Beauty and Joy of Computing Mapping to AP CSP Framework

Enduring Understandings						Learning Objectives					
Big Idea 1: Creativity						**Big Idea 1: Creativity**					
1.1 Creative development can be an essential process for creating computational artifacts.		U2				1.1.1 Apply a creative development process when creating computational artifacts. [P2]		U2			
1.2 Computing enables people to use creative development processes to create computational artifacts for creative expression or to solve a problem.		U2		U4		1.2.1 Create a computational artifact for creative expression. [P2]		U2			
						1.2.2 Create a computational artifact using computing tools and techniques to solve a problem. [P2]			U3	U4	
						1.2.3 Create a new computational artifact by combining or modifying existing artifacts. [P2]				U4	U5
						1.2.4 Collaborate in the creation of computational artifacts. [P6]		U2			
						1.2.5 Analyze the correctness, usability, functionality, and suitability of computational artifacts.[P4]			U3	U4	U5
1.3 Computing can extend traditional forms of human expression and experience.		U2				1.3.1 Use computing tools and techniques for creative expression. [P2]		U2			
Big Idea 2: Abstraction						**Big Idea 2: Abstraction**					
2.1 A variety of abstractions built upon binary sequences can be used to represent all digital data.			U3	U4		2.1.1 Describe the variety of abstractions used to represent data. [P3]				U4	
						2.1.2 Explain how binary sequences are used to represent digital data. [P5]				U4	
2.2 Multiple levels of abstraction are used to write programs or create other computational artifacts.	U1	U2	U3			2.2.1 Develop an abstraction when writing a program or creating other computational artifacts.[P2]	U1	U2	U3		
						2.2.2 Use multiple levels of abstraction to write programs. [P3]		U2	U3		
						2.2.3 Identify multiple levels of abstractions that are used when writing programs. [P3]			U3		
2.3 Models and simulations use abstraction to generate new understanding and knowledge.					U5	2.3.1 Use models and simulations to represent phenomena. [P3]					U5
						2.3.2 Use models and simulations to formulate, refine, and test hypotheses. [P3]					U5
Big Idea 3: Data and Information						**Big Idea 3: Data and Information**					
3.1 People use computer programs to process information to gain insight and knowledge.				U4	U5	3.1.1 Use computers to process information, find patterns, and test hypotheses about digitally processed information to gain insight and knowledge. [P4]				U4	
						3.1.2 Collaborate when processing information to gain insight and knowledge. [P6]				U4	U5
						3.1.3 Explain the insight and knowledge gained from digitally processed data by using appropriate visualizations, notations, and precise language. [P5]				U4	U5
3.2 Computing facilitates exploration and the discovery of connections in information.		U2	U3	U4		3.2.1 Extract information from data to discover and explain connections, patterns, or trends. [P1]				U4	
						3.2.2 Use large data sets to explore and discover information and knowledge. [P3]		U2			
3.3 There are trade offs when representing information as digital data.	U1	U2				3.3.1 Analyze how data representation, storage, security, and transmission of data involve computational manipulation of information. [P4]	U1	U2			U5
Big Idea 4: Algorithms						**Big Idea 4: Algorithms**					
4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages.	U1	U2		U4		4.1.1 Develop an algorithm for implementation in a program. [P2]	U1	U2		U4	
						4.1.2 Express an algorithm in a language. [P5]	U1			U4	
4.2 Algorithms can solve many but not all computational problems.					U5	4.2.1 Explain the difference between algorithms that run in a reasonable time and those that do not run in a reasonable time. [P1]					U5
						4.2.2 Explain the difference between solvable and unsolvable problems in computer science. [P1]					U5
						4.2.3 Explain the existence of undecidable problems in computer science. [P1]					U5
						4.2.4 Evaluate algorithms analytically and empirically for efficiency, correctness, and clarity. [P4]					U5
Big Idea 5: Programming						**Big Idea 5: Programming**					
5.1 Programs can be developed for creative expression, to satisfy personal curiosity, to create new knowledge, or to solve problems (to help people, organizations, or society).	U1	U2	U3			5.1.1 Develop a program for creative expression, to satisfy personal curiosity, or to create new knowledge. [P2]				U4	
						5.1.2 Develop a correct program to solve problems. [P2]	U1	U2			
						5.1.3 Collaborate to develop a program. [P6]	U1	U2	U3		
5.2 People write programs to execute algorithms.	U1	U2	U3		U5	5.2.1 Explain how programs implement algorithms. [P3]	U1	U2			U5
5.3 Programming is facilitated by appropriate abstractions.	U1	U2	U3			5.3.1 Use abstraction to manage complexity in programs. [P3]	U1	U2	U3		
5.4 Programs are developed, maintained, and used by people for different purposes.		U2		U4		5.4.1 Evaluate the correctness of a program. [P4]	U1	U2			
5.5 Programming uses mathematical and logical concepts.	U1	U2	U3	U4		5.5.1 Employ appropriate mathematical and logical concepts in programming. [P1]	U1	U2	U3	U4	
Big Idea 6: The Internet						**Big Idea 6: The Internet**					
6.1 The Internet is a network of autonomous systems.				U4		6.1.1 Explain the abstractions in the Internet and how the Internet functions. [P3]				U4	
6.2 Characteristics of the Internet influence the systems built on it.				U4		6.2.1 Explain characteristics of the Internet and the systems built on it. [P5]				U4	
						6.2.2 Explain how the characteristics of the Internet influence the systems built on it. [P4]				U4	U5
6.3 Cybersecurity is an important concern for the Internet and the systems built on it.			U3	U4		6.3.1 Identify existing cybersecurity concerns and potential options to address these issues with the Internet and the systems built on it. [P1]			U3	U4	U5
Big Idea 7: Global Impact						**Big Idea 7: Global Impact**					
7.1 Computing enhances communication, interaction, and cognition.		U2		U4	U5	7.1.1 Explain how computing innovations affect communication, interaction, and cognition. [P4]		U2		U4	
						7.1.2 Explain how people participate in a problem-solving process that scales. [P4]		U2			U5
7.2 Computing enables innovation in nearly every field.			U3		U5	7.2.1 Explain how computing has impacted innovations in other fields. [P1]					U5
7.3 Computing has a global affect -- both beneficial and harmful -- on people and society.	U1	U2		U4		7.3.1 Analyze the beneficial and harmful effects of computing. [P4]	U1	U2		U4	
7.4 Computing innovations influence and are influenced by the economic, social, and cultural contexts in which they are designed and used.	U1			U4	U5	7.4.1 Explain the connections between computing and economic, social, and cultural contexts. [P1]	U1			U4	U5
7.5 An investigative process is aided by effective organization and selection of resources. Appropriate technologies and tools facilitate the accessing of information and enable the ability to evaluate the credibility of sources.			U3	U4		7.5.1 Access, manage, and attribute information using effective strategies. [P1]				U4	
						7.5.2 Evaluate online and print sources for appropriateness and credibility [P5]			U3	U4	