



# Willingdon

COMMUNITY SCHOOL

CURRICULUM BOOKLET

September 2021

# Design & Technology

# Innovation by Design

## Our School Curriculum Vision

To provide a curriculum fit for our students' future, building on the successes of their past (ready for post 16 and life). This allows our students to be safe, happy, well informed global citizens who have experienced a five - year progressive and dynamic curriculum where they have the opportunity to aspire and achieve their fullest potential. This will embody the school's values of 'Personal Excellence' through a broad and balanced curriculum, which is inclusive and reflective of our local needs.

## Subject Vision

Our vision in DT is a curriculum providing the broadest possible range of opportunities, accessible to all. It should foster self-motivated and confident learners who can work independently and as part of a team. Students should develop practical and technical competencies as well as wider skills valued by employers, they need to be successful problem solvers who are not afraid of making mistakes. Students learn best by 'doing' and by allowing them to experiment and take risks, in a safe and positive learning environment. This is achieved through imaginative teaching that embraces new technologies and resembles modern industrial processes, whilst retaining the best of traditional practices. In DT here at Willingdon we look for opportunities to develop community links and enterprise opportunities and this is a key feature of our schemes of work and enrichment opportunities

# Key Concepts in Design & Technology

Students will experience a units of seven weeks in year 7,8 and 9 and the key concepts we are looking to deliver here are outlined below:

- To establish a safe learning environment which is conducive to learning, is stimulating, imaginative and relaxed where students feel supported and secure.
- To link to many different curriculum areas in order to develop a set of transferable skills they can enjoy in school and use in their future working lives.
- To enable students to combine their designing and making skills with knowledge and understanding, in order to design, make, analyse and evaluate products of high quality.
- To value the work of all students, using assessment as a means to monitor student progress, provide information in relation to attainment on a national scale and to form a basis for individual action plans.

## Design

- Identify and solve their own design problems and understand how to reformulate problems given to them
- Develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations
- Use a variety of approaches [for example, biomimicry and user-centred design], to generate creative ideas and avoid stereotypical responses
- Develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools

## Make

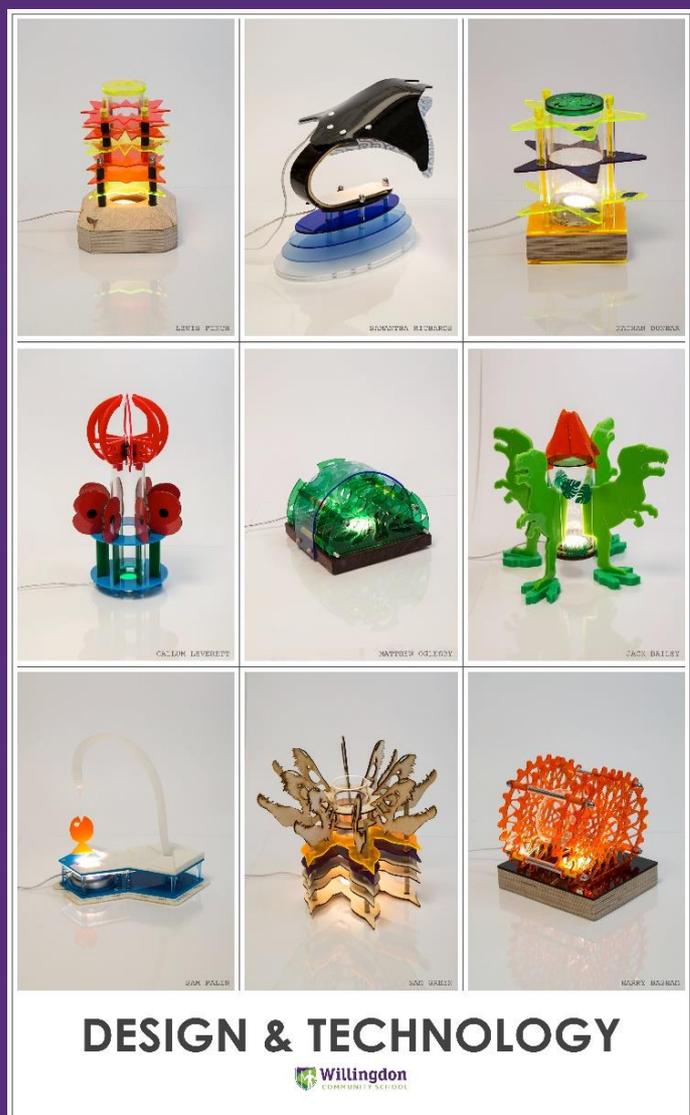
- Select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture
- Select from and use a wider, more complex range of materials, components and ingredients, taking into account their properties

## Evaluate

- Analyse the work of past and present professionals and others to develop and broaden their understanding
- Investigate new and emerging technologies
- Test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups
- Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists

## Technical knowledge

- Understand and use the properties of materials and 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
- Understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs]
- Apply computing and use electronics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers].



## DESIGN & TECHNOLOGY





# Programme of Study

## Key Stage 4

### AQA GCSE Design & Technology (1-9)

The GCSE is 50% exam and 50% coursework which can start once the contexts are released to students on 1st June in year 10. Therefore most of year 10 is planned to deliver a combination of robust theory lessons and practical projects that ensure students are fluent, safe and independent around the workshop. The theory program is split into core and specialist technical principles outlined below;

#### Core technical principles

- new and emerging technologies
- energy generation and storage
- developments in new materials
- systems approach to designing
- mechanical devices
- materials and their working properties.

#### Specialist technical principles

- selection of materials or components
- forces and stresses
- ecological and social footprint
- sources and origins
- using and working with materials
- stock forms, types and sizes
- scales of production
- specialist techniques and processes
- surface treatments and finishes.

Each specialist technical principle is delivered through the following material categories;

- papers and boards
- timber based materials
- polymers

In year 11 students will complete the majority of their NEA coursework and then an intensive term preparing for the final exam. The breakdown is shown below.

Paper 1	
<b>What's assessed</b>	
<ul style="list-style-type: none"> <li>• Core technical principles</li> <li>• Specialist technical principles</li> <li>• Designing and making principles</li> </ul>	
In addition:	
<ul style="list-style-type: none"> <li>• at least 15% of the exam will assess maths</li> <li>• at least 10% of the exam will assess science.</li> </ul>	
<b>How it's assessed</b>	
<ul style="list-style-type: none"> <li>• Written exam: 2 hours</li> <li>• 100 marks</li> <li>• 50% of GCSE</li> </ul>	
<b>Questions</b>	
<b>Section A – Core technical principles (20 marks)</b>	
A mixture of multiple choice and short answer questions assessing a breadth of technical knowledge and understanding.	
<b>Section B – Specialist technical principles (30 marks)</b>	
Several short answer questions (2–5 marks) and one extended response to assess a more in depth knowledge of technical principles.	
<b>Section C – Designing and making principles (50 marks)</b>	
A mixture of short answer and extended response questions.	

#### 4.2.1 Assessment objective weightings for GCSE Design and Technology

Assessment objectives (AOs)	Component weightings (approx %)		Overall weighting (approx %)
	Paper 1	NEA	
AO1	0	10	10
AO2	0	30	30
AO3	10	10	20
AO4	40	0	40
Overall weighting of components	50	50	100

	Section	Criteria	Maximum marks
AO1 Identify, investigate & outline design possibilities	A	Identifying & investigating design possibilities	10
	B	Producing a design brief & specification	10
AO2 Design & make prototypes that are fit for purpose	C	Generating design ideas	20
	D	Developing design ideas	20
AO3 Analyse & evaluate	E	Realising design ideas	20
	F	Analysing & evaluating	20
Total			100

# Options Booklet Entry

## AQA GCSE Design & Technology (1-9)

During Key Stage 4 students will take part in a 'design and make' project that is linked to enhance the quality of students' work, including computer-aided design and manufacture (CAD/CAM) including laser cutting, 3D printing and ICT-based sources for research. Projects will also include control and programming.

Students will consider how technology affects society and their own lives and learn that new technologies have both advantages and disadvantages. They will develop an awareness of design by looking at products already on the market, from past to present, and studying styles of design such as 'Memphis' and influential designers such as Alessi and Starck.

The timed Controlled Assessment task, set by AQA, will bring together a wide range of techniques, requiring students to create, develop and communicate solutions to their own individual project briefs. Students will find out about materials and manufacturing techniques and develop high quality design skills and modelling techniques. This course offers students the challenge to become creative, independent thinkers and the outcomes will include designing, making and marketing. Students will submit a concise design e-portfolio with appropriate ICT evidence, together with a 3D working prototype.

## Assessment

50% of the total marks are allocated to the Controlled Assessment task of approximately 30-35 hours. The Controlled Assessment coursework project consists of a single design and making activity from set AQA Design Tasks. Coursework will be internally assessed and moderated, before being seen by the external AQA moderator. The written paper accounts for 50% of the total marks.



# Assessment Plan for Key Stage 4



Assessments in year 10 are based around two key areas, Preparation for the exam with core and speciality technical principles and focussed practical tasks and projects that reflect the demanding and complex making skills required for the NEA in year 11. Assessments are all internal in year 10, with the final GCSE grade coming from their terminal exam in year 11 and the NEA task set in year 11.

Year 10 concludes with a paper based on that year's theory and a set of practical skills assessed over two mini example NEA style projects.

Assessments in year 11 are made as students make progress through the NEA task.

NEA assessment criteria:

- 10% • Identifying and investigating design possibilities
- 10% • Producing a design brief and specification
- 20% • Generating design ideas
- 20% • Developing design ideas
- 20% • Realising design ideas
- 20% • Analysing & evaluating

The exam is then 50% of the GCSE and is comprised of the areas explained below:

## Paper 1

### What's assessed

- Core technical principles
- Specialist technical principles
- Designing and making principles

In addition:

- at least 15% of the exam will assess maths
- at least 10% of the exam will assess science.

### How it's assessed

- Written exam: 2 hours
- 100 marks
- 50% of GCSE

### Questions

#### Section A – Core technical principles (20 marks)

A mixture of multiple choice and short answer questions assessing a breadth of technical knowledge and understanding.

#### Section B – Specialist technical principles (30 marks)

Several short answer questions (2–5 marks) and one extended response to assess a more in depth knowledge of technical principles.

#### Section C – Designing and making principles (50 marks)

A mixture of short answer and extended response questions.



# Programme of Study

## Key Stage 3

Design & Technology is taught to all Key Stage 3 students.

Years 7, 8 and 9 experience two main focus areas: Design & Technology and Food Skills. ICT is used in both modules.

### Teaching

Students are taught in groups of maximum 24, (mixed gender and ability), for a period of 7 weeks in one focus area by one teacher. They then move on to the next teacher for a different focus for a similar period until all modules have been completed across the year.



### Learning in year 7

#### **Module 1:**

Working with materials, tools, equipment and workshop processes. Designing and making an acrylic or wooden electronic fan with CAD/CAM engraving.

### Learning in year 8

#### **Module 1:**

Students learn about prototypes, the importance of good quality and packaging. They develop their CAD/CAM skills by designing keyrings, for which a mould is made and a prototype cast in pewter and a textile pouch made to protect it. The project will involve designing and making. Students will work on practical tasks to produce a quality item.

### Learning in year 9

#### **Module 1:**

In year 9 students will undertake design research and develop creative ideas and solutions, building on their skills and will learn to produce an aluminium hand crafted tea light holder.

# Assessment Plan for Key Stage 3

Design and Technology capability will be built upon over the year to give a final teacher assessment. The student will often be using GCSE criteria and grading to support them with their tasks.

Typical homework will include: -

- Internet research and investigation into theoretical topics studied in that year group using sites such as GCSE BBC
- Learning key vocabulary
- Learning and practising for written tests.
- Completing examination questions

Students are given regular feedback within the different units. Feedback comes with targets for improvement which they are expected to respond to by adding their own reflective and evaluative comments about how they are going to improve their grades.



# Literacy in D&T

**Literacy** is centred around the core focus of specialised vocabulary, especially key terms relating to the scientific element of the course. Students will learn how to research, construct and evaluate their work along with the skills necessary to write clear reports so that they can gain maximum marks in both the NEA coursework and the written exam.

# Numeracy in D&T

**Numeracy** is an essential component of the students studies in DT and is generally interwoven through the design and make experiences the students encounter throughout their time at Willingdon. We will cover the following areas:

## Arithmetic and numerical computation

Ratios, fractions and percentages as well as surface area and volume.

## Handling data

Presentation of data, diagrams, bar charts and histograms.

## Graphs

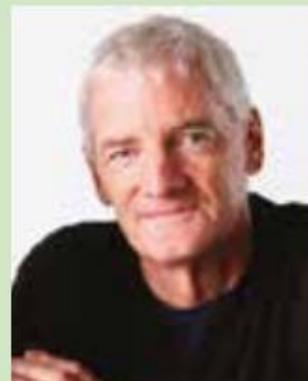
Plot, draw and interpret appropriate graphs and translating information between graphical and numeric form.

## Geometry and trigonometry

Use angular measures in degrees. Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects. Calculate areas of triangles and rectangles, surface areas and volumes of cubes.

# Raising aspirations in D&T

GCSE D&T opens the door to a wide range of careers in the creative, engineering and manufacturing industries. It is also excellent preparation for careers in many other fields e.g. medicine, law and computer science. Whatever career you choose, the knowledge and skills you learn, particularly those concerned with rapidly developing technologies, will be extremely valuable. You will also develop skills, such as teamwork and time management which are highly prized by employers



"Design and Technology is a **phenomenally important subject**. Logical, creative and practical, it's the only opportunity students have to apply what they learn in Maths and Science."

**Sir James Dyson** Founder and Chairman of Dyson and Patron to the D&T Association

# Broadening horizons in D&T

The skills developed during this GCSE course not only allow students to demonstrate and develop their originality, flair and innovation, but it also provides skills that make better informed and intelligent consumers.

It provides a solid platform for many career paths and entrepreneurial skills as well as a sound background for other less obvious careers, where the ability to think differently and creatively gives our students the edge on the competition

# Parents can help students at KS3 and KS4 by: -

Encouraging students to watch environmental documentaries in particular the Powering Britain Series.

Help them to recycle products from home and understand the consequences of not recycling on the planet.

Ask them what materials products are commonly made from now rather than 100 years ago.

Question them on why they think things have been designed and made a certain way and what designers might have influenced these products



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