Year : 6	Term : 1 & 2	Topic : Bridges	
Learning Objectives (What will the children learn?)	**Class Activities** (What will the children do?)	**Resources** (What will I need?)	**Assessment** **(opportunities)**
Investigative, Disassembly and Evaluative Activities (IDEAs)			
Children will learn: • How to research books, CD ROMs and use complex and image searches on the internet, to bookmark relevant pages and scan them using the find tool (**Progression in Design Skills R1&R3)**; • How to challenge the attributes and features of existing products (**Progression in Design Skills R5, E3).**	• Ask children to use reference resources to find examples of the three different types of structure: mass, framework and shell. • Use the internet to find pictures of bridges that could be made to move, and using complex searches, pictures of bridges that do move. • Analyse the features of different bridges by looking at a range of resources eg photographs, models, real bridges in the local area etc… • Recap the different types of mechanisms they have used and could use in their designs with a view to selecting appropriate mechanisms in their bridges.	• A4 paper • Sellotape • Slotted dowel (4mm) • Weights • Suspension hook for weights • Relevant books and CD Roms on structures, mechanisms and bridges. (eg Millennium Stadium CD Rom) • The internet.	Can children: • research books, CD Roms and use complex and image searches on the internet, to bookmark relevant pages and scan them using the find tool; • challenge the attributes and features of existing products?
Focused Practical Tasks (FPTs)			
Children will learn: • That materials can be strengthened by changing their shape; • How to use cheap materials to try designs, and modify appropriately (**Progression in Design Skills M1)**; • How levers can be used to move loads and how their ability to lift loads varies according to length of lever; • How to use inputs (eg tilt switch, reed switch, light sensor) and outputs in computer control (eg Logicator, Coco) to control movement; • how to write procedures to activate inputs and outputs.	• Use a sheet of paper to span a small gap (over 25 cm). • Strengthen the paper by folding in different ways, eg, triangular, tubular (wind tightly around a thin doweling and then remove the dowel), box etc.. (Use glue stick and/or s***mall*** amounts of Sellotape to hold their paper structures together.) • Use a weight suspended from the centre of the paper "bridge" to find the maximum load it will hold. • Investigate levers by attaching 'Geostrips' or card strips to thick card and altering the position of the fulcrum to see how loads and efforts vary • Use a buffer box and write a short procedure for controlling outputs in response to inputs..	• Geostrips • Paper fasteners • Hard card (2250 microns) • Tilt, reed and light switch • Magnets • Motors • PC • Buffer box • Appropriate software – Coco, Logicator • Wire and connections	Can children: • Strengthen materials by changing their shape; • use cheap materials to try designs, and modify appropriately; • vary levers appropriately to move different loads; • use inputs and outputs in computer control to control movement; • write procedures to activate inputs and outputs?

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Design and Make Assignment (DMA)			
• Children will learn: • How to brainstorm as many design factors as possible (**Progression in Design Skills GI3)**; • How to apply previous knowledge of pulleys and gear systems to select the most appropriate mechanisms to move bridges; • How to produce drawings that are annotated , exploded drawings and use dimensions (**Progression in Design Skills DR1&2);** • To draw views from any angle and in 3D (isometric) • How to plan the processes and list the materials needed ***before*** construction (**Progression in Design Skills P1);** • How to produce accurately made, well finished products; • Analyse how well their design meets the detail of the design brief and specification, possibly by including tests. Suggest changes. (**Progression in Design Skills E1);**	• Give children the following basic design brief: ***design and make a bridge:*** ➢ ***with moving parts, controlled by a computer using inputs and outputs;*** ➢ ***that spans 40cm;*** ➢ ***that could hold a small toy car;*** ➢ ***constructed out of A4 card (not wood).*** • Carry out a group brainstorm of all the factors that will need to be considered in designing their product eg, materials, mechanisms. • Ask children to add some of their own further details to the design brief to create a full specification. • Draw 3 possible design solutions to the brief. • Select the best design and produce detailed annotated drawings with dimensions and exploded views. Use a computer package to make drawings. • Write a step by step plan for how the bridge will be made and list the resources and tools needed. • Make the bridges to the specification. • Connect the bridge to a buffer box and construct procedures to control it. • Evaluate how well their product matches the specification and design brief.	• Scissors • Motors • Switches (as above) • Wire • Wooden dowels for axles and fulcrum of bridge • Pulleys • A range of gears: spur, worm, bevel. • A4 card (4 sheet) • For valuable assistance on brainstorm thinking skills, the ‘’thinking tool’ CAF (consider all factors) is useful; - Teach Your Child to Think by Edward de Bono p 112 • Software drawing package such as Primary Design by TechSoft	Can children: • brainstorm a comprehensive list of design factors; • apply previous knowledge of pulleys and gear systems to select the most appropriate mechanisms to move bridges; • produce drawings that are annotated , exploded drawings and use dimensions; • plan the processes and list the materials needed ***before*** construction; • produce accurately made, well finished products; • Analyse how well their design meets the detail of the design brief and specification, possibly by including tests?