

Beijing National Day School  
Department of Mathematics

AP Computer Science A

Test 1: Java Syntax and Strings

English Name: \_\_\_\_\_

Pinyin Name: \_\_\_\_\_

Mr. Alwin Tareen, Fall 2018

| Exam Record  |          |
|--------------|----------|
| Part1 _____  | / 22 pts |
| Part2 _____  | / 17 pts |
| Part3 _____  | / 12 pts |
| Total: _____ | / 51 pts |
| Grade: _____ |          |

**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.

- (1<sup>pt</sup>) 1. Which of the following choices is a legal and legitimate Java variable name?
- |      |
|------|
|      |
| 1 pt |
- 2bad4you  
 calvin&hobbes  
 year2000  
 #hammertime
- (1<sup>pt</sup>) 2. You would like to set up a variable called ounces that has the value 16. What simple Java statement will accomplish this?
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| 1 pt |
- int ounces = 16;  
 int 16 = ounces;  
 public static int ounces(16)  
 ounces(16);
- (1<sup>pt</sup>) 3. What is the output of the following Java code?
- |      |
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|      |
| 1 pt |
- ```
System.out.println(19 % 5);
```
- 3  
 0  
 4  
 1
- (1<sup>pt</sup>) 4. What is the output of the following Java code?
- |      |
|------|
|      |
| 1 pt |
- ```
System.out.println(1 / 3);
```
- 0.3333333333333333  
 0  
 0.3  
 It will give a compile-time error.
- (1<sup>pt</sup>) 5. What is the correct data type for decimal numbers such as 3.14159?
- |      |
|------|
|      |
| 1 pt |
- double  
 int  
 boolean  
 String

- (1<sup>pt</sup>) **6.** What is the correct data type for text data such as "hello world"?
- double  
 int  
 boolean  
 String
- (1<sup>pt</sup>) **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<sup>pt</sup>) **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<sup>pt</sup>) **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<sup>pt</sup>) **10.** Which of the following choices is a Java reserved keyword?
- console  
 while  
 memory  
 result
- (1<sup>pt</sup>) **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`.  
 `Strings` can only contain numbers and digits, not punctuation.  
 `Strings` are mutable, once they are created they can be changed or altered.

- (1<sup>pt</sup>) 12. What is the data type of the following variable: `num = 42;`
- boolean  
 double  
 String  
 int
- (1<sup>pt</sup>) 13. 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<sup>pt</sup>) 14. 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<sup>pt</sup>) 15. Which of the following choices demonstrates the correct way to concatenate two **Strings** together?
- `String answer = "Good" == "Burger";`  
 `String outcome = "Best" + "Pizza";`  
 `String display = "Fresh" <> "Salad";`  
 `String result = "Ripe" / "Fruit";`
- (1<sup>pt</sup>) 16. 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<sup>pt</sup>) 17. Which of the following choices is the correct **escape sequence** for the newline character?
- `\newline`  
 `\Enter`  
 `\t`  
 `\n`

(1<sup>pt</sup>) 18. Which of the following choices is the correct **escape sequence** for the tab character?

- \tab
- \Space
- \t
- \b

1 pt

(1<sup>pt</sup>) 19. What is the data type of the following variable: `victory = true;`

- boolean
- double
- String
- int

1 pt

(1<sup>pt</sup>) 20. 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

(1<sup>pt</sup>) 21. 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

(1<sup>pt</sup>) 22. Consider the following Java code:

```
String drink = "sprite";
String beverage = "pepsi";
```

How would you determine if these two `Strings` are the same, or different?

- Perform: `drink.compareTo(beverage)`. If the result is a negative integer, then the `Strings` are equal.
- Use the `differential()` method in the following manner:  
`double outcome = drink.differential(beverage);`
- Use the `equals()` method in the following manner:  
`boolean result = drink.equals(beverage);`
- Use the concatenation operator in the following manner:  
`boolean answer = (drink + beverage);`

1 pt

5 pts

**Part II: Short Answer** (17 points)

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

- (1<sup>pt</sup>) 1. Which of Java's primitive data types would be most suitable to store the square root of 2? 

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| 1 pt |
- (1<sup>pt</sup>) 2. Which of Java's primitive data types would be most suitable to store your age? 

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| 1 pt |
- (1<sup>pt</sup>) 3. Write a single line of code that will create an integer variable called `num` and store the number 407 in it. 

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| 1 pt |
- (1<sup>pt</sup>) 4. Write a single line of code that will increment the previously declared integer variable `num` by 1. 

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| 1 pt |
- (1<sup>pt</sup>) 5. What are the two possible values of a `boolean` variable? 

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| 1 pt |
- (1<sup>pt</sup>) 6. What is the Java operator for the boolean AND operation? 

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| 1 pt |
- (1<sup>pt</sup>) 7. What is the Java operator for the boolean OR operation? 

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| 1 pt |
- (1<sup>pt</sup>) 8. Write a single line of code that will create a `String` variable called `name` and store the text "Bob" in it. 

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| 1 pt |
- (1<sup>pt</sup>) 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? 

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| 1 pt |

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| 9 pts |

(2<sup>pts</sup>) **10.** Convert the following binary(base-2) numbers to decimal(base-10).

(a) (1 pt) 1011

(b) (1 pt) 10001

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| 2 pts |
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(2<sup>pts</sup>) **11.** Convert the following hexadecimal(base-16) numbers to decimal(base-10).

(a) (1 pt) A7

(b) (1 pt) 2E

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| 2 pts |
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(2<sup>pts</sup>) **12.** Convert the following binary(base-2) numbers to hexadecimal(base-16).

(a) (1 pt) 10010011

(b) (1 pt) 110010100001

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| 2 pts |
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(2<sup>pts</sup>) **13.** Convert the following hexadecimal(base-16) numbers to binary(base-2).

(a) (1 pt) B4

(b) (1 pt) 9C

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| 2 pts |
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| 8 pts |
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**Part III: Java Programming** (12 points)

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

(2<sup>pts</sup>) 1. Assume that `sample` is a `String` of lower case text characters. Write a Java function that counts the number of vowels that are contained in the `String sample`. Valid vowels are: "a", "e", "i", "o", "u". Your function should be called:

```
public static int countVowels(String sample)
```

The function should return an integer which is the total quantity of vowels in the `String`.

- If the following statements are executed:

```
int result = countVowels("azcbobobegghakl");  
System.out.println(result);
```

Then the output of your program should be: 5

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```
public static int countVowels(String sample)  
{  
    // YOUR CODE HERE
```

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| 2 pts |

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| 2 pts |

- (2<sup>pts</sup>) 2. Write a Java function that takes in a `String` as a parameter, and generates a new `String`, which is made up of three copies of the last two characters of the original `String`. Your function should be called:

```
public static String extraEnd(String word)
```

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
```

|       |
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| 2 pts |

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| 2 pts |

- (4<sup>pts</sup>) **3.** 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:

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| 4 pts |

- 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.

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. Your function should be called:

```
public static int multiply(int grow, int shrink)
```

*Note*: This function returns an integer value.

- If the following statements are executed:

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

Then the output of your program should be: 1334

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**Write your solution on the next page.**

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| 4 pts |

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

(4pts) 4. 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".

Write a Java function that takes in an English word as a parameter, and translates that word to Pig Latin. Your function should be called:

```
public static String pigLatin(String word)
```

The function should return a String which is the Pig Latin translation of 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

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**Write your solution on the next page.**

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| 4 pts |
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| 4 pts |
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```
public static String pigLatin(String word)
{
    // YOUR CODE HERE
```

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