Subject: DT	Assessment Y 5/6	Design Technology

YEAR 5 UNIT –: Monitoring Devices

KS2 Programmes of Study

Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts [for example, the home, school, leisure, culture, enterprise, industry and the wider environment].

When designing and making, pupils should be taught to:

Design

♣ use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups

♣ generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design

Make

♣ select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]

♣ 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

Evaluate

♣ investigate and analyse a range of existing products

♣ evaluate their ideas and products against their own design criteria and consider the views of others to improve their work

♣ understand how key events and individuals in design and technology have helped shape the world

Technical knowledge

♣ apply their understanding of how to strengthen, stiffen and reinforce more complex structures

♣ understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]

♣ understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]

♣ apply their understanding of computing to program, monitor and control their products.

Additional guidance

Purpose of study

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. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation.

Aims

The national curriculum for art and design aims to ensure that all pupils:

♣ produce creative work, exploring their ideas and recording their experiences

♣ become proficient in drawing, painting, sculpture and other art, craft and design techniques

♣ evaluate and analyse creative works using the language of art, craft and design

♣ know about great artists, craft makers and designers, and understand the historical and cultural development of their art forms.

Attainment targets

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

Cooking and nutrition

As part of their work with food, pupils should be taught how to cook and apply the principles of nutrition and healthy eating. Instilling a love of cooking in pupils will also open a door to one of the great expressions of human creativity. Learning how to cook is a crucial life skill that enables pupils to feed themselves and others affordably and well, now and in later life**.**

♣ understand and apply the principles of a healthy and varied diet

♣ prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques

♣ understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.

Knowledge, skills and concepts

In this unit, the children will:

- Researching (books, internet) for a particular (user's) animal's needs.
- Developing design criteria based on research.
- Generating multiple housing ideas using building bricks.
- Understanding what a virtual model is and the pros and cons of traditional and CAD modelling.
- Placing and manoeuvring 3D objects, using CAD.
- Changing the properties of, or combining one or more 3D objects, using CAD.
- Understanding the functional and aesthetic properties of plastics.
- Programming to monitor the ambient temperature and coding an (audible or
- visual) alert when the temperature rises above or falls below a specified range.
- Stating an event or fact from the last 100 years of plastic history.
- Explaining how plastic is affecting planet Earth and suggesting ways to make more sustainable choices.
- Explaining key functions in my program (audible alert, visuals).
- Explaining how my product would be useful for an animal carer including programmed features.
- To know that a 'device' means equipment created for a certain purpose or job and that monitoring devices observe and record.
- To know that a sensor is a tool or device that is designed to monitor, detect and respond to changes for a purpose.
- To understand that conditional statements (and, or, if booleans) in programming are a set of rules which are followed if certain conditions are met
- To understand key developments in thermometer history.
- To know events or facts that took place over the last 100 years in the history of plastic, and how this is changing our outlook on the future.
- To know the 6Rs of sustainability.
- To understand what a virtual model is and the pros and cons of traditional vs CAD modelling.

Key Questions

- What is a list of design criteria? (A set of rules to help designers focus their ideas and test the success of them)
- How will our research help the development of our animal monitor? (We will be able to inform our list of design criteria to the needs of a specific animal)
- Why are monitoring devices essential? (They allow us to see facts about ourselves, others or objects that we couldn't otherwise know without them)
- What is a list of design criteria? (A set of rules to help designers focus their ideas and test the success of them)
- What must our program do to be successful? (Monitor the ambient temperature and respond with an alert when the temperature rises above or falls below the specified optimal temperature range)
- Why was our animal research important in the last lesson (*'Lesson 1: Monitoring device'*)? (To inform our design criteria and adapt the program to fulfil our chosen animal's needs)
- What does our program do that an animal cannot? (Inform the owner when it is too hot or cold to feel comfortable or remain healthy)
- In what ways does it support an animal owner/carer? (Allows them to manage the temperature of the room according to the animal's needs)
- Name and explain a '_____' Block (Provide an example of a particular input, logic, basic or music block)
- Explain what a program comment is and why it is useful (To label and explain key functions within your program)
- Does the program operate as it should?
- Does the program fulfil points two and three of your design brief?
- Did you find any bugs (errors) in the code and how did you fix (debug) them?
- Have you amended or added any additional code to your program? If so, why? How does it function?
- Why did we use building bricks? (Building bricks can be pulled apart and rebuilt without the need for glue (or other adhesives) and we are reusing/repurposing a plastic item)
- What did you discover as you invented different designs?
- What sustainable methods could we use to improve the plastic pollution problem? (The 'six Rs' of sustainability)
- Can you describe your design?
- What does your design represent?
- Did you use any other tools, additional to the ones you were shown?

	• Does your 3D virtual model fulfil the design requirements? • How could you improve the 3D virtual model? • What advice would you give to someone who is new to Tinkercad? • Which tools did you find easy or difficult and why? • How could CAD (computer-aided design) be used in school (or another setting/scenario)? • What can you achieve with CAD, that you cannot with physical models
Key Vocabulary Alert ● Ambient ● Boolean ● Consumables ● Decompose ● Development ● Device ● Duplicate ● Durable ● Electronic ● Inventor ● Lightweight ● Man-made ● Manipulate ● Manoeuvre ● Microplastics ● Model ● Monitor ● Monitoring device ● Moulded ● Plastic ● Plastic pollution ● Programming comment ● Programming loop ● Reformed ● Replica ● Research ● Sensor ● Strong ● Sustainability ● Synthetic ● Thermometer ● Thermoscope ● Value ● Variable ● Versatile ● Water-resistant ● Work plane	
Cultural Capital **Opportunities** Task and Quiz	

Key Assessment Opportunity

Assessment Task plus end of unit Quiz **Pupils working towards** Put the keywords from slide 2 into context by writing a few examples sentences on the board, indicating where a familiar word could be replaced, for example, to observe/watch (monitor) the birds during the cold winter months. Provide with the Activity: Animal selector to complete the Activity: Animal research. Can be provided with a copy of the Activity: Micro: bit program (V1) or (V2) or use slides 6-7 as a visual aid. Should have support with verbal prompts. Leave the	**Working towards expectations Y5** **Progression Framework statement**: • Naming some common monitoring devices and understanding that they have developed over time. Completing given design criteria by using given data. • Writing a program that monitors the ambient temperature with the help of a visual aid and support of an adult. The program should give the carer an alert when the temperature moves out of a specified range. Identifying when there are errors in the code and suggesting ways that they could be fixed. • Understanding that plastic is affecting the environment and naming some different ways we can reduce plastic consumption. Building a variety of brick models to invent Micro: bit case, housing and stand ideas, that do	**NOTES on children**

Pupil video: Programming an animal monitor video playing in the background as they work. Should work in pairs or small groups to produce one or two models. Prompt the children with verbal ideas and suggestions of your own but not to full-completion. **Pupils working at greater depth** Challenge them to include drawings of the animal enclosures and label areas where a device could be attached or placed. Complete the extension task: Activity: Extension: Project cover to include images and/or drawings associated with their chosen animal or a collection of monitoring devices. Pause at points through the Micro: bit programming and see if the pupils can suggest what code comes next. Challenge them to add further comments to explain more functions in the program itself Can undertake independent work. Should generate multiple model solutions, explaining how it could be improved with each version and why it was necessary. Could complete the Activity: Extension: Plastic problem.	not obstruct the LED display or buttons. Discussing their design and expressing their opinions about it. • Understanding the difference between virtual modelling and physical modelling. Placing and manoeuvring 3D objects to place individual objects on Tinker cad back together again. **Working at Expectations Y5** **Progression Framework statement:** • Describing what is meant by monitoring devices and providing an example. Explaining briefly the development of thermometers from thermoscopes to digital thermometers. Researching a chosen animal's key information to develop a list of design criteria. • Writing a program that monitors the ambient temperature and alerts someone with a visual and/or audible alert when the temperature drops below or rises above a specified range. Suggesting where there are errors (bugs) in the code and ways to fix(debug) them by comparing their program to a finished example or by retracing steps. Explaining in basic terms, the functions of the program and how they will be useful for an animal carer. • Stating one or two facts about the history and development of plastic, including how it is now affecting planet Earth. Building a variety of brick models to invent Micro: bit case, housing and stand ideas, that do not obstruct the LED display or buttons. Describing the features of their favourite model and what makes it successful. • Explaining key pros and cons of virtual modelling vs physical modelling. Recalling and describing the name and use of key tools used in Tinkercad (CAD) software.	

	Fulfilling the design requirements of the 3D virtual model.	
	Working at greater depth Y5 **Progression Framework statement:** • Describing what is meant by monitoring devices and providing a few examples. Explaining in detail the development of thermometers from thermoscopes to digital thermometers and the connection they have to our animal monitor project. Researching a chosen animal's key information to develop a list of design criteria. • Writing a program that monitors the ambient temperature and alerts someone with both a visual and an audible alert when the temperature drops below or rises above a specified range. Can identify where there are errors (bugs) in the code and fix (debug) them. Explaining in detail the functions of the program including comments and how they will be useful for an animal carer. Including extension functions for 'On button [A] pressed' and justifying how it enhances the existing program. • Explaining how the history of plastic evolved and how it is now affecting planet Earth. Understanding how we can improve the situation by following the 'six R's of sustainability'. Building and developing a variety of brick models to invent Micro: bit case, housing and stand ideas, without obstructing the LED display or buttons. Justifying the reason for each design including any additional features and how it was developed. Describing in detail the features of their favourite model and what makes it successful. • Explaining and justifying the need for a virtual model and how it could be used in industry. Recalling and describing the name and use of additional tools beyond what was demonstrated in Tinkercad (CAD) software. Replicating their building brick idea and adding extra features	

	directly in Tinkercad by tinkering. Fulfilling the design requirements of the 3D virtual model, and justify their choices.	
	Working towards expectations Y6 **Progression Framework statement**: • Describing what is meant by monitoring devices and providing an example. Explaining briefly the development of thermometers from thermoscopes to digital thermometers. Researching a chosen animal's key information to develop a list of design criteria. • Writing a program that monitors the ambient temperature and alerts someone with a visual and/or audible alert when the temperature drops below or rises above a specified range. Suggesting where there are errors (bugs) in the code and ways to fix(debug) them by comparing their program to a finished example or by retracing steps. Explaining in basic terms, the functions of the program and how they will be useful for an animal carer. • Stating one or two facts about the history and development of plastic, including how it is now affecting planet Earth. Building a variety of brick models to invent Micro: bit case, housing and stand ideas, that do not obstruct the LED display or buttons. Describing the features of their favourite model and what makes it successful. • Explaining key pros and cons of virtual modelling vs physical modelling. Recalling and describing the name and use of key tools used in Tinkercad (CAD) software. Fulfilling the design requirements of the 3D virtual model.	
	Working at Expectations Y6 **Progression Framework statement:** • Describing what is meant by monitoring devices and provide examples. Explaining in detail the development of thermometers from thermoscopes to digital thermometers and the connection they have to our animal monitor project. Researching a chosen animal's key information to develop a list of design criteria.	

	• Write a program that monitors the ambient temperature and alerts someone with both a visual and an audible alert when the temperature drops below or rises above a specified range. Can identify where there are errors (bugs) in the code and fix (debug) them. Explaining in detail the functions of the program including comments and how they will be useful for an animal carer. Including extension functions for 'On button [A] pressed' and justifying how it enhances the existing program. • Explaining how the history of plastic evolved and how it is now affecting planet Earth. Understanding how we can improve the situation by following the 'six R's of sustainability'. Building and developing a variety of brick models to invent Micro: bit case, housing and stand ideas, without obstructing the LED display or buttons. Justifying the reason for each design including any additional features and how it was developed. Describing in detail the features of their favourite model and what makes it successful. • Explaining and justifying the need for a virtual model and how it could be used in industry. Recalling and describing the name and use of additional tools beyond what was demonstrated in Tinkercad (CAD) software. Replicating their building brick idea and adding extra features directly in Tinkercad by tinkering. Fulfilling the design requirements of the 3D virtual model, and justify their choices.	
	Working at greater depth Y5 **Progression Framework statement:** • Describing in detail what is meant by monitoring devices and provide a range of examples. Explain in detail the development of thermometers from thermoscopes to digital thermometers and the connection they have to our animal monitor project. Researching a chosen animal's key information to develop a list of design criteria. • Write a more complex program that monitors the ambient temperature and alerts someone with both a visual and an audible alert when the temperature drops below or rises above a specified range. Identify where	

	there are errors (bugs) in the code and fix (debug) them not only for themselves but also for others. Explain in depth the functions of the program including comments and how they will be useful for an animal carer. Including extension functions for 'On button [A] pressed' and justifying how it enhances the existing program. • Explaining how the history of plastic evolved and how it is now impacting planet Earth. Give examples of both positive and negative impacts. Understand how we can improve the situation by following the 'six R's of sustainability'. Build and develop a variety of more complex brick models to invent Micro: bit case, housing and stand ideas, without obstructing the LED display or buttons. Justifying the reason for each design including any additional features and how it was developed. Describing in detail the features of their favourite model and what makes it successful. • Explaining and justifying the need for a virtual model and how it could be used in industry. Recalling and describing the name and use of additional tools beyond what was demonstrated in Tinkercad (CAD) software. Replicating their building brick idea and adding extra features directly in Tinkercad by tinkering. Fulfilling the design requirements of the 3D virtual model, and justify their choices.	
Assessment notes / evaluation – include SEN / PP next step learning and areas that need more focus		

Year 5	Working below expectations	Working within Expected Standard	Working above expected
Target	**14 – 20%** **(no more than 2 children)**	**80 %- 86%**	**20%**
Term 1			
Term 2			
Term 3			

Year 6	Working below expectations	Working within Expected Standard	Working above expected
Target	**14 – 20%** **(no more than 2 children)**	**80 %- 86%**	**20%**
Term 1			
Term 2			
Term 3			