# Progress, Feedback and Differentiation in Computing at TCS

Bands in Computing provide a generic description of how students are generally performing as well as giving us areas to focus our feedback on e.g. if a student is describing but not explaining concepts, we need to move them forward into explanatory language. The basis of the bands we use in science is Blooms Taxonomy: a tool developed to analyse the type of questions asked in assessments; these don't entirely work hierarchically and have been updated beyond simply 'Describe, 'Explain, 'Apply', 'Link', 'Innovate' a number of times since the original work. Despite this, these core skills (DEAL!) are useful in developing the complexity of both language and ideas in computing; it is also student friendly.
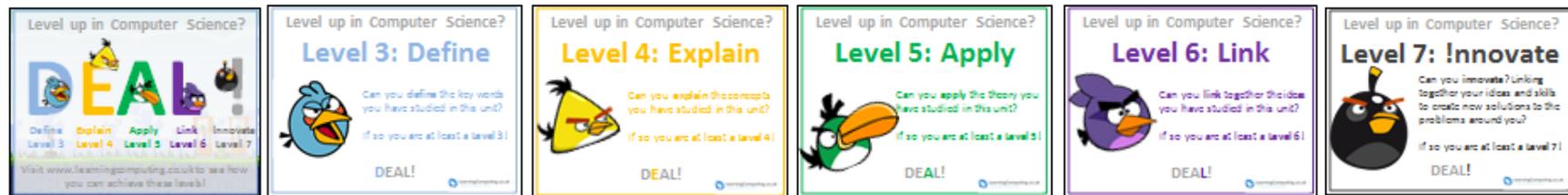
Feedback

Whilst tests provide hard data of how much a student can do accurately, feedback has to be more than just 'do better'. We need to tell them how. Our general STAR marks should therefore demand something to secure them in a DEAL skill or move them on to the next; these should be the basis of our target comment e.g. you need to state what we mean by hardware (D); you need to explain the purpose of different types of hardware (E); use basic component to build a desktop computer (A); you need to link your understanding of different pieces of hardware to customise the computer you have built for a specific purpose (L). For exceptional performance we need to stretch beyond DEAL and into students creating their own ideas and evaluating assimilated ideas for example combining pieces of hardware in new ways to achieve new objectives.

Differentiation

Computing is a content heavy subject and it is often not appropriate for us to differentiate the content or the language of delivery for students e.g. all students have to know about the use of selection in programming and be able to describe it. Our differentiation, however, should frequently distinguish between students in what we demand of them; they don't need to show us what they have learned in the same way e.g. within a sequence of lessons about programming students might be asked to create programs of differing levels of difficulty. Of course, there are many other useful ways to differentiate which we might also use within computing but this method is consistent with our bands, our feedback and the development of thinking over time. We should be differentiating

in this way regularly so that students become versed in the DEAL! acronym which is found on our classroom walls. This might be through homework, classwork or revision activity.

Guide to Progress in Computing
The lesson objectives form the basis of activities in the lessons and show how we can differentiate tasks in computing. There should be reasoning behind why we believe students fall into one criterion or why we believe they should be working on a particular activity.

Year 7 modules
Building a computer

Assessment criteria

D	E	A	L
Define	**Explain**	**Apply**	**Link**
Define the term hardware.	Explain the purpose of the four types of hardware.	Recommend a suitable piece of hardware for a given task.	Link the use of binary to represent information to the type of storage device needed to hold that information.
Name the four different types of hardware.	Explain how binary is used to represent information.	Use binary code to represent text or images.	
Give an example of a piece of hardware.	Explain the relationship between the speed of the processor and the running of a computer.	Combine different pieces of hardware together to create a computer system.	
Know that binary digits are used to represent information in computer systems.			
Know the dangers involved when building a computer.			
Level 3	**Level 4**	**Level 5**	**Level 6**

Game design

Assessment criteria

D	E	A	L	!
Define	**Explain**	**Apply**	**Link**	**!nnovate**
Define sequence.	Explain what sequence is and give a suitable example.	Create a Scratch program that uses a sequence of instructions.	Discuss and demonstrate how sequence, selection, repetition and procedures can be combined together to solve problems.	Create a game which uses complex skills that students have not been shown OR combine simple skills to great effect, above and beyond those of peers.
Define repetition.	Explain what repetition is and give a suitable example.	Create a Scratch program that uses repetition.		
Define selection.	Explain what selection is and give a suitable example.	Create a Scratch program that uses selection.		
Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**

* To achieve more than a Level 4 students must plan and create their own scripts, copying examples (for example the Pacman one provided) is not evidence of applying knowledge.

History of computers

Assessment criteria

D	E	A	L
Define	**Explain**	**Apply**	**Link**
Define what is meant by the term computer	Explain why people think Stonehenge could be the first computer.	Create a post on your blog about the first computer!	
Define what is meant by 'cloud computing'.	Explain who Charles Babbage was and what he invented.	Create a post on your blog about the first mechanical computer.	
Define what is meant by the term hyperlink.	Explain who Alan Turing was and what he invented.	Create a post on your blog about the first electronic computer.	
Define the term collaboration.	Explain who Steve Jobs was and what he invented.	Create a post on your blog about the invention of the GUI.	
Level 3	**Level 4**	**Level 5**	**Level 6**

Unit 4: Problem solving

Assessment criteria

D	E	A	L
Define	**Explain**	**Apply**	**Link**
Define what is meant by "Divide & Conquer"	Explain why Divide & Conquer is a useful way of solving problems.	Create flowcharts that use decisions.	Link Divide & Conquer to a flowchart using sub-routines.
Know that problems can be solved by describing the solution as a sequence of instructions.	Explain how flowcharts can be used to describe processes.	Use Divide & conquer to break down a problem.	Apply divide & conquer techniques to working in a team.
Define what is meant by subroutine.	Explain the pros and cons of working in a team	Work successfully in a team to solve a problem.	
Know the five main flowchart symbols.	Explain why subroutines can be useful	Create flowcharts that use subroutines	
Level 3	**Level 4**	**Level 5**	**Level 6**

Robotics

Assessment criteria

D	E	A	L
Define	**Explain**	**Apply**	**Link**
Define what is meant by hardware	Explain the purpose of different types of hardware	Use selection & repetition to create a computer program.	Link the ideas of decision and subroutines in flowcharts with selection and functions in programming.
Define what is meant by software	Explain the advantages & purpose of selection		
Know that flowcharts can be used to describe a process	Explain the advantages & purpose of repetition		
Know that robots follow a set of instructions entered by the user.	Explain the advantages & purpose of subroutines		
Know what is meant by selection			
know what is meant by repetition			
Level 3	**Level 4**	**Level 5**	**Level 6**

Text based programming

Assessment criteria

D	E	A	L	!
Define	**Explain**	**Apply**	**Link**	**!nnovate**
Define sequence.	Explain what sequence is and give a suitable example.	Create a text based program that uses a sequence of instructions.	Discuss and demonstrate how sequence, selection, repetition and procedures can be combined together to solve problems.	Use your knowledge and technical skills to create a new computer game.
Define repetition.	Explain what repetition is and give a suitable example.	Create a text based program that uses repetition.		
Define selection.	Explain what selection is and give a suitable example.	Create a text based program that uses selection.		
Define procedure.	Explain what procedure is and give a suitable example.	Create a text based program that uses a procedure.		
Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**

Year 8 modules

Algorithms

Assessment criteria

D	E	A	L	!
Define	**Explain**	**Apply**	**Link**	**Innovate**
	Explain what an algorithm is.	Apply your understanding to create a simple algorithm .	Link your work to learning from previous units like Scratch, Turtle and Mindstorms.	
	Explain what a sorting algorithm is and how the bubble sort algorithm works.	Apply your understanding to carry out a simple bubble sort .		
	Explain what a search algorithm is and how serial and binary search algorithms work.	Apply your understanding to carry out a simple serial search and a simple binary search .		
Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**

Creating an app

Assessment criteria

D	E	A	L
Define	**Explain**	**Apply**	**Link**
Define the term 'App'.	Explain what 'Event driven programming' is.	Create a simple mobile phone app.	Describe the similarities and differences between 'Event driven programming' and programming done using Python.
Define the term 'Event driven programming'.	Explain the difference between similar mobile devices.		Link an understanding of what is required to create an app to the platform it could run on.
Say what 'MIT App Inventor' is for.	Accurately explain what a given script will do.		
Level 3	**Level 4**	**Level 5**	**Level 6**

Electricity & information

Assessment criteria

D	E	A	L	!
Define	**Explain**	**Apply**	**Link**	**Innovate**
	Explain what electricity is.	Apply your understanding to create a circuit that uses electricity.	Link your understanding to last years lesson on binary.	
	Explain how computers use logic gates.	Apply your understanding to create logic circuits that make decisions.	Link your understanding to last years lesson on the processor.	
	Explain how binary is used to represent numbers.	Apply your understanding by converting decimal numbers to binary and adding them together.	Link your understanding previous lessons on electricity.	
	Explain how binary is used to create images.	Apply your understanding to create an image using binary.	Link your understanding of binary images to our work on file sizes.	
Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**

Modelling

Assessment criteria

D	E	A	L
Define	**Explain**	**Apply**	**Link**
	Explain what a computer model is and why they are used.	Apply your understanding to experiment with and evaluate a computer model.	Link your work to languages from previous units like Scratch, Turtle and Mindstorms.
	Explain who uses computer models and what they hope to learn from them.	Apply your understanding to create a prezi about people who use computer models.	Link your work today to what you have already learnt about computer models.
	Explain what rules and variables are and identify them in a computer model.	Apply your understanding to change the variables in a computer model and predict the outcome.	Link your work today to your previous lessons on computer modelling.
	Explain what a spreadsheet is and why they are used in computer modelling.	Apply your understanding to create a simple spreadsheet.	
Level 3	**Level 4**	**Level 5**	**Level 6**

Unit 8: Networking

Assessment criteria

D	E	A	L
Define	**Explain**	**Apply**	**Link**
Define what a network is	Explain why people use computer networks.	Create a LAN.	Link technical knowledge of networks to social repercussions like piracy & international law.
Know what a packet is	Explain the differences between circuit and packet switching.	Use a LAN to share information and resources.	
Know what packet switching and circuit switching are	Explain what P2P and client-server networks are.	Create a simple webpage using HTML.	
Know what the internet is	Explain how websites are built and stored.		
Know some of the components needed to create a network			
Level 3	**Level 4**	**Level 5**	**Level 6**

Python

Assessment criteria

D	E	A	L
Define	**Explain**	**Apply**	**Link**
Define what is meant by a variable.	Explain how programmers use variables.	Create a program that uses variables.	Connect the idea of variables to binary.
Define what is meant by selection.	Explain why programmers use selection & repetition.	Create a program that uses selection & repetition.	Use a text based language to enact a flowchart.
Define what is meant by repetition.	Explain why programmers use functions or procedures.	Create a program that uses selection, repetition and functions.	
Define what is meant by a function.			
Level 3	**Level 4**	**Level 5**	**Level 6**

Year 9 modules* Students in Year 9 have recently begun taking the Cambridge Nationals Certificate GCSE qualification the specification for which can be [found here](#).

Computers in business

Assessment criteria

D	E	A	L	!
Define	**Explain**	**Apply**	**Link**	**Innovate**
	Explain why it is important to layout business letters in a professional way.	Apply your understanding to create a business letter with a professional layout.	Link your work to previous units like history of computers, computer modelling, website design and spreadsheets.	Create innovative solutions to business problems using techniques not taught in lessons.
	Explain what a spreadsheet is and why they are used in business.	Apply your understanding to create a simple spreadsheet that includes formulas and functions.		
	Explain the rules that have to be followed to create a business presentation and why they are important .	Apply your understanding to create a short presentation suitable for 15+ audience.		
	Explain what a database is and how they differ from a spreadsheet.	Apply your understanding to create a simple database containing five records.		
Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**

Python adventure

Assessment criteria

D	E	A	L	!
Define	**Explain**	**Apply**	**Link**	**Innovate**
	Explain what makes a computer game suitable for its chosen audience.	Apply your understanding to design a game which is suitable for its audience.	Link your work today to languages from previous units like Python, Scratch, Turtle and Mindstorms.	Innovate use the extra skills resources to include arrays or boolean logic and make your game more exciting!
	Explain what a subroutine is and why they are useful in programming.	Apply your understanding to create some subroutines that can be used in an adventure game.		
	Explain what selection is and why it is used in programming.	Apply your understanding by using selection in your adventure game.		
Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**