

Design and Technology – Year 2

Content- Mechanisms- Wheels and Axles

Big Question: Can the fitting of wheels and axles affect the impact of a product?

NC objectives - areas of study	End point of area of study	Vocabulary		
		Basic	Adventurous	Technical
<p>Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts.</p> <p>When designing and making, pupils should be taught to:</p> <ul style="list-style-type: none"> -Children should explore and use mechanisms. -Design purposeful and functional, appealing products for themselves and others based on design criteria. -Generate, develop, model and communicate their ideas through talking, drawing, templates, models, mock ups (where appropriate) information and communication and technology. -Children can select from a range of tools and equipment to perform practical tasks. -Children can select from a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics. -Children explore and evaluate a range of existing products. -Children can evaluate their ideas and products against design criteria. 	<p><u>Mechanisms-</u></p> <p>Children will have explored and evaluated a range of existing products using wheels and axles. They can identify main features such as body, chassis, wheels, axles and axle holders and explain definitions. Children have explored and used wheels, axles and axle holders before designing and making their products. Children will understand what a chassis is and know how to fix wheels and axles. This can be done in two ways E.g. fixed to the chassis or not fixed. They will be able to distinguish between fixed and freely moving axles. Children will be able to attach wheels to their product using a variety of materials. They can explore a range of wheels made from different materials. Children can choose a wheel type for their product, explaining the reasons for their choice and link to the characteristics of the materials. E.g. wood, card, MDF, plastic, cotton wheel, foam covered wheels. When describing existing products, children will use the correct technical vocabulary. Children will be able to cut dowel safely and using the correct tools. This will include using a bench hook, vice and hacksaw following the correct safety rules and under adult supervision.</p>	<p>Vehicles, wheel, cut, join, finish.</p>	<p>Assemble, dowel, friction</p>	<p>Axles, axle holder, chassis, fixed free, mechanism, junior hacksaw, vice, cutting mat, masking tape, single hole punch.</p>

Knowledge

Substantive Knowledge

Mechanisms- Concept- Purpose

Lesson 1:

LO: To know existing wheeled products.

LO: To understand axles, chassis, wheels and axles holders and their purpose.

Vocabulary: wheel, axles, chassis, axel holders

Children to be given opportunity to know and recognise existing wheeled products including toys and everyday products. Walk around the school grounds, discuss how wheeled products are used in everyday life.

Ask children to think about the following questions when researching existing products:

How do you think the wheels move?

How do you think the wheels are fixed on? Why do you think the product has this number of wheels? Why do you think the wheels are round?

Children to draw example of wheeled products, stating purpose (link to concept) and label the main parts using the correct vocabulary-chassis, wheels, axles and axle holders.

Homework ideas-

Ask children to complete a checklist of different types of vehicles and how many of each they can see in their area.

Ask children to record a range of wheeled toys. Record in writing or drawings, cut outs and photographs and label the purpose, materials and technical vocabulary. (Retrieval from year 1 History and Science topic)

Lesson 2:

LO: To know how wheels and axles are assembled and understand the difference between fixed and freely moving axles.

Vocabulary: join, assemble, fixed, freely, dowel

Children to be given opportunity to use construction kits and make products that move. Demonstrate to the children how wheels and axles maybe assembled as either fixed or free axles. Show different ways of making axles

Disciplinary Knowledge

Each lesson: Tell chn- Today we are going to be an engineer/mechanics. This will involve us designing and making a wheeled product that can move freely for a particularly purpose. Identify the purpose with the children and create a design criteria that meets the purpose. Ask the children why they might need wheels for this product? How could it make it function and meet its true purpose? How could we test our product after to ensure it meets our criteria?

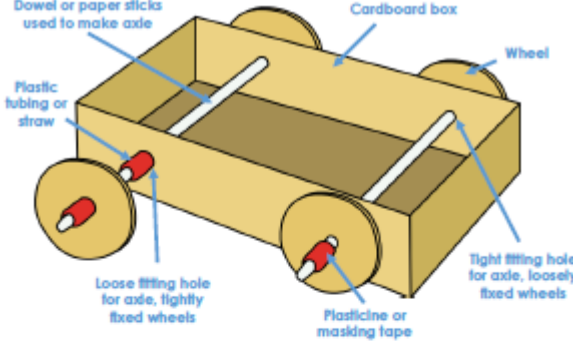
Throughout the unit, children will draw upon knowledge and skills from other subjects such as Mathematics, Science, Art and Computing. This will be seen through marking and measuring out materials, understand how moving products work and using computer aided design or art finishing techniques to complete their wheels products.

Children to follow the four aspects of Design and Technology- research, design, make and evaluate whilst building upon technical knowledge to make their finished product.

holders and stress the importance of making sure the axles run freely within the holders.

Children to use sample of materials and components to explore assembling wheels and axles.

Two different ways to fix wheels



Dowel or paper sticks used to make axle

Cardboard box

Wheel


Plastic tubing or straw

Loose fitting hole for axle, tightly fixed wheels

Plasticine or masking tape

Tight fitting hole for axle, loosely fixed wheels

Types of wheels



Wood/card/MDF


Plastic

Cotton reels


Foam covered reels

Ways to hold moving axles


Use pairs of clothes pegs glued with PVA to the underside of a box.
Check the peg holes are large enough to allow axles to move freely.
Make sure they are aligned carefully so the vehicle moves in a straight line when the wheel and axle mechanism is added.



Use card triangles with holes for the axle.
Check the holes are large enough to allow the axle to move freely.
Make sure opposite triangles are aligned carefully so the vehicle moves in a straight line when the wheel and axle mechanism is added.



Use large paper/plastic straws fixed with masking tape to the underside of a box.
Check straws are positioned carefully so the vehicle will move in a straight line when the wheel and axle mechanisms are added.
Make sure the straw hole is large enough to allow the axle to move freely. The wheels must be fixed tightly to the axle.



Lesson 3:

LO: To understand the purpose of their moving product and draw designs using labels and technical vocabulary.

Vocabulary: vehicle, friction

Children to know the product they will be designing, making and evaluating.
Children to discuss the intended user and the purpose in order to design their product. Children to generate, develop and communicate their ideas as appropriate e.g. through talk and drawings.
Children to draw upon knowledge of different features and label designs.

Lesson 4:

LO: To know how to mark out, hold, cut, and join materials and components correctly.

Vocabulary: cut, junior hacksaw, vice, masking tape, single hole punch

Children to be taught how to mark out, hold, cut and join materials and components together.
Ensure children are following the correct health and safety guidelines

Lesson 5:

LO: To know how to make their wheel and axle product using design ideas and criteria.

LO: To know a range of finishing techniques to complete their moving product.

Vocabulary: mechanism, wheel, axles

Children to independently draw upon knowledge of how to assemble wheel and axles correctly and continue to use the correct tools to make their product.
Children to use a range of finishing techniques linking to their designs as an ongoing design.
Examples of finishing techniques- This could be linked to Computing E.g. Clipart, Word processor or paint.

Lesson 6:

LO: To understand the importance of evaluating their finished product and how it has met its intended purpose.

Vocabulary: all vocabulary

Children to be asked to evaluate their product, drawing upon the intended purpose. Children to articulate how their product works, how it was assembled and whether the finished product matches their design and design criteria.

Concepts

User

Purpose

ASSESSMENT

KNOW MORE, REMEMBER MORE, DO MORE...

In this unit of learning, progress has been made when a learner knows more. This 'distance travelled' from the starting point is evidenced through them remembering more and doing more: in books, low stakes quizzes, retrieval, use of mind maps, answering the big question and being able to feel more confident about this unit.