Year 5: Design and Technology

Block 1 – Structures
Bridges

- **Prior learning –** In year 4 the children made pavilions. This involved understanding what a frame structure is and to know a 'free-standing' structure is one that can stand on its own. They discovered that a pavilion is a decorative building or structure for leisure activities. They learned that cladding can be applied to structures for different effects and furthered their understanding of how aesthetics are important to how a product looks.

• Identify stronger and weaker shapes. • Recognise that supporting shapes can help increase the strength of a bridge, allowing it to hold more weight. • Identify beam, arch and truss bridges and describe their differences. • Use triangles to create simple truss bridges that support a load (weight). • Cut beams to the correct size, using a cutting mat. • Smooth down any rough cut edges with sandpaper. • Follow each stage of the truss bridge creation as instructed by their teacher. • Complete a bridge, with varying ranges of accuracy and finish, supported by the teacher. • Identify some areas for improvement, reinforcing their bridges as necessary. •	• To understand some different ways to reinforce structures. • To understand how triangles can be used to reinforce bridges. • To know that properties are words that describe the form and function of materials. • To understand why material selection is important based on their properties. • To understand the material (functional and aesthetic) properties of wood.	• Designing a stable structure that is able to support weight. • Creating a frame structure with focus on triangulation. • Making a range of different shaped beam bridges. • Using triangles to create truss bridges that span a given distance and support a load. • Building a wooden bridge structure. • Independently measuring and marking wood accurately. • Selecting appropriate tools and equipment for particular tasks. • Using the correct techniques to saw safely. • Identifying where a structure needs reinforcement and using card corners for support. • Explaining why selecting appropriate materials is an important part of the design process. • Understanding basic wood functional properties. • Adapting and improving own bridge structure by identifying points of weakness and reinforcing them as necessary. • Suggesting points for improvements for own bridges and those designed by others.

<u>Next steps</u>

This is the last structures unit that the children will have at Bentley Heath. In KS3 they will:

- understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists

- understand and use the properties of materials and the performance of structural elements to achieve functioning solutions

Important subject vocabulary
Abutment – to support the pressure of an arch
Accurate – errorless, as perfect as can be.
Arched bridges – has an abutment at each end and a curved arch in the middle
Beam bridge - - the simplest form of bridge with abutments at each end and a simple structure across.
Coping saw – a type of bow saw to cut small things.
Sandpaper – rough paper that when rubbed on a surface usually makes it smooth.
Suspension bridge - deck is hung below suspension cables on vertical suspenders
Tenon saw - A Tennon saw has a relatively short blade with a reinforced back providing stability. It has hard point teeth
Truss bridge - bridge whose load-bearing superstructure is composed of a truss, a structure of connected elements, usually forming triangular units.

Block 2 – Mechanical systems
Pop up books

- **Prior learning –** In year 1 the children made moving parts books with sliders and levers. They revisited their lever knowledge in year 2 with linkage of levers. They completed a unit about wheels and axles, understanding how these parts work together to allow movement.

Overview of unit:	Substantive Knowledge:	Disciplinary Knowledge:
• Produce a suitable plan for each page of their book. • Produce the structure of the book. • Assemble the components necessary for all their structures/mechanisms. • Hide the mechanical elements with more layers using spacers where needed. • Use a range of mechanisms and structures to illustrate their story and make it interactive for the users. • Use appropriate materials and captions to illustrate the story.	• To know that mechanisms control movement. • To understand that mechanisms can be used to change one kind of motion into another. • To understand how to use sliders, pivots and folds to create paper-based mechanisms. • To know that a design brief is a description of what I am going to design and make. • To know that designers often want to hide mechanisms to make a product more aesthetically pleasing.	• Designing a pop-up book which uses a mixture of structures and mechanisms. • Naming each mechanism, input and output accurately. • Storyboarding ideas for a book. • Following a design brief to make a pop up book, neatly and with focus on accuracy. • Making mechanisms and/or structures using sliders, pivots and folds to produce movement. • Using layers and spacers to hide the workings of mechanical parts for an aesthetically pleasing result. • Evaluating the work of others and receiving feedback on own work. • Suggesting points for improvement.

Next steps
This is the last mechanisms unit that the children at Bentley Heath will experience before moving to KS3. In KS3 they will:

- develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools
- select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture
- understand how more advanced mechanical systems used in their products enable changes in movement and force

Important subject vocabulary

design criteria - goals we must achieve to make our design successful
motion – moving or being moved
mechanism – parts working together in a machine
input – energy needed to start something working.

Block 3 – Food – special day
What could be healthier?

Prior learning – In year 4 the children learned that the amount of an ingredient in a recipe is known as the 'quantity'. They discovered that it is important to use oven gloves when removing hot food from an oven. They used the following cooking techniques: sieving, creaming, rubbing method, cooling. Finally they understood the importance of budgeting while planning ingredients for biscuits.

Overview of unit:	**Substantive Knowledge:**	**Disciplinary Knowledge:**
• Understand how beef gets from the farm to our plates. • Present a subject as a poster with clear information in an easy to read format. • Contribute ideas as to what a 'healthy meal' means. • Notice the nutritional differences between different products and recipes. • Recognise nutritional differences between two similar recipes and give some justification as to why this is. • Work as a team to amend a bolognese recipe with healthy adaptations. • Follow a recipe to produce a healthy bolognese sauce. • Design packaging that promotes the ingredients of the bolognese.	• To understand where meat comes from – learning that beef is from cattle and how beef is reared and processed, including key welfare issues. • To know that I can adapt a recipe to make it healthier by substituting ingredients. • To know that I can use a nutritional calculator to see how healthy a food option is. • To understand that 'cross-contamination' means that bacteria and germs have been passed onto ready-to-eat foods and it happens when these foods mix with raw meat or unclean objects.	• Adapting a traditional recipe, understanding that the nutritional value of a recipe alters if you remove, substitute or add additional ingredients. • Writing an amended method for a recipe to incorporate the relevant changes to ingredients. • Designing appealing packaging to reflect a recipe. • Cutting and preparing recipes safely. • Using equipment safely, including knives, hot pans and hobs. • Knowing how to avoid cross-contamination. • Following a step-by-step method carefully to make a recipe. • Identifying the nutritional differences between different products and recipes. • Identifying and describing healthy benefits of food groups.

Next steps In year 6 the children will learn:

- To know that many countries have 'national dishes' which are recipes associated with that country.
- To know that 'processed food' means food that has been put through multiple changes in a factory.
- To understand that it is important to wash fruit and vegetables before eating to remove any dirt and insecticides.

- To understand what happens to a certain food before it appears on the supermarket shelf (Farm

Important subject vocabulary
Reared – to raise a cow from a calf
Processed – Processed meat is meat that has been preserved by curing, salting, smoking, drying or canning.
Ethical – the responsible way to treat humans and animal

Block 4 – Digital world
Monitoring devices

Overview of unit:	Substantive Knowledge:	Disciplinary Knowledge:
• **Prior learning:** The children have experienced the computing curriculum.		
• Describe what is meant by monitoring devices and provide an example. • Explain briefly the development of thermometers from thermoscopes to digital thermometers. • Research a chosen animal's key information to develop a list of design criteria for an animal monitoring device. • Write a program that monitors the ambient temperature and alerts someone when the temperature moves from a specified range. • Identify errors (bugs) in the code and ways to fix (debug) them. • State one or two facts about the history and development of plastic, including how it is now affecting planet Earth. • Build a variety of brick models to invent Micro:bit case, housing and stand ideas, evaluating the success of their favourite model. • Explain key pros and cons of virtual modelling vs physical modelling. • Recall and describe the name and use of key tools used in Tinkercad (CAD) software.	• To know that a 'device' means equipment created for a certain purpose or job and that monitoring devices observe and record. • To know that a sensor is a tool or device that is designed to monitor, detect and respond to changes for a purpose. • To understand that conditional statements (and, or, if booleans) in programming are a set of rules which are followed if certain conditions are met.	• Researching (books, internet) for a particular animal's needs. • Developing design criteria based on research. • Generating multiple housing ideas using building bricks. • Understanding what a virtual model is and the pros and cons of traditional and CAD modelling. • Placing and manoeuvring 3D objects, using CAD. • Changing the properties of, or combining one or more, 3D objects using CAD. • Understanding the functional and aesthetic properties of plastics. • Programming to monitor the ambient temperature and coding an (audible or visual) alert when the temperature moves out of a specified range. • Stating an event or fact from the last 100 years of plastic history. • Explaining how plastic is affecting planet Earth and suggesting ways to make more sustainable choices. • Explaining key functions in my program (audible alert, visuals). • Explaining how my product's programmed features would be useful for an animal carer.

Next steps

In year 6 the children will learn:

- To know that a 'device' means equipment created for a certain purpose or job and that monitoring devices observe and record.
- To know that a sensor is a tool or device that is designed to monitor, detect and respond to changes for a purpose.

To understand that conditional statements (and, or, if booleans) in programming are a set of rules which are followed if certain conditions are met

Important subject vocabulary

Boolean - a binary variable that can have one of two possible values, 0 (false) or 1 (true).

Consumables - commodity that is intended to be used up relatively quickly.

Decompose – to break down

Durable – lasts a long time