Design and Technology Progression Framework

Design and Technology Association
National Curriculum Expert Group for D&T

National Curriculum 2014 – statements which are either derived directly from the programmes of study for D&T or provide an age-related interpretation of the requirements are shown in regular font

School Curriculum – statements which are additional to the programmes of study for D&T are shown in italic font

www.data.org.uk
<table>
<thead>
<tr>
<th>Designing</th>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
</tr>
</thead>
</table>
| **Understanding contexts, users and purposes** | Across KS1 pupils should:  
- work confidently within a range of contexts, such as imaginary, story-based, home, school, gardens, playgrounds, local community, industry and the wider environment  
- state what products they are designing and making  
- say whether their products are for themselves or other users  
- describe what their products are for  
- say how their products will work  
- say how they will make their products suitable for their intended users  
- use simple design criteria to help develop their ideas | Across KS2 pupils should:  
- work confidently within a range of contexts, such as the home, school, leisure, culture, enterprise, industry and the wider environment  
- describe the purpose of their products  
- indicate the design features of their products that will appeal to intended users  
- explain how particular parts of their products work  
In early KS2 pupils should also:  
- gather information about the needs and wants of particular individuals and groups  
- develop their own design criteria and use these to inform their ideas  | Across KS3 pupils should:  
- work confidently within a range of relevant domestic, local and industrial contexts, such as the home, health, leisure, culture, engineering, manufacturing, construction, food, energy, agriculture and fashion  
- consider the influence of a range of lifestyle factors and consumer choices when designing products  
- take creative risks when making design decisions  
- consider additional factors such as ergonomics, anthropometrics or dietary needs  
- analyse where human values may conflict and compromise has to be achieved  
In early KS3 pupils should also:  
- develop detailed design specifications to guide their thinking  
- use research including the study of different cultures, to identify and understand user needs  
- identify and solve their own design problems  |
| **Generating, developing, modelling and communicating ideas** | Across KS1 pupils should:  
- generate ideas by drawing on their own experiences  
- use knowledge of existing products to help come up with ideas  
- develop and communicate ideas by talking and drawing  
- model ideas by exploring materials, components and construction kits and by making templates and mock-ups  
- use information and communication technology, where appropriate, to develop and communicate their ideas | Across KS2 pupils should:  
- share and clarify ideas through discussion  
- model their ideas using prototypes and pattern pieces  
- use annotated sketches, cross-sectional drawings and exploded diagrams to develop and communicate their ideas  
- use computer-aided design to develop and communicate their ideas  
In early KS2 pupils should also:  
- generate realistic ideas, focusing on the needs of the user  
- make design decisions that take account of the availability of resources  | Across KS3 pupils should:  
- use specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations  
- combine ideas from a variety of sources  
- use a variety of approaches, for example biomimicry and user-centred design, to generate creative ideas and avoid stereotypical responses  
- decide which design criteria clash and determine which should take priority  
- develop and communicate design ideas using annotated sketches  
- produce 3D models to develop and communicate ideas  
- use mathematical modelling to indicate likely performance before using physical materials and components, for instance when developing circuits or gearing systems  
- give oral and digital presentations and use computer-based tools  
In early KS3 pupils should also:  
- use 2D and begin to use 3D CAD packages to model their ideas  
- produce models of their ideas using CAM to test out their ideas  |
|          | Across KS1 pupils should:  
- generate ideas by drawing on their own experiences  
- use knowledge of existing products to help come up with ideas  | Across KS2 pupils should:  
- share and clarify ideas through discussion  
- model their ideas using prototypes and pattern pieces  
- use annotated sketches, cross-sectional drawings and exploded diagrams to develop and communicate their ideas  | Across KS3 pupils should:  
- use specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations  
- combine ideas from a variety of sources  
- use a variety of approaches, for example biomimicry and user-centred design, to generate creative ideas and avoid stereotypical responses  
- decide which design criteria clash and determine which should take priority  
- develop and communicate design ideas using annotated sketches  
- produce 3D models to develop and communicate ideas  
- use mathematical modelling to indicate likely performance before using physical materials and components, for instance when developing circuits or gearing systems  
- give oral and digital presentations and use computer-based tools  
In early KS3 pupils should also:  
- use 2D and begin to use 3D CAD packages to model their ideas  
- produce models of their ideas using CAM to test out their ideas  |
|          |          |          |          |

The Design and Technology Association

www.data.org.uk
<table>
<thead>
<tr>
<th>Making</th>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
</tr>
</thead>
</table>
| Planning | Across KS1 pupils should:  
• plan by suggesting what to do next  
• select from a range of tools and equipment, explaining their choices  
• select from a range of materials and components according to their characteristics | Across KS2 pupils should:  
• select tools and equipment suitable for the task  
• explain their choice of tools and equipment in relation to the skills and techniques they will be using  
• select materials and components suitable for the task  
• explain their choice of materials and components according to functional properties and aesthetic qualities  
In early KS2 pupils should also:  
• order the main stages of making  
In late KS2 pupils should also:  
• produce appropriate lists of tools, equipment and materials that they need  
• formulate step-by-step plans as a guide to making | Across KS3 pupils should:  
• select appropriately from specialist tools, techniques, processes, equipment and machinery, including computer-aided manufacture  
• select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness  
In early KS3 pupils should also:  
• produce ordered sequences and schedules for manufacturing products they design, detailing resources required  
• produce costings using spreadsheets for products they design and make  
In late KS3 pupils should also:  
• create production schedules that inform their own and others’ roles in the manufacturing of products they design  
• make simple use of planning tools, for instance Gant charts  
• communicate their plans clearly so that others can implement them  
• match and select suitable materials considering their fitness for purpose |
| Practical skills and techniques | Across KS1 pupils should:  
• follow procedures for safety and hygiene  
• use a range of materials and components, including construction materials and kits, textiles, food ingredients and mechanical components  
• measure, mark out, cut and shape materials and components  
• assemble, join and combine materials and components  
• use finishing techniques, including those from art and design | Across KS2 pupils should:  
• follow procedures for safety and hygiene  
• use a wider range of materials and components than KS1, including construction materials and kits, textiles, food ingredients, mechanical components and electrical components  
In early KS2 pupils should also:  
• measure, mark out, cut and shape materials and components with some accuracy  
• assemble, join and combine materials and components with some accuracy  
• apply a range of finishing techniques, including those from art and design, with some accuracy  
In late KS2 pupils should also:  
• accurately measure, mark out, cut and shape materials and components  
• accurately assemble, join and combine materials and components  
• accurately apply a range of finishing techniques, including those from art and design  
• use techniques that involve a number of steps  
• demonstrate resourcefulness when tackling practical problems | Across KS3 pupils should:  
• follow procedures for safety and hygiene and understand the process of risk assessment  
• use a wider, more complex range of materials, components and ingredients, taking into account their properties  
• use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely  
• exploit the use of CAD/CAM equipment to manufacture products, increasing standards of quality, scale of production and precision  
• apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods  
In early KS3 pupils should also:  
• make use of specialist equipment to mark out materials  
• use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives  
• use CAD/CAM to produce and apply surface finishing techniques, for example using dye sublimation  
• investigate and develop skills in modifying the appearance of materials including textiles and other manufactured materials e.g. dying and applique  
In late KS3 pupils should also:  
• adapt their methods of manufacture to changing circumstances  
• recognise when it is necessary to develop a new skill or technique |
<table>
<thead>
<tr>
<th>Evaluating</th>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Own ideas and products</strong></td>
<td>Across KS1 pupils should: • talk about their design ideas and what they are making • make simple judgements about their products and ideas against design criteria • suggest how their products could be improved</td>
<td>Across KS2 pupils should: • identify the strengths and areas for development in their ideas and products • consider the views of others, including intended users, to improve their work In early KS2 pupils should also: • refer to their design criteria as they design and make • use their design criteria to evaluate their completed products In late KS2 pupils should also: • critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make • evaluate their ideas and products against their original design specification</td>
<td>Across KS3 pupils should: • test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups In early KS3 pupils should also: • evaluate their products against their original specification and identify ways of improving them • actively involve others in the testing of their products In late KS3 pupils should also: • select appropriate methods to evaluate their products in use and modify them to improve performance • produce short reports, making suggestions for improvements</td>
</tr>
<tr>
<td><strong>Existing products</strong></td>
<td>Across KS1 pupils should explore: • what products are • who products are for • what products are for • how products work • how products are used • where products might be used • what materials products are made from • what they like and dislike about products</td>
<td>Across KS2 pupils should investigate and analyse: • how well products have been designed • how well products have been made • why materials have been chosen • what methods of construction have been used • how well products work • how well products achieve their purposes • how well products meet user needs and wants In early KS2 pupils should also investigate and analyse: • who designed and made the products • where products were designed and made • when products were designed and made • whether products can be recycled or reused In late KS2 pupils should also investigate and analyse: • how much products cost to make • how innovative products are • how sustainable the materials in products are • what impact products have beyond their intended purpose</td>
<td>Across KS3 pupils should investigate and analyse: • new and emerging technologies In early KS3 pupils should investigate and analyse: • products through disassembly to determine how they are constructed and function • the positive and negative impact that products can have in the wider world In late KS3 pupils should investigate and analyse: • products that they are less familiar with using themselves • products considering life cycle analysis • how products can be developed considering the concept of ‘cradle to grave’ • the concept of circular economy approaches in relation to product development and consumption</td>
</tr>
<tr>
<td><strong>Key events and individuals</strong></td>
<td>Not a requirement in KS1</td>
<td>Across KS2 pupils should know: • about inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products</td>
<td>Across KS3 pupils should know: • about an increasing range of designers, engineers, chefs, technologists and manufacturers and be able to relate their products to their own designing and making</td>
</tr>
</tbody>
</table>
## Technical knowledge

### Key Stage 1

**Making products work**

- About the simple working characteristics of materials and components
- About the movement of simple mechanisms such as levers, sliders, wheels and axles
- How freestanding structures can be made stronger, stiffer and more stable
- That a 3-D textiles product can be assembled from two identical fabric shapes
- That food ingredients should be combined according to their sensory characteristics
- The correct technical vocabulary for the projects they are undertaking

### Key Stage 2

- How to use learning from science to help design and make products that work
- How to use learning from mathematics to help design and make products that work
- That materials have both functional properties and aesthetic qualities
- That materials can be combined and mixed to create more useful characteristics
- That mechanical and electrical systems have an input, process and output
- The correct technical vocabulary for the projects they are undertaking

### Key Stage 3

- Use learning from science to help design and make products that work
- Use learning from mathematics to help design and make products that work
- Understand the properties of materials, including smart materials, and how they can be used to advantage
- Understand the performance of structural elements to achieve functioning solutions
- Understand how more advanced mechanical systems used in their products enable changes in movement and force
- How to competently use a range of cooking techniques for example, selecting and preparing ingredients; using utensils and electrical equipment

### Early KS2

- How mechanical systems such as levers and linkages or pneumatic systems create movement
- How simple electrical circuits and components can be used to create functional products
- How to program a computer to control their products
- How to make strong, stiff shell structures
- That a single fabric shape can be used to make a 3D textiles product
- That food ingredients can be fresh, pre-cooked and processed

### Late KS2

- How mechanical systems such as cams or pulleys or gears create movement
- How more complex electrical circuits and components can be used to create functional products
- How to program a computer to monitor changes in the environment and control their products
- How to reinforce and strengthen a 3D framework
- That a 3D textiles product can be made from a combination of fabric shapes
- That a recipe can be adapted by adding or substituting one or more ingredients

### Early KS3

- How to classify materials by structure e.g. hard woods, soft woods, ferrous and non-ferrous, thermoplastic and thermosetting plastics
- About the physical properties of materials e.g. grain, brittleness, flexibility, elasticity, malleability and thermal
- How more advanced electrical and electronic systems can be powered and used in their products
- How to use simple electronic circuits incorporating inputs and outputs
- About textile fibre sources e.g. natural and synthetic and fabrics e.g. plain and woven
- How to select and modify patterns and use in textile construction

### Late KS3

- How materials can be cast in moulds
- How to make adjustments to the settings of equipment and machinery such as sewing machines and drilling machines
- How to apply computing and use electronics to embed intelligence in products that respond to inputs
- Make use of sensors to detect heat, light, sound and movement such as thermistors and light dependant resistors
- How to apply the concepts of feedback in systems
- How to control outputs such as actuators and motors
- How to use software and hardware to develop programmes and transfer these to programmable components for example, microcontrollers
- How to make use of microcontrollers in products they design and manufacture themselves
- How to construct and use simple and compound gear trains to drive mechanical systems from a high revving motor
<table>
<thead>
<tr>
<th>Cooking and nutrition</th>
<th>Key Stage 1</th>
<th>Key Stage 2</th>
<th>Key Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Where food comes from</strong></td>
<td>Across KS1 pupils should know:</td>
<td>Across KS2 pupils should know:</td>
<td>Across KS3 pupils should know:</td>
</tr>
<tr>
<td></td>
<td>• that all food comes from plants or animals</td>
<td>• that a recipe can be adapted by adding or substituting one or more ingredients</td>
<td>• that food is produced, processed and sold in different ways, e.g. conventional and organic farming, fair trade</td>
</tr>
<tr>
<td></td>
<td>• that food has to be farmed, grown elsewhere (e.g. home) or caught</td>
<td>• 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</td>
<td>• that people choose different types of food and that this may be influenced by availability, season, need, cost, where the food is produced, culture and religion</td>
</tr>
<tr>
<td></td>
<td>In late KS2 pupils should also know:</td>
<td>• how to process food into ingredients that can be eaten or used in cooking</td>
<td>In late KS3 pupils should also know:</td>
</tr>
<tr>
<td></td>
<td>• that seasons may affect the food available</td>
<td>• how food is processed into ingredients that can be eaten or used in cooking</td>
<td>• how to compare the cost of food when planning to eat out or cook at home</td>
</tr>
<tr>
<td></td>
<td>• how food is processed into ingredients that can be eaten or used in cooking</td>
<td>• about the influence of food marketing, advertising and promotion on their own diet and purchasing behaviour</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food preparation, cooking and nutrition</th>
<th>Across KS1 pupils should know:</th>
<th>Across KS2 pupils should know:</th>
<th>Across KS3 pupils should know:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>how to name and sort foods into the five groups in The eatwell plate</td>
<td>how to prepare and cook a variety of predominantly savoury dishes safely and hygienically including, where appropriate, the use of a heat source</td>
<td>how to store, prepare and cook food safely and hygienically</td>
</tr>
<tr>
<td></td>
<td>• that everyone should eat at least five portions of fruit and vegetables every day</td>
<td>• how to use a range of techniques such as peeling, chopping, slicing, grating, mixing, spreading, kneading and baking</td>
<td>• how to store, prepare and cook food safely and hygienically</td>
</tr>
<tr>
<td></td>
<td>• how to prepare simple dishes safely and hygienically, without using a heat source</td>
<td>• that a healthy diet is made up from a variety and balance of different food and drink, as depicted in The eatwell plate</td>
<td>• how to select and prepare ingredients</td>
</tr>
<tr>
<td></td>
<td>• how to use techniques such as cutting, peeling and grating</td>
<td>• that to be active and healthy, food and drink are needed to provide energy for the body</td>
<td>• how to use utensils and electrical equipment</td>
</tr>
<tr>
<td></td>
<td>In early KS2 pupils should also know:</td>
<td>In late KS2 pupils should also know:</td>
<td>In late KS3 pupils should also know:</td>
</tr>
<tr>
<td></td>
<td>• that a healthy diet is made up from a variety and balance of different food and drink, as depicted in The eatwell plate</td>
<td>• that recipes can be adapted to change the appearance, taste, texture and aroma</td>
<td>• the importance of a healthy and varied diet as depicted in The eatwell plate and Eight tips for healthy eating</td>
</tr>
<tr>
<td></td>
<td>• that to be active and healthy, food and drink are needed to provide energy for the body</td>
<td>• that different food and drink contain different substances – nutrients, water and fibre – that are needed for health</td>
<td>• that food provides energy and nutrients in different amounts; that they have important functions in the body; and that people require different amounts during their life</td>
</tr>
<tr>
<td></td>
<td>In late KS2 pupils should also know:</td>
<td>In late KS3 pupils should also know:</td>
<td>In late KS3 pupils should also know:</td>
</tr>
<tr>
<td></td>
<td>• that recipes can be adapted to change the appearance, taste, texture and aroma</td>
<td>• how to taste and cook a broader range of ingredients and healthy recipes, accounting for a range of needs, wants and values</td>
<td>• how to taste and cook a broader range of ingredients and healthy recipes, accounting for a range of needs, wants and values</td>
</tr>
<tr>
<td></td>
<td>• that different food and drink contain different substances – nutrients, water and fibre – that are needed for health</td>
<td>• how to actively minimise food waste such as composting fruit and vegetable peelings and recycling food packaging</td>
<td>• how to use nutrition information and allergy advice panels on food labels to help make informed food choices</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• how to use a broader range of preparation techniques and methods when cooking, e.g. stir-frying, steaming, blending</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• how to modify recipes and cook dishes that promote current healthy eating messages</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• the principles of cleaning, preventing cross-contamination, chilling, cooking food thoroughly and reheating food until it is steaming hot</td>
</tr>
</tbody>
</table>