Manhattan Center for Science and Math High School

Mathematics Department Curriculum

Content/Discipline AP Computer Science Term 1

http://MCompSciM.weebly.com/

Marking Period 1

Topic and Essential Question

JSS, Chapter 1 - (1) What are computers? (2) What is hardware and software? (3) How are computers networked? (4) What are different programming languages and the basic Java syntax? (5) How do programming languages work?

BPJ, Lessons 1-3 - (1) Hello World (2) Basic variable types (3) Simple String operations

Unit/Topics	Unit #1 - Introduction (JSS Chapter 1) and Java syntax (BPJ, Lessons 1-3)
SWBAT/Objectives	Content ("Know"): Chapter 1 – Introduction 15 days (1) Computer processing & Software categories, (2) Binary, (3) Computer architecture & I/O devices, (4) Memory & CPU, (5) Network connections, (6) Internet & the web, (7) Programming language levels, compilers, interpreters, (8) Syntax & semantics, (9) Types of errors, (10) Java syntax, (11) Computer shopping assignment, (12) Review and retest Chapter 2 – Java syntax 12 days (1) Hello World, (2) Variable types, (3) Simple String operation Skills ("Do"): Chapter 1 – Introduction 15 days (1) Students will be able to explain basic architecture and components of digital computers and networks, and basic programming language features. Chapter 2 – Java syntax 12 days (1) Student will be able to write basic Java programs to output messages. (2) Students will be able to store and concatenate simple values.
Vocabulary/Key Terms	Hardware, software, CPU, memory, analog, digital, binary numbers, input/output, RAM, ROM, von Neumann architecture, network connections/addresses, Internet, web, URL, comments, identifiers, reserved words, white spaces, machine/assembly/higher-level languages, compiler, interpreter, bytecodes, syntax, semantics, logical, runtime, program, statement, variable, store to, concatenate/concatenation, output/print out.

Assessments:	• Unit Test / Quiz • Classwork • Lesson Summary • Homework daily • Warm-up (DO NOW) Quiz next day • Tests • At least one programming projects submitted for almost every lesson
Common Core Standards:	F.IF.7 , F.LE.1, F.LE.2, F.LE.3, F.LE.4, F.IF.8 Common Core Standards for Math Practices: •MP1: Make sense of problems and persevere in solving them. •MP2: Reason abstractly and quantitatively. •MP3: Construct viable arguments and critique the reasoning of others. •MP4: Model with mathematics •MP5: Use appropriate tools strategically •MP6- Attend to precision •MP7: Look for and make use of structure •MP8- Look for and express regularity in repeated reasoning
Differentiated Instruction:	• Flexible grouping • Cooperative Learning • Visual Learning – SMART Board, White board • Visual and interactive questions using the Smart board • Students have an option to view additional videos, tutorials, interactive practice problems online through the class website, MCompSciM.weebly.com
ELLs:	• Students with ELL's will watch videos (the video has English and Spanish both versions) and additional tutorials about the lesson through the class website. • Students are allowed extra time for works and assessments
SWDs:	▪ Preview the Key Terms to give students access to context. ▪ Assign chapter summary to give less proficient readers access to content.

High-Achievers:	❖ Have gifted students assist students that are not as gifted. ❖ Ask students to take on leadership roles when working in groups.
Resources/Books	Cook. "**Blue Pelican Java**", Version 7.0.1A. Virtualbookworm.com Publishing, 2013. Lewis, Leftus, Cocking. "**Java Software Solutions**". 2nd edition. Pearson, 2007. Teukolsky, M.S. "**Barron's Review Book for AP Computer Science A**". Barron's, 7th Edition, 2015. AP Central web site to find past free-response exams and AP Exam information. See www. apcentral.collegeboard.com.

Homework: Per Teacher

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Marking Period 2

Topic and Essential Question

BPJ, Values - (1) Using numeric variables (2) Mixed data types, casting, constants (3) Math class (4) Input from keyboard

BPJ, Flow of Control - (1) boolean type operators (2) if statement (3) switch statement & char

Unit/Topics Lessons 4-7 – Values (BPJ) and Lessons 8-10 – Flow of Control (BPJ) and Lessons 11-14, Loops

SWBAT/Objectives

Content ("Know"):

Lessons 4-7 – Values 6 days
(1) Assignment, Order of operations, Operators, (2) constants, mixed arithmetics, casting, (3) Math class methods(), (4) Input from the keyboard, Scanner class, methods

Lessons 8-10 – Flow of Control 8 days
(1) boolean values and type, precedence, (2) if statement, equals(), (3) switch statement, default, break, char

Lessons 11-14, Loops 14 days - (1) for loop (2) while loop, do-while loop (3) ASCII table (4) Base conversions

Skills ("Do"):

Lessons 4-7 – Values 6 days
(1) Students will be able to store and manipulate numerical values, and perform calculations.
(2) SWBAT apply the differences between integer and floating point numbers, and convert (cast) between types.

Lessons 8-10 – Flow of Control 8 days
(1) Student will be able to perform logic operations and complete truth tables.
(2) SWBAT draw flowcharts of flow of control with if statements, and write code from flowcharts.
(3) SWBAT rewrite switch statements as if-else statements.
(4) SWBAT differentiate between char and String.

Lessons 11-14 – Loops 14 days
(1) Students will be write programs using loops to repeat actions.

	(2) SWBAT convert between different loop types. (3) SWBAT operate on char values and variables. (4) SWBAT convert between different number systems (bases).
Vocabulary/Key Terms	modulus, remainder, order of operations, increment, decrement, declare, assign, final/constant, double, floating point, decimal, casting, ceiling/floor, Scanner, next/Int/Double/Line, boolean, AND, OR, NOT, precedence, equals, if, if-else, switch, char, initialize, control, step, break, infinite loops, scope, ASCII table, bases, number systems
Assessments:	• Unit Test / Quiz • Classwork • Lesson Summary • Homework daily • Warm-up (DO NOW) Quiz next day • Tests • At least one programming projects submitted for almost every lesson
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Marking Period 3

Topic and Essential Question

Lessons 15-16, Classes & Objects - (1) Classes (2) Objects (3) Users

Lessons 17-19, String Methods & Arrays - (1) Advanced String methods (2) Arrays of primitive types and objects

Lessons 20-22, State methods & variables, Wrapper classes - (1) boolean type operators (2) if statement (3) switch statement & char

Unit/Topics Lessons 15-16, Classes & Objects and Lessons 17-18, String Methods & Arrays

SWBAT/Objectives

Content ("Know"):

Lessons 15-16 – Classes & Objects 10 days
(1) Classes, (2) methods, (3) Objects, (4) states and behaviors

Lessons 17-19 – String methods & Arrays 6 days
(1) Declaring and initializing, length, parallel arrays, (2) Passing array to a method, Array of objects, (3) NullPointerException, sort, search, equals, (4) for-each loop

Lessons 20-22, State methods & variables, Wrapper classes 7 days
(1) Class methods and variables, static constants, static imports

Skills ("Do"):

Lessons 15-16 – Classes & Objects 10 days
(1) Students will be able to write programs that use classes to create and interact with objects.

Lessons 17-19 – String methods & Arrays 6 days
(1) Students will be able to perform advanced operations on Strings.
(2) SWBAT instantiate and manipulate arrays of primitive types.
(3) SWBAT manipulate arrays of objects.

Lessons 20-22, State methods & variables, Wrapper classes 7 days
(1) Students will be able to simplify objects with common traits with class methods and variables.

	(2) SWBAT use static constants. (3) SWBAT convert between primitive types and corresponding objects.
Vocabulary/Key Terms	instantiate, methods, state variables, constructor, signature, public, void, private, equality of objects, reassignment of objects, compareTo, indexOf, charAt, length, ArrayIndexOutOfBoundsException, passing values/objects, wrapper classes, static
Assessments:	• Unit Test / Quiz • Classwork • Lesson Summary • Homework daily • Warm-up (DO NOW) Quiz next day • Tests • At least one programming projects submitted for almost every lesson
Common Core Standards:	F.IF.7 , F.LE.1, F.LE.2, F.LE.3, F.LE.4, F.IF.8 Common Core Standards for Math Practices: •MP1: Make sense of problems and persevere in solving them. •MP2: Reason abstractly and quantitatively. •MP3: Construct viable arguments and critique the reasoning of others. •MP4: Model with mathematics •MP5: Use appropriate tools strategically •MP6- Attend to precision •MP7: Look for and make use of structure •MP8- Look for and express regularity in repeated reasoning
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