

# CURRICULUM ROAD MAP

<b>Subject</b>	STEM	<b>Year / KS</b>	Year 9
----------------	------	------------------	--------

<b>INTENT</b>																			
<p>Our Creative Curriculum at The Whitehaven Academy in STEM delivers learning that gives young people a varied breadth and depth of subject knowledge, core skills and a strong technical understanding. Students design and make products whilst developing practical, lifelong skills within a variety of contexts, considering both their own and others' needs, wants and values whilst following the Design and Technology National Curriculum. 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.</p> <p>Throughout the 12-week course, students will work towards their Bronze CREST Award, a nationally recognised qualification organised and assessed by the British Science Association as part of their STEM project work scheme.</p>																			
<b>IMPLEMENTATION</b>	<b>IMPACT - See Key Learning Indicators</b>																		
<p>In years 9 students undergo a 12-week period of STEM lessons and complete two different topics which fall within the DT curriculum. These lessons are two hours long and give 24 hours of learning time. Students complete practical work every lesson and complete one or more extended writing tasks which have a focus on analysis and evaluation skills. This can be completed independently, in pairs or small groups, focussing on developing practical skills. The units of work follow the design, make and evaluate format and provide opportunities for students to research, design and plan new products.</p> <p>The following units are completed:          Unit 1- Bath bomb challenge          This unit is part of the CREST Award, this is a scheme that inspires students to think and behave like scientists and engineers. CREST gives young people aged 5-19 the chance to choose their own subject and methodology when completing their hands-on investigation. CREST is a nationally recognised scheme for student-led project work in the STEM subjects (science, technology, engineering, and maths).</p>	<p><b>Students will be assessed throughout the year against the Key Learning Indicators</b></p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> <th>8</th> <th>9</th> </tr> </thead> <tbody> <tr> <td>Creative problem solving and use of maths</td> <td>Health and Safety</td> <td>Critical thinking</td> <td>Quality preparation, research and planning</td> <td>Quality communication</td> <td>Quality of outcomes through use of specialist technical principles</td> <td>Use of technical terminology</td> <td>Sustainability</td> <td>DT in context</td> </tr> </tbody> </table> <ol style="list-style-type: none"> <li><b>Creative problem solving and use of maths-</b> Students show creative and/or independent thinking and modification of approach shown throughout the unit of work to solve issues arising. Students can demonstrate some use of maths to solve technical problems." <span style="background-color: #90EE90;">KLI1</span></li> <li><b>Follow Health and Safety-</b> Students can demonstrate an awareness of safe working practices <span style="background-color: #90EE90;">KLI2</span></li> <li><b>Critical thinking-</b> Students use analysis and evaluation used to investigate, compare and contrast products with clear explanation(s) justification. <span style="background-color: #90EE90;">KLI3</span></li> </ol>	1	2	3	4	5	6	7	8	9	Creative problem solving and use of maths	Health and Safety	Critical thinking	Quality preparation, research and planning	Quality communication	Quality of outcomes through use of specialist technical principles	Use of technical terminology	Sustainability	DT in context
1	2	3	4	5	6	7	8	9											
Creative problem solving and use of maths	Health and Safety	Critical thinking	Quality preparation, research and planning	Quality communication	Quality of outcomes through use of specialist technical principles	Use of technical terminology	Sustainability	DT in context											

Within this area of the course, students will undertake a series of techniques that will allow them to problem solve, they will learn how to investigate bath bombs and record their findings, they will create their own improved design after testing different approaches.

#### Unit 2- Textile Entrepreneurs

This unit is delivered to inspire students to design and make their own products to meet a target audience. They develop knowledge of the design process through researching, investigating different decorative techniques, analysing products on the market then they design and make their own. Products are tested and evaluated at the end of the project.

4. **Quality preparation, research and planning-** Students use preparation, research and planning techniques to inform the outcome. **KLI4**
5. **Quality communication-** Appropriate communication techniques are used to communicate design thinking clearly and effectively. **KLI5**
6. **Quality of outcomes through use of specialist technical principles-** Students outcomes meet almost all of the project's success criteria. **KLI6**
7. **Technical terminology-** Students use correct specialist technical terminology used correctly within the unit of work. **KLI7**
8. **Sustainability-** Students show an understanding of origins of materials and the associated environmental impact. **KLI8**
9. **DT in context-** Students demonstrate an understanding of efficient manufacturing techniques and working practitioners. **KLI9**

### KEY KNOWLEDGE & SKILLS CROSS CURRICULAR

#### Students will complete the following practical lessons:

#### English:

##### Reading

Students will be taught to understand increasingly challenging texts through:

- learning new vocabulary, relating it explicitly to known vocabulary and understanding it with the help of context and dictionaries;

##### Writing

Students should be taught to write accurately, fluently, effectively and at length for pleasure and information through:

- summarising and organising material, and supporting ideas and arguments with any necessary factual detail;
- applying their growing knowledge of vocabulary, grammar and text structure to their writing and selecting the appropriate form;

Students should be taught to plan, draft, edit and proof-read through:

- considering how their writing reflects the audiences and purposes for which it was intended;
- paying attention to accurate grammar, punctuation and spelling;

### **Grammar and vocabulary**

Students should be taught to consolidate and build on their knowledge of grammar and vocabulary through:

- using Standard English confidently in their own writing and speech;

### **Spoken English**

Students should be taught to speak confidently and effectively, including through:

- using Standard English confidently in a range of formal and informal contexts, including classroom discussion;
- giving short speeches and presentations, expressing their own ideas and keeping to the point;
- Participating in formal debates and structured discussions, summarising and/or building on what has been said.

## **Mathematics**

### **Number**

Students should be taught to:

- understand and use place value for decimals, measures and integers of any size
- order positive and negative integers, decimals and fractions
- interpret percentages and percentage changes as a fraction or a decimal
- use standard units of mass, length, time, money and other measures, including with decimal quantities;
- use a calculator and other technologies to calculate results accurately and then interpret them appropriately.

### **Ratio, proportion and rates of change**

Students should be taught to:

- change freely between related standard units [for example time, length, area, volume/capacity, mass]

### **Statistics**

- construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data.

### **Science:**

## **Nutrition and digestion**

- content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed;

### **Energy**

- comparing energy values of different foods (from labels) (kJ).

**PSHE:** (non-statutory) Health and well-being

what constitutes a balanced diet and its benefits (including the risks associated with both obesity and dieting); what might influence their decisions about eating a balanced diet.

## **DT National Curriculum Coverage**

Students should be taught to

### **Design**

- use research and exploration, such as the study of different cultures, to identify and understand user needs
- 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 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, considering 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, considering 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 technologist's 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
- apply computing and use electronics to embed intelligence in products that respond to inputs and control outputs, using programmable components

KEY LEARNING INDICATORS		YEAR 8/9 SUCCESS CRITERIA
1	<b>Creative problem solving and use of maths</b>	Students can use a creative approach and mindset to solve a range of problems
		Students can modify their approach throughout the unit of work to solve issues arising.
		Students can use appropriate problem-solving approaches to solve issues and help plan or prepare their work.
2	<b>Follow Health and Safety</b>	Understanding of H&S rules within each DT room setting is clear.
		Links can be made between incorrect H&S and potential problems or injuries and correct ways to mitigate.
		Students closely follow all H&S procedures to allow safe working.
3	<b>Critical thinking</b>	Students can reflect on their working and evaluate their work against criteria.
		Clear informed and detailed improvements are identified with regards to their outcome.
		Students are able to analyse products suitability and compare products effectiveness.
4	<b>Quality preparation, research and planning</b>	A clear understanding that products have clients and some have specific needs and this in turn informs the design
		Specification writing is clear and informs the design
		Students are able to plan out how they are to complete their work and are able to change/modify where required.
5	<b>Quality communication</b>	Designing shows an innovative and informed approach
		Industry examples are used with skill and accuracy to facilitate designing where needed.
		Students can produce accurate sketching whilst making use of design programs with skill
6	<b>Quality of outcomes through use of specialist technical principles</b>	Accurate use of planning and design software to accurately make products
		Careful and skilful use of equipment to produce an accurate outcome
		Multiple design programs and other alternative equipment is used with skill and understanding
7	<b>Technical terminology</b>	Understanding of key words within the design process and how they link together.
		Students understand key words used with each specialist areas and know precisely what they refer to.
		Students can accurately and with understanding use a range of appropriate key words within their writing and wider work (including conversations)

8	Sustainability	Awareness that designer and consumers have a social responsibility when designing and using products
		Understanding of environmental issues around materials and food choices
9	DT in context	Awareness that all products in the world have been designed by someone to fulfil a need
		Students understand how a range of commercial manufacturing techniques are used to create products
		Students understand the careers which lead off from DT based disciplines.

### Assessment feedback grid focusing on the Key Learning Indicators

All criteria in the central column must be met for a student to be making expected progress in these skills. What will the learning look like?

Learning Indicator Ref	Learning Indicator Description	Working Towards Access Supported	Working At Consistent Secure	Working Beyond Mastery Independence
1. <b>Creative problem solving and use of maths</b>	Students show creative and/or independent thinking and modification of approach shown throughout the unit of work to solve issues arising. Students can demonstrate some use of maths to solve technical problems." <b>KLI1</b>	Students can use a creative approach and mindset to solve a range of problems	Students can modify their approach to solve issues arising.	Students can use appropriate mathematic approaches to solve issues and help plan or prepare their work.
2. <b>Follow Health and Safety-</b>	Students can demonstrate an awareness of safe working practices <b>KLI2</b>	Students have knowledge of H&S rules and can follow these rules to work safely.	Students can make links between H&S and potential dangers and can work safely and hygienically.	Students closely follow all H&S procedures to work safely and hygienically.

<b>3. Critical thinking-</b>	Students use analysis and evaluation used to investigate, compare and contrast products with clear explanation(s) justification. <b>KLI3</b>	Students can reflect on their working and evaluate their work against criteria. Students can analyse products suitability.	Students can reflect on their work and suggest further Improvements. Students can analyse products suitability and compare products effectiveness with support.	Students are able to reflect on their own work suggesting improvements which include justification and reasons. Students can analyse products suitability and compare products effectiveness independently.
<b>4. Quality preparation, research and planning</b>	Students use preparation, research and planning techniques to inform the outcome. <b>KLI4</b>	Students can plan a product to meet consumer needs (likes, dislikes, dietary requirements etc)	Students can carry out research and use this to plan a product to meet consumer needs, with justifications of the decisions made.	Students can carry out research and use this to plan a product to meet consumer needs, with justifications of the decisions made and are able to change/modify where needed.
<b>5. Quality communication</b>	Appropriate communication techniques are used to communicate design thinking clearly and effectively. <b>KLI5</b>	Students can communicate their ideas well.	Students can communicate their ideas with skill and accuracy.	Students can produce accurate sketching which are communicated precisely.
<b>6. Quality of outcomes through use of specialist technical principles-</b>	Students outcomes meet almost all of the project's success criteria. <b>KLI6</b>	Students can use tools and equipment independently to produce a good quality outcome	Students can use a range of tools and equipment skilfully with accuracy and precision to produce a good quality outcome.	Students can use a wide range of tools and equipment skilfully with accuracy and precision to produce a good quality outcome.
<b>7. Technical terminology-</b>	Students use correct specialist technical terminology used correctly within the unit of work. <b>KLI7</b>	Students understand a range of key words	Students understand a range of key words and can use them within their work.	Students can use a wide range of key words with accuracy and understanding within their work.



<b>8. Sustainability</b>	Students show an understanding of origins of materials and the associated environmental impact. <b>KLI8</b>	Students show some awareness of sustainability and environmental issues when designing products.	Students show good understanding of sustainability and environmental issues when using materials and making food choices	Students show very good understanding of a wide range of sustainability and environmental issues at different stages of the design process
<b>9. DT in context-</b>	Students demonstrate an understanding of efficient manufacturing techniques and working practitioners. <b>KLI9</b>	Students understand how some different techniques are used to create products.	Students understand how some different techniques are used to create products and understands the role of professionals in industry.	Students understand how a wide range of different techniques are used to create products and understands the role of professionals in industry.

