

STEAM Programme of Study

Science Technology Engineering Art and Maths links together all areas of the curriculum in a creative, exploratory fashion.

Creativity is Intelligence having fun -Albert Einstein.

Each project has a project plan with details of the project and the resources needed complete with its own PoS.

The STEAM Menu document shows all the projects developed to date with an overview and difficulty of delivery assessed.

The PoS needs to be read in conjunction with the Medium and Long term plans at the centre where STEAM is being delivered to see which projects are included.

STEAM – Programme of Study for Amplifier and Speaker Project				
KS3				
Science	Art and Design	Maths	English	DT
<p>electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</p> <p>potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</p> <p>differences in resistance between conducting and insulating components (quantitative).</p> <p>To know that sound is measured in hertz (Hz); has different frequencies</p> <p>To know that electric current is measured in amperes</p> <p>To know about potential difference and that it is measured in volts and what this means for batteries and bulbs</p>	<p>increase proficiency in the handling of different materials</p> <p>analyse and evaluate their own work</p>	<p>make and test conjectures about patterns and relationships</p> <p>understand and use place value for decimals, measures and integers of any size</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives</p> <p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
KS4				KS3 contd

<p>drawing circuit diagrams; exploring equivalent resistance for resistors in series</p> <p>describe the difference between series and parallel circuits; explain why, if two resistors are in series, the net resistance is increased, whereas with two in parallel the net resistance is decreased (qualitative explanation only).</p> <p>Recall that current is a rate of flow of charge, that for a charge to flow a source of potential difference and a closed circuit are needed and that a current has the same value at any point in a single closed loop.</p> <p>Explain that in other types of resistor the value of R can change as the current changes; explain the design and use of circuits to explore such effects – including lamps, diodes, thermistors and light-dependent resistors (LDRs).</p>	<p>demonstrate the ability to work creatively with processes and techniques appropriate to the chosen area study such as: computer-aided design, model-making; prototyping; constructing; assembling.</p>	<p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Know how more advanced electrical and electronic systems can be powered and used in their products</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p> <p>Know how more advanced electrical and electronic systems can be powered and used in their products</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p> <p>Use learning from science to help design and make products that work</p> <p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p> <p>Use learning from science to help design and make products that work</p>
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				<p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p>
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STEAM – Programme of Study for Build your own AM radio Project				
KS3				
Science	Art and Design	Maths	English	DT
<p>To know that electric current is measured in amperes</p> <p>To know about potential difference and that it is measured in volts and what this means for batteries and bulbs</p>	<p>increase proficiency in the handling of different materials</p> <p>analyse and evaluate their own work</p>	<p>Understand and use place value for decimals, measures and integers of any size</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives</p> <p>Follow procedures for safety and hygiene and understand the process of risk assessment</p>
KS4				KS3 cont
<p>Describe wave motion in terms of amplitude, wavelength, frequency, and period; define wavelength and frequency and describe and apply the relationship between these and the wave velocity.</p> <p>Recall that electromagnetic waves are transverse, are transmitted through space where all have the same velocity, and explain, with examples, that they transfer energy from source to absorber.</p> <p>Recall that light is an electromagnetic wave.</p> <p>Describe the main groupings of the spectrum – radio, microwave, infrared, visible (red to violet),</p>		<p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>

ultraviolet, X-rays and gamma rays, that these range from long to short wavelengths and from low to high frequencies, and that our eyes can only detect a limited range.

Give examples of some practical uses of electromagnetic waves in the radio, microwave, infrared, visible, ultraviolet, Xray and gamma ray regions.

Recall that current is a rate of flow of charge, that for a charge to flow a source of potential difference and a closed circuit are needed and that a current has the same value at any point in a single closed loop.

Explain that in other types of resistor the value of R can change as the current changes; explain the design and use of circuits to explore such effects – including lamps, diodes, thermistors and light-dependent resistors (LDRs).

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STEAM – Programme of Study for Chain Reaction Project				
KS3				
Science	Art and Design	Maths	English	Other
<p>All manner of science can be incorporated into this project. Particularly suited to Chemistry and Physics.</p>	<p>Students use a range of techniques to record their observations in sketchbooks or folders and other media as a basis for exploring their ideas</p> <p>Students use a range of techniques and media, including painting</p> <p>Students increase their proficiency in the handling of different materials</p> <p>Students learn about the history of art, craft, design and architecture, including periods, styles and major movements from ancient times up to the present day.</p>	<p>Timings Measurement Angles Mass Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm) mass(kg/g), Capacity,(litres/ml) to the nearest appropriate units</p> <p>change freely between related standard units [for example time, length, area, volume/capacity, mass]</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>DT Develop detailed design specifications to guide their thinking</p> <p>Use research including the study of different cultures, to identify and understand user needs</p> <p>Identify and solve their own design problems</p> <p>Use a variety of approaches to generate creative ideas and avoid stereotypical responses</p> <p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to</p>

				<p>manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
KS4				KS3 contd
<p>All manner of science can be incorporated into this project. Particularly suited to Chemistry and Physics.</p>	<p>Understanding of sources that inform their creative intentions</p> <p>Understanding of visual concepts Students must know and understand how sources inspire the development of ideas</p> <p>Gain knowledge of the work and approaches of artists, craftspeople from contemporary and/or historical contexts, periods, societies and cultures</p> <p>Understand the influence on art of contemporary and/or historical environments, situations or issues Understand different purposes, intentions and functions of art, craft and design in a variety of contexts</p>	<p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Use learning from science to help design and make products that work</p> <p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p>
	<p>Develop ideas through investigations informed by selecting and critically analysing sources</p> <p>Demonstrate and ability to apply an understanding of relevant practices</p>			

	<p>in the creative and cultural industries to their work</p> <p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>			
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STEAM – Programme of Study for Hacking Musical Keyboard Project				
KS3				
Science	Art and Design	Maths	English	DT
<p>electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</p> <p>potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</p> <p>differences in resistance between conducting and insulating components (quantitative).</p> <p>To know about potential difference and that it is measured in volts and what this means for batteries and bulbs</p>	<p>produce creative work, exploring their ideas and recording their experiences</p> <p>increase proficiency in the handling of different materials</p> <p>analyse and evaluate their own work</p> <p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>	<p>Understand and use place value for decimals, measures and integers of any size</p> <p>make and test conjectures about patterns and relationships</p> <p>Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm) mass(kg/g), Capacity,(litres/ml) to the nearest appropriate units</p> <p>Round numbers and measures to an appropriate degree of accuracy</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Develop detailed design specifications to guide their thinking</p> <p>Identify and solve their own design problems</p> <p>Use a variety of approaches to generate creative ideas and avoid stereotypical responses</p> <p>Select appropriately from specialist tools, techniques, processes, equipment and machinery</p> <p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p> <p>Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives</p>
KS4				KS3 contd

<p>Recall that current is a rate of flow of charge, that for a charge to flow a source of potential difference and a closed circuit are needed and that a current has the same value at any point in a single closed loop.</p>		<p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
				<p>Products through disassembly to determine how they are constructed and function</p> <p>The positive and negative impact that products can have in the wider world</p> <p>Know how more advanced electrical and electronic</p>

				<p>systems can be powered and used in their products</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p> <p>Know how more advanced electrical and electronic systems can be powered and used in their products</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p> <p>Use learning from science to help design and make products that work</p> <p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p>
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STEAM – Programme of Study for Hydrophone Crabbing Project				
KS3				
Science	Art and Design	Maths	English	DT
<p>To know that sound is measured in hertz (Hz); has different frequencies</p> <p>To know that sound needs a medium to travel and about the speed of sound in air, in water and in solids</p> <p>To know that sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum</p> <p>To know that sound waves are longitudinal</p>	<p>produce creative work, exploring their ideas and recording their experiences</p> <p>increase proficiency in the handling of different materials</p> <p>analyse and evaluate their own work</p> <p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>	<p>Understand and use place value for decimals, measures and integers of any size</p> <p>Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm) mass(kg/g), Capacity,(litres/ml) to the nearest appropriate units</p> <p>Round numbers and measures to an appropriate degree of accuracy</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Develop detailed design specifications to guide their thinking</p> <p>Identify and solve their own design problems</p> <p>Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives</p> <p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those</p>

				from art and design, to a broad range of materials including textiles, metals, polymers and woods
KS4				KS3 contd
<p>Describe the difference between transverse and longitudinal waves.</p> <p>Describe how ripples on water surfaces are examples of transverse waves whilst sound waves in air are longitudinal waves, and how the speed of each may be measured.</p> <p>Describe evidence that in both cases it is the wave and not the water or air itself that travels.</p>		G14 Use standard units of measure and related concepts	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Use learning from science to help design and make products that work</p> <p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p>

STEAM – Programme of Study for LED Light Box for Sensory Room Project				
KS3				
Science	Art and Design	Maths	English	DT
<p>To understand colour and the different frequencies of light, white light and prisms (qualitative only)</p> <p>To know that electric current is measured in amperes</p> <p>To know about potential difference and that it is measured in volts and what this means for batteries and bulbs</p>	<p>produce creative work, exploring their ideas and recording their experiences</p> <p>increase proficiency in the handling of different materials</p> <p>analyse and evaluate their own work</p> <p>Students analyse and evaluate their own work, and that of others, in order to strengthen the visual impact or applications of their work</p> <p>Students learn about the history of art, craft, design and architecture, including periods, styles and major movements from ancient times up to the present day.</p>	<p>Understand and use place value for decimals, measures and integers of any size</p> <p>Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm) mass(kg/g), Capacity,(litres/ml) to the nearest appropriate units</p> <p>Round numbers and measures to an appropriate degree of accuracy</p> <p>change freely between related standard units [for example time, length, area, volume/capacity, mass]</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Develop detailed design specifications to guide their thinking</p> <p>Use research including the study of different cultures, to identify and understand user needs</p> <p>Identify and solve their own design problems</p> <p>Use a variety of approaches to generate creative ideas and avoid stereotypical responses</p> <p>Select appropriately from specialist tools, techniques, processes, equipment and machinery</p> <p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p> <p>Use a broad range of material joining techniques including stitching,</p>

				mechanical fastenings, heat processes and adhesives
KS4				KS3 contd
<p>Recall that electromagnetic waves are transverse, are transmitted through space where all have the same velocity, and explain, with examples, that they transfer energy from source to absorber.</p> <p>Recall that light is an electromagnetic wave.</p> <p>Describe the main groupings of the spectrum – radio, microwave, infrared, visible (red to violet), ultraviolet, X-rays and gamma rays, that these range from long to short wavelengths and from low to high frequencies, and that our eyes can only detect a limited range.</p> <p>Give examples of some practical uses of electromagnetic waves in the radio, microwave, infrared, visible, ultraviolet, Xray and gamma ray regions.</p>	<p>Understanding of sources that inform their creative intentions</p> <p>Understanding of visual concepts Students must know and understand how sources inspire the development of ideas</p> <p>Gain knowledge of the work and approaches of artists, craftspeople from contemporary and/or historical contexts, periods, societies and cultures</p> <p>Understand the influence on art of contemporary and/or historical environments, situations or issues Understand different purposes, intentions and functions of art, craft and design in a variety of contexts</p>	<p>N13 use standard units of mass, length, time, money and other measures</p> <p>N14 estimate answers; check calculations using approximation and estimation</p> <p>N15 round numbers and measures to an appropriate degree of accuracy</p> <p>R2 Use scale factors, scale diagrams and maps</p> <p>R4 Use ratio notation, including reduction to simplest form</p> <p>R5 Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems</p> <p>R7 Understand and use proportion as equality of ratios</p> <p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
<p>Recall that current is a rate of flow of charge, that for a charge to flow a source of potential difference and a closed circuit are</p>	<p>Develop ideas through investigations informed by selecting and critically analysing sources</p>			<p>Investigate and analyse new and emerging technologies</p>

<p>needed and that a current has the same value at any point in a single closed loop.</p>	<p>Demonstrate and ability to apply an understanding of relevant practices in the creative and cultural industries to their work</p> <p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>			<p>Know about the physical properties of materials e.g. grain, brittleness, flexibility, elasticity, malleability and thermal</p> <p>Know how more advanced electrical and electronic systems can be powered and used in their products</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p> <p>Use learning from science to help design and make products that work</p> <p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p>
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STEAM – Programme of Study for Matchstick Rockets Project				
KS3				
Science	Art and Design	Maths	English	Other
<p>To know about combustion, thermal decomposition, oxidation and displacement reactions</p> <p>To understand energy changes on changes of state (qualitative)</p> <p>To know about exothermic and endothermic chemical reactions (qualitative)</p> <p>To know other processes that involve energy transfer; changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels</p> <p>To understand forces as pushes and pulls, arising from the interaction between two objects</p>	<p>Students increase their proficiency in the handling of different materials</p>		<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	
KS4				
<p>Describe all the changes involved in the way energy is stored when a system changes for common situations: a moving object hitting</p>		<p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain</p>	

an obstacle, or an object being accelerated by a constant force.			clearly their understanding and ideas listen and respond appropriately in all contexts above	
Distinguish between endothermic and exothermic reactions				

STEAM – Programme of Study for Micro:bit Project				
KS3				
Science	Art and Design	Maths	English	DT & Other
	Students analyse and evaluate their own work, and that of others, in order to strengthen the visual impact or applications of their work	Various	using Standard English confidently in a range of formal and informal contexts, including classroom discussion	Investigate and analyse new and emerging technologies Know how more advanced electrical and electronic systems can be powered and used in their products Know how to use simple electronic circuits incorporating inputs and outputs Computer Science Introduction to coding
KS4				
			participate in debate use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas listen and respond appropriately in all contexts above	

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STEAM – Programme of Study for Musical Instruments from Junk Project				
KS3				
Science	Art and Design	Maths	English	DT
	<p>Students use a range of techniques and media, including painting</p> <p>Students increase their proficiency in the handling of different materials</p>	<p>Understand and use place value for decimals, measures and integers of any size</p> <p>Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm) mass(kg/g), Capacity,(litres/ml) to the nearest appropriate units</p> <p>Round numbers and measures to an appropriate degree of accuracy</p> <p>change freely between related standard units [for example time, length, area, volume/capacity, mass]</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Develop detailed design specifications to guide their thinking</p> <p>Use research including the study of different cultures, to identify and understand user needs</p> <p>Identify and solve their own design problems</p> <p>Use a variety of approaches to generate creative ideas and avoid stereotypical responses</p> <p>Select appropriately from specialist tools, techniques, processes, equipment and machinery</p> <p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p> <p>Use a broad range of material joining techniques including stitching,</p>

				mechanical fastenings, heat processes and adhesives
KS4				KS£ contd
	<p>Practical experience of working in 2D/3D in a range of media and materials including digital media</p> <p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>	<p>N13 use standard units of mass, length, time, money and other measures</p> <p>N14 estimate answers; check calculations using approximation and estimation</p> <p>N15 round numbers and measures to an appropriate degree of accuracy</p> <p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
				Products through disassembly to determine how they are constructed and function

				<p>The positive and negative impact that products can have in the wider world</p> <p>Know about the physical properties of materials e.g. grain, brittleness, flexibility, elasticity, malleability and thermal</p> <p>Use learning from science to help design and make products that work</p> <p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p>
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STEAM – Programme of Study for Nature Film Project				
KS3				
Science	Art and Design	Maths	English	Other
	<p>Students use a range of techniques to record their observations in sketchbooks or folders and other media as a basis for exploring their ideas</p> <p>Students analyse and evaluate their own work, and that of others, in order to strengthen the visual impact or applications of their work</p>		<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	
KS4				
	<p>Understanding of sources that inform their creative intentions</p> <p>Understanding of visual concepts Students must know and understand how sources inspire the development of ideas</p> <p>Gain knowledge of the work and approaches of artists, craftspeople from contemporary and/or historical contexts, periods, societies and cultures</p> <p>Understand the influence on art of contemporary and/or historical environments, situations or issues</p>		<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	

	Understand different purposes, intentions and functions of art, craft and design in a variety of contexts			
	Demonstrate and ability to apply an understanding of relevant practices in the creative and cultural industries to their work Refine ideas as work progresses through experimenting with media, materials, techniques and processes			

STEAM – Programme of Study for Build a Naturewatch Camera Project				
KS3				
Science	Art and Design	Maths	English	DT
	Students increase their proficiency in the handling of different materials		using Standard English confidently in a range of formal and informal contexts, including classroom discussion	<p>Develop detailed design specifications to guide their thinking</p> <p>Use research including the study of different cultures, to identify and understand user needs</p> <p>Identify and solve their own design problems</p> <p>Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives</p>
KS4				KS3 contd.
	Practical experience of working in 2D/3D in a range of media and materials including digital media	G14 Use standard units of measure and related concepts	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p>

				<p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
	<p>Demonstrate and ability to apply an understanding of relevant practices in the creative and cultural industries to their work</p> <p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>			<p>Investigate and analyse new and emerging technologies</p> <p>Know how more advanced electrical and electronic systems can be powered and used in their products</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p> <p>Use learning from science to help design and make products that work</p> <p>Use learning from mathematics to help design and make products that work</p>

				Understand the properties of materials, including smart materials, and how they can be used to advantage
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STEAM – Programme of Study for Persistence of Vision LED Lights - Bike Wheel				
KS3				
Science	Art and Design	Maths	English	DT
<p>To understand colour and the different frequencies of light, white light and prisms (qualitative only)</p> <p>To know that electric current is measured in amperes</p> <p>To know about potential difference and that it is measured in volts and what this means for batteries and bulbs</p>	<p>Students use a range of techniques and media, including painting</p> <p>Students increase their proficiency in the handling of different materials</p> <p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>		<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Develop detailed design specifications to guide their thinking</p> <p>Use research including the study of different cultures, to identify and understand user needs</p> <p>Identify and solve their own design problems</p> <p>Use a variety of approaches to generate creative ideas and avoid stereotypical responses</p> <p>Select appropriately from specialist tools, techniques, processes, equipment and machinery</p> <p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p> <p>Use a broad range of material joining techniques including stitching,</p>

				mechanical fastenings, heat processes and adhesives
KS4				KS3 contd.
		<p>N13 use standard units of mass, length, time, money and other measures</p> <p>N14 estimate answers; check calculations using approximation and estimation</p> <p>G14 Use standard units of measure and related concepts</p> <p>Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm)</p> <p>mass(kg/g), Capacity,(litres/ml) to the nearest appropriate units</p> <p>change freely between related standard units [for example time, length, area, volume/capacity, mass]</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
				<p>Investigate and analyse new and emerging technologies</p> <ul style="list-style-type: none"> • Know about the physical properties of materials e.g. grain,

				<p>brittleness, flexibility, elasticity, malleability and thermal</p> <p>Know how more advanced electrical and electronic systems can be powered and used in their products</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p>
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STEAM – Programme of Study for Potabolic Parabolic Microphone Project				
KS3				
Science	Art and Design	Maths	English	DT
<p>reflection and absorption of sound</p> <p>sound needs a medium to travel, the speed of sound in air, in water, in solids</p> <p>sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</p> <p>To know that sound is measured in hertz (Hz); has different frequencies</p> <p>To know that sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum</p> <p>To know about the auditory range of humans and animals</p> <p>To know about pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone</p>	<p>to increase their proficiency in the handling of different materials</p>	<p>extend and formalise their knowledge of ratio and proportion in working with measures and geometry,</p> <p>Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm) mass(kg/g), Capacity,(litres/ml) to the nearest appropriate units</p> <p>Understand the relationships between decimals fractions and percentages</p> <p>Round numbers and measures to an appropriate degree of accuracy</p> <p>change freely between related standard units [for example time, length, area, volume/capacity, mass]</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Develop detailed design specifications to guide their thinking</p> <p>Use research including the study of different cultures, to identify and understand user needs</p> <p>Identify and solve their own design problems</p> <p>Select appropriately from specialist tools, techniques, processes, equipment and machinery</p> <p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p> <p>Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives</p>

KS4				KS3 contd
Sound Longitudinal waves	R&D for new idea.	Circles Division Measurement Parabolas	participate in debate use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas listen and respond appropriately in all contexts above	Follow procedures for safety and hygiene and understand the process of risk assessment Use a wider, more complex range of materials, components and ingredients, taking into account their properties Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods
Describe the difference between transverse and longitudinal waves. Describe how ripples on water surfaces are examples of	Practical experience of working in 2D/3D in a range of media and materials including digital media Demonstrate and ability to apply an understanding of relevant practices in the creative and cultural industries to their work	N13 use standard units of mass, length, time, money and other measures N14 estimate answers; check calculations using approximation and estimation		Investigate and analyse new and emerging technologies Know about the physical properties of materials e.g. grain, brittleness, flexibility,

<p>transverse waves whilst sound waves in air are longitudinal waves, and how the speed of each may be measured.</p> <p>Describe evidence that in both cases it is the wave and not the water or air itself that travels.</p>	<p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>	<p>N15 round numbers and measures to an appropriate degree of accuracy G2 Use the standard ruler and compass constructions; G9 Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G17 Know the formulae: circumference of a circle ,</p>		<p>elasticity, malleability and thermal</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p> <p>Know about textile fibre sources e.g. natural and synthetic and fabrics e.g. plain and woven</p> <p>Use learning from science to help design and make products that work</p> <p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p>
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STEAM – Programme of Study for Slime Making Project				
KS3				
Science	Art and Design	Maths	English	Other
To be added	Students increase their proficiency in the handling of different materials		using Standard English confidently in a range of formal and informal contexts, including classroom discussion	
KS4				
To be added	Refine ideas as work progresses through experimenting with media, materials, techniques and processes		use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas listen and respond appropriately in all contexts above	

STEAM – Programme of Study for Spaghetti & Marshmallow Challenge				
KS3				
Science	Art and Design	Maths	English	Other
	Students analyse and evaluate their own work, and that of others, in order to strengthen the visual impact or applications of their work		using Standard English confidently in a range of formal and informal contexts, including classroom discussion	
KS4				
		G14 Use standard units of measure and related concepts	participate in debate use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas listen and respond appropriately in all contexts above	

STEAM – Programme of Study for Upcycling Project				
KS3				
Science	Art and Design	Maths	English	Other
	<p>Students use a range of techniques and media, including painting</p> <p>Students increase their proficiency in the handling of different materials</p>	<p>To understand the value of money including decimals</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>DT</p> <p>Develop detailed design specifications to guide their thinking</p> <p>Use research including the study of different cultures, to identify and understand user needs</p> <p>Identify and solve their own design problems</p> <p>Use a variety of approaches to generate creative ideas and avoid stereotypical responses</p> <p>Select appropriately from specialist tools, techniques, processes, equipment and machinery</p> <p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p>

				<p>Develop detailed design specifications to guide their thinking</p> <p>Use research including the study of different cultures, to identify and understand user needs</p> <p>Identify and solve their own design problems</p> <p>Select appropriately from specialist tools, techniques, processes, equipment and machinery</p> <p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p> <p>Investigate and develop skills in modifying the appearance of materials including textiles and other manufactured materials e.g. dyeing and applique</p>
KS4				KS3 contd
	Practical experience of working in 2D/3D in a range of media and materials including digital media	G14 Use standard units of measure and related concepts	participate in debate	Follow procedures for safety and hygiene and understand

	<p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>		<p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
				<p>Products through disassembly to determine how they are constructed and function</p> <p>The positive and negative impact that products can have in the wider world</p> <p>Know about the physical properties of materials e.g. grain, brittleness, flexibility, elasticity, malleability and thermal</p>

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STEAM – Programme of Study for Vinyl Clocks Project				
KS3				
Science	Art and Design	Maths	English	DT
	<p>Students use a range of techniques and media, including painting</p> <p>Students increase their proficiency in the handling of different materials</p>		<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Develop detailed design specifications to guide their thinking</p> <p>Identify and solve their own design problems</p> <p>Investigate and develop skills in modifying the appearance of materials including textiles and other manufactured materials e.g. dying and applique</p>
KS4				
	<p>Practical experience of working in 2D/3D in a range of media and materials including digital media</p>		<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	
	<p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>			

STEAM – Programme of Study for Whisper Challenge Project				
KS3				
Science	Art and Design	Maths	English	Other
<p>To know that sound needs a medium to travel and about the speed of sound in air, in water and in solids</p> <p>To know that sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum</p> <p>To know that sound waves are longitudinal</p> <p>To know about pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone</p>			<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	
KS4				
		<p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p>	

			listen and respond appropriately in all contexts above	

STEAM – Programme of Study for Wind-proof Microphone Project				
KS3				
Science	Art and Design	Maths	English	DT
<p>reflection and absorption of sound</p> <p>sound needs a medium to travel, the speed of sound in air, in water, in solids</p> <p>sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal</p> <p>To know that sound is measured in hertz (Hz); has different frequencies</p> <p>To know that sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum</p> <p>To know about the auditory range of humans and animals</p> <p>To know about pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone</p>	<p>to increase their proficiency in the handling of different materials</p>	<p>extend and formalise their knowledge of ratio and proportion in working with measures and geometry,</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Develop detailed design specifications to guide their thinking</p> <p>Identify and solve their own design problems</p> <p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p> <p>Investigate and analyse new and emerging technologies</p> <p>Know how to use simple electronic circuits incorporating inputs and outputs</p> <p>Know about textile fibre sources e.g. natural and synthetic and fabrics e.g. plain and woven</p> <p>Use learning from science to help design and make products that work</p>

				<p>Use learning from mathematics to help design and make products that work</p> <p>Understand the properties of materials, including smart materials, and how they can be used to advantage</p>
KS4				
<p>Describe the difference between transverse and longitudinal waves.</p> <p>Describe how ripples on water surfaces are examples of transverse waves whilst sound waves in air are longitudinal waves, and how the speed of each may be measured.</p> <p>Describe evidence that in both cases it is the wave and not the water or air itself that travels.</p>	<p>Practical experience of working in 2D/3D in a range of media and materials including digital media</p> <p>Demonstrate and ability to apply an understanding of relevant practices in the creative and cultural industries to their work</p> <p>Refine ideas as work progresses through experimenting with media, materials, techniques and processes</p>	<p>G14 Use standard units of measure and related concepts</p>	<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	

STEAM – Programme of Study for Xmas Tree LED Circuit Project				
KS3				
Science	Art and Design	Maths	English	DT
<p>electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge</p> <p>potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current</p> <p>differences in resistance between conducting and insulating components (quantitative).</p> <p>To know about potential difference and that it is measured in volts and what this means for batteries and bulbs</p>	<p>increase proficiency in the handling of different materials</p> <p>analyse and evaluate their own work</p>	<p>make and test conjectures about patterns and relationships</p> <p>understand and use place value for decimals, measures and integers of any size</p> <p>Understand and use place value for decimals, measures and integers of any size</p>	<p>using Standard English confidently in a range of formal and informal contexts, including classroom discussion</p>	<p>Select appropriately from a wider, more complex range of materials, components and ingredients, taking into account their properties such as water resistance and stiffness</p> <p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>

KS4				KS3 contd
<p>Recall that current is a rate of flow of charge, that for a charge to flow a source of potential difference and a closed circuit are needed and that a current has the same value at any point in a single closed loop.</p> <p>Explain that in other types of resistor the value of R can change as the current changes; explain the design and use of circuits to explore such effects – including lamps, diodes, thermistors and light-dependent resistors (LDRs).</p>			<p>participate in debate</p> <p>use discussion in order to learn; they should be able to elaborate and explain clearly their understanding and ideas</p> <p>listen and respond appropriately in all contexts above</p>	<p>Follow procedures for safety and hygiene and understand the process of risk assessment</p> <p>Use a wider, more complex range of materials, components and ingredients, taking into account their properties</p> <p>Use a broad range of manufacturing techniques including handcraft skills and machinery to manufacture products precisely</p> <p>Apply a range of finishing techniques, including those from art and design, to a broad range of materials including textiles, metals, polymers and woods</p>
				<p>Investigate and analyse new and emerging technologies</p> <p>Know how more advanced electrical and electronic systems can be powered and used in their products</p> <p>Know how to use simple electronic circuits</p>

				incorporating inputs and outputs
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