ICT & COMPUTING

Year 8 Schemes of Work 2016/17

Term 4

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Module 3

Simulation

About this Module	***Learning Outcomes/Success Criteria (WILF) :***
In the simulation module students investigate simulations of real life events using computer software. Students consider the advantages of modelling using simulations and critically consider how realistic the simulations are.	**All students will be able to understand what a simulation is and why they are modelled using computers; investigate and use simulations to find best results for a real life scenario; builds a simple model of city on the computer** **Most students will be able to evaluate simulations and continue to use computers to investigate simulations; think critically about whether simulations truly represent real world situations; model more than one city on the computer** **Some students will be able to make predictions and change values of variable to model best cities; conside the impact of funding when planning a city**
Where the unit fits in:	***Cross- curricular Links:***
Data and Data representation Recognise the different types of data, and understand that data can be structured in tables to make it useful. Appreciate that programs can work with different types of data. Perform more complex functions and operations to analyse and retrieve data **Information Technology** Use software to collect, analyse and evaluate data.	***Literacy :*** *Learn a range of vocabulary* ***Maths:*** *Usage of a range of mathematical functions, calculations using mathematical operators* ***SMSC:*** *Spiritual –Think critically about how realistic simulations are* *Moral – Listening to others and working as a class. Use of data and the moral issues surrounding it* *Social – Share ideas and assist each other when undertaking some difficult tasks* *Cultural – To be aware of the information age we live in. take into consideration the audience and purpose when creating planning cities*

Module	Week	Topic	Teaching Activities	Learning Objectives	Resources
3	1		Discuss what a simulation is and why they are used Example of a roller-coaster is given to explain the concept of simulation Students are asked to find the best cup of coffee for Collin in the Collins coffee game They get to document their prediction after each computerised investigation until they find the right cup of coffee Similar to the coffee prediction get pupils to investigate how to make a balloon car festival as far and fast as possible in the Balloon car builder game	Students will be able to… • Understand what a simulation is and why they are modelled using computers • Investigate their first simulation • Use simulation to find the best result • Answer questions why things seem realistic in simulation • Understand that there is always more than one solution to a problem	L1 - Exploring Simulations - Coffee and Balloon Car.pptx The Collins Coffee and Balloon car worksheets should be printed one per student. Collins Coffee http://web.archive.org/web/20070328160740/http://ngfl.northumberland.gov.uk/ict/qca/ks2/unit3D/colins%20coffee/colins%20coffee.html Balloon Car Builder http://pbskids.org/zoom/games/ballooncar/
	2	**Evaluating Simulations**	Recap of why we use simulations Introduce task – to fly a duck across a ravine. Get students to write details of their duck's measurements on the sheet provided before clicking fly Introduce the roller-coaster simulation Ask students to complete as many levels of the roller-coaster as possible and get them to record their results on the paper provided	Students will be able to… • Evaluate simulations • Continue to use computers to investigate simulations • Think critically about whether simulations truly represent real world situations	Exploring Simulations - Evaluating Simulations.pptx https://www.cgpbooks.co.uk/duckBuilder Roller Coaster Game http://puzzling.caret.cam.ac.uk/game.php?game=roller

Module	***Week***	***Topic***	***Teaching Activities***	***Learning Objectives***	*Resources*
	3	**Building computer models**	*Recap of why computers are used to explore simulations* *Discuss why cities are needed and what is the purpose of a city* *Demonstrate how to use SIM CITY to create a city.* *Explain how to understand costings in SIM cITY*	*Students will be able to…* *Models a city using a computer* *Consider what a city needs* *HA's will work more independently* *Condider the impact of an additional funding when planning/ building city*	*L3 - Exploring Simulations – Cities.pptx* *SIM CITY Download http://www.abandonia.com/games/393* *L4 - Exploring Simulations - Cities and Funds.pptx* *SIM CITY – http://www.abandonia.com/games/393*

Module 4

Instruction Set Design

About this Module	***Learning Outcomes/Success Criteria (WILF) :***
This unit challenges students to think about different aspects of programming to solve a 'real-world' problem or challenge using a chosen programming language	**All students will be able to record a sequence of instructions of a given instruction list; and identify different routes to a destination and find a route with the least number of instructions; know that instructions in a set can be given different bit patterns; and adjust the movements that a robot can make so that it responds to obstacles** **Most students should understand that when an instruction set is enlarged, every instruction requires more bits; be able to produce algorithms and procedures to enable a robot to navigate obstacles in its path; and understand the scale of instruction sets in the context of modern-day storage devices and memory.** **Some students will be able to develop *algorithms and procedures that enable a robot to deal with obstacles effectively; and know how decreasing the number of instructions used to solve a problem can have a significant impact when scaled to a large environment.***
Where the unit fits in:	***Cross- curricular Links:***
Computing • *Algorithm Design* • *Programming and Development*	***Literacy:*** *Formulating command sets* ***Maths:*** *Coordinates, algorithms, angles, measurements* ***Science:*** *Sensors, robotics* ***SMSC:*** *Spiritual – Limitations of technology – Pros and cons of instruction set design* *Moral – Listening to others and working as a class. Use of data and the moral issues surrounding it* *Social – Risks of data security and ways to prevent those*

Module	***Week***	***Topic***	***Teaching Activities***	***Learning Objectives***	*Resources*
4	*4*	***Instruction set design***	*Show students the first slide of* ***PowerPoint 4.1*** *and ask them to describe how to get from the corridor outside the classroom to the canteen to a partner.* *Discuss how the instructions were all designed to solve the same problem, but differed in complexity and precision. S* *how the second slide of* ***PowerPoint 4.1*** *and ask students, in the same pairs, to discuss how the instructions would differ if they were describing the route to a robot.* *Discuss how important precise instructions and information about the terrain are to the robot if it is to get to the canteen successfully.* *Discuss what efficiency means* *Demonstrate how instructions can be represented nique binary strings* *Explain the advatages and disadvantages of using more instructions to navigate their robot froma starting point to destination*	*Students will be able to…* • *Record a sequence of instructions of a given instruction list* • *Identify different routes to a destination and find a route with least number of instructions* • *Understand that sensors are used to collect inputs in order to make decisions* • *Know that the m more instructions that are used, the more memory is needed* • *Identify the best route from a range of algorithms*	*Pages 32–39 of Compute-IT 2 Student's Book* *PowerPoint 4.1 Giving instructions* *Worksheet 4.1A Navigating robots on Mars* *Worksheet 4.1B Robot walk: planet* *Worksheet 4.1C Robot walk: counters* *Worksheet 4.1D Robot walk: record sheet 1* *Worksheet 4.1E Robot walk: record sheet 2* *Worksheet 4.1F Robot walk: obstacle cards* *Worksheet 4.1G Which is the best algorithm?* *Worksheet 4.1H RoboDate* My.dynmaic-learning.co.uk

Module	Week	Topic	Teaching Activities	Learning Objectives	Resources
	5	**Programming a robot with 2-bit instruction set**	Emphasise that understanding the task and planning ahead is critical to ensuring that a robot is only programmed with the instructions it needs to perform the task efficiently. Explain students about procedures and get them create their own planet and rover using procedures and program their rover to explore the planet	Students will be able to… • Produce a set of algorithms for basic sprite movements • Identify instructions for a 2-bit instruction set • Create procedures for 2 -bit instruction set • Identify methods to navigate around given problems with constrains • Understand how instructions are stores and executed within a computer system • Understand how data of various types can be represented and manipulated digitally in the form of binary digits	Pages 40–43 of Compute-IT 2 Student's Book Worksheet 4.2A Planning ahead: robot guitarist Unit 4 Scratch tutorial Unit 4 Scratch tutorial screencast Unit 4 Scratch tutorial template Worksheet 4.2B Connected blocks Worksheet 4.2C Disconnected blocks Scratch 4.2A Example solution for 4.2.2 Compute-IT Scratch 4.2B Example solution for 4.2.3 Compute-IT Worksheet 4.2D Overcoming obstacles Worksheet 4.2E Using a 2-bit instruction set
	6	**Assessing the efficiency of instructions**	Get students to complete the challenge of programming a 3 bit rover robot to explore efficiently a planet far from Earth, avoiding obstacles it meets along its way Play the videos clips: www.youtube.com/watch?v=FVU6R5s7W3k and mars.jpl.nasa.gov/multimedia/videos/?v=174 Get students to work through worksheets 4.3.1 and 4.3.2 Provide guidance on how to complete the challenge using Scratch tutorial	Students will be able to… • Know that instructions in a set can be given different bit patterns • Adjust the movements a robot can make so that it can respond to obstacles • Understand that when an instruction set is enlarged, every instruction requires more bits. • Produce algorithms and procedures to enable a robot to navigate obstacles in its path • Know how decreasing the number of instructions used to solve a problem can have a significant impact when scaled to a large environment	Pages 44–45 of Compute-IT 2 Student's Book Unit 4 Scratch tutorial Unit 4 Scratch tutorial screencast Scratch 4.2B Zip file 4.3 Obstacle library Scratch 4.3A Example solution for 4.3.1a Compute-IT Scratch 4.3B Example solution for 4.3.2 Compute-IT

Module	***Week***	***Topic***	***Teaching Activities***	***Learning Objectives***	*Resources*
	7	**Assessment and feedback**	*Perform a formal theory assessment on simulation and instruction set* *Assessment feedback*	*Students will be able to…* • *Exhibit their knowledge on simulation and instruct set design* • *Respond to feedback*	*Assessment papaers*