

Computer Based Math to CCR Framework Matrix

Computer Based Math https://www.computerbasedmath.org/		Knowledge		Interdisciplinary Themes							Competencies												
		Traditional Disciplines	Modern Disciplines	Environmental Literacy	Global Literacy	Civic Literacy	Information Literacy	Digital Literacy	Systems Thinking	Design Thinking	Computational Thinking	Skills				Character					Meta-Learning		
												Creativity	Critical Thinking	Communication	Collaboration	Mindfulness	Curiosity	Courage	Resilience	Ethics	Leadership	Metacognition	Growth Mindset
CT Confidence to Tackle New Problems	Recalling the four-step process											X											
	Applying the four-step process											X											
	Managing the process of breaking large problems into small problems											X											
	Applying existing tools in new contexts														X							X	
	Knowing how to teach yourself new tools							X	X							X							X
	Interpreting others' work												X	X									
IF Instinctive Feel for Maths	Identify the usefulness of maths for a given real-world problem											X			X								
	Assessing the plausibility of maths or mathematical concepts being useful																				X		
	Identifying fallacies and misuse of mathematical concepts											X				X							
	Having a feel for how reliable a model will be								X			X										X	
	Estimating a solution of the defined problem											X											
DQ Defining the Question (Step 1 of the CBM Solution Helix)	Filtering the relevant information from available information						X	X				X											
	Identifying missing information to be found or calculated						X					X		X									
	Stating precise questions to tackle												X										
	Identifying, stating, and explaining assumptions being made													X							X		

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AM Abstracting to Mathematical Concepts (Step 2 of the CBM Solution Helix)	Identifying the purpose of the abstraction												X									X		
	Creating diagrams to structure knowledge												X											
	Identifying relevant mathematical concepts and their associations													X								X		
	Understanding the relative merits of the concepts available													X										
	Being able to present alternative abstractions													X		X								
CM Concepts of Maths (Step 2 of the CBM Solution Helix of Maths)	Being able to describe the concept														X									
	Recognising whether the concept applies													X										
	Knowing which tools are relevant to the concept							X							X									
	Having intuition for the relative merits of the concept								X					X								X		
TM Tools of Maths (Step 2 of the CBM Solution Helix of Maths)	Having intuition about the tool's behaviour								X					X										
	Being aware of comparable tools								X						X									
	Understanding the relative merits of different tools for use in the context								X	X				X										

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MC Managing Computations (Step 3 of the CBM Solution Helix of Maths)	Choosing an appropriate technology						X							X		X							
	Being able to interpret documentation for the tool						X	X															
	Assessing the feasibility of getting a useful answer																X						
	Composing appropriate and accurate input for the tool						X					X		X									
	Applying the tool or demonstrating experience of its application						X															X	
	Having intuition about whether the output of the tool was appropriate for the context						X						X										X
	Combing tools to produce results required						X					X					X						X
	Isolating the cause(s) of operational problems						X						X					X				X	X
	Resolving operational problems												X					X					X
	Optimising both speed or obtaining results and reusability or computation						X							X				X					X
IN Interpreting (Step 4 of the CBM Solution Helix of Maths)	Reading common and relevant representations and notations						X	X															
	Making statements about the output in the context of the original problem													X		X							X
	Identifying and relating features of the output to real-world meaning												X										X
	Identifying interesting features in results											X	X	X			X						X
	Inferring a hypothesis beyond the current investigation												X										X

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CV Critiquing and Verifying	Quantifying the validity and impact of the assumptions made											X									X		
	Quantifying the validity and impact of tools and concepts chosen												X									X	
	Listing possible sources of error from computation failures or limitations												X	X					X				X
	Listing possible sources of error from concepts' limitations											X	X	X					X				X
	Identifying systematic and random errors												X	X					X				X
	Being able to corroborate your results													X					X				X
	Qualifying reliability of sources													X								X	
	Deciding if the results are sufficient to move to the next step, including whether to abandon														X				X				X
GM Generalising a Model/Theory/ Approach	Identify similarities and differences between different situations for the purposes of abstraction												X	X									
	Taking constants from initial model and making them variable parameters													X									X
	Being able to draw wider conclusions about the behaviours of a type of problem													X									X
	Implementing a generalised model as a robust program													X								X	

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CC Communicating and Collaborating	Distilling or explaining ideas visually												X											
	Distilling or explaining ideas verbally												X											
	Distilling or explaining ideas through written description												X											
	Using vocabulary, symbols, diagrams, code accurately and appropriately for your audience						X						X											
	Choosing the best form of communication for a given purpose												X		X									
	Structuring and producing a presentation or report												X											
	Being able to work effectively in a group to solve a problem								X				X	X										
	Deciding which facts support or hinder an argument												X	X		X							X	
	Understanding and critiquing ideas presenting to you												X	X										X
	Using techniques for question, interrogation, cross-examining												X	X	X									