Beijing National Day School
Department of Mathematics & Computer Science

AP Computer Science A

Test 1: `Java Syntax` and `Strings`

Exam Record	
Part1	/ 22 pts
Part2	/ 16 pts
Part3	/ 12 pts
Total:	/ 50 pts
Grade:	

English Name: _____

Pinyin Name: _____

Mr. Alwin Tareen, Fall 2019

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Test 1: `Java Syntax` and `Strings`

Mr. Alwin Tareen
BNDS

Part I: Multiple Choice (22 points)

- Determine the answer to each of the following questions, using the available space for any necessary scratchwork.
- Decide which is the best of the choices given, and select the correct answer by placing an "**X**" in the corresponding box.

(1pt) **1.** Which of the following choices is a legal and legitimate `Java` variable name?

- ☐ `2bad4you`
- ☐ `calvin&hobbes`
- ☐ `year2000`
- ☐ `#hammertime`

1 pt

(1pt) **2.** You would like to set up a variable called `ounces` that has the value `16`. What simple `Java` statement will accomplish this?

- ☐ `int ounces = 16;`
- ☐ `int 16 = ounces;`
- ☐ `public static int ounces(16)`
- ☐ `ounces(16);`

1 pt

(1pt) **3.** What is the output of the following `Java` code?

```
System.out.println(19 % 5);
```

- ☐ `3`
- ☐ `0`
- ☐ `4`
- ☐ `1`

1 pt

(1pt) **4.** What is the output of the following `Java` code?

```
System.out.println(1 / 3);
```

- ☐ `0.333333333333333333`
- ☐ `0`
- ☐ `0.3`
- ☐ It will give a compile-time error.

1 pt

(1pt) **5.** What is the correct data type for decimal numbers such as `3.14159`?

- ☐ `double`
- ☐ `int`
- ☐ `boolean`
- ☐ `String`

1 pt

5 pts

(1pt) **6.** What is the correct data type for text data such as `"hello world"`?

- ☐ `double`
- ☐ `int`
- ☐ `boolean`
- ☐ `String`

1 pt

(1pt) **7.** What is the value of `amount` after executing the following `Java` code?

```
String dinner = "Hamburger";
int amount = dinner.length();
```

- ☐ `8`
- ☐ `9`
- ☐ `10`
- ☐ `11`

1 pt

(1pt) **8.** What is the value of `position` after executing the following `Java` code?

```
String lunch = "Pizza";
int position = lunch.indexOf("z");
```

- ☐ `0`
- ☐ `1`
- ☐ `2`
- ☐ `3`

1 pt

(1pt) **9.** What is the value of `first` after executing the following `Java` code?

```
String breakfast = "Pancakes";
String first = breakfast.substring(0, 1);
```

- ☐ `P`
- ☐ `Pan`
- ☐ `cakes`
- ☐ `Pancakes`

1 pt

(1pt) **10.** Which of the following choices is a `Java` reserved keyword?

- ☐ `console`
- ☐ `while`
- ☐ `memory`
- ☐ `result`

1 pt

(1pt) **11.** Which of the following is a TRUE statement about the `String` data type?

- ☐ `String` is a primitive data type.
- ☐ The standard `Java` library has a predefined class called `String`.
- ☐ `String`s can only contain numbers and digits, not punctuation.
- ☐ `String`s are mutable, once they are created they can be changed or altered.

1 pt

6 pts

(1pt) **12.** What is the output of the following Java code?

```
String greetings = "Hello World!";
System.out.println(greetings.substring(6));
```

- ☐ `Hello World!`
- ☐ The Java code will not compile.
- ☐ `World!`
- ☐ `Hello`

1 pt

(1pt) **13.** What is the output of the following Java code?

```
String weather = "One Fine Day";
String result = weather.substring(4, 8);
System.out.println(result);
```

- ☐ `Fine`
- ☐ `One Fine`
- ☐ `Fine Day`
- ☐ `Day`

1 pt

(1pt) **14.** Which of the following choices demonstrates the correct way to concatenate two `String`s together?

- ☐ `String answer = "Good" == "Burger";`
- ☐ `String outcome = "Best" + "Pizza";`
- ☐ `String display = "Fresh" <> "Salad";`
- ☐ `String result = "Ripe" / "Fruit";`

1 pt

(1pt) **15.** Which of the following choices will result in a **positive integer** being assigned to the variable `outcome`?

- ☐ `boolean outcome = "sprite".compareTo("pepsi");`
- ☐ `boolean outcome = "burger".compareTo("pizza");`
- ☐ `boolean outcome = "ZELDA".compareTo("mario");`
- ☐ `boolean outcome = "958".compareTo("hello");`

1 pt

(1pt) **16.** Which of the following Java code fragments would produce the square root of 81?

- ☐ `double answer = Math.exp(81);`
- ☐ `double num = Math.squareroot(81);`
- ☐ `double digit = Math.pow(3, 4);`
- ☐ `double root = Math.sqrt(81);`

1 pt

(1pt) **17.** What is the data type of the following variable: `victory = true;`

- ☐ `boolean`
- ☐ `double`
- ☐ `String`
- ☐ `int`

1 pt

6 pts

(1pt) **18.** Consider the following Java code:

```
boolean lights = true;
boolean camera = false;
boolean action = false;
```

Which of the following statements produces a `true` value in the variable `result`?

- ☐ `boolean result = camera || action;`
- ☐ `boolean result = lights || camera || action;`
- ☐ `boolean result = lights && camera && !action;`
- ☐ `boolean result = lights && camera || action;`

1 pt

(1pt) **19.** What is the output of the following Java code?

```
for (int i = 3; i <= 12; i++)
{
    System.out.print(i + " ");
}
```

- ☐ `5 6 7 8 9`
- ☐ `4 5 6 7 8 9 10 11 12`
- ☐ `3 5 7 9 11`
- ☐ `3 4 5 6 7 8 9 10 11 12`

1 pt

(1pt) **20.** A programmer has forgotten to include an essential part of the following `while` loop. What is the technical term for this unfortunate situation?

```
int count = 0;
while (count < 10)
{
    System.out.println(count);
}
```

- ☐ endgame loop
- ☐ infinite loop
- ☐ eternal loop
- ☐ runaway loop

1 pt

(1pt) **21.** What is the data type of the following variable: `num = 42;`

- ☐ `boolean`
- ☐ `double`
- ☐ `String`
- ☐ `int`

1 pt

(1pt) **22.** What is the technical term for the item that appears between the parentheses in a function header? For example, consider: `public static int area(int radius)`

- ☐ argument
- ☐ generator
- ☐ parameter
- ☐ differential

1 pt

5 pts

Part II: Short Answer (16 points)

- Solve each of the following short answer questions. Write your solution in the space provided.

(1pt) **1.** Which of `Java`'s primitive data types would be most suitable to store the square root of 2?

1 pt

(1pt) **2.** Which of `Java`'s primitive data types would be most suitable to store your age?

1 pt

(1pt) **3.** Write a single line of `Java` code that will create an integer variable called `num` and store the number 407 in it.

1 pt

(1pt) **4.** Write a single line of `Java` code that will increment the previously declared integer variable `num` by 1.

1 pt

(1pt) **5.** What are the two possible values of a `boolean` variable?

1 pt

(1pt) **6.** What is the `Java` operator for the boolean `AND` operation?

1 pt

(1pt) **7.** What is the `Java` operator for the boolean `OR` operation?

1 pt

(1pt) **8.** Write a single line of `Java` code that will create a `String` variable called `lunch` and store the text `"pizza"` in it.

1 pt

(1pt) **9.** When comparing two Strings for equality, the assignment operator(`==`) should not be used. What is the name of the method that *should* be used?

1 pt

9 pts

(4pts) **10.** The following questions involve the use of `Java`'s random number generator.

4 pts

(a) (2 pts) Write a single line of `Java` code that would generate a random integer number in the range `8` to `23` inclusive, and place the result in the variable `num`. In other words: $8 \leq$ `num` ≤ 23

(b) (2 pts) Write a single line of `Java` code that would generate a random integer number in the range `57` to `92` inclusive, and place the result in the variable `num`. In other words: $57 \leq$ `num` ≤ 92

(1pt) **11.** What is the output of the following `while` loop?

1 pt

```
int num = 5;
while (num < 12)
{
    System.out.println(num);
    num += 2;
}
```

(1pt) **12.** What is the output of the following `for` loop?

1 pt

```
for (int i = 2; i < 10; i += 2)
{
    System.out.println(i);
}
```

(1pt) **13.** What is the output of the following `for` loop?

1 pt

```
for (int i = 4; i >= 1; i--)
{
    System.out.println(i);
}
```

7 pts

Part III: Java Programming (12 points)

- Show all of your work. Remember that program segments are to be written in the `Java` programming language.

(2pts) **1. Specification**

Write a `Java` function called `everyOther` that takes in a `String word` as a parameter, and generates a new `String`, which is made up of every other character, starting with the first.

2 pts

The function should return a `String`.

If the following statements are executed:

```
String result = everyOther("Greetings");
System.out.println(result);
```

Then the output of your program should be: `Getns`

```
public static String everyOther(String word)
{
    // YOUR CODE HERE
```

2 pts

(2pts) **2. Specification**

2 pts

Write a `Java` function called `doubleCharacter` that takes in a `String word` as a parameter, and generates a new `String`, in which for every character in the original `String`, there are two characters.

The function should return a `String`.

If the following statements are executed:

```
String result = doubleCharacter("HiThere");
System.out.println(result);
```

Then the output of your program should be: `HHiiTThheerree`

```
public static String doubleCharacter(String word)
{
    // YOUR CODE HERE
```

2 pts

(2pts) **3. Specification**

Write a `Java` function that takes in a `String word` as a parameter, and generates a new `String`, which is made up of three copies of the last two characters of the parameter `word`.

2 pts

The function should return a `String`.

If the following statements are executed:

```
String result = extraEnd("hello");
System.out.println(result);
```

Then the output of your program should be: `lololo`

```
public static String extraEnd(String word)
{
    // YOUR CODE HERE
```

2 pts

(3pts) **4. Background Theory**

3 pts

In this question, you will write a `Java` function that performs the multiplication operation, but with a technique that the Ancient Egyptians used. The algorithm for Ancient Egyptian Multiplication can be expressed as follows. Assume that `grow` and `shrink` are the numbers to be multiplied together:

- Create an integer variable called `product` to hold the solution.
- Check to see if `shrink` is an odd number.
- If `shrink` is odd, then add the number `grow` to the variable `product`.
- Multiply the number `grow` by `2`.
- Divide the number `shrink` by `2`(*Note*: Use integer division).
- Continue until the number `shrink` becomes zero.
- Return the variable `product`.

Specification

Write a `Java` function that takes in two integer values, `grow` and `shrink`, as parameters, and calculates their multiplicative product using the Ancient Egyptian Multiplication algorithm.

The function should return an `int`.

If the following statements are executed:

```
int result = multiply(23, 58);
System.out.println(result);
```

Then the output of your program should be: `1334`

Write your solution on the next page.

3 pts

```
public static int multiply(int grow, int shrink)
{
    // YOUR CODE HERE
```

0 pts

(3pts) **5. Background Theory**

3 pts

Pig Latin is a type of slang language that is easy to learn and understand. An English word can be translated into Pig Latin by following these two simple rules:

- If the English word begins with a vowel, then the corresponding Pig Latin word is generated by appending the letters `"hay"` to the end of the word. For example, `"orange"` becomes `"orangehay"`.
- If the English word begins with a consonant, then the corresponding Pig Latin word is generated by moving the first letter to the end of the word, then appending the letters `"ay"`. For example, `"peach"` becomes `"eachpay"`.

Specification

Write a `Java` function that takes in an English word as a parameter, and translates that word to Pig Latin.

The function should return a `String` which is the Pig Latin translation of the parameter `word`.

If the following statements are executed:

```
String result = pigLatin("orange");
System.out.println(result);
```

Then the output of your program should be: `orangehay`

If the following statements are executed:

```
String result = pigLatin("peach");
System.out.println(result);
```

Then the output of your program should be: `eachpay`

Write your solution on the next page.

3 pts

```
public static String pigLatin(String word)
{
    // YOUR CODE HERE
```

0 pts