Year 5: Design and Technology

Autumn Term – 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.

Next steps

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.

Spring Term – 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.

Summer – 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

Summer Term – 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.	• 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.

• 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.		• 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