Table of Contents

Some of the numbered lessons below are marked with an asterisk (*). This indicates they are subjects not covered by the AP A test. All other lessons have at least "potential relevance".

Lesson	Title	Description	Page
1	Hello World	Simple use of println, rems, remarks, comments, block rems. **Project… From Me to You**	1-1
2	Variable Types	String, int, double, legal names, illegal names, declaring, initializing	2-1
3	Simple String Operations	Concatenation, length, substring, toLowerCase, toUpperCase, escape sequences, backslash **Project… Name That Celebrity**	3-1
4	Using Numeric variables	Assignment, ++, --, modulus, +=, -=, /=, *=, PEMDAS, increment, decrement, multiple declarations, remainder, compound operator, round-off**. Project…Cheating on Your Arithmetic Assignment**	4-1
5	Mixed Data Types, Casting, and Constants	final, mixed arithmetic, casting. **Project… Mixed Results**	5-1
6	Math Class Methods	abs, pow, sqrt, ceil, floor, log, min, max, round, PI, sin, cos, tan, asin, acos, atan, toDegrees, toRadians. **Project… Compute This**	6-1
7	*Input from the Keyboard	Scanner class, nextInt, nextDouble, next, nextLine, **Project… Going in Circles, Project… What's My Name?**	7-1
8	boolean Type and Operators	AND, OR, NOT, precedence	8-1
9	"if" statement	equals, equalsIgnoreCase. **Project…Even or Odd?**	9-1
10	The "switch" Statement and char	switch, default, break, char. **Project… Weight on Other Planets**	10-1
11	The "for" Loop	Initializing, control, and step expressions. break, infinite loops, scope, for-loop project, **Project… Name Reversal**	11-1
12	while and do-while loops	Testing at top and bottom of loop, break, continue	12-1
13	ASCII and more on char	ASCII codes for numbers and letters, conversion from String to char, conversion from char to String, isDigit, is Letter, isLetterOrDigit, isLowerCase, isUpperCase	13-1
14	Binary, Hex, and Octal	Conversion between number systems, binary addition. **Project… Basically Speaking**	14-1
15	Classes and Objects	Instantiate, methods, state variables, constructor, signature, public, void, **Project… What's That Diameter? Project… Overdrawn at the Bank**	15-1
16	More on Classes & Objects	Private methods and state variables, different lines to declare and instantiate, setting objects equal, equality of objects, reassignment of objects, **Project… Gas Mileage**	16-1
17	Advanced String Methods	compareTo, indexOf( ), lastIndexOf( ), charAt( ), replace( ), trim, Scanner, reg expr. **Project… Add 'em Up, Project… Encryption / Decryption**	17-1

18	Arrays	Declaring and initializing, length, parallel arrays, Out-of-bounds exception, passing an array to a method, automatic initialization, split, reg expr. **Project… Array of Hope**	18-1
19	Advanced Array Concepts	Arrays of objects, comparison of array values, null pointer exception, different reference to same array, arraycopy, toCharArray, logical vs physical size, Arrays class, sort, binarySearch, equals, fill, importing, command line arguments, enhanced for-loop. **Project… Sorting a String Array. Project… Two Orders for the Price of One**	19-1
20	Static Methods and State Variables	Class methods and variables, static constants static imports. **Project… How Far To The Line?**	20-1
21	Wrapper Classes	Converting primitives to objects and vice versa	21-1
22	More on Wrapper Classes	parseInt, parseDouble, toHexString, toOctalString, toBinaryString, toString, valueOf	22-1
23	*Input from a Disk File	Scanner, File, throws IOException, readLine, Project for Reading Files, close, **Project… Reading Files**	23-1
24	*Processing File Input with Scanner	Processing text coded numbers, using parseInt and parseDouble, parsing and manipulating text, **Project… Get Rid of That Plus Sign**!, **Project… Student Averages**	24-1
25	*Writing to a Text File	FileWriter, PrintWriter, print, println, appending to the end of a file, close, **Project… Write Student Averages**	25-1
26	*Formatting (rounding off)	NumberFormat, formatting numbers, currency, and percent, Formatter class, printf. **Project… BaseClass. Project… Gymnastics**	26-1
27	*Bitwise operators	Bitwise-AND, OR, exclusive-OR, and NOT. Negative numbers, sign bit, msb, most significant bit	27-1
28	*Advanced Bitwise Operations	Shift left and right, <<, >>, >>>, preservation of sign, short-circuit, precedence. Negative numbers, sign bit, msb, most significant bit. **Project… Tweaking for Speed**	28-1
29	*Random Numbers	nextDouble, nextInt, Monte Carlo, simulations, **Project… Monte Carlo Technique**	29-1
30	*StringBuffer Class	append, toString, substring, length, setCharAt, delete, deleteCharAt, insert, charAt. **Project… Concatenations Gone Wild**	30-1
31	*Boolean Algebra and DeMorgan's Theorem	OR, AND, truth table	31-1
32	*Selection Operator	?: syntax	32-1
33	Passing by Value and by Reference	Arrays, primitives, objects, references. **Project… Pass the Gravy, Please**	33-1
34	Two-Dimensional Arrays	Subscripted variables, matrix, initializing, Arrays class. **Project… Matrix Multiplication**, **Project… Matrix Multiplication with File Input**	34-1
35	Inheritance	Superclass, subclass, base class, derived class, abstract, final, overriding, shadowing, cosmic superclass, instanceof, Object, this, super	35-1

36	Exceptions	Checked, unchecked, try, catch, finally, throw, throws, **Project… Keep Trying**	36-1
37	Interfaces	Implementation perspective,objective perspective, instanceof, polymorphism, realizes, implements.,**Project… Linear Function**	37-1
38	*Complexity Analysis (Big O)	sequential search, binary search	38-1
39	Recursion	Factorial, Fibonacci series, **Project… Fibonacci**	39-1
40	Sorting Routines	selection, insertion, quick, & merge sorts, partition, big O chart, **Project… Multiple Key Sorting**	40-1
41	List Interface	ArrayList, LinkedList, Vector	41-1
42	ArrayList	advantages, disadvantages, **Project… Big Bucks in the Bank**	42-1
43	*Iterator/ListIterator	stepping through a list, **Project… Big Bucks Revisited**	43-1
44	Comparable/Comparator	compare objects, compare, compareTo, **Project… Sorting BankAccount Objects, Project…Sorting BankAccount Objects Alphabetically, Project… Sorting BankAccount Objects using a Comprator**	44-1
45	*HashSet/TreeSet	Set interface, Iterators, **Project… HashSet/ Intersection, Project… HashSet/Union**	45-1
46	*HashMap/TreeMap	Keys, values, Map interface, iterator, **Project… Mapping Bank Accounts, Project…Code Talker, Project…Histogram, Project…Student Classification**	46-1
47	*Flow Charts & Optimizing for Speed	Writing code for a flow chart. **Project… Divisors of a Number**, **Project… Optimized Code for Divisors**, **Project… Super Optimized Code for Divisors**, Speed tricks	47-1
48	*Singly Linked List	Example list of pipeline nodes. **Project… *insert* Method for Singly Linked List**	48-1
49	*The LinkedList Class (doubly linked) and Stacks	Methods of the LinkedList class used to implement a Stack class (*push*, *pop*, etc). Queues. **Project… StackLL Class**. **Project… Stack Calculator**	49-1
50	Binary Search	Binary search of primitive arrays & object arrays, recursive search . Arrays.sort, Arrays.binarySearch. **Project…Binary Search, Reverse Order**; **Project… Binary Search with Objects**	50-1
51	*Binary Search Trees	Binary search trees. Preorder, inorder, postorder, and in level traversals. Expression trees. **Project… BST find Method**	51-1
52	*Queues	LinkedListQueue, ArrayListQueue. **Project… Who's Next?, Project.… Shifting Marquee**	52-1
53	*Inner Classes	**Project… Inner Class inside Outer Class, Project… Inner Class Inside Method**	53-1
54	*Heaps	Complete and full trees, adding and deleting nodes. **Project… Printing a Heap, …A Heap of Trouble**	54-1
55	*Priority Queues	Heap based priority queue, array implementation. **Project… Who Has Highest Priority?, Project… Smile for the Camera**	55-1

56	*Lookup Tables and Hashing	Lookup tables, hashing techniques, collisions, chaining, probing load factor, and Object class methods. **Project… A Taste of Hash; Project… Hashing Abraham Lincoln**	56-1

Case Study… A major project… Distance to a Meandering Trail CS1-1

Golden Nuggets of Wisdom are short learning/review activities. In the six weeks preceding an AP exam, contest, or other major evaluation, study one of these each day. Follow up with a quiz (provided in the Teacher's Test/Answer Book) on that topic the next day.

#1	Golden Nugget of Wisdom #1	loop variable after exiting loop	Ng1
#2	Golden Nugget of Wisdom #2	overriding, overloading, polymorphism	Ng2
#3	Golden Nugget of Wisdom #3	implements, realizes, log, exclusive or	Ng3
#4	Golden Nugget of Wisdom #4	charAt, special feature of substring	Ng4
#5	Golden Nugget of Wisdom #5	masking	Ng5
#6	Golden Nugget of Wisdom #6	implementing an interface, converting decimal number to binary, hex, an octal	Ng6
#7	Golden Nugget of Wisdom #7	StringBuffer insert,alph order, simultaneously adding and concatenating	Ng7
#8	Golden Nugget of Wisdom #8	escape characters, null, continue, break, selection	Ng8
#9	Golden Nugget of Wisdom #9	operator (?:), bitwise not, modulus with fractions	Ng9
#10	Golden Nugget of Wisdom #10	final, arraycopy, calling a different constructor	Ng10
#11	Golden Nugget of Wisdom #11	LIFO, FIFO, bitwise ANDing and ORing of booleans, modulus with negative numbers	Ng11
#12	Golden Nugget of Wisdom #12	casting, incompatible object comparison, access control modifier	Ng12
#13	Golden Nugget of Wisdom #13	mixed arithmetic, declaring an array of objects	Ng13
#14	Golden Nugget of Wisdom #14	equality between Wrapper class objects, hex, binary, octal, exclusive or	Ng14
#15	Golden Nugget of Wisdom #15	short circuiting, valueOf, converting numerics to Strings	Ng15
#16	Golden Nugget of Wisdom #16	Order within method signature, String replace, nextToken delimiter	Ng16
#17	Golden Nugget of Wisdom #17	indexOf, different references to same array, setting arrays and other objects equal to null	Ng17
#18	Golden Nugget of Wisdom #18	subclass method overriding superclass method, equivalence of methods and function, equivalence of signatures and headers	Ng18
#19	Golden Nugget of Wisdom #19	multiple constructors	Ng19
#20	Golden Nugget of Wisdom #20	initialization blocks	Ng20
#21	Golden Nugget of Wisdom #21	initializing numeric state and method variables	Ng21
#22	Golden Nugget of Wisdom #22	prototype, short-circuiting, isLetter (etc)	Ng22
#23	Golden Nugget of Wisdom #23	char & int, ASCII, casting, XOR	Ng23
#24	Golden Nugget of Wisdom #24	boolean simplification, law of absorption, printing 2-D arrays.	Ng24
#25	Golden Nugget of Wisdom #25	random numbers, maps, sets, keyset	Ng25

#26	Golden Nugget of Wisdom #26	recursion	Ng26
#27	Golden Nugget of Wisdom #27	Big O, floor, ceil, round	Ng27
#28	Golden Nugget of Wisdom #28	split method	Ng28
#29	Golden Nugget of Wisdom #29	Iterator, ListIterator, exceptions, abstract, final	Ng29
#30	Golden Nugget of Wisdom #30	Static methods and variables, NumberFormat, ListIterator interface	Ng30

Appendix A	Key Words	Reserved words that are part of Java	A-1
Appendix B	Escape Sequences	\b \t \n \” \’ \\	A-1
Appendix C	Primitive Data Types	byte, short, int, long, float, double, char, boolean	C-1
Appendix D	ASCII Codes	Decimal, hex, octal, and html equivalents	D-1
Appendix E	Saving Text Files	Windows settings, Notepad, WordPad	E-1
Appendix F	Text and Binary Files Explained	Storage methods	F-1
Appendix G	Two’s Complement Notation	Negative numbers, invert, ones’ compliment, ten’s complement, odometer, msb, sign bit	G-1
Appendix H	Operator Precedence	Order of operations	H-1
Appendix I	Creating Packages and Importing Classes	Importing, package, wildcard, 6steps to create a package, classpath variable	I-1
Appendix J	Typical Contest Classes and Interfaces	Scope of UIL contest	J-1
Appendix K	Exception Classes	A list of some checked and unchecked exceptions	K-1
Appendix L	An Essay on Interfaces	Down to earth explanation of Interfaces	L-1
Appendix M	Input from the Keyboard	BufferedReader, InputStreamReader.	M-1
Appendix N	Using the BlueJ Programming Environment	Creation of projects and classes	N-1
Appendix O	Using the JCreator Programming Environment	Creation of projects and classes	O-1
Appendix P	Time Allocation for Lessons	Time allocation for each lesson	P-1
Appendix Q	AP(A) Correlation	Page number correlation	Q-1
Appendix R	Texas TEKS/TAKS Correlation	Page number correlation to TEKS	R-1
Appendix S	History of Computers	Pascal, Babbage, ENIAC, operating systems, MITS Altair, TRS 80, Apple, IBM pc, disk storage, key punch cards	S-1
Appendix T	Viruses	What a virus is, how they are spread, types, protection, ethics, and etiquette	T-1

Appendix U	Enrichment Activities	Use of LANs and WANs, Using a scanner and OCR software, Software specifications, Publish Information, Electronic communities	U-1
Appendix V	Computer Languages	Java, Visual Basic, Java Script, Assembly language, Machine code, Compiled vs Interpreted languages	V-1
Appendix W	Binary Tree Terms	Definitions of terms related to binary trees.	W-1
Appendix X	Compiling and Executing without and IDE	Using javac.exe, java.exe, and javaw.exe. Compiling and executing, DOS prompt, Path Variable	X-1
Appendix Y	Kilobytes, Megabytes, Gigabytes	Tables with exact values “power of two” equivalents	Y-1
Appendix Z	The DecimalFormat Class	Formatting numbers, currency, and percents with patterns	Z-1
Appendix AA	Matrix Multiplication	Matrix multiplication explained in detail	AA-1
Appendix AB	Monospaced Fonts	Vertical alignment of printout	AB-1
Appendix AC	Regular Expressions	A discussion on how to build and interpret regular expressions. Additional methods of the String class; split, replaceAll, replaceFirst	AC-1
Appendix AD	Formatter class specifiers and flags	Format specifiers, format flags	AD-1
Appendix AE	*javaDoc*	The javDoc technique for generating web based documentation.	AE-1
Appendix AF	Generic Classes	Creation of generic classes	AF-1
Appendix AG	Pattern and Matcher classes	Discussion and examples of the methods of the Pattern and Matcher classes.	AG-1
Index			Indx-1