2D shapes help us to make a 3D shape? Take feedback, encouraging children to demonstrate what they mean practically with the shapes. Model creating a net by joining flat faces with masking tape to create a 3D shape. Children to work in pairs to practise creating nets by joining flat faces with masking tape to create 3D shapes. Encourage children to experiment with assembling nets in numerous ways. Children to record any observations made.
3.	Exploring Shell Structures (Pre-Drawn Nets)	Recap what a shell structure is and what its purpose is. Explain that today children will be exploring scoring, cutting out and assembling pre-drawn nets. Have a range of pre-drawn nets on the floor. Discuss ideas on how children think they could go about assembling them. Take feedback, encouraging children to demonstrate what they mean practically with the nets. Demonstrate, using the pre-drawn nets, how to (safely) score, cut, and assemble to make a 3D shape. Children to work in small groups with an adult to practise scoring, cutting and assembling to make a 3D shape. Children to record any observations made.
4.	Exploring Stiffening and Strengthening (Paper Prototypes)	Provide a collection of different shell structures including packaging for pupils to investigate (one on each table and rotate). Ask children to focus on how each has been stiffened/strengthened - folded, corrugated, ribbed, laminated? Define stiffened/strengthened. Discuss and take feedback on children's thinking on how each has stiffened/strengthened. Demonstrate how to use different ways of stiffening and strengthening materials to make shell structures stronger for e.g., folding, shaping, corrugating, ribbing, laminating. Children to work in small groups to investigate folding, shaping, corrugating, ribbing and laminating to strengthen and stiffen materials. Model (where necessary) and encourage children to carry out tests to find out where their structures might need to be strengthened or stiffened. Children to record any observations made.

Learning Sequence		
5.	Designing	<p>Recap Smiggle's dilemma and their design criteria. Discuss with the children the use and purpose of their shell structure. Use questioning to develop children's design ideas: What does the product need to do – protect, contain, present? Who is it aimed at? How will the intended user affect your design decisions? Explain that this is our starting point and we will need to keep referring back to this to make sure our design reflects what they want/need. Children to discuss what their lunchbox could look like using the design criteria to inform decisions. Take feedback. Children to sketch out some ideas on their design proforma including the shell structure of their desired shape lunchbox. Model how to discuss ideas and how much they fulfil the design criteria. Have they designed a lunchbox which is sustainable, strong and aesthetically pleasing to children of a similar age? Children develop and annotate their designs and choose one to move forward with. Encourage children to consider What will you need to include in your design? How can you improve it? What materials will you use? How will you make sure your product works well and has the right appearance?</p>
6.	Making and Evaluating	<p>Recap Smiggle's dilemma and their design criteria. Discuss and model safe use of any tools children may need to use. During the making process encourage children to evaluate their product as it is developed, identifying strengths and possible changes they might make. Explain that certain parts may need to be altered as the construction progresses and problems are encountered e.g. one stiffening or strengthening technique may not work so an alternative may need to be sought and that this should be recorded on their final design. Discuss problems encountered and how children solved them. Have you had to alter you design at all? In what way? Why? How does your alteration make it better? Look at the design criteria. Model how to evaluate their product thinking about how well it has met its intended purpose. Children work in pairs to evaluate each other's product and record any observations made.</p>

Spring Term

Year 4

Learning Sequence		
1.	Exploring Changing Technologies	<p>Explain that STEM is an acronym for Science, design & Technology, Engineering and Mathematics. Watch the different clips here. Moving through the scenes progressively removes stages of technological development. The idea is that children can see how products and services have been improved and also how this is related to developments and discoveries. For each scenario, discuss the questions on the page. At the end of each section ask: What changes have taken place? What enabled those to happen? What have the effects been and how have they helped shape the world? Ask children to work in pairs to think about and discuss which developments have changed the way we light our homes. Take feedback. Explain that they will now look at some images and text of lighting throughout history. They will need to place them in chronological order. What technological developments have already taken place which have affected the way we light our homes? How have these helped shape the world?</p> <p>Imagine a home of the future. How will we light it? What type of energy will we use?</p>
2.	Exploring Electrical Systems	<p>Discuss the difference between mains and non-mains electricity. Look at the safety rules for mains electricity. When would we need a light which uses non-mains electricity? If the light source needs to be portable, if it is going to be used by a child, if it is to be used in the garden, if there isn't any supply of mains electricity etc. Show a diagram of a simple series circuit (single pathway) to a light bulb. What can you tell me about the diagram? Discuss which components the symbols represent. Explain what a series circuit means. Explain that sometimes a series circuit doesn't work because there is a fault in one of the components of the electrical system. Show a ready-made faulty circuit and demonstrate how to fault find by testing each component in a systematic way. (For this lesson children should use wire with crocodile clips on the end). Explain that another option to a series circuit would be to make two smaller circuits with each bulb having its own circuit parallel to one another. An advantage of parallel circuits is that if there is a fault in one component, the other continues to function. Show the diagram of the two types of circuits. Children make a series circuit and a parallel circuit and draw the circuits using symbols. Ask the children to start to collect resources which can be used to make their lights from.</p>
3.	Exploring Switches	<p>Explain circuits and the problems with having an incomplete circuit. Look at the circuit. Would this work as a circuit in a lamp? Explain that the lamp would light up however it would be permanently on. How could we make it easier to turn the lamp on/off? Discuss that we would need to place a switch into the circuit. Explain that the outside of switches are often made out of plastic, which is an insulator (does not easily allow electric to pass through it) and the material used to create the inside of the switch should be a conductor (a material which allows electric to pass through it). Demonstrate two different ways of making a home-made switch (first with a piece of card, two split pins and a paper clip, second with card and foil). Children make the same switches which were demonstrated by the teacher. They will then use them as part of a circuit to turn a bulb on and off. Children design and make their own homemade switch and draw a labelled diagram of it.</p>
4.	Designing	<p>What is meant by design criteria and why do we need design criteria when making a product? Explain design criteria specify and what they are for. Explain that the children will develop their own design criteria for a battery operated archaeologist's head lamp. These will be used later in the lesson to inform their designs. Ask the children - Who is the lamp for? Where will it be used? What will it be used for? Show the example. Explain that they should think about the 'needs' these lights would have to meet, these will be their specifications. Show an example of these. Children create, refine and list their criteria. They must ensure that they have thought about the purpose of the lamp and the target group. Explain that they will now use their design criteria to inform their designs. Explain that as they design their lamps they must use the examples but they need to strive to make their designs innovative. Tell the children that they are now going to create their designs. Model how to create original ideas from examples. Explain that they will then develop their ideas further. Show how to use annotations to give information about materials, measurements and decoration.</p>

Learning Sequence

5.	Making	<p>Ask the class to close their eyes and picture what their lamps will be like. Then ask Is the picture in your head mainly a tube? If your idea is mainly a tube then perhaps you should start with a plastic bottle or a card tube. Is the picture in your head mainly a box? If your idea is mainly a box then perhaps you should start with a cardboard box or a net that forms a box. Invite them to raise their hands if the answer is yes. Explain that the key idea is to use materials that are already similar to the effect you want to achieve.</p> <p>Children use their design from the previous lesson help them carefully select the materials they want to use to make their lamps from to achieve to effect they are aiming for in their finished product. They then start to make the main outer part of the lamp. As the children begin to develop the structure of their lights, you will need to stop them and give advice about batteries. Have a range of shapes and sizes of batteries and battery holders available and ask the children to decide the type they will use. (Note: you need to decide if the children are going to use bought battery holders or if they are going to make their own.) If children are making their own battery holders, once the battery has been selected, children can look for a box that will fit it (Smartie tubes will fit two AA sized batteries). Children may need to make their own cylinders or boxes out of card. To provide a tight fit, bubble wrap can be used as padding. The batteries mustn't rattle around. Drawing on their learning about switches children should be able to choose one of the switches they have made. What type of switch will you use? Why? How will your switch work? Where will you put the switch? Children follow their designs to select/make the correct switch for their light. What design decisions do you plan to make next lesson to help achieve the goals set out in your design criteria? Update design proforma.</p>
6.	Evaluating	<p>Explain that some battery operated lights have a spring inside to force the batteries into contact with each other and one terminal of the bulb. The spring also acts as a connection with the negative end of the battery. Demonstrate how to wire up a circuit, stripping wire and using a screw driver to connect to the bulb holder. Tell the children that when all of the parts of the lamp are assembled it may not work the first time. Children will need to diagnose where the loose connections or faulty components are. (Wiring up the circuit is probably the part where children will need most help. Making fail-safe connections is very difficult.) Children use wire with crocodile clips, and a bulb holder to make the circuit which will light their bulb. Next children need to add in materials to make the light reflect efficiently so that it works well. Explain the different things they need to think about and decisions that they need to make. Demonstrate how to add decoration. Explain that the overall appearance of the light will depend on how it is decorated. Explain that at the end of last lesson they completed a mid-point evaluation. Now the lamp is finished it is important they make a more detailed evaluation by referring back to the specification they set out at the beginning. How can we find out whether the lamps fulfil the design criteria? Suggest simple tests.</p>