

★ ANSWER KEY – CONFIDENTIAL ★

UIL COMPUTER SCIENCE – 2019 REGION

Questions (+6 points for each correct answer, -2 points for each incorrect answer)

- | | | | |
|------------------|------------------|------------------|----------------------|
| 1) <u> D </u> | 11) <u> C </u> | 21) <u> D </u> | 31) <u> D </u> |
| 2) <u> E </u> | 12) <u> B </u> | 22) <u> B </u> | 32) <u> B </u> |
| 3) <u> B </u> | 13) <u> E </u> | 23) <u> C </u> | 33) <u> C </u> |
| 4) <u> A </u> | 14) <u> D </u> | 24) <u> D </u> | 34) <u> D </u> |
| 5) <u> C </u> | 15) <u> D </u> | 25) <u> A </u> | 35) <u> E </u> |
| 6) <u> E </u> | 16) <u> A </u> | 26) <u> B </u> | 36) <u> E </u> |
| 7) <u> E </u> | 17) <u> B </u> | 27) <u> E </u> | 37) <u> A </u> |
| 8) <u> D </u> | 18) <u> C </u> | 28) <u> A </u> | 38) <u> B </u> |
| 9) <u> A </u> | 19) <u> E </u> | 29) <u> C </u> | *39) <u> 10 </u> |
| 10) <u> E </u> | 20) <u> A </u> | 30) <u> B </u> | *40) <u>10000000</u> |

* See "Explanation" section below for alternate, acceptable answers.

Note: Correct responses are based on **Java SE Development Kit 8 (JDK 8)** from Sun Microsystems, Inc. All provided code segments are intended to be syntactically correct, unless otherwise stated (e.g., "error" is an answer choice) and any necessary Java SE 8 Standard Packages have been imported. Ignore any typographical errors and assume any undefined variables are defined as used.

Explanations:

1.	D	<pre> 01010011 11 = 3 +10000011 010 = 2 ----- 11010110 110 = 6 326₈ </pre>
2.	E	$6 * (122 - 81) / 5 \% - 3 = 6 * 41 / 5 \% - 3 = 246 / 5 \% - 3 = 49 \% - 3 = 1$
3.	B	(and , are flags that indicate that the number should be displayed using a comma separator and to use parenthesis to indicate a negative number. The value is right justified in 10 spaces.
4.	A	ASCII value of '2' is 50. ASCII value of 'm' is 109. $50 - 109 = -59$.
5.	C	<pre> T^T&&T = F&&T = F </pre>
6.	E	<code>Math.pow(4, 3)</code> is 4^3 . $4 * 4 * 4 = 64$. <code>Math.pow(x, y)</code> returns a double. Correct answer = 64.0
7.	E	<pre> (int)(14.48+12.5) = 26+(int)35.14 = g = 5 print(61.0/5) (int) 26.98 = 26+35 = print 12.2 26 61 e=26 f=61.0 because f is double </pre>
8.	D	<pre> 8*-3<-24 is false -3-8== -11 is true, print "b " -3>0 is false, print "d " </pre>
9.	A	h is decremented to 9 before printing the first *. Therefore the code segment in answer choice A will only print 9 asterisks.
10.	E	2 is the last possible index value for array list. <code>list[3]="frog"</code> ; throws an <code>ArrayIndexOutOfBoundsException</code> when the code is executed.
11.	C	<code>new Scanner(file)</code> creates a Scanner object that is associated with the file <code>datafile.dat</code> .
12.	B	<pre> q r s 1 0 0 3 0 0 3 1 1 3 2 3 5 0 3 5 1 4 5 2 6 5 3 9 5 4 13 7 0 13 7 1 14 7 2 16 7 3 19 7 4 23 7 5 28 7 6 34 9 0 34 9 1 35 9 2 37 9 3 40 9 4 44 9 5 49 9 6 55 9 7 62 9 8 70 </pre>
13.	E	<pre> ~++-8 = ~-7 = 6 </pre> <p>Complement operator (~) = add one, take the opposite.</p>
14.	D	The range of the byte data type is -128 to 127.

15.	D	<table><tr><td>index numbers</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>after adding all values</td><td>0</td><td>6</td><td>-3</td><td>4</td><td>-1</td><td>5</td><td></td></tr><tr><td>list.add(list.get(2))</td><td>0</td><td>6</td><td>-3</td><td>4</td><td>-1</td><td>5</td><td>-3</td></tr><tr><td>list.remove(3)</td><td>0</td><td>6</td><td>-3</td><td>-1</td><td>5</td><td>-3</td><td></td></tr><tr><td>list.set(4,4)</td><td>0</td><td>6</td><td>-3</td><td>-1</td><td>4</td><td>-3</td><td></td></tr></table>	index numbers	0	1	2	3	4	5	6	after adding all values	0	6	-3	4	-1	5		list.add(list.get(2))	0	6	-3	4	-1	5	-3	list.remove(3)	0	6	-3	-1	5	-3		list.set(4,4)	0	6	-3	-1	4	-3	
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16.	A	Method <code>mtd</code> swaps parameters <code>i</code> and <code>j</code> . Since <code>i</code> is a reference type, changes made in <code>mtd</code> occur in <code>main</code> as well. <code>j</code> is passed by value so changes made in <code>mtd</code> are not carried over to the <code>main</code> method.																																								
17.	B	Answer choice A returns the ASCII value of any character less than 'A'. Answer choice C returns <code>10+hex-'A'</code> for ALL characters. Answer choice D does not correctly calculate the values.																																								
18.	C	<code>p</code> stores the sum of each row. <code>q</code> stores the index of the row that contains the largest total. <code>z</code> stores the largest sum. Rows 0 and 3 both total 18, however, <code>p</code> must be greater than <code>z</code> to reassign <code>q</code> . Therefore row 0 is printed.																																								
19.	E	<code>keySet()</code> returns a set containing just the key values for Map <code>m</code> . In this case all Strings.																																								
20.	A	<code>m.put("yrt", 3)</code> replaces 14 with 3. <code>m.replace("mbc", 15)</code> replaces 8 with 15. <code>m.remove("qfh")</code> removes the "qfh" key and its value (15). <code>m</code> is a <code>TreeMap</code> so values are printed in alphabetical order based on the keys.																																								
21.	D	Resulting array looks like this: <table><tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>"gr"</td><td>""</td><td>"tb"</td><td>"gb"</td><td>""</td><td>rs</td></tr></table>	0	1	2	3	4	5	"gr"	""	"tb"	"gb"	""	rs																												
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22.	B	Variables designated as <code>static</code> become class variables which are shared by all objects derived from the class.																																								
23.	C	Array <code>a</code> is declared to have 6 elements of type <code>Circle</code> . The default value for an unassigned element in an array of objects is <code>null</code> . The value stored in <code>var</code> prior to the for loop is 3 because 3 <code>Circle</code> objects have been instantiated at this point. Two more <code>Circle</code> objects are added to the array at index values 3 and 4 leaving index value 5 unassigned.																																								
24.	D	Three <code>Circle</code> objects are instantiated prior to the for loop and 2 more during the execution of the loop.																																								
25.	A	Here is the call stack. <code>d</code> <code>cd</code> <code>bcd</code> <code>abcd</code> Values are popped off the stack from the top down. <code>d</code> then <code>cd</code> then <code>bcd</code> and finally <code>abcd</code> .																																								
26.	B	<code>0b</code> designates a binary value. <code> </code> is the bitwise OR operator. 10110001 OR 10000001 ----- 10110001																																								
27.	E	A valid string is added to the array <code>data</code> and <code>count</code> is incremented AFTER the assignment is done.																																								
28.	A	<code>mtd2</code> removes <code>s</code> from <code>data</code> by shifting each subsequent element forward one place in the array.																																								
29.	C	The calls to <code>mtd1</code> adds moon, stars, sun and planet the array. The call to <code>mtd2</code> removes stars from the array. The call to <code>mtd1("sun")</code> does not add a duplicate to the array. The array is doubled in size each time the array is full.																																								
30.	B	The class <code>AClass</code> implements a set. Sets cannot contain any duplicate elements. In this implementation duplicates are prevented by a call to the <code>ok</code> method.																																								
31.	D	For each partition of a Quicksort all elements that are less than the pivot value are moved to the left of the pivot and all elements greater than the pivot value are moved to the right of the pivot. In this example the first pivot value is 7. Working from the outside in, the first two values out of place, the 8 on the left and the 6 on the right, are switched.																																								

		<p>Moving on in towards the pivot, the next two values out of place, the 10 and zero are switched. Once this happens, both partitions are now correct, with all values less than 7 on the left, and all greater on the right.</p> <table><tr><td>3</td><td>8</td><td>10</td><td>5</td><td>7</td><td>0</td><td>9</td><td>6</td><td>11</td></tr><tr><td>3</td><td>6</td><td>10</td><td>5</td><td>7</td><td>0</td><td>9</td><td>8</td><td>11</td></tr><tr><td>3</td><td>6</td><td>0</td><td>5</td><td>7</td><td>10</td><td>9</td><td>8</td><td>11</td></tr></table>	3	8	10	5	7	0	9	6	11	3	6	10	5	7	0	9	8	11	3	6	0	5	7	10	9	8	11
3	8	10	5	7	0	9	6	11																					
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32.	B	Fastest – $O(\log n)$ – $O(n \log n)$ – $O(n)$ – $O(n^2)$ – Slowest. Constants are ignored so n and $2n$ are considered the same.																											
33.	C	Class B does not declare any instance variables, however, it does inherit <code>x</code> and <code>s</code> from class A.																											
34.	D	When the <code>obj1</code> object is instantiated the B constructor calls the A constructor with <code>super(i, s)</code> . The A constructor prints "string" then the B constructor prints 3 and "string". When the <code>obj2</code> object is instantiated the B constructor calls the A constructor again which prints "object" and then the B constructor prints 7 and "object". <code>obj1</code> calls the <code>mtd</code> method in class B and "string" is printed one last time.																											
35.	E	Since class B inherits from class A both objects are instances of both classes.																											
36.	E	DeMorgan's Law states that you distribute the NOT and change the operator. This occurs in both A and D.																											
37.	A	The generic type <code><E extends Comparable<E>></code> specifies that E is a subtype of <code>Comparable</code> and it specifies that the elements to be compared are of the E type.																											
38.	B	<p>Here is the resulting binary search tree:</p> <pre>graph TD 4((4)) --- 1((1)) 4 --- 8((8)) 1 --- 0((0)) 1 --- 2((2)) 2 --- 7((7)) 7 --- 5((5)) 8 --- 9((9))</pre>																											
39.	10	$46 \ 4 \ 9 \ * \ - \ =$ $46 \ 36 \ - \ =$ 10																											
40.	10000000	<p>-128 is the largest negative value that can be displayed in 8-bit two's complement notation. (See explanation for question #14)</p> <p>Write -128 in binary 10000000</p> <p>Flip all of the bits 01111111</p> <p>Add one 10000000</p>																											