

IBDP Computer Science

Revision sample

Object Oriented Programming

Candidate Name

Level (please circle) HL SL

Points available : SL: 38
HL: 44

1

Define the term “encapsulation”

[1]

2

Explain one benefit provided by encapsulation.

[3]

3

Write the following terms in the correct space.
Terms may be used more than once or not at all.

reference / mutator / instance / abstraction / constructor / accessor / modifier / parameter / attributes

A class is an example of _____ because its design focuses only on essential details. All other details are ignored. The purpose of a _____ method is usually to initialise any class _____. The use of the private _____ means that in order for other classes to analyse data stored in properties of the class, _____ methods need to be designed.

When creating an _____ of a class, the _____ method is called. In order for a computer program to communicate with the object, a _____ variable will be required.

[8]

4

A cakeshop sells cakes. Every Cake has a flavour eg "chocolate", a size eg "small" and a price in dollars eg 2.75. When a cake is made (constructed) all of this information will be passed as parameters

eg `Cake c = new Cake("Strawberry", "medium", 1.50);`

Design the Cake class using data hiding and include a constructor method and accessor and mutator methods for all class properties.

The House class has been defined as follows:

```
public class House{

    //class attributes not shown

    //constructor method not shown

    public int getNumRooms(){
        return this.rooms;
    }

    public boolean hasGarage(){
        return this.garage;
    }

    public void setOccupied(boolean occupied){
        this.occupied = occupied;
    }

}
```

Another House class method needs to be designed, `fitForFamily`.

This method takes the number of family members as a parameter.

It returns `true` if the number of rooms in the House is greater than or equal to the number of family members and it has a garage, otherwise it returns `false`.

Design the House class method `fitForFamily`.

6

A computer program creates an instance of the House class from the previous question:

```
House h = new House(4, false, false);
```

The code will now determine if the house is fit for a family of x people. x is a variable which stores a whole number.

If it is, the House will have its occupied status set to `true` and a message "House now occupied" will be displayed.

Otherwise, a message "Not fit for family" will be displayed.

Write this program. The first few lines are given below:

```
House h = new House(4, false, false);  
  
int x = (int) (Math.random()*8)+1; //random family size
```

The `BubbleSorter` class is defined as follows:

```
public class BubbleSorter{

    private int[] nums;

    public BubbleSorter(int[] nums){
        this.nums = nums;
    }

    public void sortNums(){
        /*to be completed in part A*/
    }

    public int getMax(){
        /*to be completed in part B*/
    }

}
```

a) The `BubbleSorter` class method `sortNums` sorts the attribute `nums` into ascending order of value.

Code this method.

```
public void sortNums(){
```

7b) The `BubbleSorter` class method `getMax` calls the `sortNums` method and then returns the largest value in the array `nums`.

Code this method.

```
public int getMax() {
```

[2]

8a

The `JavelinThrower` class is defined as follows:

```
public class JavelinThrower{  
    private int totalDistance;  
    public JavelinThrower(){  
        this.totalDistance = 0;  
    }  
    public int getTotalDistance(){  
        return this.totalDistance;  
    }  
    public void throw(int distance){  
        this.totalDistance = this.totalDistance + distance;  
    }  
}
```

A computer program constructs an instance of a `JavelinThrower`.

It then allows the `JavelinThrower` to throw 10 times.

After the 10 throws, if the distance thrown is greater than 1000, a message

“You can attend the Olympic trials” will be displayed. Otherwise a message “Try again!” is displayed.

Use the JavelinThrower class to write this computer program.

[5]

8b

A collection of JavelinThrower objects, THROWERS, exists.

Write an algorithm that will process the collection and output a count of all JavelinThrowers in the collection who threw more than 100m.

When processing a collection, start at the first element - use resetNext() method

When processing a collection, use a while loop using hasNext()

To process an item in the collection, use getNext()

9

HL Extension

An ArrayList of JavelinThrower objects exists.

A function, getMaxThrow, accepts the ArrayList as a parameter. It returns a reference to the JavelinThrower who threw the furthest. Code this function.

pre-condition: the size of the ArrayList is greater than 0

ArrayLists have a variety of methods we can use:

.size() to determine the length of the ArrayList

.get(i) to get the element at index i

.add(Object) to append an object to the end of the ArrayList

.add(Object, i) to add an object at a specific index, pushing current objects to subsequent indexes

.set(Object, i) to replace an element at index i with a new object

.remove(i) to remove an object at index i

Also, a reminder of how to declare an ArrayList, if necessary:

```
ArrayList<ObjectType> identifier = new ArrayList<ObjectType>( );
```

An ArrayList, like a LinkedList, is considered to be a DYNAMIC data structure!

Unlike a regular array, which is STATIC, its length (size) can change!

