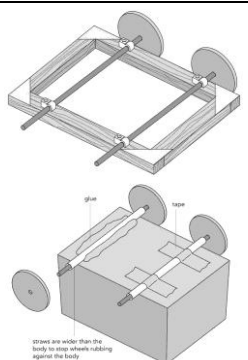
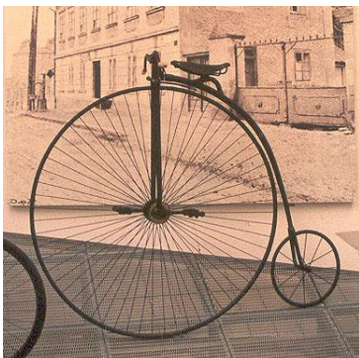


Year 2

D.T. Knowledge Organiser - Mechanics: vehicles with axles

Key Enquiry Questions:	
What is a mechanism?	A mechanism is the part that makes something move. Mechanisms are all around us – most things that help us in our everyday lives involve mechanisms.
What is a wheel?	A wheel is a circular object that rolls on the ground, helping object and vehicles move easily.
Why are wheels round?	The circular (round) shape of wheels and tyres ensure that vehicles can move fast. Wheels help vehicles move by rolling smoothly and without much drag. The circular shape is the most appropriate one as they maintain a uniform and smooth contact with the surface.
What is an axle?	<p>An axle is a rod that helps wheels to rotate.</p> <p>Free axle – The axle moves freely (usually in a tube or through a fitting fixed to the vehicle) and is fixed to the wheels, rotating with the wheels.</p> <p>Fixed axle – The axle is fixed to the vehicle and the wheels move freely on the axle.</p> 
Do all vehicles have the same number and size of wheels?	<p>Cycles with only one wheel are called unicycles. The prefix before the root word 'cycle' implies the number of wheels (uni- one, bi- two, tri- three). Usually vehicles have pairs of wheels, though there have been three-wheeled cars as well as three-wheeled cycles. Some vehicles have different sized wheels (e.g. tractors), in these vehicles, the opposite wheels on an axle are usually the same size. The most common road vehicles have four wheels. Some vehicles such as lorries and trains can have many wheels. By adding axles in the chassis (eg adding trailers), these vehicles become easier to turn. A number of vehicles (tanks, plant equipment on building sites) have tracks which are made up of hundreds of metal links. The wheels ride along the moving track, just like the wheels in a car run along the road. The penny-farthing was the first machine to be called a bicycle and had a large wheel at the front and a much smaller one at the rear.</p>
Why are vehicles different shapes?	<p>The shape of a vehicle is predominantly designed to make it effective for its purpose. A bus would not be very customer friendly if all the passengers had to sit low down like a racing driver does in a racing car. Likewise, a truck would not be able to negotiate bends on a racetrack with other racing cars. Likewise, the wheels are designed for the maximum satisfaction: racing bikes have large, narrow wheels to use the energy of the cyclist to the maximum and to have the least amount of friction. A racing bike would not be efficient for carrying heavy materials around a muddy building site, where a tracked vehicle would be more effective. Some vehicles are designed to be streamlined, to reduce air resistance, so that they can be fast.</p>





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Key Vocabulary	
design	The act of working out the form of something (as by making a sketch or outline or plan).
vehicle	Something used to transport people or goods.
axle	Central shaft for rotating wheels.
axle holder	The component through which an axle fits and rotates.
chassis	Frame.
wheel	Round frame that turns on the axle.
body	Built on the chassis to complete the vehicle.
durability	The ability something has to exist for a long period of time and resist wear, pressure or damage.
hacksaw	A saw with small teeth used for cutting hard materials.
bench clamp	A device (used by carpenters) that holds things firmly together
dowel	A round rod or stick.
construct	To build or make something physical.
evaluate	To judge the value or worth of someone or something.
joining	To put or bring together so as to form a unit (join two blocks of wood with glue).

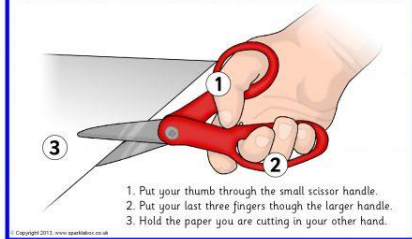
Important Facts	
The history of the wheel	<p>It is thought that the first type of wheel was the potters' wheel and it was invented in Mesopotamia around 5,500 years ago.</p> <p>There is evidence that the Ancient Greeks used wheelbarrows (though some think there is earlier evidence of wheelbarrows in China and Europe).</p> <p>The wheel as we know it was probably invented around 3500 BC.</p> <p>Wheeled vehicles with axles were evidenced on pottery found in Poland dating back to 3370BC.</p>

Points to note:	
Ensure a variety of different shaped boxes are available so children can select the one most appropriate for their design.	
Provide wheels with a range of diameters and thicknesses for children to explore and select the most suitable.	
A card disc glued onto a wooden/MDF wheel is easy to draw on to add details using felt tipped pens.	
To add a trailer, use flat magnets glued onto the ends of boxes (opposite poles outwards) or short pieces of pipe cleaner bent to form a 'hook and eye'.	

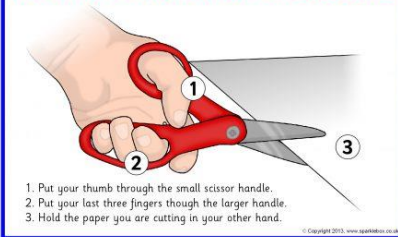
Health and Safety

- Remove any jewellery and tie back long hair.
- Use scissors correctly.
- Walk safely and calmly around the classroom/ workshop.
- Wear an apron and roll up your sleeves.
- Follow the teacher's cutting instructions carefully.
- Make sure that you are using the correct equipment for tasks.
- If you need to move around with scissors, hold around the closed blades, facing down.
- Report any accidents & clean up properly after yourself.

How to Hold a Pair of Scissors



How to Hold a Pair of Scissors



Ways to hold free 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.

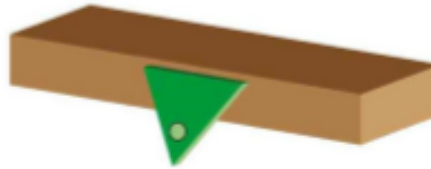
Make sure they are aligned carefully so the vehicle moves in a straight line when the wheel and axle mechanism is added.



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.

