RECOVERY CURRICULUM

Subject: CS
Author: ACR/GMA
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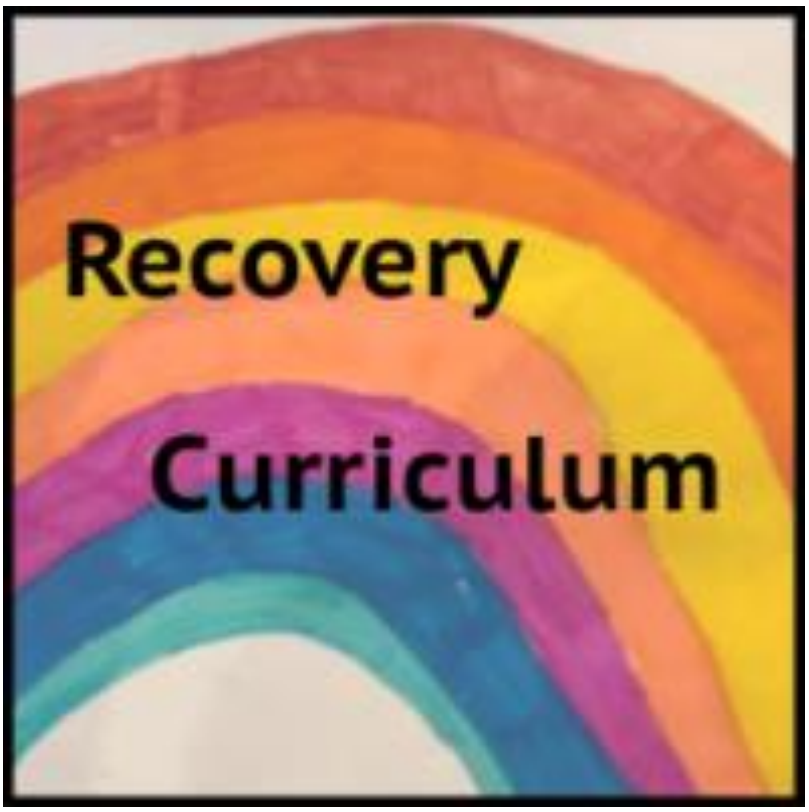

Subject:	CS	Teacher:	Lead: GMA
Year:	10	Class:	All
Unit title:	Fundamentals of Algorithms		
Duration:	7 Sessions		

Intent

Intent Statement - at Landau Forte Amington, we believe learning powerful knowledge helps students achieve and creates a fairer society. How are you trying to accomplish this, with this unit/topic?

This topic will focus on student recovery following the pandemic, which has resulted in students experiencing the following possible losses: routine, structure, friendship, opportunity and freedom. It will support students academically, socially and emotionally, in order to transition students back to Academy life and support with the issues resulting from loss.

Aims - what do you want pupils to be able to know and do by the time they finish this unit/topic?

Can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation
Can analyse problems in computational terms, and apply systematic problem solving.

Academy values – at Landau Forte Amington, we want students to be ambitious, brave and kind. How are these values promoted in this PoS?

Brave: Empower pupils to become digitally literate in order to able to use, and express themselves and develop their ideas through, information and communication technology. Encourages pupils independence by providing the opportunity to formulate solutions to the problems at hand, create a culture of error by encouraging pupils to create creative solutions to a complex problem and debug problems and modify for efficiency.

Ambitious: Delivery of challenging concepts and ideas. Utilisation of tiered BEBRAS DNA, stretch tasks provided to challenge HA. Resilience promoted through independent learning.

Kind: to become digitally literate in order to become active participants in a digital society and workplace. Alternative provision prepared in the eventuality of a local/national lockdown. Baseline testing and progressive knowledge auditing throughout to better plan lessons.	
Content – what is being covered, ensuring breadth & depth?	National Curriculum/Exam Specification - how does the content link to the NC or Exam Spec?
1. Abstraction – learning the definition of abstraction, how to extract the key points from long briefs, how to apply them ready for decomposition 2. Decomposition – learning the definition of decomposition, how to split a task into smaller components. 3. Flowcharts/pseudo-code - learning the interpretation of flowcharts and how to construct them correctly, learning the meaning of the elements of pseudo-code and how to utilise the code effectively 4. Algorithms – learning the definition of algorithms, knowing which to use and recognising their different applications through efficiency.	3.1.1 Representing algorithms 3.1.2 Efficiency of algorithms 3.1.3 Searching algorithms 3.1.4 Sorting algorithms
Powerful Knowledge - what powerful knowledge is included in this SoW? Consider what knowledge is it important for our students to know, so that when they leave school they can engage in and lead discussions, with people from the most advantaged backgrounds?	
How to program / Concepts of programming Abstraction and Decomposition.	

Implementation

GAPS	
Identification – how are you going to identify the gaps in knowledge/skills?	**Triage** – how are you going to rank order these gaps in knowledge/skills and 'fill' them, in order of importance?

Create a baseline test of programming knowledge before the programming unit at the start of term. This will identify uptake/ areas of confusion etc. Use of knowledge audit to tailor learning in future terms or adapt learning based on pupil needs. This is a new course, so pupils won't have missed any content, however they may skill gaps in core computer science principles that need to be addressed/revisited	The results of the baseline test will determine if a group needs to revisit a year 9 topic or spend extended time on a topic in GCSE. Knowledge audits will determine which pupils will require more support in specific topics for example: 1 to 1, teacher support, scaffolded answers or support from a peer. Baseline and audit review will determine if wider planning needs to be amended, E.G. revisiting a topic of spending more time on a topic.
KEY CONCEPTS	
Key Concepts – what are the key concepts being taught?	**Progression** – how will studying these key concepts support progression to the traditional curriculum that has been planned?
1. Abstraction – learning the definition of abstraction, how to extract the key points from long briefs, how to apply them ready for decomposition 2. Decomposition – learning the definition of decomposition, how to split a task into smaller components. 3. Flowcharts/pseudo-code - learning the interpretation of flowcharts and how to construct them correctly, learning the meaning of the elements of pseudo-code and how to utilise the code effectively 4. Algorithms – learning the definition of algorithms, knowing which to use and recognising their different applications through efficiency.	**These key concepts follow the traditional curriculum plan in the initial implementation document.** **Taken from the existing traditional curriculum and modified to suit the needs of an extended leave of absence.** **IF A BLENDED LEARNING APPROACH IS REQUIRED, modified versions of each lesson in the SOW have been created** **The alternative series of lessons covers the same topics in a more user-friendly format for pupils studying at home. A booklet version of the content has also been created. Both will cover the same content as original lessons but in a more independent format.**

WELLBEING	
Lockdown – how will students share their experiences of lockdown?	**Social and Emotional** – how will student social and emotional health be supported?
Legal Ethical Environmental Cybersecurity module will run later in the year and will focus on the impacts of lockdown in more detail. Discussion of how the government use algorithms to formulate the 'R number', and using computer models of virus spread scenarios.	Differentiation – this will occur through additional resources, scaffolded tasks, targeted questioning and self assessment. Peer assessment – this will happen throughout the course with pupils discussing their individual approaches to the task at hand. Classroom discussions – throughout the course each of the concepts will be discussed with pupils being able to offer their opinions of the concepts as well as the teacher tackling misconceptions.
RE-ESTABLISH	
Learning Skills – how are you going to re-establish the skills for learning?	**Relationships** – how are you going to re-establish classroom relationships?
Introduction lesson: re-establish rules for the Computer Science classroom. Discussion of course, I.E. layout, modules overview, assessments. Each lesson starts with an overview of topics covered in that lesson as well as each new module includes an overview of topics that will be in that module. Discussion of exam key words. Computing baseline.	Introductory ice breaking task. Discussions in classroom around different topics based on current lesson, challenging concepts posed by the teacher, in a respectful way, is encouraged. Introduction focused on kindness and compassion Attempt to embed more classroom dialogue into planning. E.g. how data theft is part of everyday life, and what we should do about it.

Routine in look and structure of lesson with recap lessons at the end of each cycle.	
OPPORTUNITIES	
Discussion – what are the discussion based opportunities?	**Group** – what are the group work based opportunities (while still ensuring social distancing)?
Reflective discussion at the end of each lesson that looks at how pupils solved the problem using different solutions, discussing their approach and the benefits and drawbacks to each solution	Peer assessment, during the discussions held at the end of the lessons Group presentation work, where pupils will: research, create and present and PowerPoint presentation on a topic the teacher chooses Reflective discussion at the end of each lesson that looks at how pupils solved the problem posed using different solutions, discussing their approach and the benefits and drawbacks to each solution

Delivery

		1) Lesson Type (classroom or blended for remote homework)		2) DNA (Do Now Activity/Reading)	3) Learning Intentions (what, why & how)	
1		Classroom (whole sequence completed)	☐	**BEBRAS Activity**	What	The key terms for tackling problems
		Blended (live and remote as independent study) **IF A BLENDED LEARNING APPROACH IS REQUIRED, AN**	☐		Why	To practice methods of problem solving
					How	**E** To understand and explain the term algorithm

		ALTERNATIVE SCHEME OF WORK ON THE SAME CONTENT IS AVAILABLE FROM THE TEACH COMPUTING HOME TEACHING REPOSITORY (6 LESSONS AVAILABLE). https://teachcomputing.org/home-teaching/python-programming-pathway-1/ **THIS SERIES OF LESSONS COVERS THE SAME TOPICS BUT IN A MORE USER-FRIENDLY FORMAT FOR PUPILS STUDYING AT HOME.**			**4 – 5** To understand and explain the term decomposition **5 +** To understand and explain the term abstraction	
	Number of lessons in cycle:	4) New Material (previous learning/ new material)		5) Check for Understanding (questioning/checking)	6) Prepare for Practice (model/ scaffold)	Synchronous (live)
		Algorithms, decomposition, abstraction, problem solving, flowcharts, pseudo-code		**The starter is used to gauge prior knowledge of problem solving** **Use of various questioning techniques throughout the lesson**	The teacher will, during the discussions, challenge any misconceptions and guide the discussions to keep them on topic	
		7) Deliberate Practice (guided/ independent)		8) Feedback (light/deep)	9) Review (daily/monthly)	Asynchronous (remote)
		The task is a group discussion around the key terms		**The teacher will ask for volunteers to provide their answers with the group**	Review will take place monthly	
2		1) Lesson Type (classroom or blended for remote homework)		2) DNA (Do Now Activity/Reading)	3) Learning Intentions (what, why & how)	
		Classroom (whole sequence completed)	☐	**BEBRAS Activity**	What: solving problems Systematically Why: Applying systematic approaches to problems	
		Blended (live and remote as independent study)	☐			

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	Number of lessons in cycle:	4) New Material (previous learning/ new material)	5) Check for Understanding (questioning/checking)	6) Prepare for Practice (model/ scaffold)	Synchronous (live)
		Algorithms, decomposition, abstraction, problem solving, flowcharts, pseudo-code	**The groups are required to re-read a long and verbose brief, this is to give them an opportunity to utilise abstraction, which will be checked against the example and the teachers own version** **Use of various questioning techniques throughout the lesson**	At the task stage the teacher will model their abstracted brief, and their decomposition of the solution	
		7) Deliberate Practice (guided/ independent)	8) Feedback (light/deep)	9) Review (daily/monthly)	Asynchronous (remote)
		The task will be complete independently	**The teacher will ask for volunteers to demonstrate their abstraction and decomposition.**	Review will take place monthly	
3		1) Lesson Type (classroom or blended for remote homework)	2) DNA (Do Now Activity/Reading)	3) Learning Intentions (what, why & how)	

		Classroom (whole sequence completed)	☐	**BEBRAS Activity**	What: solving problems Systematically Why: Applying systematic approaches to problems How: **E** Demonstrate decomposition and abstraction; **3 - 4** Use flowcharts to plan a solution; **5 +** Use pseudocode to plan a solution	
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		Algorithms, decomposition, abstraction, problem solving, flowcharts, pseudo-code		**The starter is used to ensure the concepts of last lesson are fully understood,** **Use of various questioning techniques throughout the lesson**	At the task stage the teacher will model their flowchart, and their pseudo-code for the solution	
		7) Deliberate Practice (guided/ independent)		8) Feedback (light/deep)	9) Review (daily/monthly)	Asynchronous (remote)
		The task will be complete independently		**The teacher will ask for volunteers to demonstrate their flowchart and pseudo-code**	Review will take place monthly	
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		The task will be complete independently		**The teacher will ask for volunteers to demonstrate their flowchart and pseudo-code**	Review will take place monthly	

5

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Number of lessons in cycle:

4) New Material (previous learning/ new material)	5) Check for Understanding (questioning/checking)	6) Prepare for Practice (model/ scaffold)	
Algorithms, decomposition, abstraction, problem solving, flowcharts, pseudo-code	**The starter is used to ensure the concepts of last lesson are fully understood, Use of various questioning techniques throughout the lesson**	At the task stage the teacher will model their flowchart, and their pseudo-code for the solution	Synchronous (live)
7) Deliberate Practice (guided/ independent)	8) Feedback (light/deep)	9) Review (daily/monthly)	
The task will be complete independently	**The teacher will ask for volunteers to demonstrate their flowchart and pseudo-code**	Review will take place monthly	Asynchronous (remote)

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<tr><td rowspan="5">6</td><td></td><td colspan="2">1) Lesson Type
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<table>
<tr><td>What</td><td>solving problems Systematically</td></tr>
<tr><td>Why</td><td>To compare algorithms to understand efficiency</td></tr>
<tr><td>How</td><td>
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<tr><td>E</td><td>Identify what an algorithm does</td></tr>
<tr><td>4 – 5</td><td>Understand that more than one algorithm can be used to solve the same problem.</td></tr>
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					How	**E**	Understand and explain how the linear search algorithm works. Understand and explain how the binary search algorithm works
						4 – 5	Understand and explain how the merge sort algorithm works. Understand and explain how the bubble sort algorithm works.
						5 +	Compare and contrast linear and binary search algorithms. Compare and contrast merge sort and bubble sort algorithms.
	N ⊃	4) New Material (previous learning/ new material)		5) Check for Understanding (questioning/checking)	6) Prepare for Practice (model/ scaffold)		Synchron

		Algorithms, decomposition, abstraction, problem solving, flowcharts, pseudo-code	**The starter is used to ensure the concepts of last lesson are fully understood,** **Use of various questioning techniques throughout the lesson**	The teacher will model the differences between the algorithms after the students have presented their research findings	
		7) Deliberate Practice (guided/ independent)	8) Feedback (light/deep)	9) Review (daily/monthly)	Asynchronous (remote)
		The task will be complete independently	**The teacher will feedback to the groups regarding their presentation**	Review will take place monthly	