



22127014



**COMPUTER SCIENCE  
STANDARD LEVEL  
PAPER 2**

Monday 21 May 2012 (morning)

1 hour 30 minutes

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INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- A clean copy of the **Computer Science** case study is required for this paper.
- The maximum mark for this examination paper is [70 marks].

Answer **all** the questions.

1. Consider the following code.

```
public static void main(String[] args)
{
    int distance = 600;
    String town = "Mexico";
    String newTown = changes(distance, town);
    output distance;
    output newTown;
}

private static String changes(int distance, String town)
{
    distance = distance + 100;
    String t = " City";
    town = town + t;
    output distance;
    return town;
}
```

- (a) (i) Define, using an example from the above code, the *scope* of a variable. [2 marks]
- (ii) With reference to the above code, outline the significance of the identifier **private**. [2 marks]
- (iii) State the output from the above code. [3 marks]

The string function `length()` returns the number of elements in a string. For example, `word.length()` will return the value 8, if `word = "computer"`.

Similarly, the function `charAt(x)` returns the character at position `x` in a string. For example, `word.charAt(1)` will return the character "o" and `word.charAt(3)` will return "p".

(b) Consider another section of code.

```
String word = "school";
int a = word.length();
char b = word.charAt(0);
```

- (i) State the value assigned to the variable `a`. [1 mark]
- (ii) State the value assigned to the variable `b`. [1 mark]

*(This question continues on the following page)*

*(Question 1 continued)*

The method `analyse()` has been written that counts the number of vowels in a set of words (the vowels can be considered to be the letters a, e, i, o and u).

- (c) Describe the global variable `vowels` that holds the number of occurrences of each of the five vowels.

*[3 marks]*

The method `analyse` will be called by the statement `analyse(wordArray, size);`, where `wordArray` is an array of words, and `size` is the number of words in this array.

- (d) Construct the method `analyse()` that will look for each vowel in every word in `wordArray`, and amend `vowels` accordingly. You can assume that all of the words are formed of lower case letters.

*[8 marks]*

2. A small supermarket has computerized both its checkout (where the customers pay) and its inventory system (where the stock levels are kept). Each item in the supermarket can be identified by means of a barcode.

- (a) State **two** essential features of the barcodes that will enable them to function within this computerized system. *[2 marks]*

Details of all of the supermarket's products are stored on a sequential access file on the main server. This file can be accessed from the checkout terminals.

- (b) Identify **two** reasons for the checkout terminals being able to access this file. *[2 marks]*

The `Customer` class is called every time a new customer arrives at the checkout. The `Item` class contains details of one particular supermarket item. The two classes are partly shown below.

```
public class Item // contains details of an item
{
    String name;
    String barcode;
    double cost;
    String type; // e.g. fruit, cosmetics
}

public class Customer
{
    public double totalCost; // final cost

    public static void newCustomer()
    // runs the checkout process

    private static String readBarcode()
    // returns the barcode for a scanned item

    private Item getDetails(String barcode)
    // retrieves the details of one item from the database

    private static void printItem(Item i)
    // prints some details of the current item on the receipt

    private static void updateInventory(String barcode)
    // updates the inventory (stock levels) on the file
    // when an item is bought

    public static void main(String[] args)
    {
        new Customer();
    }
}
```

*(This question continues on the following page)*

(Question 2 continued)

- (c) Assuming that there are no other classes in the program, state the first **two** methods that would be run by the `Customer` class. *[2 marks]*

As the checkout process begins, the method `newCustomer()` is called. After the last item is scanned, the process is terminated by pressing an END key. The `newCustomer()` method includes the following series of steps:

- an array of `Item` objects is created
- repeat until END key is pressed
  - \* an item is scanned in and its barcode read
  - \* an `Item` object is initialized using data from the database
  - \* some of its details are printed on the receipt
- **after** the END key is pressed
  - \* the inventory is updated for each item sold
  - \* the total cost is printed.

- (d) Construct the method `newCustomer()` which is started below. You should make use of the other methods listed in the `Customer` class **without** writing their code. *[8 marks]*

```
public static void newCustomer()  
{  
    Item[] goods = new Item[500];  
    // the rest of the code is missing  
}
```

- (e) Outline the steps (**without** writing code) that must take place whenever the method `updateInventory()` is called. *[4 marks]*

- (f) Suggest an additional process that can be carried out as item records are updated on the file. *[2 marks]*

3. *This question requires the use of the case study.*
- (a) Suggest **two** principal reasons that have led to the convergence of technologies as shown on page 3 of the case study. *[2 marks]*
  - (b) Explain **two** reasons why flash memory is used extensively by mobile devices. *[4 marks]*
  - (c) Explain why Wi-Fi has been chosen as the communication technology for Internet hotspots as opposed to other technologies. *[4 marks]*
  - (d) Discuss whether the lack of dominance of one operating system for mobile devices might improve the security of data in smartphones in comparison with personal computers. *[4 marks]*
  - (e) Two students are sitting in a café. They both have smartphones which have their Bluetooth facility enabled.
    - (i) Describe the precautions they should take while sending files to each other. *[4 marks]*
    - (ii) State **two** different examples of a piconet that might be operating within this café. *[2 marks]*
    - (iii) Outline how *frequency-hopping* prevents the piconets from interfering with each other. *[4 marks]*
  - (f) With reference to **one** specific example, discuss whether the possible disadvantages of the use of smartphones by doctors for their work outweigh the advantages. *[6 marks]*
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