**Essential characteristics of designers**

* Originality and the willingness to take creative risks to produce innovative ideas and prototypes.
* An excellent attitude to learning and independent working.
* The ability to use time efficiently and work constructively and productively with others.
* The ability to carry out thorough research, show initiative and ask questions to develop a detailed knowledge of users’ needs.
* The ability to act as responsible designers and makers, working ethically, using finite materials carefully and working safely.
* A thorough knowledge of which tools, equipment and materials to use to make their products.
* The ability to apply mathematical knowledge.
* The ability to manage risks well to make products safely and hygienically.
* A passion for the subject and knowledge of up-to-date technological innovations in materials, products and systems.

**Breadth of study: key stage 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 mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
* understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
* apply their understanding of computing to program, monitor and control their products.

***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.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Strand** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Developing, planning and communicating ideas** | With growing confidence generate ideas for an item, considering its purpose and the user/s. Start to order the main stages of making a product. Identify a purpose and establish criteria for a successful product. Understand how well products have been designed, made, what materials have been used and the construction technique.Learn about inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products. Start to understand whether products can be recycled or reused. Know to make drawings with labels when designing. When planning explain their choice of materials and components including function and aesthetics. | Start to generate ideas, considering the purposes for which they are designing- link with Mathematics and Science. Confidently make labelled drawings from different views showing specific features. Develop a clear idea of what has to be done, planning how to use materials, equipment and processes, and suggesting alternative methods of making, if the first attempts fail. Identify the strengths and areas for development in their ideas and products. When planning consider the views of others, including intended users, to improve their work. Learn about inventors, designers, engineers, chefs and manufacturers who have developed ground -breaking products. When planning explain their choice of materials and components according to function and aesthetic. | Start to generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces.Begin to use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose. With growing confidence apply a range of finishing techniques, including those from art and design. Draw up a specification for their design- link with Mathematics and Science. Use results of investigations, information sources, including ICT when developing design ideas. With growing confidence select appropriate materials, tools and techniques. Start to understand how much products cost to make, how sustainable and innovative they are and the impact products have beyond their intended purpose. | Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces. Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose. Accurately apply a range of finishing techniques, including those from art and design. Draw up a specification for their design- link with Mathematics and Science.Plan the order of their work, choosing appropriate materials, tools and techniques. Suggest alternative methods of making if the first attempts fail. Identify the strengths and areas for development in their ideas and products. Know how much products cost to make, how sustainable and innovative they are and the impact products have beyond their intended purpose. |
| **Working with tools, equipment, materials and components to make quality products** | Select a wider range of tools and techniques for making their product i.e. construction materials and kits, textiles, food ingredients, mechanical components and electrical components. Explain their choice of tools and equipment in relation to the skills and techniques they will be using.Start to understand that mechanical and electrical systems have an input, process and output. Start to understand that mechanical systems such as levers and linkages or pneumatic systems create movement. Know how simple electrical circuits and components can be used to create functional products. Measure, mark k out, cut, score and assemble components with more accuracy. Start to work safely and accurately with a range of simple tools. Start to think about their ideas as they make progress and be willing to change things if this helps them to improve their work. Start to measure, tape or pin, cut and join fabric with some accuracy.  | Select a wider range of tools and techniques for making their product safely. Know how to measure, mark out, cut and shape a range of materials, using appropriate tools, equipment and techniques. Start to join and combine materials and components accurately in temporary and permanent ways.Know how mechanical systems such as cams or pulleys or gears create movement. Understand how more complex electrical circuits and components can be used to create functional products.Continue to learn how to program a computer to monitor changes in the environment and control their products. Understand how to reinforce and strengthen a 3D framework. Now sew using a range of different stitches, to weave and knit. Demonstrate how to measure, tape or pin, cut and join fabric with some accuracy. Begin to use finishing techniques to strengthen and improve the appearance of their product using a range of equipment including ICT. | Select appropriate materials, tools and techniques e.g. 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. Understand how mechanical systems such as cams or pulleys or gears create movement. Know how more complex electrical circuits and components can be used to create functional products and how to program a computer to monitor changes in the environment and control their products.Understand that mechanical and electrical systems have an input, process and output. Begin to measure and mark out more accurately. Demonstrate how to use skills in using different tools and equipment safely and accurately with growing confidence cut and join with accuracy to ensure a good-quality finish to the product. Weigh and measure accurately (time, dry ingredients, liquids). Use finishing techniques to strengthen and improve the appearance of their product using a range of equipment including ICT. | Confidently select appropriate tools, materials, components and techniques and use them. Use tools safely and accurately. Assemble components to make working models. Aim to make and to achieve a quality product.With confidence pin, sew and stitch materials together to create a product. Demonstrate when make modifications as they go along. Construct products using permanent joining techniques. Understand how mechanical systems such as cams or pulleys or gears create movement. Know how more complex electrical circuits and components can be used to create functional products and how to program a computer to monitor changes in the environment and control their products.Know how to reinforce and strengthen a 3D framework.Understand that mechanical and electrical systems have an input, process and output. Use finishing techniques to strengthen and improve the appearance of their product using a range of equipment including ICT. |
| **Evaluating processes and products** | Start to evaluate their product against original design criteria e.g. *how well it meets its intended purpose*Begin to disassemble and evaluate familiar products and consider the views of others to improve them. Evaluate the key designs of individuals in design and technology has helped shape the world.  | Evaluate their products carrying out appropriate tests. Start to evaluate their work both during and at the end of the assignment. Be able to disassemble and evaluate familiar products and consider the views of others to improve them. Evaluate the key designs of individuals in design and technology has helped shape the world.  | Start to evaluate a product against the original design specification and by carrying out tests. Evaluate their work both during and at the end of the assignment. Begin to evaluate it personally and seek evaluation from others. Evaluate the key designs of individuals in design and technology has helped shape the world.  | Evaluate their products, identifying strengths and areas for development, and carrying out appropriate tests. Evaluate their work both during and at the end of the assignment. Record their evaluations using drawings with labels. Evaluate against their original criteria and suggest ways that their product could be improved. Evaluate the key designs of individuals in design and technology has helped shape the world.  |
| **Food and Nutrition**  | Start to know that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world. Understand how to prepare and cook a variety of predominantly savoury dishes safely and hygienically including, where appropriate, the use of a heat source.Begin to understand how to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking. Start to understand that a healthy diet is made up from a variety and balance of different food and drink, as depicted in ‘The Eat well plate’ Begin to know that to be active and healthy, food and drink are needed to provide energy for the body.  | Understand that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world. Understand how to prepare and cook a variety of predominantly savoury dishes safely and hygienically including, where appropriate, the use of a heat source. Know how to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking. Know that a healthy diet is made up from a variety and balance of different food and drink, as depicted in ‘The Eat well plate’ Know that to be active and healthy, food and drink are needed to provide energy for the body. | Understand that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world. Begin to understand that seasons may affect the food available. Understand how food is processed into ingredients that can be eaten or used in cooking. Know how to prepare and cook a variety of predominantly savoury dishes safely and hygienically including, where appropriate, the use of a heat source. Start to understand how to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking. Begin to understand that different food and drink contain different substances – nutrients, water and fibre – that are needed for health.  | Know that food is grown (such as tomatoes, wheat and potatoes), reared (such as pigs, chickens and cattle) and caught (such as fish) in the UK, Europe and the wider world. Understand that seasons may affect the food available. Understand how food is processed into ingredients that can be eaten or used in cooking. Know how to prepare and cook a variety of predominantly savoury dishes safely and hygienically including, where appropriate, the use of a heat source. Understand how to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking. Know different food and drink contain different substances – nutrients, water and fibre – that are needed for health.  |