

## Design and make a Micrometer



**Pupil Name**

**Key Stage 2 Learning Points (from the National Curriculum) Specific to this project.**

### Design Technology

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| • D1 | work confidently within a range of contexts, such as the home, school, leisure, culture, enterprise, industry and the wider environment |
| • D2 | describe the purpose of their products  |
| • D3 | indicate the design features of their products that will appeal to intended users   |
| • D4 | explain how particular parts of their products work   |
| • D6 | identify the needs, wants, preferences and values of particular individuals and groups  |
| • D7 | develop a simple design specification to guide their thinking   |

### Designing - Generating, developing, modelling and communicating ideas

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| • D8  | share and clarify ideas through discussion  |
| • D9  | model their ideas using prototypes and pattern pieces   |
| • D10 | use annotated sketches, cross-sectional drawings and exploded diagrams to develop and communicate their ideas |
| • D11 | use computer-aided design to develop and communicate their ideas  |
| • D12 | generate realistic ideas, focusing on the needs of the user   |
| • D13 | make design decisions that take account of the availability of resources                                      |

### Evaluating - Own ideas and products

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| • E1 | identify the strengths and areas for development in their ideas and products   |
| • E2 | consider the views of others, including intended users, to improve their work  |
| • E3 | critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make |
| • E4 | evaluate their ideas and products against their original design specification  |

### Evaluating - Existing products

#### Pupils will be taught to investigate and analyse:

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| • E5  | how well products have been designed and made           |
| • E6  | why materials have been chosen                          |
| • E7  | what methods of construction have been used             |
| • E8  | how well products work to achieve their purposes        |
| • E9  | how well products meet user needs and wants             |
| • E10 | how much products cost to make                          |
| • E11 | how innovative products are                             |
| • E12 | how sustainable the materials in products are           |
| • E13 | what impact products have beyond their intended purpose |

### Making - Planning

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| • M1 | select tools and equipment suitable for the task  |
| • M2 | explain their choice of tools and equipment in relation to the skills and techniques they will be using |
| • M3 | select materials and components suitable for the task   |
| • M4 | explain their choice of materials and components according to functional properties                     |



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|   | and aesthetic qualities  |
| • M5  | produce appropriate lists of tools, equipment and materials that they need   |
| • M6  | formulate step-by-step plans as a guide to making  |
| <b>Making - Practical skills and techniques</b>   |  |
| • M7  | follow procedures for safety   |
| • M8  | use a wider range of materials and components than KS1, including construction materials and kits, mechanical components and electrical components |
| • M9  | accurately measure, mark out, cut and shape materials and components   |
| • M10   | accurately assemble, join and combine materials and components   |
| • M11   | accurately apply a range of finishing techniques, including those from art and design  |
| • M12   | use techniques that involve a number of steps  |
| • M13   | demonstrate resourcefulness when tackling practical problems   |
| <b>Technical knowledge - Making products work</b> |  |
| • T1  | how to use learning from science and maths to help design and make products that work  |
| • T2  | that materials have both functional properties and aesthetic qualities   |
| • T3  | that materials can be combined and mixed to create more useful characteristics   |
| • T4  | that mechanical and electrical systems have an input, process and output   |
| • T5  | the correct technical vocabulary for the projects they are undertaking   |
| • T9  | how to reinforce and strengthen a 3D framework   |

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| <b>Objectives covered from other subject areas</b> |  |
| <b>Maths</b>                                       |  |
| <b>Measurement</b>                                 | Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)   |
| <b>Science</b>                                     |  |
| <b>Working Scientifically</b>                      |  |
| • WS2  | taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate  |
| • WS5  | reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations |
| • WS9  | draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.  |
| <b>Properties and changes of materials</b>         |  |
| • PM4  | give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic   |
| <b>Art</b>   |  |
| <b>Drawing</b>                                     |  |
| • D1   | work on sustained, independent, detailed drawings.   |
| • D2   | develop close observational skills   |
| <b>Exploring ideas</b>                             | use in their work, recording and annotating in sketchbooks.  |
| • E1   | create sketch books to record their observations and use to review and revisit ideas.  |
| • E2   | record and explore ideas from first hand observations, experience and imagination  |
| • E3   | question and make thoughtful observations about starting points and select ideas for different purposes  |
| • E4   | think critically about their art and design work.  |



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| <b>Computing</b>  |  |
| <b>Control &amp; Coding</b>   |  |
|   | recognise common uses of information technology beyond school  |
|   | design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts |
|   | use sequence, selection, and repetition in programs; work with variables and various forms of input and output   |
| Evidence for meeting these strands to come from:<br>Teacher observations and questioning pupils during project.<br>Pupil design sheet.<br>Pupils Self-Assessment on evaluation sheet.<br>Peer Assessment on evaluation sheet.<br>Photographs taken during making / testing process. |  |



## Key Stage 2 Learning Points (from the National Curriculum 2014) Generic to all Imagineering Projects

### **Science: Health and Safety - Pupils should be taught to:**

- recognize that there are hazards in materials and physical processes, and assess risks and take action to reduce risks to themselves and others

### **Design and Technology: Knowledge, skills and understanding**

Working with tools, equipment, materials and components to make quality products:

#### **Pupils should be taught to:**

- select tools, techniques and materials for making their product from a range suggested by the teacher
- suggest alternative ways of making their product, if first attempts fail
- explore the sensory qualities of materials and how to use materials and processes
- measure, cut and shape a range of materials

#### **Evaluating processes and products:**

Pupils should be taught to:

- reflect on the progress of their work as they design and make, identifying ways they could improve their products
- carry out appropriate tests before making any improvements


#### **Design and Technology: Breadth of study**

**During the key stage, pupils should be taught the knowledge, skills and understanding through:**

- focused practical tasks that develop a range of techniques, skills, processes and knowledge
- design and make assignments using a range of materials, including electrical and mechanical components

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| Pupil Project Record   |                  | Date |
|--|------------------|------|
| Name   | Title of Project |      |
| <p>Before you begin your project...<br/>Draw a picture of what you think it will look like.</p> <p>Who are you making it for?</p> <p>What safety rules will you need to follow? Why?</p> |                  |      |
| <p>When you have finished your project...<br/>Draw and label a picture of your design. Use arrows to explain how it works.</p>   |                  |      |
| <p>What do you think of your finished project?<br/>What happened during testing?</p>   |                  |      |
| <p>What would you change/improve if you did it again?<br/>Could you make it more attractive?</p>   |                  |      |
| <p>What skills did you use to build it?</p>  |                  |      |
| <p>What does your partner think?</p> <p>Give it a star rating out of 5 stars </p>                     |                  |      |