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Progression Map – Computing (Computer Science Strand)

Computer science addresses the application of logical thinking and programming to control what a computer system does. To distinguish between aspects of the subject area, it has been sub-divided into *computational thinking*, *programming* and *coding*. The interpretation of these here has been to regard *computational thinking* objectives as involving 'higher order' skills and more abstract concepts, *coding* as 'lower order' skills that still require knowledge and understanding, with *programming* sitting somewhere between the two, applying key programming language features to put aspects of computational thinking into practice.

Sub-strands	**Year One**	**Year Two**	**Year Three**	**Year Four**	**Year Five**	**Year Six**
Computational thinking	▪ combine a series of actions or steps to achieve a purpose by guessing, discovering and refining ▪ talk about what they have done, describing their understanding of what worked and what didn't ▪ make choices when exploring real and imaginary problem-solving tasks	▪ use software that represents real or imaginary situations, make decisions and predict how their choices will affect outcomes ▪ recognise that an algorithm is a set of precise and unambiguous instructions ▪ develop algorithms to solve given problems, discussing their work and how it might be improved	▪ find different ways to solve a problem or complete a task ▪ evaluate choices and solutions ▪ look for patterns in the things we do, where we repeat a sequence of actions ▪ use computer models and simulations to gain a greater understanding of the world	▪ practise identifying the essential features of a given programming task or problem (abstraction) ▪ tackle programming tasks or problems by breaking them down into smaller parts, to make them easier to complete or solve (decomposition) ▪ recognise that computer models such as simulations or games have rules and explain how different choices may result in different outcomes	▪ identify a range of ways that programs can accept user input or respond to events ▪ describe examples of programs that output data, including to control physical systems ▪ use computer models and understand that they can be used to simulate real, physical systems	▪ know what variables in computer programs are and explain how they may be used in simulations and games ▪ describe how the value of a variable can be manipulated ▪ design programs to control or simulate real physical systems
Programming	▪ in a variety of contexts, build a sequence of instructions by: 1 entering an instruction 2 describing what	▪ plan, develop and debug a logical sequence of instructions to control a floor robot or other digital device to achieve a given outcome	▪ recognise that an algorithm is a step-by-step list of instructions that need to be followed to complete a task or solve a problem ▪ understand how	▪ describe what they think programs will do by examining their code ▪ recognize that sets of instructions can be grouped as reusable	▪ develop programs that accept user input or respond to events ▪ develop programs that output data in different ways, controlling the	▪ design programs that employ variables to manipulate numeric and text data ▪ design programs that use (pseudo)random

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	they think will happen 3 running their program 4 talking about what they have done, in particular their understanding of what worked and what didn't and identify if any changes need to be made ▪ describe what they think will happen when a sequence of instructions is executed on a digital device	▪ execute a program and evaluate what happens against the desired outcome ▪ review and modify the planned series of instructions if necessary	instructions can be grouped together in a loop within an algorithm ▪ create programs that use loops to repeat groups of instructions ▪ recognise and describe some similarities and differences between programming languages	subroutines, procedures or scripts (collections of blocks) for parallel processing ▪ develop programs that benefit from grouping instructions in reusable subroutines, procedures, or scripts	timing of those outputs, if required ▪ suggest how their own and others' programs might be improved	numbers ▪ design programs that respond to inputs with alternative outcomes, for example by using selection statements
Coding	▪ enter instructions into digital devices ▪ enter instructions in order ▪ keep a record of instructions and their order	▪ enter, test and modify a sequence of instructions to achieve a given outcome, using a range of devices ▪ give simple instructions in the right order for them to work ▪ recognise the importance of ordering instructions correctly to achieve a specific and desired outcome	▪ enter sequences of instructions correctly grouped together using repeat commands for efficiency ▪ use repeat commands within sequences of instructions to achieve desired effects in a range of contexts ▪ recognise and respond to error messages, such as	▪ write a variety of programs that take advantage of features such as procedures (Logo) or scripts (Scratch) that enable the development and testing of programs in small parts ▪ recognise and debug syntax and logic errors ▪ appreciate how the world wide web uses code by	▪ write and debug programs that use inputs or events to influence program flow or outcome ▪ write and debug computer systems to control one or more outputs with purpose ▪ control the timing of program outputs using wait statements	▪ of variables to achieve a purpose ▪ write programs that mimic real-life situations through the use of (pseudo)random numbers ▪ use selection statements, such as if... then... else…, to make computer programs respond to different conditions

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			syntax errors	creating simple HTML pages locally (not on the internet) that include text, pictures and links		

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