

St John & St James' C of E Primary School

Mechanisms - Skills and Knowledge Progression Document



Nursery
ELG – Expressive Art and Design: Creating with Materials
Physical Development: Fine motor skills, Gross Motor Skills

Child initiated exploration of a range of construction and design opportunities through continuous provision construction area and separate block play area.
 Explore different materials freely, in order to develop their ideas about how to use them and what to make.
 Develop their own ideas and then decide which materials to use to express them.
 Beginning to develop control with single-handed utensils or writing implements and growing control of simple constructions.

Reception
ELG – Expressive Art and Design: Creating with Materials
Physical Development: Fine motor skills, Gross Motor Skills

A construction area in each classroom throughout the year and a separate block area for construction buildings.
 Free choice junk modelling with a range of connecting including tape, glue, string
 Make a plan for a project and communicate that plan to others.
 Explore different materials freely, in order to develop their ideas about how to use them and what to make.
 Develop their own ideas and then decide which materials to use to express them.
Three Little Pigs Ogden Trust experiment. Building bridges using simple materials (lollipop stick and pinch pegs)
 Refine ideas and develop their ability to represent them.
 Create collaboratively, sharing ideas, resources and skills.

Year 1
Project: To design, make and evaluate a pop up information book about the seaside (mechanics)

Designing	Making	Evaluating	Technical Knowledge
<ul style="list-style-type: none"> ● State what products they are designing and making. ● Describe what a products purpose is ● Explain how their products will work ● Use simple design criteria ● Generate ideas by drawing on their own experiences ● Use knowledge of existing products to come up with ideas 	<ul style="list-style-type: none"> ● As a class, talk about the order of the steps to make the mechanism ● Select from a range of tools and equipment ● Select from a range of materials according to their characteristics ● Measure, mark out, cut and shape materials ● Assemble and join materials 	<ul style="list-style-type: none"> ● Talk about their design ideas and what they are making. ● Make simple judgements about their products and ideas against design criteria ● Suggest how their products could be improved ● Discuss what they like and dislike about products. 	<ul style="list-style-type: none"> ● Explore and use sliders and levers ● Understand that different mechanisms produce different types of movement.

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- Draw and make mock-ups of their ideas with paper and card

Key Vocabulary: slider, lever, pivot, slot, bridge/guide, pull, push, up, down, straight, curve, forwards, backwards, purpose, mechanism

Equipment: card strips, card rectangles, paper, masking tape, paper fasteners, paper binders, stick glue, PVA glue, finishing materials and media, scissors, cutting mats, card drills

Year 2

Project: To design, make and evaluate a moving vehicle to show how to travel sustainably (mechanics)

Designing	Making	Evaluating	Technical Knowledge
<ul style="list-style-type: none"> ● State what products they are designing and making. ● Describe what the products are for ● Explain how their products will work ● Explain how they will make their products suitable for intended users ● Use simple design criteria ● Generate ideas by drawing on their own experiences ● Use knowledge of existing products to come up with ideas ● Model ideas by exploring components, making templates and mock-ups. ● Develop and communicate their ideas. 	<ul style="list-style-type: none"> ● Plan by suggesting ideas and what to do next ● Select from a range of tools and equipment explaining their choices ● Select from a range of materials and components according to their characteristics ● Measure, mark out, cut and shape materials ● Assemble, join and combine materials and components ● Use a range of materials and components such as paper, card, plastic and wood according to their characteristics. 	<ul style="list-style-type: none"> ● Discuss their design ideas and what they are making. ● Make and evaluate judgements about their products and ideas against design criteria ● Suggest how their products could be improved ● Explore and evaluate a range of products with wheels and axels ● Understand how products are used and where products might be used ● Discuss what they like and dislike about products. 	<ul style="list-style-type: none"> ● Explore and use wheels, axels and axle holders ● Distinguish between fixed and freely moving axels

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Key Vocabulary: vehicle, wheel, axle, axle holder, chassis, body, cab, assembling, cutting, joining, shaping, finishing, fixed, free, moving, mechanism
Equipment: card boxes, card, cotton reels, plastic tubing, dowel, clothes pegs, paper sticks/dowel, paper/plastic straws, card discs, MDF wheels, wooden wheels, hole punch, card drill, cutting mat, masking tape, PVA glue, paint

Year 3
Project: To design, make and evaluate a moving creature toy for EYFS (mechanics)
Amazon animal focus

Designing	Making	Evaluating	Technical Knowledge
<ul style="list-style-type: none"> • Generate realistic and appropriate ideas and their own design criteria through discussion, focusing on the needs of the user. • Use annotated sketches and prototypes to develop, model and communicate ideas. • Use simple design criteria • Generate ideas by drawing on their own experiences • Model ideas by exploring components, making templates and mock-ups. • Develop and communicate their ideas. • make design decisions that take account of the availability of resources 	<ul style="list-style-type: none"> • Order the main stages of making. • Select from and use appropriate tools with some accuracy to cut and join materials and components such as tubing, syringes and balloons. • Select from and use finishing techniques suitable for the product they are creating. • measure, mark out, cut and shape materials and components with some accuracy • assemble, join and combine materials and components with some accuracy • apply a range of finishing techniques, including those from art and design, with some accuracy use a wider range of materials and components 	<ul style="list-style-type: none"> • Investigate and analyse books, videos and products with pneumatic mechanisms. • Evaluate their own products and ideas against criteria and user needs, as they design and make. <p>To investigate and analyse:</p> <ul style="list-style-type: none"> • who designed and made the products • where products were designed and made • when products were designed and made • whether products can be recycled or reused 	<ul style="list-style-type: none"> • Understand and use pneumatic mechanisms. • Know and use technical vocabulary relevant to the project. • materials have both functional properties and aesthetic qualities • materials can be combined and mixed to create more useful characteristics

Key Vocabulary: components, fixing, attaching, tubing, syringe, plunger, split pin, paper fastener pneumatic system, input movement, process, output movement, control, compression, pressure, inflate, deflate, pump, seal, air-tight
Equipment: washing-up liquid bottles, 5mm plastic tubing, sterile syringes, T-connectors, balloons card, plastic sheet, PVA glue, masking tape, parcel tape, sticky pads, pipe cleaners, elastic bands, clips

Year 5
Project: Design, Make and Evaluate a mechanical Christmas toy. (CAMS)

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Designing	Making	Evaluating	Technical Knowledge
<ul style="list-style-type: none"> - Carry out research into user needs and existing products -Develop a simple design specification to guide the development of ideas - Generate, develop and model ideas, through discussion, prototypes and annotated sketches 	<ul style="list-style-type: none"> ● Formulate a clear plan, including a step-by-step list of what needs to be done. ● Select from and use appropriate tools to accurately measure, mark out, cut, shape and join construction materials to make frameworks. ● Use finishing and decorative techniques suitable for the product you are designing and making. 	<ul style="list-style-type: none"> ● Investigate and evaluate a range of existing frame structures. ● Evaluate your products against the design specification, intended user and purpose, identifying strengths and areas for development ● Test product use with intended user 	<ul style="list-style-type: none"> ● Understand how cams can be used to produce different types of movement and change the direction of movement. ● Understand that mechanical systems have an input, process and an output.

Key Vocabulary: Rotary motion Oscillating motion Reciprocating motion CAM Follower Slider Guide Spacer

Equipment: Card Paper straws Newspaper Masking tape, PVA glue junior hacksaws, glass paper, G-clamps, bench hooks, hand drill