

Mechanisms	<u>Design brief and explore existing products</u>	<u>Explore and practise techniques (prototype)</u>	<u>Design a product</u>	<u>Make lesson:</u>	<u>Evaluate:</u>
<p>Reception: (Refer to CUSP Y1 mechanisms)</p> <p>NEED ACCESS TO A RANGE OF DIFFERENT POP UP BOOKS</p>	<p>A range of different pop up books for children to explore showing different motions. Have one for class story to model the use and purpose of the use of pop ups.</p>	<p>Children to have access to toys and other objects that move with the motion of push and pull e.g. toys, bikes, cars etc. Children to have access to these as part of provision- adults to question the motion e.g. are you pulling or pushing, can you push or pull X?</p>	<p>Using your design brief, highlight what needs to be included in the end product:</p> <ul style="list-style-type: none"> • Colourful • Needs to be able to slide and move. <p>Children can design their pop up toy as part of drawing and design in creative area.</p>	<p>Make a simple pop up toy using cardboard, paper and glue to create a pop up toy/card.</p>	<p>Test the product and see if it slides up and down successfully. Children to verbally make comments about their product through questioning from adult: Do you like your slider? Was it easy or hard to make? What do you like about your slider? Would you change anything?</p>
<p>Vocabulary:</p>	<p>Pop up, slider, materials, fixings, slot, push, pull</p>				
<p>Year 2 (Use existing hexagon and knowledge note on CUSP)</p>	<p>Introduce a design brief to make a simple vehicle. Look at designer Karl Friedrich Benz and discuss his Motor wagon. Discuss how wheels existed for many years but have only used them in the last 150 years on vehicles. Introduce the difference between a fixed axle with rotating wheels and a rotating axle with fixed wheels- children to experiment with wheels,</p>	<p>Look at images of existing products (tractors/wheelchairs/penny-farthing) does it matter if wheels are different sizes? Explore different variables relating to the number of wheels and axles used and their location on the chassis, the size of wheel used and their positioning on the axle. Effect of motion if: *axles are placed too high on chassis</p>	<p>Using the design brief, highlight what needs to be included in the end product:</p> <ul style="list-style-type: none"> • Be able to move • Use either a fixed or rotating axle • Consider the position, alignment and size of wheels <p>Children to work in partners to design a product. (CUSP lesson 3)</p>	<p>Children to work in pairs to create their vehicle.</p>	<p>Take photograph of end product and label. Children to identify what went well e.g. my wheels were positioned so the vehicle ran smoothly. Children to identify a new skill they have learnt (refer to CUSP vocabulary) Assessment: *Children to discuss how smoothly the vehicle moved and why.</p>

	dowels and boxes (CUSP lesson 1)	<ul style="list-style-type: none"> *both axles are placed close together on the chassis *multiple axles are used on one chassis *axles are not placed parallel to each other *holes for axles are not mounted in the centre of wheels *different sized wheels are used on one chassis (CUSP lesson 2) 			<ul style="list-style-type: none"> *What improvements could be made? Why? *Has the position of the axles made your vehicle more or less stable? *What difficulties did you have during constructions? How did you overcome these problems?
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Vocabulary:

Core Knowledge	Explanation	Technical Vocabulary	Definition
wheel	A wheel is a circular object that rotates on an axle.	rotate	to move or turn around a fixed point
axle	An axle is a rod or spindle (either fixed or rotating) passing through the centre of a wheel or group of wheels.	position	the place where somebody or something is located
axle holder	An axle holder is the part of a mechanism that holds an axle steady.	centre	the middle point or part of something
chassis	A chassis is the base frame of a car, carriage or other wheeled vehicle.		

Year 3:
(Use existing hexagon and knowledge note on CUSP)

ASK PARENTS FOR LOTS OF CARDBOARD FOR UNIT

Introduce a design brief to make a simple linkage system toy. Look at famous greek mathematician Archimedes. "Give me a lever long enough and a fulcrum from which to place it and I shall move the world."-potential mechanical advantages leavers can give.
Have a range of images (p.g.3 CUSP) for children to discuss:
*What are the individual leavers and what do they do?



Using the design brief, highlight what needs to be included in the end product:

- Be able to move
- Use a lever system to move
- Explain how it works with linkage system on the back
- Include the types of motions (linear, oscillating,

Children gather resources to make their simple linkage system toy.

Take photograph of end product and label.
Test against the criteria listed in the design brief section
Suggest ways the product can be improved
Have a success criteria taken directly from the design brief children to tick or cross if it was met.
Children to identify a new skill they have learnt.

Assessment:
*What kind of movement does your linkage create?

*What do they all have in common? (make a job easier)

*Identify Fulcrum- point at which lever hinges/pivots, effort- applied where the person touches it and creates force, load- what is being moved.

*Introduce 3 classes of levers:

Which types of leavers fit which class and why? E.g. seesaw 1st class lever, wheelbarrow- 2nd class, tweezers/bbq tongs- 3rd class.

Demonstrate leavers in use-hit a nail into wood and use a claw

hammer/wheelbarrow?

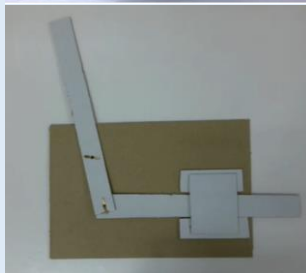
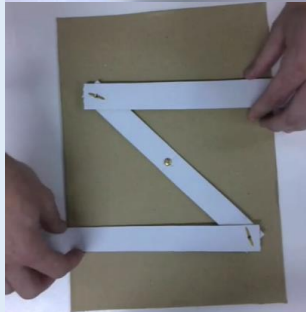
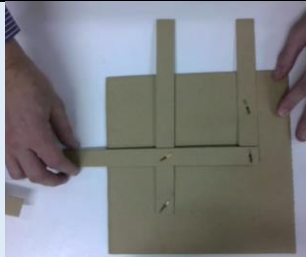
All hand powered known as simple mechanisms (make a job easier/better-

Mechanical advantage)



<https://vimeo.com/651091026/deb3323933> (Shows how to make this seesaw, block of wood with hole, metre stick etc, 10:50)

Children to experiment moving the fulcrum into



<https://vimeo.com/651091026/deb3323933> (47 mins to show you how to make different linkages)

Children to explore making different types of linkage system to begin to make choices about the linkage system they will use in their toy.

Before making explore some different types of linkage systems and discussing what these are called (linear,

rotary,
reciprocating)

Children to create their own drawn design showing the front and the back. Children should consider the linkage they will use and what movement this may replicate e.g. birds flapping wings, moving feet etc.

Children may want to do a mock up before- to test before making the final product.

Children may want to use a pre-printed image rather than drawing the design onto cardboard.

Are the movements what you expected?

*Why did you select that linkage for your toy?

*What difficulties or challenges did you face in the making of your toy?

*What improvements could you make to the linkage system and its movement?

	different positions to see what happens, consider the load and how this effects the lever. Leaver- a bar attached to a pivot. Linkages are a series of levers linked together.	rotary, oscillating, reciprocating).			
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Vocabulary:

Core Knowledge	Explanation
lever	The lever is one of the most basic forms of a machine. A lever is a rigid body that has a fulcrum along its length. The fulcrum is the point where the lever pivots.
linkage	A mechanical linkage is a series of connected levers and pivots.
mechanism	A mechanism is a system of parts working together in a machine.

Technical Vocabulary	Definition
force	pushes or pulls, measured in Newtons
load	the weight of an object or objects being moved
effort	the force applied to make something move

Year 6:

To design and make a Ferris wheel. Show images of different pulleys- are children able to recall what a pulley is?
Look at examples of different lifts (elevators) and the pulley systems that they use:
*Eiffel Tower
*Heron building
*Burj Al Arab (outside lift/elevator)
Pulleys help us to go up higher to get amazing views of the world.

Pulley- disc or wheel that has a groove around its edge

Introduce different types of gears:
*Spur (used to increase and sometimes decrease the turning force)

*Bevel
*Worm

CHILDREN TO USE K'NEX SETS TO CREATE DIFFERENT TYPES OF GEARS.

Children to design and make a ride for a funfair which requires the use of gears, levers and pulley. Children will be able to make this using pieces of wood and cardboard.

Share and discuss the design brief: p.g. 3 (CUSP Mechanisms Block B unit- may need

Children to make their ride for the funfair.

Take photograph of end product and label. Suggest ways the product can be improved. Children to explain how they met the design brief and identify areas that were not successful and make suggestions on what they would do next time. Children to identify a new skill they have learnt

that allow a rope to run around.

Experiment with different types of pulleys:

Fixed pulley (stays in stationary position)



Moveable pulley (pulley attached to the load)



Compound pulley system (combine fixed and moveable)



Combine two fixed pulleys and two moveable pulleys

adapting if children are not doing ferris wheel)



As above but vertically
(double pulley and move onto
treble pulley):



Where are pulleys used?
How do pulleys work
Why are pulleys classified as
simple machines?
Can you give any examples
of simple machines?
Can you define mechanical
advantage?
How much mechanical
advantage does each pulley
give?
What is an X pulley system?
What type of motion does
the load travel in?

	ALTERNATIVELY USE K'NEX TO CREATE DIFFERENT TYPES OF PULLEYS.				
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Vocabulary:	Core Knowledge		Explanation		Technical Vocabulary		Definition	
	pulley		A pulley is a wheel with a grooved rim around it which holds a cord, belt or rope. Pulleys are used to change the speed, direction or magnitude of a force and can be used to raise heavy loads.		block and tackle		a lifting mechanism consisting of ropes, a pulley block and a hook	
	movable pulley		This is a simple pulley where the wheel can both move and rotate. In this pulley system, less force is required to lift a load.		rack and pinion		a device for converting rotary into linear motion and vice versa, in which a gear wheel (the pinion) engages with a flat-toothed bar (the rack)	
	fixed pulley		A fixed pulley is one which has a rotating wheel that is attached to a stationary object such as a beam.		driver gear		a gear wheel that causes other wheels in a gear train to rotate	
					driven gear		a gear wheel that moves in the opposite direction to the gear that is driving it	