

Poway Unified School District
Career Technical Education Program
Course Outline/Competencies/Standards

AP Computer Science A
PUSD Course#: 001056, 001057

Approved Hours: 180

School/Teacher: DNHS/John Mortensen, MCHS/Michael Engebrits, Patty Brooks, RBHS/Justin Couvrette, PHS/Bailey Tormey, Bennett Guillume, WVHS/Dom David

Course Outline	Assessments	Competencies	CTE/ Common Core Curriculum Standards	
			CTE	CC

PRIMITIVE TYPES				
Variables and Data Types Expressions and Assignment Statements Compound Assignment Operators Casting and Ranges of Variables Introduction to an Integrated Development Environment Introduction to an IDE	Formative Entry/Exit Slip Assessments Participation Discussions Short Programming Exercises Quizzes CollegeBoard Unit 1 Progress Checks Summative Unit Test Project	Call <code>System</code> class methods to generate output to the console. Create <code>String</code> literals. Identify the most appropriate data type category for an articular specification. Declare variables of the correct types to represent primitive data. Evaluate arithmetic expressions in a program code. Evaluate what is stored in a variable as a result of an expression with an assignment statement Evaluate what is stored in a variable as a result of an expression with an assignment statement. Evaluate arithmetic expressions that use casting. Create java projects in an Integrated Development Environment (Eclipse, VS Studio) SKILLS (Define at the bottom of the document): 1.A, 1.B, 2.B, 4.B, 5.A	C4.1 C4.3 C4.4 C4.6 SCRP: 1, 2, 4	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2, 11-12.3, 11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6) C (5) G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6) S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
USING OBJECTS				
Objects: Instances of Classes Creating and Storing Objects Calling methods	Formative Entry/Exit Slip Assessments Participation Discussions	Explain the relationship between a class and an object. Identify, using its signature, the correct constructor being called.	C4.7 C4.8 SCRP: 5, 9, 10	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2,11-12.3,

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String Objects and Literals String Methods Wrapper Classes: Integer, Double Using the Math Class	Programming Exercises Drawing Lab Quizzes CollegeBoard Unit 2 Progress Checks Summative Unit Test	Create objects by calling different constructors Define variables of the correct types to represent reference data. Call non-static void methods with or without parameters. Create String objects and use String class methods Be familiar with the use of the Integer and Double wrapper classes. Evaluate expressions that use the Math class methods. Evaluate Boolean expressions that use relational operators in program code. SKILLS: 1.B, 1.C, 2.A, 2.C, 3.A, 5.A		11-12.3,11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6) C (5) G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,2,3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6) S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10, 15, 16)
BOOLEAN EXPRESSIONS AND IF STATEMENTS				
Boolean Expressions if Statements and Control Flow if-else Statements else if Statements Compound Boolean Expressions Equivalent Boolean Expressions Comparing Objects	Formative Short Debugging Exercises Programming Exercises Introduction to GitHub for Eclipse Quizzes CollegeBoard Unit 3 Progress Checks Summative Pong - First GUI-Based Program	Represent branching logical processes by using conditional statements. Compare and contrast equivalent Boolean expressions. Compare object references using Boolean expressions in program code. Follow starter code for a GUI-based java project Write if-statements for keyboard input of a java program	C4.9 SCRP: 5,7	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2,11-12.3, 11-12.3,11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6) C (5)

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Introduction to Graphic-User-Interface in java	Unit Test	Use java drawing methods to draw shapes in java Complete a java program that uses a GUI for the simple game of Pong SKILLS: 2.A, 2.B, 3.A, 3.C, 4.A, 4.C		G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6) S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
ITERATION				
while Loops for Loops Developing Algorithms for Strings Nested Iteration Code Analysis	Formative Entry/Exit Slip Assessments Participation Discussions Short Debugging Exercises Programming Exercises Quizzes CollegeBoard Unit 4 Progress Checks Summative Unit Test	Represent iterative processes using a while or for loop. Identify, modify, and develop standard String-related algorithms Represent nested iterative processes Compute statement execution counts and informal run-time comparison of iterative statements. SKILLS: 1.B, 2.B, 2.D, 3.C, 4.C, 5.C	C4.9 SCRP: 5, 10	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2, 11-12.3, 11-12.3, 11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6) C (5) G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6)

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				S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
WRITING CLASSES				
Anatomy of a Class Constructors Code Comments Accessor/Getter Methods Mutator/Setter Methods Writing Methods Static Variables and Methods Scope and Access this Keyword	Formative Entry/Exit Slip Assessments Participation Discussions Short Debugging Exercises Programming Exercises Quizzes Introduction to AP-Level FRQs Style 1 - Methods and Control Structures Introduction to AP-Level FRQs Style 2 - Classes CollegeBoard Unit 5 Progress Checks Summative Unit Test DuckHunt Project	Designate access and visibility constraints to classes, data, constructors, and methods. Designate private visibility of instance variables to encapsulate the attributes of an object. Define instance variables for the attributes to be initialized through the constructors of a class. Describe the functionality and use of program code through comments. Define behaviors of an object through non-void methods without parameters written in a class. Define behaviors of a class through static methods. Define the static variables that belong to the class. Explain where variables can be used in the program code. Evaluate object reference expressions that use the keyword this SKILLS: 1.A,1.B, 1.C, 2.C, 3.B, 4.B, 5.A, 5.B, 5.D	C4.5 C4.8 C4.11 SCRP: 9, 11	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2,11-12.3, 11-12.3,11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1-2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6) C (5) G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,2,3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6) S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
ARRAY				
Creation and Access Traversing Arrays	Formative Entry/Exit Slip Assessments Participation	Represent collections of related primitive or object reference data using one dimensional (1D) array objects.	C4.7	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6)

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Enhanced for Loops for Arrays Reading, Modifying, and Developing Algorithms Using Arrays	Discussions Debugging and Programming Exercises Quizzes CollegeBoard Unit 6 Progress Checks Summative Frogger / Agario Project Unit Test	Traverse the elements in a 1D array using a while, for, or enhanced for loop. Identify, modify and develop array traversals algorithms. Integrate 1D Arrays, Loops, and Objects into a GUI-Based java program. SKILLS: 1.C, 2.B, 4.B, 4.C, 5.D	SCRP: 2, 10	RSIT (11-12.1, 11-12.2, 11-12.3, 11-12.3, 11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,7,8,9,10) F-LE (5,6) C (5) G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,2,3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6) S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
ARRAYLIST				
Introduction to ArrayList ArrayList Methods Traversing ArrayLists Reading, Modifying and Developing Algorithms Using ArrayList Searching - Sequential Sorting: Insertion, Selection	Formative Entry/Exit Slip Assessments Participation Discussions Debugging & Programming Exercises FRQ Practice (AP Prep) Quizzes	Represent collections of related object reference data using ArrayList objects. Traverse ArrayList objects using while, for, and enhanced loops. Identify, modify and develop algorithms involving traversals Apply sequential/linear search algorithms to search for specific information in an array or ArrayList of objects.	C4.7 C4.10 SCRP: 4, 5	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2, 11-12.3, 11-12.3, 11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6)

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	Infection Simulation / Agar.io Clone Re-visited with ArrayList and dynamically adding objects into simulation CollegeBoard Unit 7 Progress Checks Summative Unit Test	Apply selection sort and insertion sort algorithms to sort the elements of an array or <code>ArrayList</code> objects. Compute statement execution counts and informal run-time comparison of sorting algorithms. SKILLS: 1.B, 2.C, 2.D, 5.C		C (5) G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1, 3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6) S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
2D ARRAY				
Creation and Access Traversing 2D Arrays Reading, Modifying and Developing Algorithms using 2D Arrays	Formative Entry/Exit Slip Assessments Participation Discussions Debugging & Programming Exercises MagicSquares FRQ Practice (AP Prep) Quizzes CollegeBoard Unit 8 Progress Checks Picture Lab / 2048 Summative Unit Test	Represent collections of related primitive or object reference data using two-dimensional (2D) array objects. Traverse 2D array objects using while, for, or enhanced for loops. Identify or modify algorithms requiring 2D array traversals Write program code to create, traverse, and manipulate elements in 2D array objects. SKILLS: 1.B, 1.C, 2.B, 2.D, 4.A,	C4.7 SCRP: 7	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2,11-12.3, 11-12.3,11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6) C (5) G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,3) G-SRT (1.2.3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6)

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				S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
INHERITANCE				
Creating Superclasses and Subclasses Writing Constructors for Subclasses	Formative Entry/Exit Slip Assessments Participation Discussions Programming Exercises Elevens Lab Quizzes CollegeBoard Unit 9 Progress Checks Summative Unit Test	Create an inheritance relationship from a subclass to the superclass Define reference variables of a superclass to be assigned to an object of a subclass in the same hierarchy. Call methods in an inheritance relationship. Call Object class methods through inheritance. SKILLS: 1.A, 1.C, 3.A, 3.B, 5.A, 5.D	C4.5 C4.8 SCRP: 7	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2, 11-12.3, 11-12.3, 11-12.3, 11-12.5, 11-12.6) WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6) C (5) G-CO (6,7,8,12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,2,3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6) S-ID(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
RECURSION				
Determining the result of recursive methods Writing simple recursive methods: Determining base cases and recursive calls	Formative Programming Exercises	Apply recursive search algorithms to information in String, 1D array, or ArrayList objects. Apply recursive algorithms to sort elements of an array or ArrayList objects.	C4.9 C4.10 C5.3 C5.6 SCRP: 11	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) RSIT (11-12.1, 11-12.2, 11-12.3, 11-12.3, 11-12.5, 11-12.6)

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Recursive Traversals on <code>ArrayLists</code> and Strings Recursive Searching Algorithm: Binary Search Recursive Sorting Algorithm: Merge Sort	Fractal Drawing in Java - Recursively Drawing Shapes Recursive Method Tracing Exercises Quizzes CollegeBoard Unit 10 Progress Checks Summative Unit Test Group Project	Determine the result of executing recursive methods. SKILLS: 1.B, 2.B, 2.D, 5.A		WS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6, 11-12.8, 11-12.9) A-CED (1,2,3,4) A-REI (1,2) F-IF (1,2,3,4,5,6,7,8,9,10) F-LE (5,6) C (5) G-CO (6,7,8, 12) G-GMD (1,2,3,5) G-GPE (4,5,6,7) G-MG (1,2,3) G-SRT (1,2,3) N-RN (1,2) N-Q (1,2,3) N-CN (4,5,6) N-VM (6,7,8,9,10,11,12) S-IC(1,2,3,5,6) S-MD (1,2,3,4,5,6,7) APPS (10,15,16)
ETHICAL COMPUTING				
Ethical and Social Implications of Computing Systems Ethical Issues Around Data Collection	Formative Discussions	Explain the risks to privacy from collecting and storing personal data on computer systems.	C8.3 C8.6 C8.8 C10.1 SCRP: 8, 12	LS (11-12.1, 11-12.2, 11-12.3, 11-12.4, 11-12.5, 11-12.6) A-CED (1,2,3,4) G-GPE (4,5,6,7) G-MG (1,2,3) N-Q (1,2,3) N-CN (4,5,6) S-IC(1,2,3,4,5,6) S-MD (1,2,3,4,5,6,7)

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SKILLS

1.A Determine an appropriate program design to solve a problem or accomplish a task. 1.B Determine code that would be used to complete code segments. 1.C Determine code that would be used to interact with completed program code.	2.A Apply the meaning of specific operators. 2.B Determine the result or output based on statement execution order in a code segment without method calls (other than output). 2.C Determine the result or output based on the statement execution order in a code segment containing method calls. 2.D Determine the number of times a code segment will execute.	3.A Write program code to create objects of a class and call methods. 3.B Write program code to define a new type by creating a class. 3.C Write program code to satisfy method specifications using expressions, conditional statements, and iterative statements. 3.D Write program code to create, traverse, and manipulate elements in a 1D array or ArrayList objects. 3.E Write program code to create, traverse, and manipulate elements in 2D array objects.	4.A Use test cases to find errors or validate results. 4.B Identify errors in program code. 4.C Determine if two or more code segments yield equivalent results	5.A Describe the behavior of a given segment of program code. 5.B Explain why a code segment will not compile or work as intended. 5.C Explain how the result of program code changes, given a change to the initial code. 5.D Describe the initial conditions that must be met for a program segment to work as intended or described.
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