

Cornwall-Lebanon School District Curriculum Overview

AP Computer Science A- High School

<div style="border: 1px solid red; padding: 2px; display: inline-block;">33</div> length of time in weeks	Concepts & Competencies	Common Assessments	Academic Standards (PA Core if applicable)
Unit 1 <div style="border: 1px solid red; padding: 2px; display: inline-block; margin-top: 10px;">5</div>	<p style="text-align: center;"><u>Java Basics</u></p> <p>A. Student will be able to write algorithms that include sequential, conditional and iterative control.</p> <p>B. Student will be able to analyze algorithms through statement execution counts and information run-time comparisons.</p> <p>C. Student will be able to analyze problems and develop potential solutions using RAD and pseudocode.</p> <p>D. Student will be able to use primitive data types int, double and Boolean.</p> <p>E. Student will be able to use final keyword for final block scope constants and static final class scope constants.</p> <p>F. Student will be able to use arithmetic operators: +, -, *, /, and %.</p> <p>G. Student will be able to use assignment operators: =, +=, -=, *=, /= and %=.</p> <p>H. Student will be able to use the postfix form of the increment/decrement operators ++ and --.</p> <p>I. Student will be able to use /* */, and // comments.</p> <p>J. Student will be able to use numeric casts (int) and (double) and understand "truncation towards 0" behavior as well as the fact that positive floating-point numbers can be rounded to the nearest integer as (int)(x + 0.5), negative numbers as (int)(x - 0.5).</p> <p>K. Student will be able to use System.out.print and System.out.println for program output.</p> <p>L. Student will be able to recognize and fix compile-time, run-time and logic errors using a debugger, adding extra output statements or hand-tracing code.</p>	<ul style="list-style-type: none"> ➤ Programming Project Completion ➤ Unit 1 Test 	APCS A Subset

		<p>M. Student will be able to convert numerical representations of integers between different number bases (binary, octal, hexadecimal).</p> <p>N. Student will be able to use reference types such as the String class and its associated methods: length(), equals(other), substring (to, from), substring (from), indexOf(str), compareTo(other) as well as String concatenation, conversion of numbers to strings and invoking of toString on objects.</p> <p>O. Student will be able to use escape sequences inside strings \\, \", \n.</p> <p>P. Student will be able to use relational operators (==, !=, <, >=) and logical operators (&&, , !) including the "short circuit" evaluation of the && and operators.</p> <p>Q. Student will be able to use control structures if, if/else, while, for, enhanced for (for-each) and return.</p> <p>R. Student will be able to use control structures if, if/else, while, for, enhanced for (for-each) and return.</p> <p>S. Student will be able to create, fill and traverse one-dimensional arrays of both primitive types (e.g., int[]) and objects (e.g., String[]) to include initialization of named arrays (int[] arr = { 1, 2, 3 };;).</p>		
Unit 2	6	<p>Advanced Java</p> <p>A. Student will be able to use the Math class and its associated methods: abs(int x), abs(double x), pow(base, exponent), sqrt(double x) and random().</p> <p>B. Student will be able to use the Integer class, its constructor, its intValue() method and its MIN_VALUE and MAX_VALUE constants.</p> <p>C. Student will be able to use the Double class, its constructor and its doubleValue() method.</p> <p>D. Student will understand the difference between object equality (equals) and identity (==).</p> <p>E. Student will be able to understand the exceptions that occur when their programs contain errors (in particular, NullPointerException, ArrayIndexOutOfBoundsException, ArithmeticException, ClassCastException, IllegalArgumentException).</p>	<ul style="list-style-type: none"> ➤ Programming Project Completion ➤ Unit 2 Test 	APCS A Subset

		<p>F. Student will be able to use the List interface to create and use ArrayLists and its associated methods: size(), add(obj), add(index, obj), get(index), set(index, obj), and remove(index).</p> <p>G. Student will be able to create, fill and traverse two-dimensional including understanding that arr[0].length is the number of columns in a rectangular two-dimensional array.</p> <p>H. Student will be able to understand the use of recursion and trace through code that applies it.</p> <p>I. Student will be able to analyze the logic behind programming code and identify correct outcomes.</p> <p>J. Student will be able to provide an overview of the key steps and considerations related to software engineering and design.</p> <p>K. Student will be able to use both top-down and bottom-up implementation techniques.</p> <p>L. Student will be able to develop program methods using procedural abstraction.</p> <p>M. Student will be able to develop appropriate test cases including boundary cases and perform both unit and integration testing.</p> <p>N. Student will be able to identify program correctness through pre- and post-condition and assertions.</p>		
Unit 3	6	<p>Object Oriented Java</p> <p>A. Student will be able to write a class definition when given a general description of the class.</p> <p>B. Student will be able to identify and use method overloading (e.g. MyClass.method(String str) and MyClass.method(int num)) and understand that the signature of a method depends only on the number, types, and order of the parameters, and not on its return type.</p> <p>C. Student will be able to use visibility modifiers such as public classes and private instance variables, and public or private for methods, constructors and constants (static final variables).</p> <p>D. Student will be able to implement constructors that initialize all instance variables.</p> <p>E. Student will be able to describe the connection between OOP and encapsulation/information hiding.</p> <p>F. Student will be able to construct objects with the new operator, to supply construction parameters, and to invoke accessor and modifier methods as well as modify existing</p>	<ul style="list-style-type: none"> ➤ Programming Project Completion ➤ Unit 3 Test 	APCS A Subset

		<p>classes (by adding or modifying methods and instance variables) and designing new classes.</p> <p>G. Student will be able to use static methods appropriately by invoking them only through a class, never an object (i.e., <code>ClassName.method()</code>, not <code>obj.method()</code>).</p> <p>H. Student will be able to use static final variables.</p> <p>I. Student will be able to assign and check for null references.</p> <p>J. Student will be able to use the keyword “this” to pass the implicit parameter in its entirety to another method (e.g., <code>obj.method(this)</code>) and for descriptions such as “the implicit parameter this”.</p> <p>K. Student will be able to use basic code packages and have a reading knowledge of import statements of the form: <code>import packageName.subpackageName.ClassName;</code></p>		
Unit 4	9	<p><u>Inheritance</u></p> <p>A. Student will understand inheritance hierarchies.</p> <p>B. Student will be able to extend classes and have a knowledge of inheritance that includes understanding the concepts of method overriding and polymorphism and implementation of their own subclasses.</p> <p>C. Student will be able to use the keyword “super” to invoke a superclass constructor (<code>super(args)</code>) or to invoke a superclass method (i.e., <code>super.method(args)</code>).</p> <p>D. Student will understand that conversion from a subclass reference to a superclass reference is legal and does not require a cast and that class casts (generally from <code>Object</code> to another class) are part of the AP Java subset, to enable the use of generic collections, for example: <code>Person p = (Person)people.get(i);</code></p> <p>E. Student will be able to define his/her own abstract class and read the definitions of abstract classes and understand that the abstract methods need to be redefined in non-abstract classes.</p>	<ul style="list-style-type: none"> ➤ Programming Project Completion ➤ Unit 4 Test ➤ Successful Completion of 10-hour Lab 	APCS A Subset
Unit 5	7	<p><u>Interfaces</u></p> <p>A. Student will be able to design, create and modify an interface.</p> <p>B. Student will be able to design, create and modify classes that implement interfaces.</p> <p>C. Student will be able to identify and use interfaces to create polymorphic behavior.</p>	<ul style="list-style-type: none"> ➤ Programming Project Completion ➤ Unit 5 Test ➤ Successful Completion of 10-hour Lab 	APCS A Subset

