

Beijing National Day School  
Department of Mathematics & Computer Science

AP Computer Science A  
Semester 2 Exam

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

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

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**Exam Record**

Multiple Choice \_\_\_\_\_ / 25 pts

Short Answer \_\_\_\_\_ / 25 pts

Java Programs \_\_\_\_\_ / 10 pts

Total: \_\_\_\_\_ / 60 pts

Grade: \_\_\_\_\_

**Section I: Multiple Choice** (25 points)

- Number of questions: 25.
- 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 is NOT a primitive data type?

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

1 pt

(1<sup>pt</sup>) 2. Which of the following arithmetic expressions produces a result of 3?

- ☐ `(1 + 17) % 3`  
☐ `1 + 17 % 3`  
☐ `12 % 3 - 1`  
☐ `5 * 2 % 3`

1 pt

(1<sup>pt</sup>) 3. If the operator AND is used, which of the following will make the whole condition **true**?

- ☐ First operand **true**, second operand **false**  
☐ First operand **false**, second operand **true**  
☐ Both operands **true**  
☐ Both operands **false**

1 pt

(1<sup>pt</sup>) 4. The Boolean expression `!(E && F)` is logically equivalent to which of the following?

- ☐ `E || F`  
☐ `!E || !F`  
☐ `E && F`  
☐ `!E && !F`

1 pt

(1<sup>pt</sup>) 5. What is the output of the following code fragment?

```
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

5 pts

- (1<sup>pt</sup>) 6. What is the value of `pos` after the following code executes?

```
String s1 = "ac ded ca";  
int pos = s1.indexOf("d");
```

1 pt

- ☐ 3  
☐ 4  
☐ 5  
☐ -1

- (1<sup>pt</sup>) 7. How many times does the following code fragment print a `*`?

```
for (int i = 3; i <= 9; i++)  
{  
    System.out.print("*");  
}
```

1 pt

- ☐ 9  
☐ 7  
☐ 6  
☐ 10

- (1<sup>pt</sup>) 8. Given the following code fragment, what will be the contents of the array `arr` if the method `doubleLast()` is executed?

```
public int[] arr = {-20, -15, 2, 8, 16, 33};  
public void doubleLast()  
{  
    for (int i = arr.length/2; i < arr.length; i++)  
    {  
        arr[i] = arr[i] * 2;  
    }  
}
```

1 pt

- ☐ [-40, -30, 4, 16, 32, 66]  
☐ [-40, -30, 4, 8, 16, 32]  
☐ [-20, -15, 2, 16, 32, 66]  
☐ [-20, -15, 2, 8, 16, 33]

- (1<sup>pt</sup>) 9. Which of the following is a valid reason to use an `ArrayList`, instead of an array?

- ☐ An `ArrayList` can grow or shrink as needed, while an array is always the same size.  
☐ You can use a for-each loop on an `ArrayList`, but not on an array.  
☐ You can store objects in an `ArrayList`, but not in an array.  
☐ You can find the length of an `ArrayList`, but you can't find the length of an array.

1 pt

4 pts

- (1<sup>pt</sup>) 10. Which one of the following statements assigns the letter **S** to the third row and first column of a two-dimensional array named **strGrid**, assuming row-major order?

☐ **strGrid**[0][2] = "S"  
☐ **strGrid**[1][3] = "S"  
☐ **strGrid**[3][1] = "S"  
☐ **strGrid**[2][0] = "S"

1 pt

- (1<sup>pt</sup>) 11. Which of the following statements would correctly retrieve the value 6 out of the array **arr**?

```
int[][] arr = {{2, 4, 6, 8}, {1, 2, 3, 4}};
```

☐ **arr**[0][3]  
☐ **arr**[1][3]  
☐ **arr**[0][2]  
☐ **arr**[2][0]

1 pt

- (1<sup>pt</sup>) 12. What is a class?

☐ A class is a data structure similar to an **ArrayList**.  
☐ A class is a section of main memory which contains no data.  
☐ A class is like a blueprint, which describes the state and behaviour of an object.  
☐ A class is an array data structure that can only contain integers.

1 pt

- (1<sup>pt</sup>) 13. Which of the following invokes the method **length()** of the object referenced by **str** and stores the result in **val**?

☐ **val** = **str.length()**;  
☐ **val** = **length.str()**;  
☐ **val** = **length().str**;  
☐ **val** = **length(str)**;

1 pt

- (1<sup>pt</sup>) 14. How many choices are possible when using a single **if-else** statement?

☐ 1  
☐ 2  
☐ 3  
☐ 4

1 pt

- (1<sup>pt</sup>) 15. A colony of rabbits doubles its population every 28 days. The population starts out at 2, and increases until it reaches 100000. Say that a section of code simulates this process. Which of the following **while** statements is most likely to be used?

☐ **while** (**population** = 100000)  
☐ **while** (**population** < 100000)  
☐ **while** (**population** > 28)  
☐ **while** (**population** = 28)

1 pt

6 pts

(1<sup>pt</sup>) **16.** When you run a Java application by typing `java SomeClass` what is the first method that starts?

- ☐ The `main()` method of `SomeClass`.
- ☐ The `run()` method of `SomeClass`.
- ☐ The `someClass` method.
- ☐ The applet method.

1 pt

(1<sup>pt</sup>) **17.** What value is assigned to a reference variable to show that there is no object?

- ☐ 0
- ☐ void
- ☐ null
- ☐ nada

1 pt

(1<sup>pt</sup>) **18.** When an object no longer has any reference variables referring to it, what happens to it?

- ☐ It sits around in main memory forever.
- ☐ It is swapped out to the hard disk drive.
- ☐ The garbage collector makes the memory it occupies available for new objects.
- ☐ It gets emailed to the Oracle corporation, who then disposes of it.

1 pt

(1<sup>pt</sup>) **19.** What is the output of the following code fragment?

```
String str = "Hello World!";  
System.out.println(str.length());
```

- ☐ 0
- ☐ 10
- ☐ 11
- ☐ 12

1 pt

(1<sup>pt</sup>) **20.** What is the output of the following code fragment?

```
for (int i = 0; i < 5; i++)  
{  
    System.out.print(i + " ");  
}
```

- ☐ 1 2 3 4 5
- ☐ 0 1 2 3 4
- ☐ 0 1 2 3 4 5
- ☐ i i i i i

1 pt

5 pts

(1<sup>pt</sup>) 21. What is the output of the following code fragment?

```
int[] arr = {2, 4, 6, 8};
System.out.println(arr[0] + " " + arr[1]);
```

1 pt

- ☐ 2 6
- ☐ 8
- ☐ 2 4
- ☐ 6 8

(1<sup>pt</sup>) 22. What is the output of the following code fragment?

```
int[] arr = {2, 4, 6, 8, 10, 1, 3, 5, 7, 9};
for (int i = 0; i < 5; i++)
{
    System.out.println(arr[i] + " ");
}
```

1 pt

- ☐ 2 4 6 8
- ☐ 2 4 6 8 10
- ☐ 2 4 6 8 10 1
- ☐ 2 4 6 8 10 1 3 5 7 9

(1<sup>pt</sup>) 23. Given the following array declaration, what is values[2][1]?

```
double[][] values = { {1.2, 9.0, 3.2},
                      {9.2, 0.5, 1.5},
                      {7.3, 7.9, 4.8} };
```

1 pt

- ☐ 7.3
- ☐ 7.9
- ☐ 9.2
- ☐ There is no such array element.

(1<sup>pt</sup>) 24. Which of the following choices is the correct way to set up a constructor?

- ☐ public String Rectangle()
- ☐ public static int SportsTeam(int players)
- ☐ public constructor Bicycle(int gears)
- ☐ public Compass(int direction)

1 pt

(1<sup>pt</sup>) 25. Consider a class that has two constructors. Which of the following conditions must be true in order for the program to compile correctly?

- ☐ The constructors must be declared private and void.
- ☐ The constructors must be placed in separate source code files.
- ☐ The constructors must specify a return type.
- ☐ The constructors must have unique parameter lists.

1 pt

5 pts

**Part II: Short Answer** (25 points)

- Number of questions: 25.
- Answer each of the following questions in the space provided.

(1<sup>pt</sup>)    **1.** Which of Java's primitive data types would you use to store the square root of 2?

1 pt

(1<sup>pt</sup>)    **2.** Which of Java's primitive data types would you use to store your age?

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.

1 pt

(1<sup>pt</sup>)    **4.** Write a single line of code that will create a `String` variable called `name` and store your name in it.

1 pt

(1<sup>pt</sup>)    **5.** If `String buddy = "groovy dude";` then what is the output of:  
`System.out.println(buddy.toUpperCase());`

1 pt

(1<sup>pt</sup>)    **6.** Which character is at the 5th index in the String `"Herman Munster"`?

1 pt

(1<sup>pt</sup>)    **7.** When comparing two Strings for equality, the double equals operator(==) should not be used. What is the name of the method that *should* be used?

1 pt

7 pts

(1<sup>pt</sup>)    **8.** Write a single line of code that will increment the integer variable `num` by 1.

1 pt

(1<sup>pt</sup>)    **9.** What are the two possible values of a `boolean` variable?

1 pt

(1<sup>pt</sup>)    **10.** What is the `Java` operator for the boolean **AND** operation?

1 pt

(1<sup>pt</sup>)    **11.** What is the `Java` operator for the boolean **OR** operation?

1 pt

(1<sup>pt</sup>)    **12.** What is the output of: `System.out.println(true && true || false);`

1 pt

(1<sup>pt</sup>)    **13.** Write a statement that will store the value `true` in a `boolean` variable `throttle` if the value in the variable `height` is 44 or less.

1 pt

(1<sup>pt</sup>)    **14.** Given the following line of code, identify the class, and identify the object:  
`Rectangle board = new Rectangle(length, width);`

1 pt

(1<sup>pt</sup>)    **15.** Write code using a `for-loop` that will print out the numbers 3, 6, 9, 12, 15.

1 pt

8 pts



- (1<sup>pt</sup>) **16.** Instantiate an object called **fido** from the **Puppy** class using a single line of code. Assume that no parameters are sent to the constructor.

1 pt

- (1<sup>pt</sup>) **17.** Write a single line of code that will create an array of type **double** called **scores** having 800 elements.

1 pt

- (1<sup>pt</sup>) **18.** Given the array: `double[] digits = new double[21]`  
What is the output of: `System.out.println(digits.length);`

1 pt

- (1<sup>pt</sup>) **19.** Assume that the integer array **data** contains the five values: 34, 56, -102, 18 and 5. What is the value of **data[1]**?

1 pt

- (1<sup>pt</sup>) **20.** Write a single line of code that will instantiate an **ArrayList** object called **places** and have the restriction that only **String** objects can be stored in it.

1 pt

- (1<sup>pt</sup>) **21.** Is it possible to have multiple constructors in the same class? Answer **yes** or **no**.

1 pt

- (1<sup>pt</sup>) **22.** Consider the following array: `int[] temps = {34, 56, -102, 18, 5}`  
What is the output of: `System.out.println(temps[3] + temps[4])`?

1 pt

7 pts

- (1<sup>pt</sup>) **23.** Consider the following array: `String[] names = {"Bob", "Jim", "Sally"}`  
Write a single line of Java code that will display the element "Sally" from this array.

1 pt

- (1<sup>pt</sup>) **24.** What is the output of the following code fragment?

```
String lunch = "Cheeseburger";  
System.out.println(lunch.substring(6));
```

1 pt

- (1<sup>pt</sup>) **25.** Consider the following array: `int[] nums = new int[7];`  
Write a section of Java code that would place the number 23 into every position in the array. *Hint:* Use a `for` loop.

1 pt

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3 pts

3 pts

**Section III: Java Programs** (10 points)

- Number of questions: 3.
- Show all of your work. Remember that program segments are to be written in the **Java** programming language.

- (4<sup>pts</sup>) 1. Assume that **word** is a **String** of lower case text characters. Write a **Java** function that counts the number of **a**'s and **b**'s that are contained in the **String word**. Your function should be called:

4 pts

```
public static int countAlphaBeta(String word)
```

The function should return an integer which is the total quantity of **a**'s and **b**'s in the **String**.

- If the following statements are executed:

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

Then the output of your program should be: 5

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

4 pts

- (3<sup>pts</sup>)    **2.** Write a Java function that takes in a single `int` parameter called `num`, and returns an `int[]` array containing the values `0, 1, 2, ..., num - 1`. Your function should be called:

3 pts

```
public static int[] fizzArray(int num)
```

The function should return an `int[]` array.

- If the following statement is executed:

```
int[] result = fizzArray(5);
```

Then `result` should contain: `[0, 1, 2, 3, 4]`

```
public static int[] fizzArray(int num)
{
    // YOUR CODE HERE
}
```

3 pts

- (3<sup>pts</sup>) 3. Consider the following Java program that contains a student's daily schedule of school courses, represented as **Strings** in an **ArrayList** called **courseSchedule**. This **ArrayList** stores each course in consecutive order, by period. For instance, **Computer Science** takes place in the first period, **Spanish** takes place in the second period, etc.

3 pts

After one week of school, the student decides that she would like to change her schedule in the following manner:

- Change the **Calculus** course to **Geometry**.
- Drop the **Physics** course.

Write the necessary Java code statements that would update the **ArrayList** to reflect the student's new course schedule.

```
import java.util.*;

public class SelectedCourses
{
    public static void main(String[] args)
    {
        ArrayList<String> courseSchedule = new ArrayList<String>();
        courseSchedule.add("Computer Science");
        courseSchedule.add("Spanish");
        courseSchedule.add("Calculus");
        courseSchedule.add("English");
        courseSchedule.add("History");
        courseSchedule.add("Physics");

        // YOUR CODE HERE

    }
}
```

3 pts