Millbrook Primary School Unit Plan

Year Five: Design and Technology: Mechanisms

Enquiry Question

How can we explore Mars safely?

About this unit

Children follow the 'PRIME' design process to design, make and evaluate a space buggy to explore the surface of – and collect samples from – Mars to establish whether it is a suitable location to build a new colony for human life on.

National Curriculum Objectives

- To use research to design innovative, functional products aimed at a particular individual or group and to generate, develop, model and communicate their ideas through discussion, annotated sketches and exploded diagrams
- To draw up a specification for their design.
- To develop a clear idea of what has to be done, planning how to use materials, equipment and processes, and suggesting alternative methods of making if the first attempts fail.
- To select appropriate materials, tools and techniques.
- To measure and mark out accurately.
- To use skills in using different tools and equipment safely and accurately.
- To cut and join with accuracy to ensure a good-quality finish to the product.
- To apply their understanding of how to strengthen, stiffen and reinforce more complex structures using a range of equipment
- To evaluate a product against the original design specification.
- To evaluate it personally and seek evaluation from others to improve their work.

'Sticky Six' Knowledge

1. To draw up a specification for their design.
2. To select appropriate materials, tools and techniques.
3. To measure and mark out accurately.
4. To cut and join with accuracy to ensure a good-quality finish to the product.
5. To apply their understanding of how to strengthen, stiffen and reinforce structures
6. To evaluate a product against the original design specification.

'Big Six' Vocabulary

rover	compressor	pneumatic
chassis	actuator	hydraulic

Prior Learning

Children have limited experience from previous years of using the tools involved in this unit.

Key Questions

1. 'What features **must** our design include? Why?'

Future Learning

Children will use the designing, cutting and joining skills they learn in this project when they complete their multi-aspect project in Year Six.

Key Links

STEM: How does the ExoMars Rover Work?

Assessment Opportunities

By lesson:

1. Does my criteria fit the design brief? Peer assessment of their checklists.
2. Which of your design best fits your checklist? Why? Which areas might you need to change as you build your rover?
3. How can we be safe? What can we do to make sure our chassis is strong and durable?
4. Can my arm grab successfully? How can I adapt it to be more efficient?
5. How can I ensure my scoop is successful?
7. How does my

Unit Outcome

Children will create a space buggy which is able to move freely and collect samples in different ways using separate mechanisms.

Learning Sequence

1	2	3	4	5	6	7
 **Problem & Research**	 **Ideas**	 **Make**	 **Make**	 **Make**	 **Make**	 **Evaluate**
We need to create a craft to explore Mars and investigate potential of Mars being a habitable environment. 1. Look at existing designs of rovers/vehicles including tanks (tracks). 2. Write a checklist for what features their rover needs to have in order to solve the problem and meet the design brief	1. Create designs: children create a range of designs to suit their design brief from last lesson. 2. Compare their designs against their checklist and choose their favourite design accordingly. 3. Create a list of equipment they need to make their buggy.	Create chassis by: 1. Measuring out the length and width of the buggy using a ruler and pencil. 2. Using a hacksaw to cut the four pieces of the frame accurately. 3. Using a glue gun to piece the chassis together. 4. Reinforcing the corners using cardboard triangles.	Create arms: scissor mechanism 1. Use lollypop sticks and split pins to create mechanism 2. Attach to chassis 3. Practise 'grabbing' technique including innovating the design to pick items up more easily. 	Mechanism for arm (pneumatics/ hydraulics): 1. Learn about the theory of hydraulics and pneumatics 2. Test and choose their favoured mechanism to raise and lower the scoop 3. Attach it to chassis.	Attaching wheels and tracks: 1. Using straws, wooden dowel rods, wooden wheels and glue guns, attach wheels in children's chosen location.	Test: 1. Does it move backwards and forwards freely? 2. Is it able to move up and down terrains? 3. Is it able to pick up, grab and lift different surface samples? 4. Can it survive a drop test? Evaluate: What changes would I make based on my product?