Mighty Metals

Year Group: 3 and 4

Cycle B

Design and Technology • Build and program a simple robot using a robotics kit.	**Science** • Forces • Working Scientifically: Magnet investigations
Art and Design • 3D Work - Metal jewelry design and making • Artist Knowledge - Rene Lalique	**Computing** • Programming
Climate/Environment • Use of precious metals in computers and mobile phones, impact of mining for metals on the environment and need for reduction in use and recycling of electrical goods.	

Science

National Curriculum (Knowledge and Skills): Pupils should be taught to:

Year 3

- compare how things move on different surfaces
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis on whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing

Year 3 and 4 Working Scientifically

- ask relevant questions and use different types of scientific enquiries to answer them
- set up simple practical enquiries, comparative and fair tests
- make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- gather, record, classify and present data in a variety of ways to help in answering questions
- identify differences, similarities or changes related to simple scientific ideas and processes
- report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- use straightforward scientific evidence to answer questions or to support their findings
- use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

Investigation Focus:

- Investigate how magnetic forces work through different materials.

Prior Learning

Forever Firs children working at ARE should already be able to:

- ask simple questions and recognise that they can be answered in different ways
- observe closely, using simple equipment
- perform simple tests
- gather and record data to help in answering questions
- identify and classify
- use their observations and ideas to suggest answers to questions

Key Vocabulary

Tier 1		Tier 2		Tier 3	
Distance	Push	Compare	Repel	Magnetic	Comparative test
Near	Together	Surface	Material	Poles	Fair test
Far	Apart	Force	Predict	North	
Close	Group	Contact	Observation	South	
Pull	Similar	Object	Measurement		
	Different	Attract	Record		
		Data	Classify		
		Conclusion	Present		
		Diagram	Evidence		
		Results			

Science Assessment			
Children working below ARE	**Children working towards ARE**	**Children working at ARE**	**Children working above ARE**

Art and Design

National Curriculum:

Pupils should be taught to:

- create sketch books to record their observations and use them to review and revisit ideas
- improve their mastery of art and design techniques including drawing, painting and sculpture with a range of materials (for example, pencil, charcoal, paint, clay)

Pupils should be taught:

- about great artists, architects and designers in history

Curriculum Intentions (Key Knowledge and Skills to be learned):

- 3D Work - Metal jewelry design and making
- Artist Knowledge - Rene Lalique

Age Related Subject Skills (Progression Guidance):

Year 3

3D Work

- Use equipment and media with confidence.
- Begin to show an awareness of objects having a third dimension and perspective.
- Learn to secure work to continue at a later date.
- Join two parts successfully.
- Construct a simple base for extending and modelling other shapes.
- Use a sketchbook to plan, collect and develop ideas. To record media explorations and experimentations as well as try out ideas.
- Produce more intricate surface patterns/ textures and use them when appropriate.
- Produce larger ware using pinch/ slab/ coil techniques.
- Continue to explore carving as a form of 3D art.
- Use language appropriate to skill and technique

Artist Knowledge

- Continue to explore the work of a range of artists, craft makers and designers, describing the differences and similarities between different practices and disciplines, and making links to their own work
- Discuss own and others work, expressing thoughts and feelings, and using knowledge and understanding of artists and techniques.
- Respond to art from other cultures and other periods of time.

Year 4

3D Work

- Work in a safe, organised way, caring for equipment.
- Secure work to continue at a later date.
- Make a slip to join to pieces of clay.
- Decorate, coil, and produce marquettes confidently when necessary.
- Model over an armature: newspaper frame for modroc.
- Use recycled, natural and man- made materials to create sculptures.
- Adapt work as and when necessary and explain why. Gain more confidence in carving as a form of 3D art.
- Use language appropriate to skill and technique.
- Demonstrate awareness in environmental sculpture and found object art.
- Show awareness of the effect of time upon sculptures.

Artist Knowledge

- Discuss and review own and others work, expressing thoughts and feelings, and identify modifications/ changes and see how they can be developed further.
- Begin to explore a range of great artists, architects and designers in history.

Prior Learning

Forever Firs children in Year 3 working at ARE should already be able to:

3D Work

- Use equipment and media with increasing confidence.
- Use clay, modroc or other malleable material to create an imaginary or realistic form – e.g. clay pot, figure, structure etc…
- Explore carving as a form of 3D art.

Forever Firs children in Year 4 working at ARE should already be able to:

- See Progression guidance for year 3 above

Artist Knowledge

- Continue to explore the work of a range of artists, craft makers and designers, making comparisons and describing the differences and similarities and making links to their own work.
- Express thoughts and feelings about a piece of art.
- Reflect and explain the successes and challenges in a piece of art created.
- Explain how a piece of art makes them feel – link to emotions. Identify changes they might make or how their work could be developed further.

Key Vocabulary

Tier 1		Tier 2		Tier 3	
Metal Jewelry Make Same Different Similar	Join Idea Artist Thought Feeling	Design Collect Plan Develop Explore Experiment Secure	Intricate Craft maker Designer Reflect Explain Modify Adapt	Three-dimensional Man-made	

Art and Design Assessment

Children working below ARE	Children working towards ARE	Children working at ARE	Children working above ARE

Design and Technology

National Curriculum: Pupils should be taught:

- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities
- apply their understanding of computing to program, monitor and control their products

Curriculum Intentions (Key Knowledge and Skills to be learned):

- Children will learn how to build and program a simple robot using a robotics kit.

Age Related Subject Skills (Progression Guidance):

Design

- Gather information about the needs and wants of particular individuals and groups
- Develop their own design criteria and use these to inform their ideas
- Research designs
- Share and clarify ideas through discussion
- Model their ideas using prototypes and pattern pieces
- Use annotated sketches, cross-sectional drawings and diagrams
- Use computer-aided design

Make

- 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 Order the main stages of making
- Produce detailed lists of tools, equipment and materials that they need
- Follow procedures for safety
- Use a wider range of materials and components, including construction materials and kits, textiles, food ingredients, mechanical components and electrical components
- 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

Evaluate

- Identify the strengths and weaknesses of their ideas and products
- Consider the views of others, including intended users, to improve their work
- Refer back to their design criteria as they design and make
- Use their design criteria to evaluate their completed products
- Investigate - 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 and how well products meet user needs and wants
- Identify great designers and their work and use research of designers to influence work
- Identify the strengths and weaknesses of their ideas and products
- Consider the views of others, including intended users, to improve their work
- Investigate - who designed and made the products, where products were designed and made, when products were designed and made and whether products can be recycled or reused

Technical Knowledge

- Understand how to use learning from science and maths to help design and make products that work
- Know that materials have both functional properties and aesthetic qualities
- Know that materials can be combined and mixed to create more useful characteristics
- Know that mechanical and electrical systems have an

finishing techniques, include those from art and design, with some accuracy	input, process and output • Use the correct technical vocabulary for the projects they are undertaking • Understand how levers and linkages or pneumatic systems create movement • Understand how simple electrical circuits and components can be used to create functional products • Understand how to program a computer to control their products • Know how to make strong, stiff shell structures

Prior Learning
Forever Firs children working at ARE should already be able to:

Design

- State the purpose of the design and the intended user
- Explore materials, make templates and mock ups
  - e.g. moving picture / lighthouse
- Generate own ideas for design by drawing on own experiences or from reading

Make

- Select from a range of tools and equipment explaining their choices
- Select from a range of materials and components according to their characteristics
- Follow procedures for safety
- Use and make own templates
- Measure, mark out, cut out and shape materials and components
- Assemble, join and combine materials and components
- Use simple fixing materials e.g. temporary – paper clips, tape and permanent – glue, staples
- Use finishing techniques, including those from art and design

Evaluate

- 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
  Evaluating products and components used
- Investigate - what products are, who they are for, how they are made and what materials are used

Technical Knowledge

- Understand about the simple working characteristics of materials and components
- Understand about the movement of simple mechanisms including levers, sliders (Year 1) wheels and axles (Year 2)
- Understand that food ingredients should be combined according to their sensory characteristics
- Know the correct technical vocabulary for the projects they are undertaking
- Understand how freestanding structures can be made stronger, stiffer and more stable

Key Vocabulary

Tier 1		Tier 2		Tier 3	
Robot Join Move Make Up Down	Plan Forwards Backwards Left Right Turn	Materials Components Functional Aesthetic Program Monitor Control	Robotics Electrical Assemble Evaluate	Input Process Output Circuit	

Design and Technology Assessment			
Children working below ARE	**Children working towards ARE**	**Children working at ARE**	**Children working above ARE**

Computing

National Curriculum:

- Design, write and debug programs that accomplish specific goals, solve problems by decomposing them in smaller parts
- use sequence, selection and repetition in programs
- use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs

Curriculum Intentions (Key Knowledge to be learned):

- Children will learn to program a moveable robot which they will build from a construction kit (cross-curricular DT unit)

Age Related Subject Skills (DDAT Progression Guidance):

- Pupils learn to use graphical programming language, such as Scratch or Logo to draw regular 2D shapes. Pupils add loops or procedures to create a repeating pattern
- Pupils learn to sequence instructions, for instance to create an animation using Scratch, or by using the timing features in PowerPoint
- Pupils write a simple algorithm, for instance to create a basic traffic light sequence. They then use flowcharting software (such as Go or Flowgo) to create a simple program to control an onscreen icon

Age Related Subject Skills (Firs Progression Guidance):

Year 3	Year 4
Explain what an algorithm will do by reading the commands.	Can talk about what everyday/real life objects uses algorithms and discuss what the algorithms will tell them to do
Test my algorithm and recognise when to change it	Begin to break algorithms down to solve problems. I know an algorithm is a set of instructions.
Link their learning of a programmable robot to creating a set list of instructions for a on screen robot (e.g Textease turtle) Use an on screen robot to draw a path	
Navigate around Scratch (or similar) Create a repeat pattern that instructions motions by specifying the number of steps, direction and turn. Adds speech Make my sprite change colour Control what my sprite does using specified keys.	Create a list of 5 commands which involve movements and looks. Draw using pen up and down linking their knowledge of properties of shapes Use costumes Use two sprites and two algorithms Use sound Begin to use sensing to create a command Begin to use timings to control movements and speech between characters

Prior Learning

Forever Firs children working at ARE should already be able to:

- Program a basic floor turtle such as a BeeBot to navigate increasingly complex routes and are able to debug their instructions when the turtle does not reach the intended destination
- Program an onscreen app such as BeeBot or Kodable to complete a set task and are able to debug their instructions when the turtle does not reach the intended destination
- Use a more complex turtle with standard units to navigate increasingly complex routes, and are able to debug their instructions when the turtle does not reach the intended destination

Key Vocabulary

Tier 1		Tier 2		Tier 3	
Problem Fix Find Plan Left Right	Direction Forwards Backwards Up Down Turn	Error Detect Logical Reasoning	Correct Route Instructions	Debug Algorithm Program Sequence	Selection Repetition Loop Procedure

Firs
Primary
School

Computing Assessment			
Children working below ARE	**Children working towards ARE**	**Children working at ARE**	**Children working above ARE**

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