

Knowledge Organiser

Subject: Design & Technology

Unit: Fairgrounds

Overview		
<p>Children will explore and discuss different fairground rides, thinking about how they move, what the components are that join them together and the mechanisms that make them work. The children will investigate electrical motors and how they make fairground rides rotate; they will learn about pulley and belt systems and use appropriate materials to create a circuit. Children will design and make their own fairground ride.</p>		
What should I already know?	Vocabulary:	
<p>Design</p> <ul style="list-style-type: none"> • Can investigate examples of cam toys and explain how they work. • Can investigate and talk about how different shaped cams change the movement of the follower. • Can make suggestions how different cams could be used for different kinds of toys (steam engines - circular, carousel pear shaped etc.) • Can create a design for a moving toy with a cam that: <ul style="list-style-type: none"> • has a clear purpose and audience • has a moving part • has a sturdy structure as the base for the toy. • Can create a detailed plan, recording how the design meets the needs of the user, the purpose; the equipment and the order of work for the making process. • Can suggest some alternative designs and discuss the benefits/drawbacks • Can identify the parts of the process that will be easy and more challenging. • Can identify how they can overcome the challenges - ask for help <p>Make</p> <ul style="list-style-type: none"> • Can use a template to investigate the ways different cams affect the movement of the follower • Know a range of techniques to make a structure sturdier: <ul style="list-style-type: none"> • use a cardboard triangle to reinforce corners • for a wooden frame, use pieces of wood to create a triangular reinforcement • double up card or cardboard to make it stronger • create feet at the base of the structure so it is easier to balance • Can independently follow their design to make a successful, moving toys that: <ul style="list-style-type: none"> • has a cam mechanism that works effectively • is sturdy • is appropriate for the intended audience • looks like the design <p>Working with tools</p>	<p>design brief</p> <p>components</p> <p>construct</p> <p>movement</p> <p>Cam</p> <p>shaft</p> <p>precise</p> <p>testing</p> <p>refine</p> <p>accuracy</p> <p>belt</p> <p>pulley</p>	<p>a set of instructions given for a designer to follow to create</p> <p>a part or element of a larger whole; wheels are components of a car.</p> <p>to build from a variety of materials</p> <p>a change or development</p> <p>a projection on a rotating part in machinery, designed to make sliding contact with another part while rotating and impart motion to it.</p> <p>a long cylindrical rotating rod for the transmission of motive power in a machine</p> <p>with the greatest of accuracy</p> <p>enabling a product to be tried and refined to ensure it meets its designed function</p> <p>make minor changes to improve</p> <p>exact in all detail</p> <p>a continuous band of material used for transferring motion from one wheel to another.</p> <p>a wheel, which a cord passes, to change the direction of a</p>

- Measure and cut precisely to millimetres
- Can independently organise appropriate equipment and materials needed.
- Can use a range of tools and equipment with good accuracy and effectiveness, within established safety parameters e.g., thick card, dowelling, tubing, cams, wood, glue, saws, scissors,
- Can experiment with a variety of materials, tools and techniques

Evaluate

- Can develop own designs through reflection and evaluation of others products
- Can identify what works well and what might be improved using these prompts:
 - Which parts of the making process went well.
 - What are you particularly pleased with?
 - Did you encounter any problems in the making process? How did you overcome them?
 - Did you change any part of your design during the making process, if so, why?
 - How well does your product for the design criteria and the intended purpose?
 - Would you change anything about your finished product if you were to make it again?

Technical Knowledge

- A cam mechanism is a linkage system which has a follower to convert rotary movement (moving round and round) to linear movement (moving up and down).
- As the cam is rotated by the dowelling, the follower is lifted up and down because of the shape of the cam
- The shape of the cam affects the movement of the follower.
- Lots of children's toys have objects attached to the follower to create a fun moving toy



pneumatic mechanism

electrical mechanism

materials

load

motor

Different types of rotation



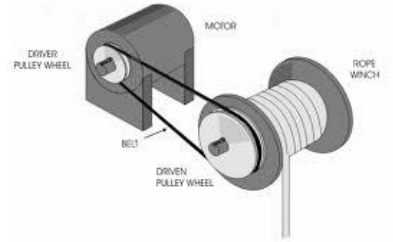
detailed diagram

transfer

axle

framework

force applied to the cord and is used to raise heavy weights



operated by air or gas, under pressure

operated by a circuit using electricity

things needed to create a product

a heavy or bulky thing that is being carried

a source of power

the action of rotating about an axis or centre.

a drawing which has technical information and minute detail to form an accurate representation of a product

move from one place to another

a rod or spindle (either fixed or rotating) passing through the centre of a wheel or group of wheels

an essential supporting structure of a building, vehicle, or object

What will I know by the end of the unit?

Design

- Can compare different fairground rides using the following criteria: -
 - What are they like
 - How they move
 - How are the components joined together
 - What mechanism turns the ride
- Can use electrical components to investigate and describe ways of creating replica fairground rides, considering the following:
 - What needs to be attached to the motor?
 - What different kinds of rotating parts could we have?
 - How could pulley and belt systems can be used to transfer movement from one axle to another.
- Can experiment with different techniques to gather ideas for fairground ride frameworks considering:
 - Materials used
 - Joining techniques
 - Strengthening methods
 - Whether it is free standing
 - How the prototype could be used for a fairground ride.
- Can apply research and knowledge to design a fairground ride with a rotating part. The design to show:
 - Kind of ride (and audience)
 - Which part will rotate
 - An appropriate electrical circuit
 - How movement will be controlled
 - Type of framework and how it will be made sturdy
 - Materials needed
- Can talk through how they will construct their design, justifying choice

Make

- Can follow a design to create a fairground ride with a rotating part:
 - working appropriately with arrange of tools, techniques and electrical components
 - finished product matches the design
 - Product has a stable framework
 - using finishing techniques to ensure that their finished product is of a high quality
- Can work within constraints
- Can demonstrate how their product is strong and fit for purpose

Working with tools

- Measure and cut out in precise detail
- Can choose appropriate tools and equipment and use them effectively:
 - wires, motors, batteries, switches, elastic bands, cotton reels, doweling, card, paper, string, straws, doweling, empty boxes, scissors, glue, tape,
- Can use a variety of materials and components accurately
- Work within health and safety rules when working with materials such as scissors and other sharp objects

Evaluate

- Can share models and objectively evaluate them using these prompts:
 - How well does your product fit the design criteria and the intended purpose?
 - Is it sturdy/attractive/functional?
 - Are the joins secure?
 - How well does the rotating part of your fairground ride work
 - What is successful about it?
 - Is there anything that could be improved upon for next time?
- Understand that all finished products, no matter how good, can be improved in some way.

Technical Knowledge

- Electrical circuits and motors are used to make objects rotate. Fairgrounds and other everyday objects (vacuum cleaner, electric fan) use electrical circuits for rotation.
- The components of an electrical circuit are - battery, wire, switch, motor. The circuit needs to be complete for the motor to work.
- Motors can be attached to pulley and belt systems so that other objects can be rotated as well as the motor itself
- Belt and pulley systems are used to transfer movement from one axel to another.
- Know how to reinforce frameworks:
 - Create a triangle out of the corners.
 - Creating diagonals in the frame
 - Making 'beams' across shapes