



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Centre Number

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Candidate Number

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Software Systems Development

Unit AS1:

Introduction to Object Oriented Development



A1S11

[A1S11]

MONDAY 15 MAY, AFTERNOON

TIME

2 hours.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all six** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

ADVICE TO CANDIDATES

You are advised to take account of the marks for each part question in allocating the available examination time.

For Examiner's use only			
Question	Marks available	Marks	Remark
1	9		
2	23		
3	23		
4	14		
5	24		
6	7		
Total	100		

- 1 Complete the following statements about an object-oriented programming environment by inserting the appropriate words or phrases from the list given below.

overloading interfaces inheritance classes polymorphism
 signatures overriding implements methods late binding
 new Object early binding object instantiation

- (i) _____ is the creation of an object to the design of a class.
- (ii) _____ is the base building block of an object-oriented system and all _____ are derived from it.
- (iii) _____ occurs where two or more methods have the same name but different _____, even if their return types differ.
- (iv) Customising a super / base method within a derived/sub class is known as _____.
- (v) Multiple inheritance is implemented in C#/Java through the use of _____.
- (vi) A primary concept of object-oriented programming is _____. It allows sub/derived class methods to be invoked through a super / base class reference during run-time. This is enabled through _____.

[9]

Examiner Only

Marks

Remark

- 2 An artist runs a restoration service where donated items or those retrieved from recycling, are restored or turned into alternative reusable items. These are then offered for sale through upmarket retailers. Restorations fall into three main categories, A – Lamps, B – Tables and C – Sundry.

The production cost is the total of the labour cost, materials cost and specialism cost. The labour cost is the number of hours multiplied by the rate of £20 per hour. Specialism costs occur for outsourced work when required.

The sale price is determined by increasing the production cost by 40%.

- (a) Complete the design of a class called **Job** shown below.

Ensure the creation of:

- A constant variable to hold the value 20 for the hourly rate;
- **Get** and **Set** (Properties / Methods) for the field **noHours** only;
- **Methods** to determine appropriate costs.

```
class Job{
    private int      jobNo;
    private String   description;
    private char     category;
    private DateTime jobDate;
    private DateTime saleDate;
    private int      noHours;
    private double   materialCost; // examples – paint, material
    private double   specialismCost;

    // constant variable to hold the value 20 for the hourlyRate.
```

[2]

Examiner Only	
Marks	Remark

```

public Job(){
    private jobNo = 0;
    private description = null;
    private category = ' ';
    private jobDate = new DateTime(); // sets today's date
    private saleDate = default(DateTime); // sets date to 01/01/0001
    private noHours = 0;
    private materialCost = 0.0;
    private specialismCost = 0.0;
}
// GET and SET (Property/Methods) for the field noHours only

```

[4]

```

// A method to determine the productionCost due on a job.

```

[3]

Examiner Only	
Marks	Remark

// A method to determine the **salePrice** for a job.

[4]

(b) A program using the class Job has the following line of code:

```
Job [ ] jobArray = new Job[150];
```

(i) Explain the terms in bold.

[2]

Examiner Only

Marks

Remark

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(Questions continue overleaf)

3 Sorting is a common activity conducted on data in information processing.

(a) (i) Name and describe a simple sorting method.

[5]

Examiner Only	
Marks	Remark

(b) C# and Java provide a SORT class to facilitate sorting requirements.

Complete the sentence below.

(i) To allow use of the SORT facility a class header must implement the _____ called _____. [2]

(ii) For the following class Product, a list of product details is required where the product category is in alphabetical order and the price within each category is in ascending order.

C#

```
class Product : IComparable{
    private int        productNo;
    private String     description;
    private String     category;
    private int        noOfProduct;
    private double     price;
```

java

```
class Product implements Comparable{
    private int        productNo;
    private String     description;
    private String     category;
    private int        noOfProduct;
    private double     price;
```

Write the method that will accomplish this requirement by comparing two product objects and return an integer that is:

negative if the first object is 'less than' the second object;
zero if the objects are equal;
positive if the first object is 'greater than' the second object.

*Note that the class **String** facilitates a SORT with a **compareTo** method that returns an integer to indicate the alphabetical order of the two String objects being compared.*

Hint: the price only needs to be considered if the two product items have the same category.

Examiner Only	
Marks	Remark

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4 Details of stock for sale are defined in a class Stock as shown below:

```
class Stock
{
    private String stockNo; // maximum 8 chars
    private String model; // maximum 12 chars
    private int qtyInStock; // range 0 – 6
    private double price; // range 1200 – 35000
}
```

- (a) Write the output statement which will **display** the details of an item of stock including the stock value. Ensure the information is formatted appropriately.

[3]

- (b) The stock will be stored in a binary file for subsequent processing. What amendment must be made to the class definition to facilitate reading and writing of stock objects to and from the file?

[1]

Examiner Only	
Marks	Remark

- (c) Below is a section of code to deal with a file of stock objects. Choosing either the C# or Java example explain what you understand by the emboldened terms.

Section of C# code

```

int size=0;
Stream strm;
try
{
strm = File.OpenRead("Stock.dat");
BinaryFormatter bf = new BinaryFormatter( );

try
{
    while (strm.Position < strm.Length)
    {
        arrayStock[size] = (Stock)bf.Deserialize(strm);
        size++;
    }
    strm.Close();
}
}
catch

```

Section of Java code

```

int size = 0;
try{
FileInputStream strm = new FileInputStream("Stock.dat");
ObjectInputStream ois = new ObjectInputStream(strm);

try
{
    while (strm.Position < strm.Length)
    {
        arrayStock[size] = (Stock)ois.readObject();
        size++;
    }
    strm.Close();
}
}
catch(

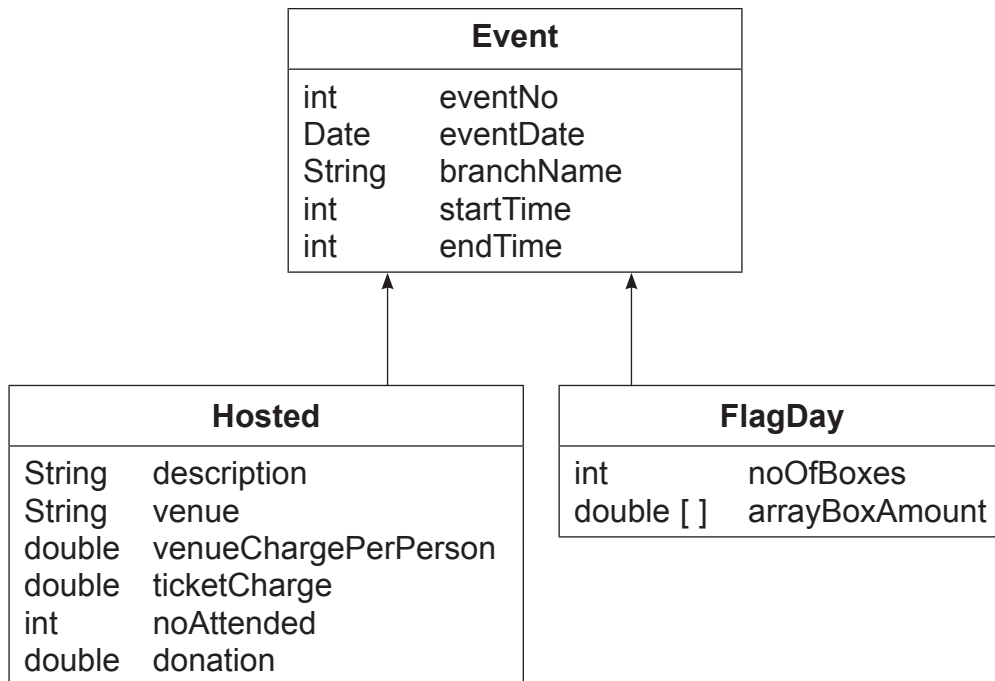
```

Examiner Only	
Marks	Remark

- 5 A charity's fund-raising section supports a variety of events run by volunteer branches throughout the country. Common events are flag days, breakfasts, lunches, dinner dances and sporting events.

The charity holds information about each event for the purposes of advertising and the tracking of income. The volunteer branch deals with the planning details.

Inheritance diagram for the charity fund-raising section.



The header for the class **Event** has been defined as follows:

abstract class Event

- (a) Explain the term in bold indicating why it has been applied to the class Event.

[2]

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Marks Remark

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