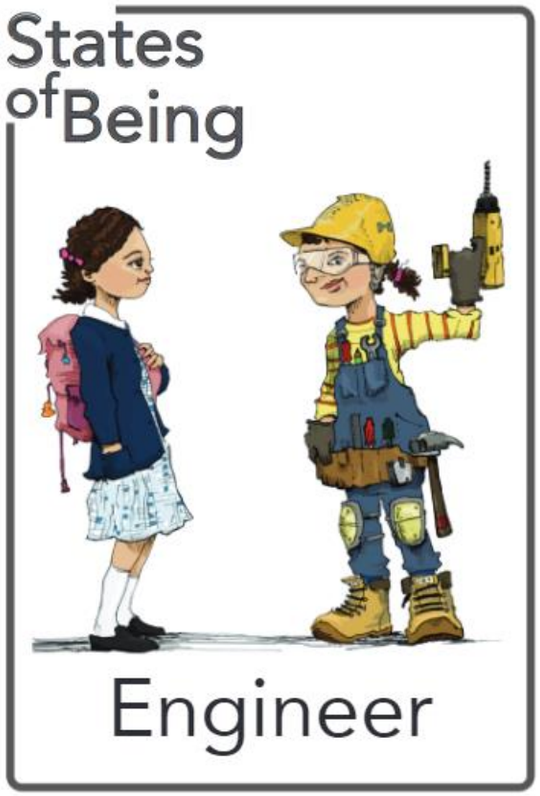
Engineer progression



Intent and curriculum approach:

-Being an Engineer is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.

-We follow the design, make, evaluate process. The initial engineer lessons in an enquiry consider purpose, user and design criteria and functionality and decision making. The next stage of the enquiry focuses on making and refining the key skills needed to do this successfully. The final stage centres on evaluating existing products and considering adaptations.

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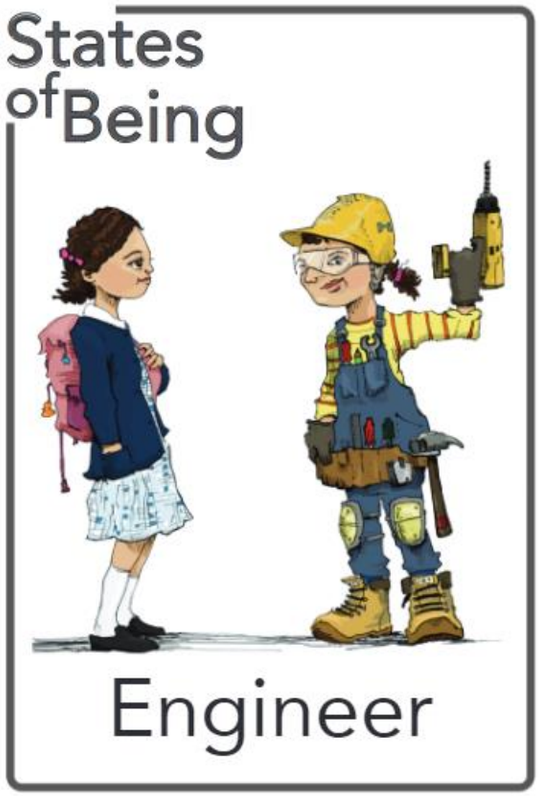
FILTON AVENUE
PRIMARY SCHOOL



Being a Engineer Teaching and Learning Approach:

-In engineer, key skills are modelled and practised at all stages of the design process (planning, making, evaluating). This is often done using visualisers for more intricate skills.

-Vocabulary is explicitly taught. Disciplinary sentence stems and mapped vocabulary are used to ensure children can articulately speak about the design process and their finished products.

-Being an engineer is assessed through responsive teaching, vocabulary checks and end of enquiry outcomes.

Engineer progression

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EYFS			
ELG	Safely use and explore a variety of materials, tools, and techniques, experimenting with colour, design , texture, form and function.		
	Technical Knowledge •Designers design, make and evaluate •Materials have different properties. •Tools must be used safely. •We can evaluate our work ("What worked well?").		
Key Knowledge	**Materials can be shaped, joined and changed (roll, bend, cut, stick, pinch).** **Different materials have different properties (soft, hard, flexible, strong).** **Tools must be used safely (scissors, glue spreaders)**	**Designs should be fit for purpose (e.g. glasses help people see).** **Materials can be chosen for a purpose (warm, waterproof, bright).**	**Vehicles need wheels to move.** **Ramps create slopes that affect speed and distance.** **Testing and improving designs makes them work better.**
Design Challenges	Term 1/2 - what makes me unique? Making playdough people Paper plates faces Making telescopes/binoculars (junk modelling) Clay diva lamps Rangoli patterns- seeds/rice Firework rockets- junk modelling Remembrance poppy badges Moving animals (pets with paper and split pins Building homes/dens- large construction Design and make a birthday hat (mixed media)	Term 3- who helps me stay safe and healthy? Large and small scale construction using lego/big bricks of police stations/hospitals Make a pair of glasses- opticians Fire pictures paint Design a new school uniform Term 4- Where do we call home? Junk modelling- houses/buildings Create a 3D model of a park Design new school uniform	Term 5- How do I travel around? Be bots- programming directions Paper aeroplanes Constructing vehicles with wheels Ramps- investigate which will go fastest/furthest Term 6- How do things grow? Animal homes/dens build nests natural resources Bird feeders
Key Vocabulary	**New words** Engineer, gluing, taping, slide, up, down, left, right, movement, join, fold, materials	**New words** Design, equipment, purpose	**New words** Wheels, ramps, slopes, spin, turn

Engineer progression

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<table>
<tr><th colspan="6">Year 1</th></tr>
<tr><th>Enquiries</th><th colspan="2">What is my hat made of?</th><th colspan="2">How do we move around?</th><th>What might I do in the future?</th></tr>
<tr><td rowspan="2">National Curriculum KS1</td><td colspan="5">Design
• design purposeful, functional, appealing products for themselves and other users based on design criteria
• generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology
Make
• select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]
• select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics
Evaluate
• explore and evaluate a range of existing products
• evaluate their ideas and products against design criteria</td></tr>
<tr><td colspan="5">Technical Knowledge
• build structures, exploring how they can be made stronger, stiffer and more stable
• explore and use mechanisms [for example, levers, sliders, wheels and axles], in their products</td></tr>
<tr><td>Key Knowledge</td><td colspan="2">• Join materials by gluing, taping, hole punching, stapling
• Select and use a range of tools and materials to measure, cut and join.
• Strengthening joins between hat and brim using glue/staples/hole punching.</td><td colspan="2">• Identify moving parts in a picture and talk about the direction of movement.
• Explore and make mechanisms
- sliders move left/right, up/down
-hinges can make pictures pop out
- pivots spin/turn pictures
• Begin to understand the purpose of simple mechanisms – left/right, up/down spin, pop out

<u>Skills</u> – select and use appropriate tools and equipment safely</td><td>• Identify a flip book and explore how they are made
• Design and illustrate a simple version of a flip book to show what they could be in the future
• Use appropriate tools to join e.g. tape, ring clips, hole punch, split pins, stapler.
• Evaluate and decide which joining material/technique works better</td></tr>
<tr><td>Design Challenge</td><td colspan="2"><u>Design</u>
Research party hats before creating a simple design to wear to the Christmas party

<u>Make</u>
Choose appropriate materials to make a party hat

<u>Evaluate</u>
Does your hat fit? Is it secured to your head i.e. would the wind blow it off? Is it colourful? Are materials joined effectively e.g. are they secure?</td><td colspan="2"><u>Design</u>
To design a local scene that has at least three different mechanisms for movement e.g. local park, classroom, dinner hall / slider, lever, pivot

<u>Make</u>
Use levers and split pins to make a pivot (fixed point), allowing their picture to turn/spin on their local scene. Learners contribute a one-page pop illustration, creating a whole class pop-up book about the school and local area.

<u>Evaluate</u>
How are the different elements made to move (classify: folds, sliders, levers & pivot/ spins).</td><td><u>Design</u>
Learners choose two activities or jobs they think they would like to do in the future.

<u>Make</u>
Make simple versions of a flap book by choosing three states of being to mix and connect at the top.

<u>Evaluate</u>
What join did you use? Why did you choose that material and join e.g. it’s secure, the pages turn smoothly etc? Does your flap book work i.e. can you mix and match the pictures effectively?</td></tr>
<tr><td>Key Vocabulary</td><td>Familiar words

Engineer, gluing, taping</td><td>New words / sentence stems

join, material, purpose, design, suitable, fabric, secure, product, prototype, hole punching, stapling

My hat is made from ….
I chose this material because
I used …. to join the materials so that …</td><td>Familiar words

equipment, slide, up, down, left, right, pop-up, movement, join, fold, spin, turn</td><td>New words

lever, slider, hinge, pivot, technique, mechanism, design, product, observe, evaluate</td><td>Familiar words

join ,material, purpose, design, technique, suitable, evaluate</td><td>New words

Illustrate,</td></tr>
</table>

Engineer progression

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	Year 2					
Enquiries	**How do we live a healthy life?**		**What's my classroom made of?**		**What did Brunel do for Great Britain?**	
National Curriculum KS1	**Design** • design purposeful, functional, appealing products for themselves and other users based on design criteria • generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology **Make** • select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing] • select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics **Evaluate** • explore and evaluate a range of existing products • evaluate their ideas and products against design criteria					
	Cooking and nutrition • use the basic principles of a healthy and varied diet to prepare dishes • understand where food comes from		**Technical Knowledge** • build structures, exploring how they can be made stronger, stiffer and more stable			
Key Knowledge	• Read and follow a recipe • **Choose the correct tools for chopping, slicing, peeling** • **Use safe techniques when chopping, slicing, peeling** • Understand the importance of hygiene when cooking • Name some examples of healthy food choices		• Explain how and why materials are chosen for specific purposes • Join a range of large construction materials according to properties (tyres, cardboard boxes, tarpaulin, netting, wooden bricks) • **Use appropriate tools to join materials e.g. ropes/net and knotting/wrapping,**		• **Strengthen paper by folding or rolling** • **Join paper rolls** • **Joining using PVA glue & bracing with cardboard triangles.** • **Strengthening using tubes or stiffening paper.**	
Design challenge	<u>Design</u> Learners record their group recipe for their final soup. Ensure they record their adaptations/any changes after the previous session. <u>Make</u> In groups, learners make their final soup. <u>Evaluate</u> Once cooked, do a final taste test and provide tasting notes/evaluation sheet. How does it taste? *sweet, savoury, bitter, sour, salty* What is the texture like? *Thick, thin, chunky, smooth* What flavour comes through? *sweet carrot* Who would you recommend it to and why?		<u>Design</u> Learners design by drawing a den and labelling it using scientific knowledge <u>Make</u> In groups, using OPAL/Scrapstore materials, make a den for reading/quiet zone/ friend zone <u>Evaluate</u> Evaluate their end products: explaining why they have chosen those construction materials, using scientific and design knowledge.		<u>Design</u> After exploring different bridge designs using paper/card, sketch and label chosen design to support an egg. <u>Make</u> In groups, create a bridge using strengthening/joining methods for a 'Brunel' egg to travel across intact. <u>Evaluate</u> Analyse different bridge designs: construction materials, shape, design. Evaluate own bridge construction identifying successful aspects and areas which could have been improved. *What materials did you use and why? How did you join and strengthen the materials? What shapes did you use for the structure and why? Was your bridge strong enough to support an egg?*	
Key Vocabulary	**Familiar words** healthy, chopping, slicing, peeling, taste, sweet, salty, bitter, sour	**New words** ingredient, recipe, technique, texture, consistency, thick, thin, chunky, smooth	**Familiar words** tools, tyres, netting, wooden bricks, ropes, nets, material, product,	New words /sentence stems construction, knotting, wrapping We decided to make … because… *(what did you make?)* We build it … because … *(where did you make it? Why?)* We used …. because it is … *(what materials did you use and why)* We joined materials by … *(what techniques did you use?)*	**Familiar words** join, material, purpose, design, suitable, fabric, secure, prototype folding, rolling, reinforce	**New words** strengthening, stiffening,

Engineer progression

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	Year 3		
Enquiries	**What is the difference between surviving and being healthy?**	**How can you feel force?**	**Why did people travel in the past?**
National Curriculum KS2	**Design** • use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups • generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design **Make** • select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately • select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities **Evaluate** • investigate and analyse a range of existing products • evaluate their ideas and products against their own design criteria and consider the views of others to improve their work		
	Cooking and nutrition • understand and apply the principles of a healthy and varied diet • prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques	**Technical knowledge** • apply their understanding of how to strengthen, stiffen and reinforce more complex structures • Magnetic attraction, Scoring. • Use a needle safely, and thread the needle	
Key knowledge	• **Name some of the food groups** • **Identify foods in each group** • **Discuss what makes a healthy diet** • Choose a recipe adaptation that matches their healthy message • Choose the correct tools for chopping, slicing, peeling • Use safe techniques when chopping, slicing, peeling • Understand the importance of hygiene when cooking	• Research games that use forces • Sketch and label their design for a chosen audience • Measure accurately to nearest mm • Score thicker card to make a fold or cut • **Select the appropriate equipment, tools and materials** • Adapt a design based on evaluation and feedback	• Choose the appropriate tools for sewing • Learn the techniques for sewing • **Use a needle safely, and thread the needle** • Make simple stitches in and out of the fabric in a line
Design Challenge	<u>Design</u> Create a healthy snack using an alternative ingredient. <u>Make</u> Using their recipes, make their snack. <u>Evaluate</u> Taste their final product, and evaluate to see if the alternative ingredient has affected the taste.	<u>Design</u> Sketch and label a game that uses magnets for Year 2. <u>Make</u> Using magnets, paper clips, cardboard, shoe box etc, make a simple game like Go Fish. <u>Evaluate</u> Teach Y2 children how to play the game and compare other games. Does the game play effectively? Which elements work well? Which elements could be improved?	<u>Design</u> Your pennant. What images could we use to depict the journey of John Cabot on The Mathew? (simple ship outline, sea colours, compass, any object that he may have used) <u>Make</u> Learners cut a simple shape from coloured fabric or felt to sew onto their pennant. *The pennant can be made from hessian, an old pillowcase cut up or pre bought plain bunting.* <u>Evaluate</u> Identify strengths and areas for development, for example, Is the object clear? Are the colour choices contrasting? Is the fabric joined effectively?
Key Vocabulary	**Familiar words** healthy, recipe, chopping, slicing, peeling, technique,	**New words** investigate, alternative, adaptation,	**Familiar words** material, properties, design, evaluate, prototype, cutting, joining, sketch, strengthen, stiffen	**New words** magnet, magnetic, components,	**Familiar words** fabric, tools, techniques	**New words** sewing, thread, needle, stitches, contrast

Engineer progression

FILTON AVENUE PRIMARY SCHOOL

	Year 4					
Enquiries	**How can we switch off?**		**What are we doing to save our seas?**		**What if we were all vegetarian?**	
National Curriculum KS2	**Design** • generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design **Make** • select from and use a wider range of materials and components according to functional properties **Evaluate** • evaluate their ideas and products against their own design criteria and consider the views of others to improve their work					
	Technical knowledge • understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]		**Evaluate** • investigate and analyse a range of existing products • understand how key events and individuals in design and technology have helped shape the world		**Cooking and nutrition** • understand and apply the principles of a healthy and varied diet • prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques • understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed	
Key knowledge	• **A circuit is made of several components and must have a power source.** • **Parts of a circuit can include wires, bulbs, buzzers, batteries, switches.** • Electricity cannot flow if the circuit is broken. • A switch opens and closes a circuit. • Explain reasons for choosing particular components. • Engineers use circuits in their products such as …		• Some causes of water pollution are… (plastic, rubbish islands) • Engineers have redesigned products to reduce pollution, for example,		• **Name some seasonal fruits and vegetables** • **Read and follow a recipe** • **Choose the correct tools for chopping, slicing, peeling** • **Use safe techniques when chopping, slicing, peeling** • **Understand the importance of hygiene when cooking**	
Design challenge	Learners create a working electrical game (e.g. buzz wire, electronic quiz board) to share to a younger audience. <u>Design</u> Create a simple game that uses electrical components. <u>Make</u> Make a buzz wire game using a circuit. <u>Evaluate</u> Did the product work? How did you know? Take feedback from Y3 audience.		<u>Evaluate</u> • Research and evaluate the changes that have been made by engineers e.g. cotton buds, straws, shampoo bars, paper bags in supermarkets. • Investigate and analyse how engineers have redesigned products to reduce pollution.		<u>Design</u> Plan a recipe for a seasonal savoury dish <u>Make</u> Prepare and make rainbow pasta salad. Learners create a YouTube cookery video. <u>Evaluate</u> Taste and evaluate based on appearance, taste, texture. Does it taste sweet/bitter/sour/salty? What's the texture? Who would recommend this to? How have you chosen the ingredients based on the season?	
Key Vocabulary	**Familiar words:** Electricity energy	**New words:** bulb, switch, lamp, wire, battery, symbol, circuit, appliance, insulator, motor, series circuit, conductor, buzzer	**Familiar words:** investigate, evaluate, engineers, design, technology, product,	**New words:** Pollution, toxic,	**Familiar words:** cooking, dish, chopping, slicing, peeling, recipe, diet, hygiene, tools, ingredients	**New words:** varied, seasonality, savoury,

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Year 5				
Enquiries	**How can science help the homeless?**	**Who is trading with whom?**	**Where is our twin?**	**How are you helping save our planet?**
National Curriculum KS 2	**Design** • use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups • generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design **Make** • select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately • select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities **Evaluate** • investigate and analyse a range of existing products • evaluate their ideas and products against their own design criteria and consider the views of others to improve their work • understand how key events and individuals in design and technology have helped shape the world			
	Technical knowledge • apply their understanding of how to strengthen, stiffen and reinforce more complex structures • understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]			
Key Knowledge	• Materials that are good in one scenario may not be the best in another or in real life where we have to compromise. Scientists and engineers have to come up with the best all-round solutions, which may not be perfect. • **Some materials are better at insulating than others.**	• Historical research can be used to develop board games design that uses trade.	• Thread can be used to discover different sewing stitches: running stitch, backstitch and cross-stitch. • Begin to 'draw' with thread, using several different colours. • Use a range of coloured threads and stitches to add detail to create a thread drawing or details to patterns. • **Secure stitching can be used to attach fabrics (running and back-stitching).**	• **Natural materials can be repurposed to create a new product.** • **A wide range of reusable materials can be used to design, develop and generate a product.** • **Materials are chosen for a particular purpose e.g. size, shape, texture.**
Design Challenge	<u>Design</u> Learners begin to plan their design of a waterproof bag, drawing on previous science knowledge. <u>Make</u> Make a mini waterproof bag (for a bear – scale model). Some needs to be sewn (maybe a pocket), other sections can be glued. <u>Evaluate</u> Evaluate their product to see if it is waterproof and warm. Is it sustainable?	<u>Design</u> Draw a board game design that uses trade and historical facts, labelling with materials. <u>Make</u> Learners can make thoughtful selections of relevant historical information. Use 3D printer to create playing pieces. <u>Evaluate</u> Does the game meet the brief i.e. Is it aesthetically pleasing, is it playable, is it factual etc	<u>Design</u> Learners design a banner for their new twin town in small groups. They will each sew a feature onto their banner. <u>Make</u> Individual learners create elements for the group banners - sewing where possible - and working in groups to ensure the banner includes all the necessary components for their country/town of choice. <u>Evaluate</u> Evaluate product against purpose: Can others identify which twinned town that the pendant signifies? Have you included physical / human features? Are the symbols clear? Have you chosen the best colours to represent each part?	<u>Design</u> Design and label a bug hotel, identifying materials used. Label with reasons for their choices eg dead leaves to provide dampness, bamboo canes for shade etc <u>Make</u> In small groups, learners build their bug hotel and secure it in the school grounds. <u>Evaluate</u> Quality of construction and identify where improvements could be made. Does it meet the design brief?
Key Vocabulary	**Familiar words** materials, solutions, waterproof **New words** insulating, scale, product, sustainable	**Familiar words:** cutting, joining, design, material, sketch, develop, finishing **New words:** generate, industry, prototype	**Familiar words** fabric, tools, techniques, sewing, thread, needle, stitches, contrast **New words:** running stitch, backstitch, cross-stitch	**Familiar words** materials, product, join, purpose, design, suitable, secure, strengthening, stiffening, **New words:** repurpose, generate,

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FILTON AVENUE PRIMARY SCHOOL

	Year 6	
Enquiries	**Who were the greater engineers: The Victorians or the Ancient Britons?**	
National Curriculum KS2	**Design** • use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups • generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design **Make** • select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately • select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities **Evaluate** • investigate and analyse a range of existing products • evaluate their ideas and products against their own design criteria and consider the views of others to improve their work • understand how key events and individuals in design and technology have helped shape the world	
	Technical knowledge • apply their understanding of how to strengthen, stiffen and reinforce more complex structures • understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]	
Key Knowledge	• Engineer: How things work and why they work in the way they do. That products are designed for their application and are often the result of more than one version. • A pulley is a machine with a wheel and a rope for lifting. There are three main types of pulleys: fixed, moveable and compound. • **Triangles are widely used to reinforce many engineering structures** • **Materials can be strengthened in a variety of ways**	
Design Challenge	<u>Design</u> After exploring pulleys, give the design brief – to build a bridge using a pulley mechanism. Consider how we could use mechanical advantage of a pulley to raise and lower a bridge. Design a bridge that uses a mechanical advantage of a pulley. <u>Make</u> In groups, learners use a variety of materials and techniques to create a working bridge. Using given resources (card, wood, straws, plastic tubes, fixatives – tapes, glue guns, bands) make a bridge that raises and lowers. Stiffen with intricate crossing / triangles – shape. ALL using a pulley mechanism. <u>Evaluate</u> Learners assess their bridge against the design brief – does it use a pulley? Is the structure stable? Respond to feedback “What would you change / adapt?” “Why was it successful / unsuccessful?” Does it use a pulley system?	
Key Vocabulary	**Familiar words:** design, bridge, prototype, materials, tools,	**New words:** components, levers, hinge, pulleys, fixed, moveable, compound, mechanism, mechanical,

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Key Stage One		
	Year 1	**Year 2**
Designing: *Considering Purpose, User/ design criteria, Functionality & decision making*	• Follow a design brief. • Draw a simple design and communicate their ideas.	• Follow a design brief • Create a reading/friend zone/ quiet zone den using scientific knowledge • Receive feedback on design and plan improvements.
Making: *Cutting, Shaping, Joining & finishing*	• Choose appropriate materials to make a party hat • Identify moving parts in a picture and talk about the direction of movement. • Explore and make mechanisms - sliders move left/right, up/down -hinges can make pictures pop out - pivots spin/turn pictures • Begin to understand the purpose of simple mechanisms – left/right, up/down spin, pop out • Use levers and split pins to make a pivot (fixed point), allowing their picture to turn/spin on their local scene. • Design and illustrate a simple version of a flip flap book to show what they could be in the future • Use appropriate tools to join e.g. tape, ring clips, hole punch, split pins, stapler.	• Join a range of large construction materials according to properties (tyres, cardboard boxes, tarpaulin, netting, wooden bricks) • Use appropriate tools to join materials e.g. ropes/net and knotting/wrapping,
Evaluating: *Analyse existing products, learn about individual designs & designers, understand changing*	• Evaluate and decide which joining material works better • How are the different elements made to move (classify: folds, sliders, levers & pivot/ spins). • Describe how a product works • Identify a flip book and explore how they are made	• Explain how and why materials are chosen for specific purposes • Evaluate den constructions against design brief. • Analyse different bridge designs: construction materials, shape, design. Evaluate own bridge construction identifying successful aspects and areas which could have been improved.
Technical Knowledge: *Strengthening, mechanical systems, electrical systems, control (IT) systems*	• Children know how to strengthen with layers or card/ paper/ additional tape. • Strengthening joins using glue/staples/hole punching/ ring clips, split pins	• Joining using PVA glue & bracing with cardboard triangles. • Strengthening using tubes or stiffening paper
Cooking & Nutrition: *Healthy diets, cookery techniques, seasonality.*		• Learners create own soup: following recipe, cutting & grating vegetables, boiling & seasoning (supervision needed). Learners can explain why vegetable soups are healthy. • Read and follow a recipe • **Choose the correct tools for chopping, slicing, peeling** • **Use safe techniques when chopping, slicing, peeling** • Understand the importance of hygiene when cooking • Name some examples of healthy food choices

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Key Stage Two				
	Year 3	**Year 4**	**Year 5**	**Year 6**
Designing: *Considering Purpose, User/ design criteria, Functionality & decision making*	• Research games that use forces • Follow a design • Sketch and label their design for a chosen audience • Follow and adapt a recipe using an alternative ingredient	• Follow instructions to make circuits (series) • Design a rainbow pasta salad using seasonal ingredients	• Draw a board game design that uses trade and historical facts, labelling with materials. • Follow design instructions on how to sew a pendant • Learners design a banner for their new twin town in small groups. They will each sew a feature onto their banner. • Research & design a small bug hotel using natural and recyclable materials	• After exploring pulleys, give the design brief – to build a bridge using a pulley mechanism. Consider how we could use mechanical advantage of a pulley to raise and lower a bridge. Design a bridge that uses a mechanical advantage of a pulley.
Making: *Cutting, Shaping, Joining & finishing*	• Select the appropriate equipment, tools and materials • Measuring accurately to nearest mm, scoring and folding card, cutting safely • Choose the appropriate tools for sewing • Make simple stitches in and out of the fabric in a line	• Recap creating circuits with a series of components. • Follow circuit diagrams. • Make a buzz wire game using a circuit.	• Learners can make thoughtful selections of relevant historical information. Use 3D printer to create playing pieces. • Individual learners create elements for the group banners - sewing where possible – using different stitches, running stitch, cross stitch, back stitch. • In small groups, learners build their bug hotel using appropriate materials for a particular purpose.	• Learners use a variety of materials and techniques to create a working bridge. Using given resources (card, wood, straws, plastic tubes, fixatives – tapes, glue guns, bands) make a bridge that raises and lowers. Stiffen with intricate crossing / triangles – shape. ALL using a pulley mechanism.
Evaluating: *Analyse existing products, learn about individual designs & designers, understand changing*	• Does the game play effectively? Which elements work well? Which elements could be improved?	• Identify why some circuits won't work. • Explain reasons for choosing particular components. • Research and evaluate the changes that have been made by engineers e.g. cotton buds, straws, shampoo bars, paper bags in supermarkets. • Investigate and analyse how engineers have redesigned products to reduce pollution.	• Does the game meet the brief i.e is it aesthetically pleasing, is it playable, is it factual etc • Evaluate product against purpose: Can others identify which twinned town that the pendant signifies? • Quality of construction and identify where improvements could be made. Does it meet the design brief?	• Learners assess their bridge against the design brief – does it use a pulley? Is the structure stable? Respond to feedback. *What would you change / adapt? Why was it successful / unsuccessful?" Does it use a pulley system?*
Technical Knowledge: *Strengthening, mechanical systems, electrical systems, control (IT) systems*	• Apply their understanding of how to strengthen, stiffen and reinforce more complex structures • Magnetic attraction, Scoring. • Use a needle safely, and thread the needle	• Create simple series circuit • Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]	• apply their understanding of how to strengthen, stiffen and reinforce more complex structures • understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]	• apply their understanding of how to strengthen, stiffen and reinforce more complex structures • understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
Cooking & Nutrition: *Healthy diets, cookery techniques, seasonality.*	• Baking muffins using alternatives to sugar eg apple sauce, honey • **Name some of the food groups** • **Identify foods in each group** • **Discuss what makes a healthy diet** • Choose the correct tools for chopping, slicing, peeling • Use safe techniques when chopping, slicing, peeling • Understand the importance of hygiene when cooking	• Prepare and make rainbow pasta salad. Learners create a YouTube cookery video. • **Name some seasonal fruits and vegetables** • **Read and follow a recipe** • **Choose the correct tools for chopping, slicing, peeling** • **Use safe techniques when chopping, slicing, peeling** • **Understand the importance of hygiene when cooking**		