Construction:
Fairy-tale engineering

Year 5

How can we use pulleys and levers to solve a problem?

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Skills

Core skills

- Investigate how mechanisms work in everyday life and how they can solve problems
- Develop construction skills and experiment with how to make their own simple mechanisms
- Create design criteria and plan a maquette of a theatre model that uses mechanisms to solve a fairy-tale problem
- Construct a strong, functional and appealing maquette of a theatre model that uses mechanisms to solve a fairy-tale problem
- Test, improve and evaluate the model's function and appearance against design criteria, suggesting realistic improvements

Supporting skills

- Solve problems creatively by testing mechanisms, identifying faults and adapting designs through a test–improve–evaluate process rather than starting again
- Work collaboratively during practical tasks by sharing tools and resources, listening to others' ideas and using peer feedback to improve designs and mechanisms
- Use technical vocabulary to communicate ideas clearly through discussion, labelled drawings, annotated plans and simple exploded diagrams, explaining how pulleys, levers and linkages work
- Draw inspiration from fairy tales and theatre design to innovate imaginative, functional solutions that meet the needs of a user and solve a clearly defined problem
- Make considered choices about recycled and sustainable materials, reflecting on how material selection affects strength, movement, appearance and environmental impact
- Apply mathematical skills when measuring, estimating and scaling materials to create a theatre maquette, including understanding simple scale (e.g. 1:10) and positioning mechanisms accurately

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Vocabulary

Lesson 1

	force	Something that makes an object move, stop. Change shape, speed or direction.
	user	The person who will use the product you are designing.
	problem	The difficulty or challenge the user needs help with.

Lesson 2

	problem	The difficulty or challenge the user needs help with.
	fulcrum	The pivot point of a lever; the spot where the lever rests and turns.
	lever	A rigid bar that moves around a pivot point to help you lift, open, push or move something with less effort.
	linkage	Two or more bars joined with pivots.
	pivot	A fixed point that something turns or rotates around
	pulley	A wheel with a rope around it that helps you lift or move things more easily.

Lesson 3

	appealing	Something that looks nice or attractive.
	functional	Designed to be useful and serve a purpose.
	problem	The difficulty or challenge the user needs help with.
	set	The background and scenery in film or theatre.
	user	The person who will use the product you are designing.

Lesson 4

	dimension	A measurement of something's size, such as how tall, wide or deep it is.
	maquette	A small-scale model of a design used in art, theatre and architecture to help visualise the final piece.

Lesson 5

	improve	To make something better.
	successful	Having achieved a desired aim or result.
	test	To try something out to see if it works or if it's good enough.
	problem	The difficulty or challenge the user needs help with.
	user	The person who will use the product you are designing.

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I Now Know...

1

- A mechanism is specifically designed to create or change movement.
- A pulley helps change the direction of a force.

2

- A pulley is a wheel and axle with a string.
- A lever is a rigid bar that moves around a pivot (fulcrum).
- A linkage is two or more bares joined together with pivots.

3

- A maquette is a small-scale model used to plan a design.
- An exploded diagram shows the separate parts of a design.

4

- A backdrop is the painted scenery at the back of the stage.
- The midground is the middle area where most of the action happens.
- The foreground is the area closest to the audience.
- The proscenium arch is the framed opening at the front of the stage.

5

- When evaluating a theatre model, designers should check that it solves the user's problem and that it works as planned.

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Links

Previous Learning	Future Learning
KS1 -Introduce basic construction, explore stability, joining methods and simple wheel and axle mechanisms -Build strong, stable frame structures with cross-bracing and simple mechanisms such as hinges, sliders and pivots **Year 3** -Develop design criteria for a model that uses magnets to create movement, applying joining methods such as folds, slots, tabs, ties, flanges and L-braces. **Year 4** -Construct interactive models with mechanisms such as cams	**Year 6** -Combine advanced electrical and mechanical systems with imaginative design to produce dramatic and functional models

Construction: Fairy-tale engineering Learning Objectives

Lesson 1: How can mechanisms help solve a problem in a fair-tale? LO: I can investigate how mechanisms can solve real-life problems and link this to a problem in the world of fairy tales	Researching
I can identify the user in a fairy tale and what they need	
I can choose the best mechanism to solve a fairy-tale problem	
I can sketch my idea to show how the mechanism helps the character	

Lesson 2: How do pulleys, levers and linkages work? LO: I can learn how pulleys, levers and linkages work.	Technical knowledge
I can explain how pulleys, levers and linkages work	
I can build simple prototype mechanisms and explain what each part does	
I can test and improve my mechanism to make it work more effectively	
I can explain how I might use these mechanisms in a fairy-tale theatre set	

Lesson 3: How can I design a model of a fairy-tale theatre set with moving parts? LO: I can create design criteria and draw a labelled plan of a model fairy-tale theatre set with moving parts.	Designing
I can identify a fairy-tale problem and choose a mechanism that will help the user	
I can design a theatre maquette that is both appealing and functional	
I can create a mood board that clearly shows my ideas, scenery layers and chosen mechanisms	
I can draw an exploded diagram to show how the parts of my model fit together	

Lesson 4: How can I build a model of a fairy-tale theatre with moving parts? LO: I can build a model of a model fairy-tale theatre set with moving parts.	Making
I can build a theatre maquette using my design and design criteria	
I can solve problems that come up while building my model	
I can add scenery, props and a moving mechanism that help the user	
I can explain how my finished model solves the fairy-tale problem	

Lesson 5: What makes my theatre set model successful? LO: I can evaluate my model against the design criteria and suggest improvements.	Evaluating
I can test my theatre model to see if it works as planned	
I can explain how my model solves the user's problem	
I can identify what works well and what could be improved	
I can use feedback to make improvements to my model	

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Post Assessment

What is a mechanism?

- A decoration added to a model ☐
- A part that helps something move using a force ☐
- A material used to strengthen a structure ☐

Explain why designers identify a problem before choosing a mechanism.

_____

_____



Complete the missing words in the sentence.

A product is designed to solve a _____ for a _____.



Draw a line to match the mechanism to its description.

pulley	a rigid bar and a pivot
lever	a wheel and axle with a string
linkage	transfers movement using joined bars

What is the pivot point of a lever called?

- axle ☐
- fulcrum ☐
- prototype ☐



True or false? A pulley can change the direction of a force, allowing you to pull down to lift something up.



_____

Why do designers make prototypes before building the final product?

_____

_____

_____

_____

Put these design steps in the correct order.

- evaluate ☐
- make ☐
- research ☐
- design ☐

Choose the correct words to complete the sentence.

Moving parts must be positioned carefully so the mechanism is _____ and the model is _____.

appealing **colourful**
functional **decorative**

Draw a line to match each image to the correct word.







exploded diagram	mood board	maquette

What is the proscenium arch?

- A moving part of the stage ☐
- The framed opening that separates the stage from the audience ☐
- The floor of the stage ☐

True or false? A prototype is the final finished product.



_____

Why is it important to evaluate our work? Tick all that apply.

- to test if it works well ☐
- so we can copy someone else's ideas ☐
- to check it matches the design criteria ☐
- to think about what could be improved ☐
- because the teacher tells us to ☐

Name two improvements you could make to a model after testing it.

1. _____

2. _____