

Unit 2A Vehicles

Focus – mechanisms

ABOUT THE UNIT

This unit builds on children's experiences of joining and combining sheet and reclaimed materials and of using moving joints. They learn about wheels and axles and how to use these when making wheeled vehicles for a specific purpose. They are encouraged to develop their design ideas based on investigating vehicles in the world around them. Work in this unit also offers opportunities to use construction kits, and computer generated graphics or text to enhance their finished products, to apply basic measuring skills and to draw on knowledge of forces from science.

This unit could be adapted and based on other wheeled products *eg service vehicles (fire engine, tip-up truck, milk float, ambulance), carnival float, prams and buggies, wheelchairs, shopping trolleys, wheelbarrows*. The main features of the particular vehicle would be the purpose of the product.

PRIOR LEARNING

It is helpful if the children have:

- joined and combined materials
- cut and shaped card and reclaimed materials
- discussed ideas
- made hinges

This unit builds on Unit 1A 'Moving pictures'.

It also builds on Science Units 1C 'Sorting and using materials', 1E 'Pushes and pulls', and on IT Units 1E 'Representing information graphically: pictograms' and 1F 'Understanding instructions and making things happen'.

VOCABULARY

In this unit, children will use words and phrases relating to:

- designing *eg purpose, ideas, discuss, explore, predict, guess, survey, table, venn diagram, most/least common*
- making *eg joining, combining, connecting, testing, punching*
- knowledge and understanding *eg vehicle, wheels, chassis, axles, doweling, hole punch, logo, distance*

RESOURCES

- toy vehicles, models, pictures of vehicles, video of vehicles moving
- various types of wheels, including wooden and plastic wheels, cotton reels and card discs
- collage materials
- straws, doweling and plastic tubing, reclaimed boxes, card, clothes pegs, single-hole punch or card punch, thin corrugated plastic sheet
- simple jigs for holding materials
- computer and printer with paint, draw or graphics programs

EXPECTATIONS

at the end of this unit

most children will:

have gained an understanding of how simple mechanisms related to moving vehicles work, after clarifying their ideas through discussion; have made a wheeled vehicle which moves and which generally matches their design intention

some children will not have made so much progress and will:

have a limited understanding of simple mechanisms; have attempted to create a vehicle which represents their original idea

some children will have progressed further and will:

have shown a wider understanding and will have incorporated moving parts *eg opening doors and windows, tipping bodies or simple steering* into their design, after reflecting on their early ideas; have created a working model which matches their design intention, after having made judgements about what they want the design to do

LEARNING OBJECTIVES

POSSIBLE TEACHING ACTIVITIES

LEARNING OUTCOMES

POINTS TO NOTE

CHILDREN SHOULD LEARN

CHILDREN

INVESTIGATIVE, DISASSEMBLY AND EVALUATIVE ACTIVITIES (IDEAs)

- that there are many types of vehicles
- that vehicles have different purposes
- that vehicles are made up of different parts
- that ideas for their own designs can be obtained by looking at familiar products
- to make simple drawings and label parts

- Provide opportunities for children to examine vehicles *eg lorries, prams, cars, vans, ambulances, caravans, fire engines, tractors, buses, carnival floats.*
- Discuss with the children the different features of the vehicles, *eg Why do vehicles have wheels? Do they all have the same number and size of wheels? Why are vehicles different shapes? Which vehicles have parts that move, light up or make a noise?*
- Ask the children to identify the different parts of vehicles – wheel, axle, chassis, body, cab.
- Children could make simple freehand drawings of vehicle and label parts appropriately.

- give examples of how different vehicles are used for different purposes and what features they may contain
- name the main parts of a vehicle
- draw on their investigation of vehicles to inform their own design ideas
- make simple drawings, with some labels of parts

Links to this unit

Science: Units 2E ‘Forces and movement’, 4E ‘Friction’

Information technology: Units 2B ‘Creating pictures’, 2D ‘Routes: controlling a floor turtle’

Mathematics: Measurement (standard, non-standard, apart, between, ruler, longer, shorter, weigh, more, less, balance, weight)

Literacy: Children could investigate the difference between long and short captions in information books, before labelling their drawings. Focus attention on how best to structure ideas when making an evaluation by teaching the use of a writing frame or supportive pattern *eg listing opinions under particular headings*

Content

- Although a wide range of vehicles should be investigated, for ease in the classroom it may be necessary to restrict the outcomes to one type *eg lorries to carry different loads, farm vehicles, ambulances, baby carrier, trolleys.*

Class management

- This unit is demanding with significant amounts of taught knowledge and skills. Children will need to be shown the different assembly techniques for wheels and axles. Teachers may wish to demonstrate both these methods but concentrate on one. Working models of construction techniques are valuable. It is important to have supplies of wheels, axles and framework materials for making the vehicle. Construction kits will be valuable in showing principles.
- Children will have ideas beyond their making skills in some cases. Careful judgements need to be made which do not curtail their creativity.

Health and safety

When carrying out a risk assessment for this activity, teachers will need to consider the materials, tools and equipment being used.

In addition, the following points should be noted:

- the use of simple jigs can reduce health and safety risks with some processes *eg cutting and drilling*
- ensure appropriate adhesives are used

Out-of-school activities and homework

Children could:

- collect pictures and models of vehicles and use these to aid discussion on the purpose of the different vehicles
- look at books about vehicles to extend their knowledge of how vehicles work and their purposes
- talk to older relatives to find out how vehicles have changed
- find stories and poems that include vehicles

FOCUSED PRACTICAL TASKS (FPTs)

- to use wheels and axles, understanding that wheels and axles can be assembled in two different ways:
 - either the wheel is attached tightly to the axle and the axle is free to rotate, or
 - the axle is fixed with the wheel free to rotate around it
- to apply rules which will control risk when using materials, tools and equipment
- to use hand tools safely and appropriately
- to choose and use appropriate finishing techniques

- Ask the children to practise joining wheels and axles to allow movement.
- The children could try out different ways of making axle holders *eg using clothes pegs, punched holes in card or boxes, using large drinking straws.*
- The children could try out different finishing techniques *eg collage, paint, cut-out shapes to stick on, computer-generated graphics or text to print out and stick on.*
- Using pictures from books or magazines ask children to describe a vehicle and the type of person who would drive it. Concentrate on the character of the person. They could then design a vehicle for a person they know.

- join wheels and axles effectively and explain how they work
- use a range of finishing techniques

DESIGN AND MAKE ASSIGNMENT (DMA)

Design and make a wheeled vehicle for a purpose

- to identify a purpose for what they intend to design and make
- to develop their design ideas through discussion, observation and drawing
- to measure and cut accurately
- to assemble, join and combine materials in order to make a vehicle
- to evaluate against their design criteria

- ★ Discuss what the vehicle is designed for *eg to carry things such as an animal or postal deliveries. Why is it needed to carry things? What other functions does it have?*
- ★ Encourage the children to consider type and size of vehicle, size and number of wheels, how it might be finished, what extras to add.
- ★ Ask the children to decide what their vehicle will include – set the design criteria and record them.
- ★ Encourage the children to collect everything they will need including tools and joining components. *What will you need? What materials will work well for this? How much do you need? What else can you use?*
- ★ Provide opportunities to create different labels or logos for the vehicle.
- ★ Discuss the order in which the children will do things.
- ★ Encourage the children to evaluate against their design criteria.

- apply what they have learnt through IDEAs and FPTs in their designing and making
- develop ideas for making a model vehicle which has a purpose, and which reflects their original idea
- suggest how they might make the vehicle they have designed
- apply rules which reduce risk whilst constructing their design
- construct a vehicle which functions
- finish the vehicle with a label or logo
- evaluate their finished vehicle, recording how it works and matches the original ideas

- essential activities
- ★ assignment stages (all are essential)
- optional activities

