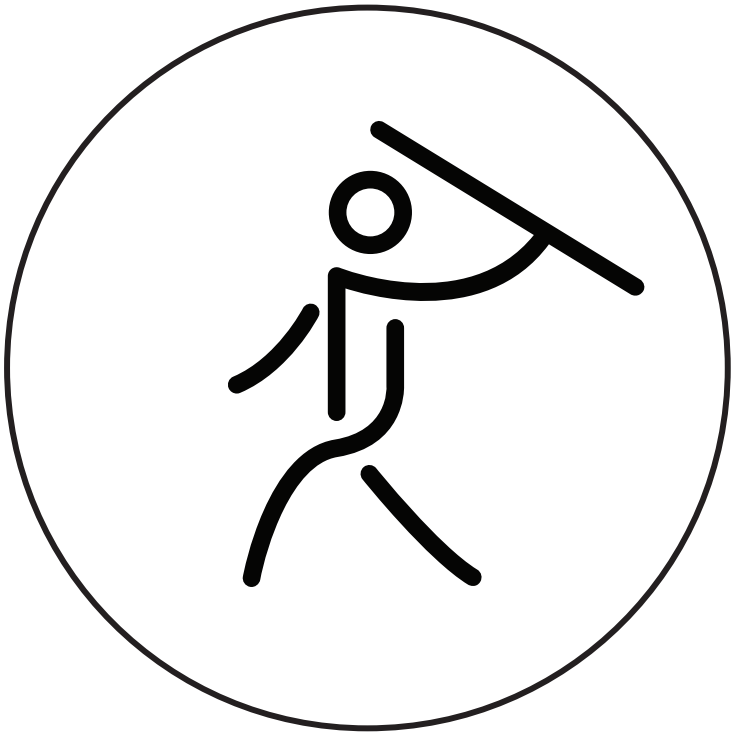
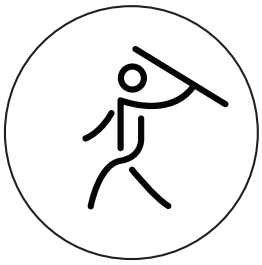
IBDP Computer Science

THEME B3 - REVISION SET

Candidate Name

Points available : 41





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.

[4]

5

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`.

5. continued

[3]

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
```

[3]

7

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(){
```

[4]

7c) State the time complexity of this algorithm using Big O notation.

[1]

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

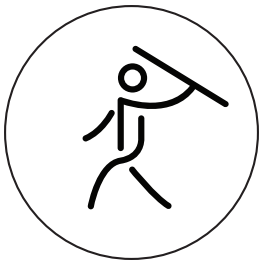
Code this method.

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

[2]

8a

The JavelinThrower class is defined as follows:



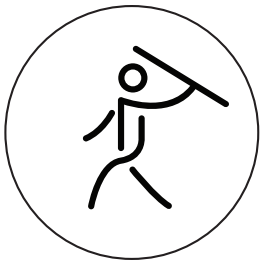
```
public class JavelinThrower{

    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 method, `count100` takes an ArrayList of `JavelinThrower` objects as a parameter. The method returns a count of all JavelinThrowers in the list who threw more than 100m.

Implement the method `count100`. Include the signature in your answer.

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!

[5]

9 An queue of athletes, ATHLETES, is being processed.

Draw the queue after the following series of operations has been completed.

Annotate the queue to clearly indicate the front and rear of the queue.

```
ATHLETES.enqueue(”Bob”);
ATHLETES.enqueue(”Carl”);
ATHLETES.peek();
ATHLETES.enqueue(”Cheryl”);
ATHLETES.dequeue();
ATHLETES.enqueue(”Max”);
ATHLETES.peek();
```

[2]