

# D&T MTP

## Year 5 Autumn 2

Context							
Unit		Digital World: Monitoring devices (TinkerCAD)					
Assessment		Final product evaluation.					
Concepts - How does this unit fit in?		<u>Significant Designers / Products</u> Galileo Galilei (Thermoscope), Daniel Gabriel Fahrenheit (Thermometer and Fahrenheit Scale), Anders Celsius (Centigrade scale)		<u>Noteworthy Products in our Daily Lives</u> Thermometer, Fitness trackers, security systems and alarms		<u>Purpose and Use</u> To monitor surroundings to give accurate readings to inform about a chosen specific environment.	
Kapow Lesson		Learning Intention	DT Skills Skills Progression	Knowledge Concepts	GRADES	Local Art	Curriculum Links
1	<a href="#">L1 Monitoring devices</a>	To <b>explain</b> the design criteria for my monitoring device.	D 20				Science: Sustainability Science: Living things Computing
2	Tinker with Micro:Bit	To <b>sequence</b> coding blocks to create an animation on the output LED display of my Micro:Bit.	D 20, 21 M 18				Computing
3	<a href="#">L2 Programming an animal monitor</a>	To <b>apply</b> my knowledge of block coding to solve a problem.	D 19, 21 E 11, 12				Computing
4	<a href="#">L3 Plastics</a>	To <b>make, record and label</b> various creative case designs, to house a Micro:Bit	D 19, 20, 21, 23 E 12, 12, 13				Science: Sustainability Computing
5	<a href="#">L4 3D CAD Skills</a>	To <b>change</b> the properties of and <b>combine</b> various 3D shapes, using Computer Aided Design (CAD), and create a 3D representation of my Micro:Bit case.	D 19, 20, 21, 23 M 23, 18, 19, 26, E 11, 12, 13,				Computing

## THIS IS A DIGITAL UNIT.

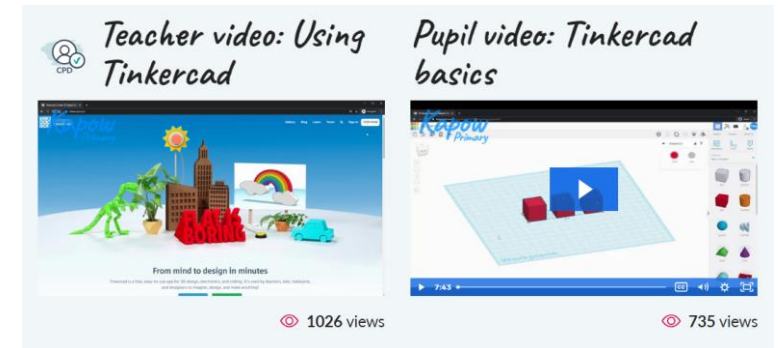
Class teachers **must** be familiar with both online interfaces, so as to teach this unit confidently and successfully.

**Micro:Bit** - Create a free account.

**TinkerCAD** - Create a free Educator account and set up your online classroom with the names of your students.

**This must be done in advance of beginning the unit.**

- The [Micro:Bit website](#) has various tutorials
- [TinkerCAD](#) set up and basic tutorial is found on the Kapow website ([Lesson 4 3D CAD Skills](#)).



## Lesson 1

<b>Kapow Lesson</b>	<a href="#">L1 Monitoring devices</a>
<b>Learning Intention</b>	<p>To <b>explain</b> the design criteria for my monitoring device.</p> <p>To <b>design my monitoring device</b>.</p>
<b>SOLO SC: Uni- Structural</b> <i>Bronze</i>	<p>I can <b>name</b> historical figures who invented temperature monitoring devices.</p> <p>I <b>know what a monitoring device is</b>.</p>
<b>SOLO SC: Multi- Structural</b> <i>Silver</i>	I can <b>describe</b> my target audience and what the product will be used for.
<b>SOLO SC: Relational</b> <i>Gold</i>	I can <b>explain</b> the design criteria for my monitoring device.
<b>SOLO SC: Extended Abstract</b> <i>Platinum</i>	I can justify my design criteria choices, using my research.
<p style="text-align: center;"><b>Activity</b></p> <p>(What will the children do to demonstrate their understanding of the LI?)</p>	<p>Chn will explore the invention and developmental history of the thermometer. They will research animal facts and write informed design criteria, for an animal monitoring device.</p> <p><b>Across KS2 children should know about inventors, designers, engineers, chefs and manufacturers who have developed ground breaking products.</b></p> <p>Chn to be explicitly introduced to significant designers <b>Galileo Galilei (Thermoscope), Daniel Gabriel Fahrenheit (Thermometer and Fahrenheit Scale), Anders Celsius (Centigrade scale)</b>.</p> <p>Chn to be explicitly introduced to significant products that impact our daily lives - <b>Thermometer, Fitness trackers, security systems and alarms</b> and understand how design of similar products have transformed over the years and how our lives would be different if we did not have these products in our lives. <b>(This is knowledge that must be sourced elsewhere as it is not provided by Kapow)</b>.</p> <p>Provide visuals of different types of monitoring devices, such as fitness trackers.</p> <p><b>Chn must demonstrate their understanding of significant designers and products in their sketchbooks.</b></p> <p>Kapow provides a design brief - <b>'Research, design and develop an animal monitor that can inform the owner of a chosen animal when the temperature is above or below a comfortable temperature range.'</b></p> <p><b>Be creative and feel free to amend this design brief so that it links to a Year 5 unit (Reading, Writing, Science etc, if possible).</b></p>

	<p>Provide and display key information about the significant people in history who are introduced in this lesson, on your DT working wall. Do so along with key vocabulary.</p> <p><a href="#">Follow Kapow lesson</a></p> <p>Print and complete the downloadable design criteria - ideally, have this displayed on the board and encourage children to write sentences independently into their sketchbooks, after writing the Date and having stuck in their LI and SOLO. <b>Do not mark drawn work but do correct incorrect spellings of mechanism parts.</b> Chn may wish to draw pencil lines upon which to write. Encourage the use of handwriting pens when writing in sketchbooks. <b>Encourage the use of neat handwriting and presentation.</b></p> <p>Chn can use <a href="#">National Geographic for Kids Animal Fact File pages</a>, to research animals (from mammals, to insects, to amphibians to sharks!). There are many other websites that the chn can use. <b>Make all links accessible via Google Classroom.</b> Chn will need to consider the enclosure of their creature as this is where their monitor will be affixed.</p> <p>Class teacher may decide to create a sheet for chn to collect their research information, or, that the children write their animal research notes directly into their sketchbooks.</p>
<b>Key Vocabulary for the lesson</b>	Monitor device, monitor, device, electronic, sensor, thermoscope, thermometer, research, design brief, design criteria, development, inventor, historical, vivarium.
<b>Curriculum Links</b>	Computing, Science
<b>Resources</b>	Kapow downloadable resources.

## Lesson 2

<b>Kapow Lesson</b>	-
<b>Learning Intention</b>	<p>To <b>sequence</b> coding blocks to create an animation on the output LED display of my Micro:Bit.</p> <p>To <b>explore coding on a Micro:Bit.</b></p>
<b>SOLO SC: Uni- Structural</b> <i>Bronze</i>	I can <b>name</b> the input and output functions of a Micro:Bit
<b>SOLO SC: Multi- Structural</b> <i>Silver</i>	I can <b>combine</b> coding blocks to create an output.

<b>SOLO SC: Relational</b> <i>Gold</i>	I can <b>sequence</b> coding blocks to create an animation on the output LED display of my Micro:Bit.
<b>SOLO SC: Extended Abstract</b> <i>Platinum</i>	I can <b>extend</b> my coding to create my own output.
<b>Activity</b> (What will the children do to demonstrate their understanding of the LI?)	<p><b>Chn will be given time to ‘tinker with the online BBC Micro:Bit emulator. They will be using this software next lesson to programme their monitoring device, so will need to be familiar with the block programming interface.</b> Nothing will be recorded in sketchbooks during this session.</p> <p><b>Class teachers must become familiar with this platform, prior to the children using the emulator.</b> Alternatively, <b>Speak with your DT Lead or Digital Lead , if unsure. Training and resources are available on the website.</b> <a href="#">BBC Microbit Online Emulator</a></p> <p><b>Class teacher to demonstrate a simple task which can be performed using the Micro:Bit emulator</b> - eg creating a simple LED animation, with sound. This will introduce the children to the basic block programming structure of the Micro:Bit interface. <b>Speak with your DT Lead or Digital Lead , if unsure.</b> <a href="#">This is a link to creating a simple animated heart beat using the Micro:bit’s LEDs.</a> and here’s the <a href="#">step by step ‘How To’.</a></p> <p>Allow children to then ‘tinker’ with the various programming blocks to create their own LED output animations, and for them to share their discoveries through regular mini plenaries during the lesson. Children can come to the board (plug in their chromebook to the classroom digital display) and demonstrate their programming discoveries. If class teacher has demonstrated how to use the music blocks, chn should be free to explore this too, along with tinkering with time variables to adjust pitch. <b>Speak with your DT Lead or Digital Lead , if unsure.</b></p> <p>Chn to know that the Micro:Bit is an ‘input / output’ device - Input (when a button or movement is activated) Output (a light or sound will be emitted)</p>
<b>Key Vocabulary for the lesson</b>	Micro:Bit, emulator, LED, programming blocks, block programming, animation, code, buttons, input, output, variables, pitch
<b>Curriculum Links</b>	Computing
<b>Resources</b>	Chromebooks, link to <a href="#">BBC Micro:Bit online emulator</a>

<b>Lesson 3</b>	
<b>Kapow Lesson</b>	<a href="#">L2 Programming an animal monitor</a>

<p><b>Learning Intention</b></p>	<p>To apply my knowledge of block coding to solve a problem.</p> <p>To solve a problem using block coding.</p>
<p><b>SOLO SC: Uni- Structural</b> <i>Bronze</i></p>	<p>I can identify basic code blocks that perform simple operations.</p> <p>I can copy a code to achieve an output.</p>
<p><b>SOLO SC: Multi- Structural</b> <i>Silver</i></p>	<p>I can combine appropriate blocks to create a simple code.</p>
<p><b>SOLO SC: Relational</b> <i>Gold</i></p>	<p>I can apply my knowledge of block coding to solve a problem.</p>
<p><b>SOLO SC: Extended Abstract</b> <i>Platinum</i></p>	<p>I can evaluate my code and debug issues.</p>
<p><b>Activity</b> (What will the children do to demonstrate their understanding of the LI?)</p>	<p>Having tinkered with Micro:Bit, the chn must recall their knowledge of block coding and the different types of blocks, to build a series of commands which will run a program to be used as a monitoring device. <b>The chn will develop a clear idea of what has to be done, planning how to use equipment and processes, and suggest alternative methods of making if the first attempts fails</b>, by debugging their code.</p> <p><b>Presentation:</b> Quizmaster - recall from previous lesson about monitoring devices.</p> <p><b>Run Attention grabber slides</b> and discuss Design brief - display this in the classroom, for easy reference.</p> <p><b>Design brief</b></p> <p>Research, design and develop an animal monitor that can inform the owner of a chosen animal when the temperature is above or below the animal's maximum and minimum comfortable temperature range.</p> <p><b>Chn to program the online Micro:Bit simulator.</b> Download and print off the code program sheets from Kapow. Chn to work in pairs and encourage partner talk to enthuse creative and problem-solving conversations. CT should ask leading questions, for chn to explore, to develop their analytical thinking.</p> <p>Stretch - for those who complete the task, they can be digital experts and help others or, can answer the questions in their sketchbooks</p>

	<p><b>Questions</b></p> <ul style="list-style-type: none"> <li>✓ 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.)</li> <li>✓ In what ways does it support an animal owner/carer? (Allows them to manage the room's temperature according to the animal's needs.)</li> <li>✓ Name and explain a ' _____ ' Block (Provide an example of a particular input, logic, basic or music block.)</li> <li>✓ Explain what a program comment is and why it is useful (To label and explain key functions within your program.)</li> </ul> <p>Finish with the Wrapping Up questions - use as AfL.</p>
<b>Key Vocabulary for the lesson</b>	Alert, ambient, boolean, copy, duplicate, monitor, programming comment, programming loop, value, variable.
<b>Curriculum Links</b>	
<b>Resources</b>	Kapow downloadable resources, <a href="#">Micro:Bit online simulator</a>

## Lesson 4

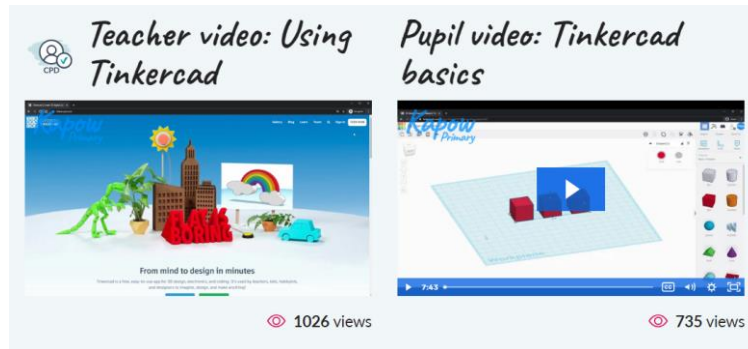
<b>Kapow Lesson</b>	<a href="#">L3 Plastics</a>
<b>Learning Intention</b>	<p>To make, record and label various creative case designs, to house a Micro:Bit</p> <p>To explore cases to house a Micro:Bit.</p>
<b>SOLO SC: Uni- Structural</b> <i>Bronze</i>	I can draw a design for a Micro:Bit case

<p><b>SOLO SC: Multi- Structural</b> <i>Silver</i></p>	<p>To combine various material parts to form a case.</p>
<p><b>SOLO SC: Relational</b> <i>Gold</i></p>	<p>I can make, record and label various creative case designs, to house a Micro:Bit</p>
<p><b>SOLO SC: Extended Abstract</b> <i>Platinum</i></p>	<p>I can evaluate my designs and justify future changes.</p>
<p><b>Activity</b> (What will the children do to demonstrate their understanding of the LI?)</p>	<p>Having used Micro:Bit to code a monitoring device, the chn will learn about sustainability and the global issue of plastic waste and single use plastics. The chn will think creatively to make and record a number of different designs, to meet the specifications of the design criteria.</p> <p><b>Presentation:</b> Quizmaster - recap key vocabulary</p> <p><b>Run Attention grabber slides</b> and discuss single use plastics and their impact on the environment. Watch the BBC Earth Unplugged Vid - not on website about some footage chn may find unsettling - discuss if to be shown to chn.</p> <p><b>Chn to build a number of LEGO cases, to house a physical representation of a Micro:Bit</b> Print paper Micro:Bit net - chn to make. Use LEGO blocks to build various cases to hold a Micro:Bit securely - use the Micro:Bit net to place into the case, to evaluate if the LEGO model will hold a device securely. Will the screen be visible while in the case? How can the design be rebuilt to allow ease of use and screen visibility?</p> <p><b>Chn must record their designs.</b> Build one, sketch and label, then move onto the next build. <b>Sketches must be labelled correctly</b> - CT to model expectations - and a ruler to be used for straight lines. Joined writing and neat presentation to be monitored by CT.</p> <p><b>Stretch</b> - use Plastic Problem extension sheet. All sheets to be trimmed and stuck into sketchbooks, neatly.</p> <p>Questions</p> <ul style="list-style-type: none"> <li>✓ 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.)</li> <li>✓ In what ways does it support an animal owner/carer? (Allows them to manage the room's temperature according to the animal's needs.)</li> <li>✓ Name and explain a '_____ ' Block (Provide an example of a particular input, logic, basic or music block.)</li> <li>✓ Explain what a program comment is and why it is useful (To label and explain key functions within your program.)</li> </ul> <p>Finish with the Wrapping Up questions - use as AfL.</p>
<p><b>Key Vocabulary for the lesson</b></p>	<p>Alert, ambient, boolean, copy, duplicate, monitor, programming comment, programming loop, value, variable.</p>

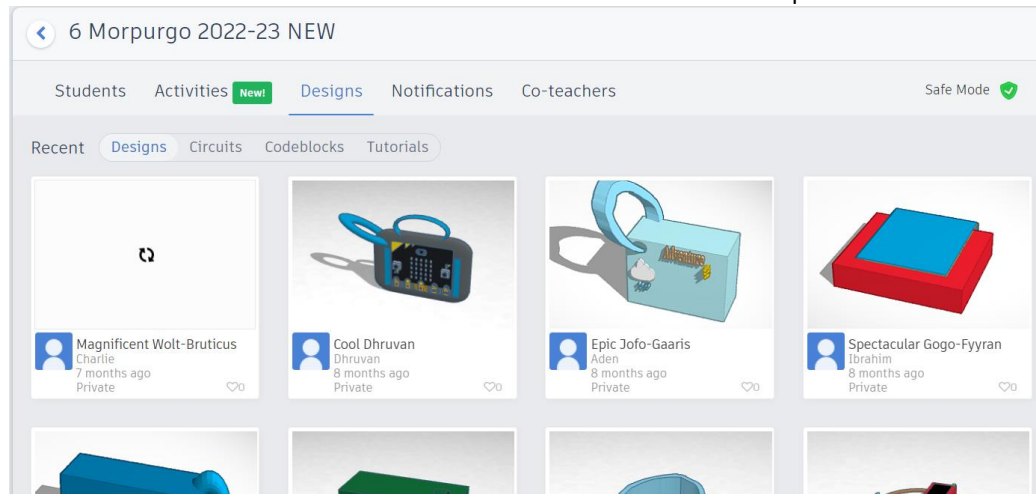
<b>Curriculum Links</b>	Science - Sustainability
<b>Resources</b>	Kapow downloadable resources, <a href="#">Micro:Bit online simulator</a> , <a href="#">LEGO building blocks</a>

## Lesson 5

<b>Kapow Lesson</b>	<a href="#">L4 3D CAD Skills</a>
<b>Learning Intention</b>	<p>To change the properties of and combine various 3D shapes, using Computer Aided Design (CAD), and create a 3D representation of my Micro:Bit case.</p> <p><b>To design a case using Computer Aided Design.</b></p>
<b>SOLO SC: Uni- Structural</b> <i>Bronze</i>	I can name the different parts of the CAD interface.
<b>SOLO SC: Multi- Structural</b> <i>Silver</i>	I can place and manoeuvre 3D objects on a 'workplane', using Computer Aided Design (CAD)
<b>SOLO SC: Relational</b> <i>Gold</i>	I can change the properties of and combine various 3D shapes, using Computer Aided Design (CAD), and create a 3D representation of my Micro:Bit case.
<b>SOLO SC: Extended Abstract</b> <i>Platinum</i>	I can evaluate my final design and I can hypothesise the pros and cons of CAD.
<b>Activity</b> (What will the children do to demonstrate their understanding of the LI?)	<p>Time allowing, the TinkerCAD session can be split into two lessons - 1. Tinkering with TinkerCAD (chn will have freedom to experiment with the TinkerCAD interface and various functions, and 2. Complete the actual lesson of building a 3D representation of their LEGO Micro:Bit case.</p> <p><b>IMPORTANT - The teacher MUST be familiar with the interface and must have set up an educator account, well in advance of the lesson. Watch the videos on the website or, speak with the DT Lead for CPD (YM)</b></p>



Teachers will have a view of their class' work once the classroom is set up:



### 1. Tinker with TinkercAD

**The class teacher will have set up their TinkercAD classroom well in advance of the lesson, so that the teacher can view and monitor all designs that the chn are creating, in real time.**

Introduce chn to TinkercAD and how to access the online design interface.

CT modelling and small challenge set (eg - write name in 3D text)

Chn can screen-grab their design, paste onto a shared class Google Slide which can then be printed for recording the session in sketchbooks, as part of the design and skill-learning process.



### 2. Build a 3D representation of the Micro:Bit case

**The class teacher will have set up their TinkercAD classroom well in advance of the lesson, so that the teacher can view and monitor all designs**

	<p><b>that the chn are creating, in real time.</b></p> <p>Introduce chn to TinkerCAD and how to access the online design interface.</p> <p>CT model design expectation - <b>ideally the teacher will have designed their own, prior to the lesson.</b></p> <p>Chn must refer to their sketchbooks, to help inform the 3D model they will create on their workplane.</p> <p>Chn use various shapes from the menu; changing properties and join functions to create a 3D Micro:Bit case. Chn will demonstrate their evaluation skills and control of the orientation of the work place, to come to a final design.</p> <p><b>Stretch</b> - here is a Micro:Bit object in the shapes menu, which the chn can drag and drop onto their workplane, if the wish to incorporate this in their case design.</p> <p>Chn should screen grab their final design (or wherever they have gotten to during the design time), paste onto a shared class Google Slide which can then be printed for recording the session in sketchbooks, as part of the design and skill-learning process.</p> <p>Follow <a href="#">Kapow slides</a>.</p> <p>Use evaluation questions at the end - these can be printed and chn answer these questions in their sketchbook.</p> <p>Designs must be stuck into sketchbooks, once printed, to demonstrate the design process from start to final product and will inform understanding of the chn's evaluation.</p> <p>Chn answer the Think question in the sketchbook.</p>
<b>Key Vocabulary for the lesson</b>	CAD (Computer Aided Design), manoeuvre, group, ungroup, replica, TinkerCAD, 3D model, consumables, manipulate, opaque, shape properties, transparent, workplane
<b>Curriculum Links</b>	
<b>Resources</b>	Kapow slides, <a href="#">TinkerCAD</a> , sketchbooks, class GoogleSlides

<b>Assessment Think!</b> Question	<b>'The design of my case would need altering if the Micro:Bit had a charging port'</b>
<b>Tasks</b>	See the lesson above.
<b>Key Vocabulary for the lesson</b>	

<b>Curriculum Links</b>	
<b>Resources</b>	