

**DT KNOWLEDGE, SKILLS & UNDERSTANDING**

***Churchfield Primary School***

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**National Curriculum Content**

**Purpose of Study & Aims**

Design and technology 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.

The national curriculum for design and technology aims to ensure that all pupils:

* develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
* build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
* critique, evaluate and test their ideas and products and the work of others
* understand and apply the principles of nutrition and learn how to cook.

**Key Stage 1**

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts [for example, the home and school, gardens and playgrounds, the local community, industry and the wider environment].

When designing and making, pupils should be taught to:

#### 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

#### 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.

**Key Stage 2**

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment].

When designing and making, pupils should be taught to:

#### 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.

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| **YEAR 1 DT** | | | | | |
| **Developing, planning & communicating ideas** | | **Working with tools & materials** | | **Evaluating processes & products** | |
| * Can they think of some ideas of   their own?   * Can they explain what they want to do? * Can they use pictures and words to plan? | | * Can they explain what they are   making?   * Which tools are they using? | | * Can they describe how   something works?   * Can they talk about their own work and things that other people have done? | |
| **Textiles** | **Mechanisms** | | **Use of materials** | | **Construction** |
| * Can they describe how different textiles feel? * Can they make a product from textile by gluing? | * Can they make a product which moves? * Can they cut materials using scissors? * Can they describe the materials using different words? * Can they say why they have chosen moving parts? | | * Can they make a structure/model using different materials? * Is their work tidy? * Can they make their model stronger if it needs to be? | | * Can they talk with others about how they want to construct their product? * Can they select appropriate resources and tools for their building projects? * Can they make simple plans before making objects, e.g. drawings, arranging pieces of construction before building? |

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| **YEAR 2 DT** | | | | | |
| **Developing, planning & communicating ideas** | | **Working with tools & materials** | | **Evaluating processes & products** | |
| * Can they think of ideas and plan what to do next? * Can they choose the best tools and materials? Can they give a reason why these are best? * Can they describe their design by using pictures, diagrams, models and words? | | * Can they join things (materials/ components) together in different ways? | | * What went well with their work? * If they did it again, what would they want to improve? | |
| **Textiles** | **Mechanisms** | | **Use of materials** | | **Construction** |
| * Can they measure textile? * Can they join textiles together to make something? * Can they cut textiles? * Can they explain why they chose a certain textile? | * Can they join materials together as part of a moving product? * Can they add some kind of design to their product? | | * Can they measure materials to use in a model or structure? * Can they join material in different ways? * Can they use joining, folding or rolling to make it stronger? | | * Can they make sensible choices as to which material to use for their constructions? * Can they develop their own ideas from initial starting points? * Can they incorporate some type of movement into models? * Can they consider how to improve their construction? |

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| **YEAR 3 DT** | | | | | |
| **Developing, planning & communicating ideas** | | **Working with tools & materials** | | **Evaluating processes & products** | |
| * Can they show that their design meets a range of requirements? * Can they put together a step-by- step plan which shows the order and also what equipment and tools they need? * Can they describe their design using an accurately labelled sketch and words? * How realistic is their plan? | | * Can they use equipment and tools accurately? | | * What did they change which made their design even better? | |
| **Textiles** | **Electrical & mechanical components** | | **Stiff & flexible sheet materials** | | **Moldable materials** |
| * Can they join textiles of different types in different ways? * Can they choose textiles both for their appearance and also qualities? | * Do they select the most appropriate tools and techniques to use for a given task? * Can they make a product which uses both electrical and mechanical components? * Can they use a simple circuit? * Can they use a number of components? | | * Do they use the most appropriate materials? * Can they work accurately to make cuts and holes? * Can they join materials? | | * Do they select the most appropriate materials? * Can they use a range of techniques to shape and mould? * Do they use finishing techniques? |

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| **YEAR 4 DT** | | | | | |
| **Developing, planning & communicating ideas** | | **Working with tools & materials** | | **Evaluating processes & products** | |
| * Can they come up with at least one idea about how to create their product? * Do they take account of the ideas of   others when designing?   * Can they produce a plan and explain it to others? * Can they suggest some improvements and say what was good and not so good about their original design? | | * Can they tell if their finished product is going to be good quality? * Are they conscience of the need to produce something that will be liked by others? * Can they show a good level of expertise when using a range of tools and equipment? | | * Have they thought of how they will check if their design is successful? * Can they begin to explain how they can improve their original design? * Can they evaluate their product, thinking of both appearance and the way it works? | |
| **Textiles** | **Electrical & mechanical components** | | **Stiff & flexible sheet materials** | | **Moldable materials** |
| * Do they think what the user would want when choosing textiles? * Have they thought about how to make their product strong? * Can they devise a template? * Can they explain how to join things in a different way? | * Can they add things to their circuits? * How have they altered their product after checking it? * Are they confident about trying out new and different ideas? | | * Can they measure carefully so as to make sure they have not made mistakes? * How have they attempted to make their product strong? | | * Do they take time to consider how they could have made their idea better? * Do they work at their product even though their original idea might not have worked? |

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| **YEAR 5 DT** | | | | | |
| **Developing, planning & communicating ideas** | | **Working with tools & materials** | | **Evaluating processes & products** | |
| * Can they come up with a range of ideas after they have collected information? * Do they take a user’s view into account when designing? * Can they produce a detailed step-   by-step plan?   * Can they suggest some alternative plans and say what the good points and drawbacks are about each? | | * Can they explain why their finished product is going to be of good quality? * Can they explain how their product will appeal to the audience? * Can they use a range of tools and equipment expertly? | | * Do they keep checking that their design is the best it can be? * Do they check whether anything could be improved? * Can they evaluate appearance and function against the original criteria? | |
| **Textiles** | **Electrical & mechanical components** | | **Stiff & flexible sheet materials** | | **Moldable materials** |
| * Do they think what the user would want when choosing textiles? * How have they made their product attractive and strong? * Can they make up a prototype first? * Can they use a range of joining techniques? | * Can they incorporate a switch into their product? * Can they refine their product after testing it? * Can they incorporate hydraulics and pneumatics? | | * Are their measurements accurate enough to ensure that everything is precise? * How have they ensured that their product is strong and fit for purpose? | | * Are they motivated enough to refine and improve their product? * Do they persevere through different stages of the making process? |

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| **YEAR 6 DT** | | | | | |
| **Developing, planning & communicating ideas** | | **Working with tools & materials** | | **Evaluating processes & products** | |
| * Can they use a range of information to inform their design? * Can they use market research to   inform plans?   * Can they work within constraints? * Can they follow and refine their plan if necessary? * Can they justify their plan to someone else? * Do they consider culture and society in their designs? | | * Can they use tools and materials precisely? * Do they change the way they are   working if needed? | | * How well do they test and evaluate their final product? * Is it fit for purpose? * What would improve it? * Would different resources have improved their product? * Would they need more or different information to make it even better? | |
| **Textiles** | **Electrical & mechanical components** | | **Stiff & flexible sheet materials** | | **Moldable materials** |
| * Have they thought about how their product could be sold? * Have they given considered thought about what would improve their product even more? | * Can they use different kinds of circuit in their product? * Can they think of ways in which adding a circuit would improve their product? | | * Can they justify why they selected specific materials? * Can they work within a budget? * How have they ensured that their work is precise and accurate? * Can they hide joints so as to improve the look of their product? | | * Did they consider the use of the product when selecting materials? * Does their product meet all design criteria? |

**Assessment Criteria**

The following criteria should be used as a ‘best fit’ model. Teachers should consider whether or not a pupil is working towards meeting the KPIs, has met the KPIs or is exceeding the KPIs.

It is critical that pupils have depth to their learning, and can apply the KPIs independently in a range of scenarios.

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| **DT ASSESSMENT KPIs** | |
| **As a Year 1 designer…** | **As a Year 2 designer…** |
| * I use my own ideas to make something. * I describe how something works. * I cut food safely. * I make a product which moves. * I make my model stronger. * I explain to someone else how I want to make my product. * I choose appropriate resources and tools. * I make a simple plan before making. | * I think of an idea and plan what to do next. * I choose tools and materials and explain why I have chosen them. * I join materials and components in different ways. * I explain what went well with my work. * I explain why I have chosen specific textiles. * I measure materials to use in a model or structure. * I describe the ingredients I am using. |

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| **DT ASSESSMENT KPIs** | |
| **As a Year 3 designer…** | **As a Year 4 designer…** |
| * I prove that my design meets some set criteria. * I follow a step-by-step plan, choosing the right equipment and materials. * I design a product and make sure that it looks attractive. * I choose a material for both its suitability and its appearance. * I select the most appropriate tools and techniques for a given task. * I make a product which uses both electrical and mechanical components. * I work accurately to measure, make cuts and make holes. * I describe how food ingredients come together. | * I use ideas from other people when I am designing. * I produce a plan and explain it. * I evaluate and suggest improvements for my designs. * I evaluate products for both their purpose and appearance. * I explain how I have improved my original design. * I present a product in an interesting way. * I measure accurately. * I persevere and adapt my work when my original ideas do not work. * I know how to be both hygienic and safe when using food. |

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| **DT ASSESSMENT KPIs** | |
| **As a Year 5 designer…** | **As a Year 6 designer…** |
| * I come up with a range of ideas after collecting information from different sources. * I produce a detailed, step-by-step plan. * I suggest alternative plans; outlining the positive features and draw backs. * I explain how a product will appeal to a specific audience. * I evaluate appearance and function against original criteria. * I use a range of tools and equipment competently. * I make a prototype before make a final version. * I show that I can be both hygienic and safe in the kitchen. | * I use market research to inform my plans and ideas. * I follow and refine my plans. * I justify my plans in a convincing way. * I show that I consider culture and society in my plans and designs. * I show that I can test and evaluate my products. * I explain how products should be stored and give reasons. * I work within a budget. * I evaluate my product against clear criteria. |