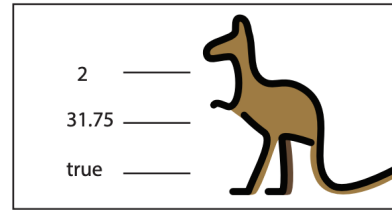


OPTION D REVIEW ACTIVITY

Kangaroo objects have 3 attributes:

- age eg 3
- weight eg 46.5
- healthy indicator (true/false)



There will be **two ways** to construct Kangaroos:

- 3 data items will be sent to the constructor method and used to initialise the attributes
- the above attributes will be set to 0, 0.0 and true respectively.

1. Design the entire Kangaroo class. Include accessor/mutator methods for the **age** attribute only.

Java

```
public class Kangaroo{
```

```
}
```

2. Outline an advantage of encapsulation.

Go

3. Write a line of code to instantiate a `Kangaroo` using either of the 2 constructor methods you designed.

Java

4. Write a line of code to instantiate an array of 10 `Kangaroo` objects:

Java

5. HL ONLY: Write a line of code to instantiate an **LinkedList** (Java class) of `Kangaroo` objects.

Java

6. The `Kangaroo` class has more than one method with the same name but different parameter lists. Name this form of **Polymorphism**:

Go

7. Describe one **benefit** of this form of Polymorphism in program development.

Java

8. A Kangaroo **IS-A** Marsupial. So is a Wallaby, a Wombat and a Koala. These additional classes need to be designed. Using this scenario, describe the benefit of incorporating inheritance into the program design.

Go

A **collection** of Kangaroos exists, MOB.

9. Process the collection to determine the average age of all Kangaroos in the collection MOB.

Go

10. Kangaroos live in Australia. Here is the Australia class:

Java

```
public class Australia{
    private int totalPopulation;
    private String[] states;
    private int[] statePopulations;

    public Australia(int tp, String[] s, int[] sp ){/*code not shown*/}
    public int getPopulation(){ /*code not shown*/ }
    public String[] getStates(){ return states; }
    public int[] getStatePopulations(){ return statePopulations; }
    public boolean populationChecker( ){ /*to be implemented*/ }
    public void updateStateData(int population, String state){
        /*to be implemented*/
    }
}

//note there may be other Australia class methods. You only need to use the
ones listed.
```

Using the information available in the Australia class, draw the corresponding UML diagram.

In another class, the following code exists:

Java

```
String[] x = {"Victoria", "Queensland", "New South Wales"};
int y = 20500; //Australia's population in 1000s
int[] z = {6800, 5400, 8300}; //state populations in 1000s
```

11. Write a line of code to construct an instance of the `Australia` class

Java

12. The `Australia` class may be termed an **abstraction** of real Australia. Explain why this is so.

Go

The `Australia` class method `populationChecker` checks that the total of all of the values in the integer array is the same as the total population. It returns true if they are the same, and false otherwise.

13. Design the `populationChecker` method of the `Australia` class.

Java

The **Australia** class method `updateStateData` takes an integer and a String as parameters.

The String represents a state eg "Queensland" and the integer represents the new population of that state.

The `updateStateData` method searches `states` for the String and, if found, updates the population of that state in `statePopulations` and also updates `totalPopulation`.

For example, `states` contains {"Victoria", "Queensland", "New South Wales"} and `statePopulations` contains {6800, 5400, 8300},

A call is made to `updateStateData`:

```
updateStateData("New South Wales", 8450)
```

It will update `statePopulations` as follows: {6800, 5400, 8450} and also `totalPopulation`

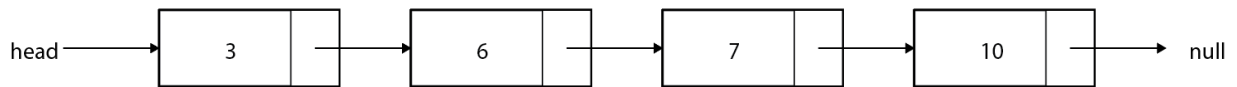
A call to `updateStateData("Northern Territories", 930)` will not create any changes in the `statePopulations` array or the `totalPopulation`.

Implement the `updateStateData()` method of the **Australia** class.

Java

HL Only

A Linked List of Kangaroo objects exists (note only the age is shown):



14. What is the data type of `head`?

15. A new `Kangaroo` aged 9 is to be inserted into the list. The list must be maintained in ascending order of age. Outline how this new `Kangaroo` can be inserted into the list.

Go

16. A binary tree storing the ages of some older `Kangaroos` is as follows:

[illegible]