BILSTON CHURCH OF ENGLAND PRIMARY

MEDIUM TERM PLANNING

Subject	Topic/Key Question	Year Group	Term	Time Allocation
Design and Technology	Moving Toys	5	Autumn 1	6 hours
End of upper Key Stage 2 objectives	Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately. Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work. Understand how key events and individuals in design and technology have helped shape the world			
Mechanical Systems				
End of unit objectives	I explore how different transmissions create different movements. • I can use a crank to change the motion on a transmission from circular to linear motion.			
Vocabulary	Design		Use, Market research, Inform, Plans/plan ideas, Ideas, Follow Refine, Justify plan, Convince, Culture, Society, Designs, Constraints, Relation to audience	

	Make	Use, Make, Specific tool, Specific task, Correctly, Safely, Explain, Specific action, Change work, Precise, Accurate, Hide joints, Improve
	Evaluate	Test, Evaluate, Explain, How, Know, Clear criteria Decide, Fit for purpose, Improve, Evaluate resources, Justify, Selected materials

Lesson Sequence	Time Allocation	Key Question/WALT	Teaching Activities	Resources
Technical knowledge Lesson 1	1 hour	To investigate toys with moving cam mechanisms.	What different kinds of moving toys can you think of? Can you explain how you think they work? Invite children to discuss their ideas. • Explain that many mechanical toys have a cam mechanism to make the various parts move. Go through the slides explaining what a cam mechanism is and how they are used in moving toys. • Show children an example of a toy with a cam mechanism and ask them to explain how they think it works. If you don't have any toys with cam mechanisms available there are plenty of videos on the internet with good examples. Videos and animated images of toys with cam mechanisms can be found on PlanBee's YouTube channel (https://www.youtube.com/playlist?list=PLvCYdoiwfI_DMjYFAVnlREMymcbh4JbUd) and Pinterest boards (https://pin.it/76xJeSk). Activity If there are no toys available to investigate, ask children to get into pairs and ask them to investigate cam toys online. Challenge each pair to examine 3 different cam toys to sketch and label on worksheet IC. • Some useful websites: • http://www.technologystudent.com/cams/cam5.htm • https://www.instructables.com/Mechanical-Cam-Toys/ • http://barkingdogsautomata.homestead.com/newBarki	Slides Examples of cam toys (if available) Question Cards Worksheet IA/IB Worksheet IC (FSD? activity only)

			Assessment Questions • Can children recognise the movement of a mechanism within a toy or model? • Do children understand that a cam mechanism will change rotary motion into linear motion? • Can children investigate examples of cam toys and comment on how they work?	
Technical knowledge Lesson 2	1 hour	To investigate different types of cam mechanisms.	What can you remember about cam mechanisms and how they work? Invite children to share their ideas, encouraging them to use appropriate vocabulary, e.g. cam, follower, rotary, linear, etc. • Show children the pictures of different shaped cams on the slides. How do you think each of these cams will affect the movement of the follower? Children to think, pair, share your ideas. • Tell children that today they will be testing how these different cams work. How do you think we could do this? Invite children to share their ideas. • Go through the slides showing how to use the Framework Template to test different types of cams. NB: If it is not possible to explore different types of cams manually, a good website to investigate the different movement of different shaped cams can be found at: http://www.mystery-productions.com/hyper/ Activity Provide children with a variety of different types of cams or use the Cam Template sheet to make cams from thick card. Children to construct the framework from the Framework Template sheet to test each one and note the type of movement on worksheet 2B and explain what kind of toy each cam could be used for Provide children with some thick card and dowelling and tell them that they need to create their own cams using different shapes to see how each shape affects the movement of the follower. Encourage children to think about where the hole for the dowel will be and how this will also change the movement. Children to sketch each of their cams on worksheet 2C and explain the kind of movement it created. Assessment Question	Slides Worksheet 2A/2B Different shaped cams OR Cam Template sheet Framework Template sheet photocopied onto card Thick card Dowelling Tubing if necessary Worksheet 2C (FSD? activity only)

			Can children describe how cams work using appropriate vocabulary? • Can children explore how different shaped cams affect the movement of the follower? • Can children make suggestions for how different cams could be used for different kinds of toys?	
Technical knowledge Lesson 3	1 hour	To investigate ways of strengthening structures for a moving toy.	Explain to children that they will soon be designing and making their own moving toy with a cam mechanism and to do that they will need a sturdy structure to use as the base for their toy. What kind of structure do you think you could use? • Show children the materials and tools on the slides (card, dowelling, wood, boxes). How could we use these materials to make a sturdy structure for a moving toy? Children to think, pair, share their ideas. • Go through the slides explaining some of the ways in which they can make structures stronger, e.g. by adding triangles in the corners, doubling card to strengthen, etc. Activity Provide children with a range of materials and tools in a small group and support them in investigating how to combine the materials and components to create sturdy structures. Challenge children to create more complex structures, such as a structure with legs. Children to work in pairs and choose one of the Challenge Cards to work through. Children to make as sturdy a structure as possible with the specified materials. • When children have had time to investigate their materials and how to make structures with them, children to feedback to the rest of the class. How well did your materials work? What ways of strengthening your structure did you use? Discuss ideas together. Assessment Questions • Can children make suggestions for how they could make a sturdy structure for a moving toy? • Can children experiment with a variety of materials, tools and techniques? • Can children identify ways of strengthening a structure?	Slides Materials (e.g. dowelling, wood, card, paper, etc.) Tools (glue, saws, scissors, etc.) Challenge Cards (FSD? activity only)

Design Lesson 4	1 hour	To be able to design a moving toy with a cam mechanism.	• Tell children that over the next few lessons they will be designing, making and evaluating their own moving toy with a cam mechanism. What kind of toy do you think you would like to make? What will your moving part be? Children to think, pair, share their ideas. • Go through the questions on the slides for children to discuss: Who will your toy be aimed at? What shape of cam will you use? How will you make your structure? How will you decorate your structure? How will you construct your toy? Note ideas down on the slides. Activity Children to design their moving toy on worksheet 4B. Encourage children to note down measurements and precise details, being as accurate as they can in their design. Assessment Question Can children state the purpose and audience of their design? • Can children design a moving toy with a cam mechanism? • Can children describe how they will create their toy and what materials and tools they will need?	Slides Worksheet 4A/4B Large sheets of paper (FSD? activity only
Make Lesson 5	1 hour	To be able to follow a design to create a moving toy with a cam mechanism.	Ask children to get out their moving toy designs from lesson 4 and give them a few minutes to look back over them to remind themselves of what they need to do. • Tell children that today they will be creating their moving toy. Go through the questions on the slides, writing notes of the children's ideas for each one: How will you make sure your structure is sturdy? How will you make sure your cam mechanism works effectively? What will you do if you come across problems as you make your toy? How can you make sure your finished product looks like your original design? What will happen if you have to change aspects of your design? Activity Children to create their moving toy following their design. Encourage children to work with attention to detail, making sure that their finished product is of a high standard.	Slides Designs from Lesson 4 Materials (e.g. dowelling, wood, cams, card, etc.) Tools (e.g. saws, glue, rulers, etc.)

			Assessment Question Can children follow a design to create a moving toy? • Can children work safely with a variety of materials and tools? • Can children identify areas of their toy that could be improved upon?	
Evaluate Lesson 6	1 hour	To be able to evaluate a finished moving toy.	Ask children to get out their finished moving toys with cam mechanisms and give them some time to look at the toys of other children. Which toy do you like best and why? What do you think of the way different cam shapes have been used to create different movements? What do you think of the way different toys have been decorated? • Tell children that today they will be evaluating their finished toys. Why do you think evaluation is such an important part of the designing and making process? • Ask children to think about what kinds of questions they would need to ask themselves in order to evaluate their toys. Create a list of questions on the slides. Activity Children to evaluate their finished toy on worksheet 6B. When finished, children to go back to their original design and annotate ways in which they would change or alter their design if they were to make their toy again. Assessment Questions • Can children evaluate a finished product fairly? • Can children suggest ways they could improve their product if they were to make it again? • Can children recognise ways in which they have been successful?	Slides Finished toys Worksheet 6A/6B Worksheet 6C (FSD? activity only)