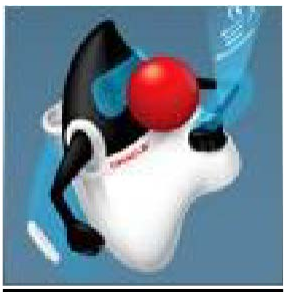


OCA 5: Working with Strings, Arrays and ArrayLists

Exercises

Q1 – JAT5Ex1

Review the following class. What do you consider to be the program output?

To prove that you are correct, create the program using your favourite text editor / IDE.

Save the program as **JAT5Ex1.java**.

```
public class JAT5Ex1{
  public static void main(String[] args){
    String ja = new String("Java Associate");
    ja = new String("Java Associate !");
    ja.toUpperCase();
    System.out.println(ja);
  }
}
```

Q2 – JAT5Ex2

Review the following class. What do you consider to be the program outputs?

To prove that you are correct, create the program using your favourite text editor / IDE.

Save the program as **JAT5Ex2.java**.

```
public class JAT5Ex2{
  public static void main(String[] args){
    String ja = "Java Associate";
    String jAssociate = new String("Java Associate");
    System.out.println(ja == jAssociate);
    System.out.println(ja.equals(jAssociate));
  }
}
```

Please Turn Over

Q3 – JAT5Ex3

Review the following class. What do you consider to be the program outputs?

To prove that you are correct, create the program using your favourite text editor / IDE.

Save the program as **JAT5Ex3.java**.

```
public class JAT5Ex3{
  public static void main(String[] args){
    String name = "Java Duke";
    String java = name;
    String icon = new String("Duke");
    String bean = icon;

    name.toUpperCase();
    icon.toUpperCase();
    name = icon.substring(2);
    icon = bean.substring(1);

    System.out.println(name);
    System.out.println(java);
    System.out.println(icon);
    System.out.println(bean);
  }
}
```

Please Turn Over

Q4 – JAT5Ex4

```
public class JAT5Ex4{
  public static void main(String[] args){
    String duke = "Java Duke";
    // Write your code here.
  }
}
```

Create a class named **JAT5Ex4.java**.

Use appropriate methods of the String class to answer the following questions. Write your code in the main method.

1. Extract the character at index position 2 of the String.

```
The character at index position 2 is: v
```

2. Concatenate the String literal, " Mascot", to the String object referenced by the variable, 'duke'. The value of the new String object should be, Java Duke Mascot.

```
The new value stored in String 'duke' is Java Duke Mascot
```

3. Display the number of characters found in the newly created String, 'Java Duke Mascot'.

```
The length of String 'duke' is: 16 characters.
```

4. Replace the word "Mascot" with "Icon". The value of the new String object referenced by the variable 'duke', should be, Java Duke Icon.

```
The new value stored in String 'duke' is Java Duke Icon
```

5. Use the substring() method to extract the words "Duke Icon". The variable 'duke' should reference this new String object.

```
The new value stored in String 'duke' is Duke Icon
```

Please Turn Over

Q5 – JAT5Ex5

What is the output? Using a pen and paper, work through the logic of the code and write out the program outputs. Now create the program using your favourite text editor / IDE and see if you were right!

```
public class JAT5Ex5{                                   // Line 1

  public static void main(String[] args){               // Line 3

   String x = new String ("Java");                      // Line 5
    x = x.concat(" Rules");                             // Line 6
    System.out.println("x = " + x);                     // Line 7
    x.toUpperCase();                                    // Line 8
    System.out.println("x = " + x);                     // Line 9
    x.replace('a', 'X');                                // Line 10
    System.out.println("x = " + x);                     // Line 11
    x = x.concat(" Rules!");                            // Line 12
    System.out.println("x = " + x);                     // Line 13
 }
}
```

Create a class named **JAT5Ex5.java**.

Q6 – JAT5Ex6

What is the output? Using a pen and paper, work through the logic of the code and write out the program outputs. Create the program using your favourite text editor / IDE and see if you were right!

```
public class JAT5Ex6{                                   // Line 1

  public static void main(String[] args){               // Line 3

    String s1 = "spring ";                              // Line 5
    String s2 = s1 + "summer ";                         // Line 6
    s1.concat("fall ");                                 // Line 7
    s2.concat(s1);                                      // Line 8
    s1+= "winter ";                                     // Line 9
    System.out.println(s1 + " " + s2);                  // Line 10
 }
}
```

Create a class named **JAT5Ex6.java**.

Please Turn Over

Q7 – JAT5Ex7

What is the output? Using a pen and paper, work through the logic of the code and write out the program outputs. Now create the program using your favourite text editor / IDE and see if you were right!

public class JAT5Ex7{	// Line 1
public static void main(String[] args){	// Line 3
String s1 = new String("dinghy");	// Line 5
String s2 = "dinghy";	// Line 6
String s3 = s2;	// Line 7
s1 = s1.concat("rubber");	// Line 8
s2.concat(s1);	// Line 9
System.out.println(s1 == s2);	// Line 10
System.out.println(s1.equals(s2));	// Line 11
System.out.println(s2 == s3);	// Line 12
System.out.println(s2.equals(s3));	// Line 13
System.out.println(s1 == s3);	// Line 14
System.out.println(s1.equals(s3));	// Line 15
System.out.println(s1 + " " + s2);	// Line 16
}	
}	

Create a class named **JAT5Ex7.java**.

Please Turn Over

Q8 – JAT5Ex8

Create a class named **JAT5Ex8.java.** In the main method, create the following String.

String aMessage = “ A message for you, Trudy ”;

Note**:** There are 3 leading and trailing white spaces in the above String.

The String should be trimmed before use.

Using the IndexOf**()** method of the String class, write a program which determines the following:

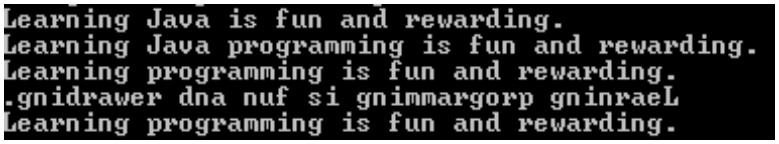
- The position of the first occurrence of the substring, “Trudy” within the message.
- The position of the first occurrence of the character, ‘**e**’ within the message.
- The position of the first occurrence of the character ‘u’ within the message, starting at index position 10.

Q9 – JAT5Ex9

Create a class named **JAT5Ex9.java**.

In the main method, create a StringBuilder object containing the String, “Learning Java is fun”.

- Append the following String to the StringBuilder object. “ **and rewarding.**”. Print the value of the StringBuilder object to the console.
- Insert the String "programming ", after the word "Java " in the StringBuilder object. Print the value of the StringBuilder object to the console.
- Delete the String "Java ", from the StringBuilder object. Print the value of the StringBuilder object to the console.
- Reverse the value of the String stored in the StringBuilder object. Print the value of the StringBuilder object to the console.
- Reverse the value again and call the toString() method of the StringBuilder object.



Please Turn Over

Q10 – JAT5Ex10

Create a class named **JAT5Ex10.java**.

In the main method, create a StringBuilder object containing the String, "John is a famous pop star"

- Insert the String, "McCartney " after the word "John " in the StringBuilder object. Display the value stored in the StringBuilder object to the console.
- Append the String, " and former member of the Beatles group." to the existing StringBuilder. Display the value stored in the StringBuilder object to the console.
- Delete the String "pop" in the StringBuilder. Display the value stored in the StringBuilder object.
- Reverse the contents of the StringBuilder and display the new value to the console.
- What is the advantage of using a StringBuilder object instead of a String object? Add a comment to your source code file to explain the difference.

```
John McCartney is a famous pop star
John McCartney is a famous pop star and former member of the Beatles group.
John McCartney is a famous star and former member of the Beatles group.
.puorg seltaeB eht fo rebmem remrof dna rats suomaf a si yentraCcM nhoJ
```

Please Turn Over

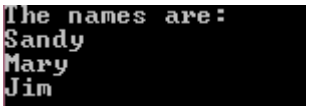
Q11 – JAT5Ex11

Create a class named **JAT5Ex11.java**.

You wish to store the following names in an array. Create an anonymous array (declare, create and initialise the array in one statement).

The names to be stored are Sandy, Mary and Jim.

Use an enhanced for loop to display the contents of the array.



Q12 – JAT5Ex12

Create a source code file named **JAT5Ex12.java.**

The source code file should contain two classes.

- public class JAT5Ex12
- class Friend

The 'Friend' class should contain the following:

Instance Variables

```
private String firstName;
private String lastName;
private String phoneNo;
private String emailAddress;
```

Constructor

```
public Friend(String firstName, String lastName, String phoneNo, String emailAddress)
```

Methods

```
public String toString()
```

The main method should be declared in class **JAT5Ex12**. In the main method, create the following objects of type Friend.

firstName; lastName; phoneNo; emailAddress;	Sandy Smith 0864545321 sandysmith@livemail.com

firstName; lastName; phoneNo; emailAddress;	Ben Jones 0864152412 jonesben@livemail.com

Please Turn Over

Create an anonymous array (declare, create and initialise the array in one statement) to store the two object references. Use a standard for loop to call the toString() method of each object stored.

```
The names of my friends are:

First Name: Sandy
Last Name: Smith
Phone No: 0864545321
Email Address: sandysmith@livemail.com

First Name: Ben
Last Name: Jones
Phone No: 0864152412
Email Address: jonesben@livemail.com
```

Q13 – JAT5Ex13

Create a class named **JAT5Ex13.java**

A company wants to store the following quarterly sales forecasts for the next three-year period.

	Q1	Q2	Q3	Q4
Year 1	12000	13000	14000	15000
Year 2	13000	14000	15000	16000
Year 3	10000	12000	15000	13000

Use a two-dimensional array to store the figures. Standard for loops should be used to display the values stored.

```
Year 1
12000 13000 14000 15000
Year 2
13000 14000 15000 16000
Year 3
10000 12000 15000 13000
```

Please Turn Over

Q14 – JAT5Ex14

Create a class named **JAT5Ex14.java,** to store the temperatures recorded in Ireland for the last two years.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
9.0	9.1	11.2	12.0	14.1	18.0	23.0	21.1	20.0	13.0	10.1	9.0
8.0	8.1	10.2	11.0	14.1	17.0	22.0	22.1	21.0	12.0	11.1	8.0

Use a two-dimensional array to store the figures.

Part A: Use standard for loops to display the values stored.

Part B: Use enhanced for loops to display the values stored.

```
Part A

Year 1
9.0 9.1 11.2 12.0 14.1 18.0 23.0 21.1 20.0 13.0 10.1 9.0
Year 2
8.0 8.1 10.2 11.0 14.1 17.0 22.0 22.1 21.0 12.0 11.1 8.0

Part B

Year 1
9.0 9.1 11.2 12.0 14.1 18.0 23.0 21.1 20.0 13.0 10.1 9.0
Year 2
8.0 8.1 10.2 11.0 14.1 17.0 22.0 22.1 21.0 12.0 11.1 8.0
```

Q15 – JAT5Ex15

Create a class named **JAT5Ex15.java**

Create a two dimensional array to store the following Strings.

green	white	orange			
red	white	blue	yellow	black	green

Use enhanced for loops to display the values stored

```
Row 1 green     white   orange
Row 2 red       white   blue    yellow  black   green
```

Please Turn Over

Q16 – JAT5Ex16

True or false. The following class compiles and produces a .class file.

Use a pen and paper to work through each line of the program.

To prove that you are correct, create the program using your favourite text editor / IDE.

Create a class named **JAT5Ex16.java**

```
public class JAT5Ex16{
  public static void main(String[] args){
    long[] nos = new long[]{127L, 127, (byte) 127};

    Animal[] ans = new Animal[] {new Animal(), new Horse()};
    Horse[] hrs = {new Horse()};
    ans = hrs;

    byte twoD[][] = new byte[3][];
    byte twoE[][] = twoD;
    byte twoF[] = twoE[0];
   }
}

class Animal{}
class Horse extends Animal{}
```

Q17 – JAT5Ex17

Create an ArrayList to store the names of the following film stars. The data type of the ArrayList is String.

- Elvis Presley
- Marilyn Monroe
- James Dean
- Rita Davies

Complete the following actions, making use of the methods found in the ArrayList object.

1. Cary Grant should be added to the list at index position two.
2. Determine if Marilyn Monroe is included in the list.
3. Display the name of the actor stored at index position four of the list.
4. At what index position of the list, is James Dean stored?
5. Remove Rita Davies from the list.
6. Display the contents of the arraylist.

```
Is Marilyn Monroe in the list? true
At index position four of the list is: Rita Davies
James Dean is at index position: 3

Printing the contents of the ArrayList:
Elvis Presley
Marilyn Monroe
Cary Grant
James Dean
```

Create a class named **JAT5Ex17.java.**

Please Turn Over

Q18 – JAT5Ex18

In this question, an ArrayList will be used to store object references created from a custom class named, **CD**. The CD class models a compact disc. The ArrayList will represent a CD Catalogue.

Create a source code file named **JAT5Ex18.java**.

In the source code file, create a class (with default access) named **CD**.

The class should contain the following.

Instance Variables

- private String name;
- private String artist;
- private String yearReleased;
- private String recordLabel;

Constructor

- One constructor should be created to accept four arguments.

Methods

- Accessor Methods (setters and getters) should be set for each of the instance variables.
- The *equals()* method should be overridden to allow two CD objects be comparable. Assume that two CD objects are considered equal, if they share the same (album) name.
- The *toString()* method should also be overridden appropriately.

In the same source code file, create a class named **JAT5Ex18** and use the public access modifier.

In the main method, create an ArrayList and complete the following steps. Use methods of the ArrayList object in each step.

- **Step 1:** Create the following two objects and add them to the ArrayList.

Name	Artist	Year Released	Record Label
Rattle and Hum	U2	1988	Island Records
The Dark Side of the Moon	Pink Floyd	1973	Capitol Records

- **Step 2:** Create the following object and add it to index position one of the ArrayList.

Name	Artist	Year Released	Record Label
The Very Best Of Fleetwood Mac	Fleetwood Mac	2002	Warner Bros. Records

- **Step 3:** Create the following object and add it to index position two of the ArrayList.

Name	Artist	Year Released	Record Label
Alanis Morissette: The Collection	Alanis Morissette	2005	Maverick

- **Step 4:** Determine if the album, 'The Very Best of Fleetwood Mac', is stored in the ArrayList.

Please Turn Over

- **Step 5:** Return details of the album stored at index position 3 of the ArrayList.
- **Step 6:** Remove the album, 'The Very Best of Fleetwood Mac' from the ArrayList.
- **Step 7:** Display the number of albums stored in the ArrayList.
- **Step 8**: Display the contents of the ArrayList.

```
Step 4:

The album, 'The Very Best of Fleetwood Mac', is already stored in the catalogue.

Step 5:

Name: The Dark Side of the Moon
Artist: Pink Floyd
Year Released: 1973
Record Label: Capitol Records
```

```
Step 7:

The CD Catalogue contains: 3 cd's.

Step 8:

**********CD Catalogue**********
Name: Rattle and Hum
Artist: U2
Year Released: 1988
Record Label: Island Records

Name: Alanis Morissette: The Collection
Artist: Alanis Morissette
Year Released: 2005
Record Label: Maverick

Name: The Dark Side of the Moon
Artist: Pink Floyd
Year Released: 1973
Record Label: Capitol Records

**********
```

Please Turn Over

Q19 – JAT5Ex19

The following question is perhaps better suited to the OCP exam than the OCA.

Using your knowledge of the ArrayList class, do you believe that (A). The following class will compile. (B): The following class will produce any output?

To prove that you are correct, create the program using your favourite text editor / IDE.

Create a class named **JAT5Ex19.java**

```
import java.util.ArrayList;                    // Line 1

public class JAT5Ex19{                         // Line 3
  public static void main(String[] args){      // Line 4
    ArrayList list = new ArrayList();          // Line 5
    list.add(12);                              // Line 6
    list.add((byte) 13);                       // Line 7
    list.add(14L);                             // Line 8
    list.add(new Cat("Snowball"));             // Line 9

    for(Object o:list){                        // Line 11
      System.out.println(o);                   // Line 12
    }                                          // Line 13
  }                                            // Line 14
}                                              // Line 15

class Cat{                                     // Line 17
  String name;                                 // Line 18
  public Cat(String name){                     // Line 19
   this.name = name;                           // Line 20
 }                                             // Line 21

@Override                                      // Line 23
 public String toString(){                     // Line 24
  return name;                                 // Line 25
 }                                             // Line 26
}                                              // Line 27
```

END OF EXERCISES