

## Year 9 – Metals Design Technology Faculty

Rationale and Context of Unit:	Core curriculum content:	Tier 2 & Tier 3 vocabulary explicitly taught:		
<p>Students have developed a repertoire of knowledge of timbers and polymers to date at KS3. This scheme of learning introduces or extends that knowledge by the use of Metals. An extensive list of tools, techniques, machinery, CAD-CAM processes are implemented within the workshop to give students first-hand experience to ensure they have the practical expertise needed to preform everyday tasks confidently.</p> <p>Students are delivered content in similar way throughout KS3 to enable recall opportunities to be created throughout KS3 delivery. Tools, techniques, machinery, CAD-CAM processes are specific to the material that is being used however there are on occasions cross overs in subject pedagogy. Out of the three main material type’s timbers, polymers, metals, metals are the hardest to manipulate. This material is used when students are typically more physically strong.</p> <p>Design Technology operates a carousel system which enables clear sections in which students can learn. Within Product Design students need to fully understand three main material types, timbers, polymers and metals. These get delivered across KS3 with one material type covered per year.</p> <p>Students that undertake this scheme of learning develop their creative, technical and practical skills. They can apply a vast knowledge base in order to design and make high-quality products. Students are proactively asked to critique and evaluate the work of others to improve their own concepts.</p>	<p><b>Year 9: Metals</b> Metal based materials – Desk tidy, Bottle Opener, Casting</p> <p><b>Origin of material:</b> Ore</p> <p><b>How to shape and form:</b> How to cut, drill, turn, mill, cast, braze and weld Metals</p> <p><b>Stock forms:</b> sheet, rod, bar and tube length, width, thickness and diameter rivets, machine screws, nuts, and bolts</p> <p><b>Commercial processes:</b> milling and casting</p> <p><b>Quality Control:</b> dimensional accuracy using a depth stop</p> <p><b>Surface Treatments:</b> dip coating, powder coating and galvanizing</p>	<p><b>Metal Types</b> Copper Aluminium</p>	<p><b>Processes</b> Extraction Furnace Forging</p>	<p><b>Categories</b> Ferrous</p>
		<p><b>Joining Methods</b> Soldering Threads</p>	<p><b>Tools</b> Scriber Hacksaw</p>	
Challenge and Support:	Worldwide learning / links to 21 <sup>st</sup> century:	Cultural capital/ Industry/ Enrichment:		
<p>Practical and theory lessons are delivered in very different teaching styles. Theory lessons are very much instruction based with specific content covered and lesson activities are similar however students’ outcomes vary depending upon understanding. This also enables students to learn independently. Practical lessons are very focused on problem solving and peer teaching enabling students to make positive relationships to overcome similar obstacles.</p>	<p>The word design means different things to different people. Often the word design is associated with the way something looks, often it is used as a noun, that’s a good design but really it is a verb. Design is a way of doing things, it is a way of thinking and above all it’s a way of thinking creatively. Design Technology in all of its forms and disciplines are fundamentally about converting ideas and raw materials into the products</p>	<p>The skills used in practical activities have direct links to jobs market and these are highlighted throughout the rotation to students. These practical skills will also develop student’s ability to problem solve and apply knowledge learnt across other faculties within Acle Academy. To further enrich our student’s links have been made with the following to further develop the learning experience of our students.</p> <p><b>Worldwide:</b></p>		

Final outcomes are only allowed to leave the workshop once complete and this ethos ensures that practical activities are challenging and ambitious. Many students have manipulated metal before however the practical outcomes achieved are very good.

All students complete the book Learn about Metalwork. This book gives a full spread of knowledge from the history of metals to manufacturing processes. The book also includes some fantastic illustrations that enable students to make links between.

To ensure that students of all abilities have full access to the learning material given examples of work are always given. Theory work is modelled by the teacher and explained before being undertaken and during practical lessons examples and detailed CAD drawings given to work from.

and services that we all use and need today. Everything around us has been designed.

<https://www.youtube.com/watch?v=4ILSEDVSAp4>

MSI Defence Systems Ltd: Norwich

JCB

**Local:**

Maverick Engineering Ltd: Acle

Milltech: Norwich

### Historical, Social, Moral, Spiritual, Cultural context:

The use of raw materials has a direct impact on the world we all live in. Students are introduced to the concept of carbon footprint and what it stands for. Although materials are used it is important students appreciate to origin of that material.

Students are introduced to a range of hand tools and machinery equipment that all come with an element of risk. Students are taught how to use this in a safe manner and to work in a way to not endanger other.

Students enjoy the independence that the practical elements that the subject brings. It enables students to have a sense of achievement when completing their final outcome.

### Cross curricular links/ literacy/numeracy:

**Gatsby Benchmark:**

<https://www.bbc.co.uk/bitesize/articles/znj9scw>

<https://www.bbc.co.uk/bitesize/articles/zrpdf4j>

<https://www.bbc.co.uk/bitesize/articles/z6gjscw>

**STEAM Ambassadors:**

Students will be awarded a STEAM ambassador badges if they have been identified for doing exceptional work either academically or practically within this Design Technology curriculum.

**Cross Curricular links:**

The department has linked all KS3 schemes of learning with

Maths: Diameter **(All Years)**

Science: Periodic table **(YEAR 7)**

Science: Metals types **(YEAR 7)**

### Common misconceptions:

Basic measuring skills need to be highlighted in practical pieces so that students can fully appreciate the purpose of using a rule correctly. Often students will still measure in inches and not start using the rule at 0.

Students are often surprised at the amount of time that it takes to make a product out of metal. This is due to students becoming acclimatised to getting whatever you need at the click of a button and this scheme of learning enables students to appreciate hand crafted items.

### Assessment timeline:

There are three formative assessments that take place throughout the Scheme of Learning. These formative tests are in the form of class quizzes and are tracked throughout on the student assessment sheet within class folders. At the end of the scheme of learning students take a test that amalgamates these tests into one large test. This data is recorded onto the front of student folders and informs teachers and students of subject knowledge retained.

Typically, tests should be taken every three weeks to ensure that regular knowledge recall is in operation. The carousel is made up of 12 weeks with single lessons lending themselves to more theory-based lessons. Both formative and summative tests are multiple choice with questions covering a variety of subject specific pedagogy. Students will be questioned during plenaries of lessons and will be asked to explain the previous lessons content at the start of the following lesson.

Students are given a target percentage to achieve for their summative tests and their success criteria would be beating this. For all practical lessons students are given WAGOLs in the form of physical outcomes or of previous student's work. To ensure students develop independent skills within a workshop setting exemplar materials are always in place to ensure students can participate successfully.

Through the use of Google Forms statistics are provided for teachers to identify specific areas of poor student knowledge retention. This information enables teachers amend teaching practice if required or enable more time to be given in its delivery.

<p><b>Assessment Area: Design</b> This test is designed to assess students' knowledge on the following areas: Metals: origin / tools / machinery Literacy spelling</p> <p style="text-align: right;"><b>Exam: 20 marks</b></p>	<p><b>Assessment Area: Make</b> This test is designed to assess students' knowledge on the following areas: Metal: periodic elements / fabrication / forces / stock forms</p> <p style="text-align: right;"><b>Exam: 20 marks</b></p>	<p><b>Assessment Area: Evaluate</b> This test is designed to assess students' knowledge on the following areas: Finite and Non-finite resources ACCESS FM terminology Metal types</p> <p style="text-align: right;"><b>Exam: 20 marks</b></p>
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**Home learning**

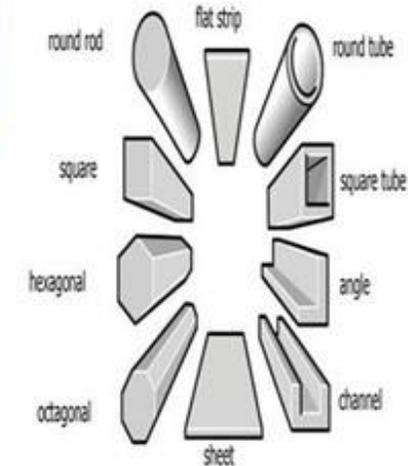
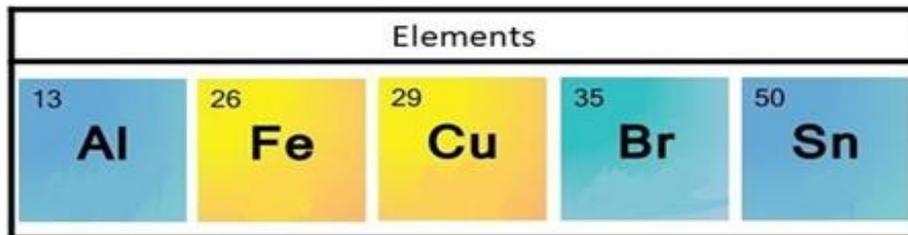
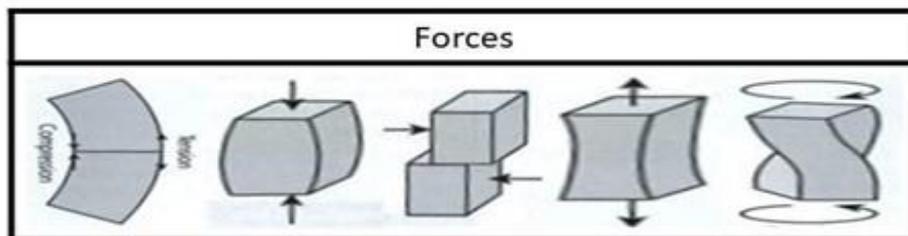
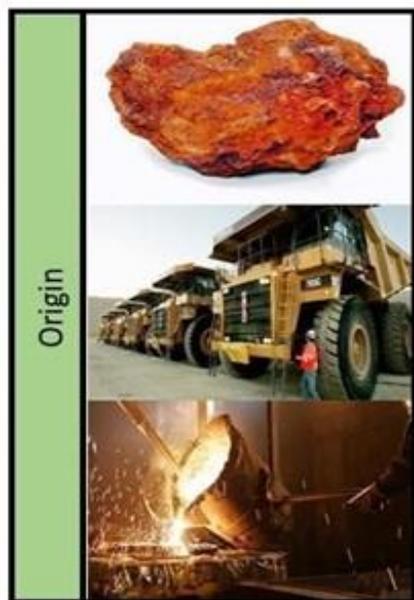
Drawing skills are an essential part of Design Technology and a student has to be able to successfully communicate their ideas at all Key Stages. A booklet has been created to ensure students develop these skills. Students will be given traffic light feedback as to whether they need to revisit a specific drawing technique again.

Literacy is an essential part of the subject and books have been assigned to all year groups. Students in year 7 read, Learn about Woodwork. Three single lessons have been allotted to read the book and cover teaching strategies that are used throughout Acle Academy. Digital copies are also available on the Google Classroom platform.

**Feedback**

Design Technology uses subject specific front sheets to inform students of their learning journeys within that rotation. These percentage scores demonstrate student attainment across theory and practical work based on: Design, Make and Evaluate. Within a practical environment verbal feedback is always present to ensure that students are focused and achieving their full potential. Demonstrations are always interactive with the teaching using student's knowledge to set the benchmark of discussion. During practical lessons WWW and EBI are used to maintain student engagement and raise aspiration.

# Metals



Threads		Furnace		Extraction		Copper		Aluminium	
Ferrous		Scriber		Hacksaw		Soldering		Forging	

