Key Stage: **3**	Year Group: **7/8**	Project Title: **Computer Science**	D&T Area: **Computing**	Duration: 12 weeks

Brief description of project:
To learn the basics of computer systems architecture, computational thinking and programming through use of Scratch and the BBC Microbit.

The Learning Intentions for this project are:-

All students will be able to: CAPABILITY.	All students will learn: TECHNOLOGICAL CONTENT.	All students will understand: CONCEPTS.
● Recognise SMART behaviours for e-safety ● Create a game using block based coding languages ● Control a Microbit board and buggy	● How to decompose a problem ● How to create an algorithm ● How to use flow charts ● How to handle a BBC Microbit	● Risks associated with use of the internet ● What computational thinking is ● The basic model of a system ● Basics of Binary ● Computational notation (flowchart) ● Iteration and repetition in a program

Key learning objectives:	Assessment opportunity. Including self assessment:
● Understand what computation thinking is	Questioning, class activity, practical application
● Be able to model an algorithm with a flow chart	Workbook activity
● Be able to recognise and do basic conversions to binary	In book exercises
● Identify the parts of a simple system (input, output, process)	Test
● Be able to control a system with a flowchart	Workbook activity
● Be able to use Scratch and Microbit design tools	Teacher observation
● Be able to build Blockly code	Teacher observation, Test
● Apply looping and iteration in code	Code output, Test
● Investigate, design, build and evaluate different challenges using blockly code	Project Outcomes

Differentiation:

1 Resources to support:
Online learning book, paper learning book, wall resources, help sheets, how to sheets

2 Extension activities:
Accelerated progress, additional build challenges, additional levels and complexity in game

Use of ICT, CAD, CAM:
Google Suite, Internet, Flowol 4, Scratch 3 Desktop

Create a simple game in Scratch

Unit Summary:	To learn the basics of computational thinking and coding through designing and building a game using a block based coding language

Lesson no.	Topic areas/sub topic areas	Lesson ideas and activities	Lesson keywords	Lesson outcome(s)	Useful links/resources	DATA and CAS descriptors
1	Recognise the SMART E-Safety behaviours	Discuss risks of online communication and social media (bullying, sexual harrassment, grooming, etc) Identify key behaviours for safe use Create a Poster displaying the SMART behaviours	Safe, Meet, Accurate, Reliable, Trust	Able to define SMART behaviour	workbook https://saferinternet.org.uk/	IT6
2	Understand the concept of a system Identify key system blocks – input / output / process	Review the black box model of a system. Learn about input and output devices through looking at examples Create a diagram showing the model and examples	system, input, output, process, sensor, robot	Able to define a system		
3	Be able to identify Hardware and software examples and purpose.	Review system Identify the purpose of Hardware - give examples and review what they are used Repeat for software - briefly	input output process hardware	Be able to identify examples of inputs and outputs		
4	Introduction to Binary	Explain the reasons for binary notation Work through examples and denary to binary conversions Look at examples of where binary is used - e.g. bitmap image	binary denary conversion notation calculation	Be able to recognise simple binary notation Be able to convert denary 0-255 to binary		
5	Understand the concept of computational thinking Identify meaning of key terms Identify key flowchart symbols	Discuss how computers are used to solve problems Look at the term computational thinking, breakdown in to key aspects and discuss Learn how flowcharts can map a process - look at Cup of Tea example and work though. Identify key symbols	Abstraction Decomposition Pattern recognition Algorithms Flow chart	Able to explain key aspects of computation thinking Can create a flow chart	https://www.bbc.co.uk/bitesize/guides/zp92mp3/revision/1 https://www.bbc.co.uk/bitesize/guides/z3bq7ty/revision/3	A5 PD5

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6	Understand the purpose of a Flowchart as a visual algorithm\n\nImplement an algorithm to control actions	Introduce pupils to Flowol 4 tools and systems Demonstrate lighthouse mimic and copy\n\nIntroduce and work through pelican crossing mimic	Flowol\nFlow chart\nMimic\nLoop	Successful completion of lighthouse and pelican mimics	http://www.flowol.com/flowol4/flowol4tutorial.pdf	TK13\n\nA4\nA7
7	Understand what a coding environment is\n\nUnderstand what block coding is	Introduce scratch environment and work through the different elements\n\nDiscuss block vs text based coding and benefits for beginners. Build basic game elements - character, movement, control - Pong	Scratch\nBlockly\nControl	Be able to explain block coding\n\nBuild a basic game with control	https://learn.adafruit.com/guide-to-scratch-3?view=all	TK13\n\nA7
8	Understand how coordinates are used in Scratch\n\nBe able to recognise and manipulate coordinates	Look at the scratch stage area and revise the graphing axis. Highlight the origin (0,0) in the centre and discuss + and - coordinates.\n\nBuild coordinate based game such as space shooter	Coordinates\norigin\nmanipulate	Understand how to use coordinates in Scratch Build a basic game with coordinates	https://en.scratch-wiki.info/wiki/Coordinate_System\n\nworkbook	TK13\nTK16\n\nA7
9	Understand the importance of troubleshooting\n\nUnderstand the purpose of variables\n\nBe able to create, initialise and manipulate variables	Look at an issue within a game, such as character not moving correctly, How do we solve, troubleshooting - look at issue one at a time until resolved\n\nDiscuss variables - link to science and maths. Values which can change (e.g. score, timer). Demonstrate how to create a countdown clock and a scoring system\n\nBuild space invaders game	Troubleshoot\nvariable\ninitialise\nvary\nincrement	Know how to approach solving a problem\n\nSuccessfully create and use variables within a game environment	https://en.scratch-wiki.info/wiki/Variable	TK13\n\nA7
10	Understand the purpose of success criteria in a design brief\n\nDevelop ideas for a solution to a design brief	Look at the project brief.\nReview success criteria - specification elements - what purpose do they serve?\n\nGenerate initial ideas for a game - create code log	Brief\nSpecification\nIdea\nDevelopment	Use a provided specification\n\nGenerate a game idea	workbook	TK13\nA7\nIT2\nIT4
11	Half term assessment\n\nCreate a solution to a design brief	Start to build own game design - update code log	Design\nSolution	Progress in game development	workbook	TK13\nA7
12	Create a solution to a design brief	Develop own game - update code log	Development\nTest	Progress in game development	workbook	TK13\nA7
13	Create a solution to a design brief	Develop own game - update code log	Development\nTest	Progress in game development	workbook	TK13\nA7

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14	Introduce the BBC: Microbit	Presentation on Microbit - history and purpose Identify and explain key components Students label diagram	BBC: Microbit Compass Accelerometer	Recognise key features	https://microbit.org/get-started/user-guide/overview/	IT5
15	Using the BBC: MIcrobit	Worked example of producing a program and flashing to Microbit Review key concepts of iteration, etc as used in Microbit.	Flashing USB	Successfully flash code to card	https://microbit.org/get-started/user-guide/features-in-depth/#usb-interface	TK9 TK10 TK11 TK13 A4 A5 A8 A9 PD5 PD7 PD8
16	Simple LED based challenges	Complete the basic coding lessons from the learning booklet at own pace. Push more able to accelerate	Coding Testing	Solve challenges using Microbit code	Learning booklet	TK9 TK10 TK11 TK13
17	Using operators	Discuss Rock, paper, scissors game - develop algorithm together as model Build simple rock paper scissor game Ext1: Add Lizard Spock options Ext 2: Modify into a dice	Operator Looping Random	Successful apply variables and operators Create random number generator	https://microbit.org/projects/make-it-code-it/rock-paper-scissors/	TK9 TK10 TK11 TK13 A4 A5 A8 A9 PD5 PD7 PD8
18	More complex code and game functions	Students follow guide to independently develop the Flappy Bird game - they can work in development teams if they choose for mutual support	Code Variables	Successfully develop / part develop flappy bird game using game tools	https://makecode.microbit.org/projects/crashy-bird	TK9 TK10 TK11 TK13 A4 A5 A8 A9 PD5 PD7 PD8

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19	Introduce the BBC: Microbit Move	**Make sure batteries are charged** Give out buggies - 1 between 2. 1 Microbit each Look at features and functions of buggy Discuss sensible, careful use and cost of replacement Look at importing Move code into Microbit IDE Demonstrate how to use code blocks	Move Connection Motor Sensor Ultrasonic Servo	Recognise key components of move Understand how to use Move Know how to import code blocks for Move	https://kitronik.co.uk/blogs/resources/online-resources-for-move-motor-microbit	TK9 TK10 TK11 TK12 TK13 A4 A5 A8 A9 PD5 PD7 PD8
20	Driving and turning	Investigate how to control motors. Individually and together. Discuss variables of speed, time and direction. Practice using variables to move motor around Ext: Look at solving motor bias - pdf and tutorial links here	Bias Speed Direction	Be able to control motor speed, direction and adjust for bias	https://makecode.microbit.org/#editor https://resources.kitronik.co.uk/pdf/5683-move-motor-microbit-additional-resources-advanced-motor-adjustment.pdf	TK9 TK10 TK11 TK12 TK13 A4 A5 A8 A9 PD5 PD7 PD8
21	Final assessment Using the ultrasonic sensors	Investigate how to use ultrasonic sensor to stop vehicle colliding with objects. How does it work? Practice using and changing distances. Stop and change direction options. Help guide tutorial and pdf links here	Ultrasonic Sensor Adjust Redirect	Be able to use ultrasonic sensors	https://makecode.microbit.org/#editor https://resources.kitronik.co.uk/pdf/5683-move-motor-microbit-additional-resources-ultrasonic-distance%20sensors.pdf	TK9 TK10 TK11 TK12 TK13 A4 A5 A8 A9 PD5 PD7 PD8
22	Microbit move challenges	Independently solve the different challenges	Workbook	Successful challenge completion		TK9 TK10 TK11 TK12 TK13 A4 A5

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						A8 A9 PD5 PD7 PD8
23	Microbit move challenges	Independently solve the different challenges	Workbook	Successful challenge completion		TK9 TK10 TK11 TK12 TK13 A4 A5 A8 A9 PD5 PD7 PD8
24	DIRT Review Complete all work Complete review					