



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014

Centre Number

71

Candidate Number

Software Systems Development

Unit AS1:

Introduction to Object Oriented Development

[A1S11]

TUESDAY 20 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** 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 Number	Available Marks	Marks	Remarks
1	10		
2	23		
3	21		
4	23		
5	9		
6	14		
Total Marks	100		

- 1 Complete the following definitions within an object-oriented programming environment by inserting the appropriate word from the list given below. A word may be used only once.

multiple **reuses** **implementation** **related**
single **type** **encapsulation** **implements**
characteristics **static** **instantiation** **behaviour**

Classes describe the _____ of objects, while objects are usable instances of classes. The act of creating an object is called _____. Inheritance, together with _____ and polymorphism, is one of the three primary _____ (or pillars) of object-oriented programming. Inheritance enables you to create a new class that _____, extends, and modifies the _____ that is defined in another class.

Encapsulation means that a group of _____ properties, methods, and other members are treated as a _____ unit or object. Polymorphism means that you can have _____ classes that can be used interchangeably, even though each class _____ the same properties or methods in different ways. [10]

Examiner Only

Marks	Remark

- (d) Write the code in the class method **main()** for the call statements to the two methods below:

C#

```
public static int enter_No_Of_Items( int min, int max)
public static bool validTelephoneNo( String telNo)
```

Java

```
public static int enter_No_Of_Items( int min, int max)
public static boolean validTelephoneNo( String telNo)
```

Assume the following variables have been declared and the telephone number, telNo, has been assigned a value:

```
noOfItems as type integer;
telNo as type string;
validTelNo as type boolean;
min as type integer;
max as type integer.
```

[2]

Examiner Only

Marks

Remark

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(Questions continue overleaf)

- 3 A company that specialises in gourmet food determines the delivery charge for a hamper of food by the weight of the hamper. Each hamper is weighed and assigned a standard delivery charge according to its weight as follows:

Weight (kg)	Standard delivery charge (£)
greater than 15	16
between 10 and 15 inclusive	10
between 5 and 9.99 inclusive	4.25
less than 5	2.50

* The delivery charge is increased by 30% if next day delivery is required.

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

Ensure the creation of:

- A **constructor** method with fields;
- **GET** and **SET** (Properties / Methods);
- A **Method** to determine delivery cost (**standard delivery charge + next day charge**).

```
class Hamper{
    private          double          weight;
    private          char            nextDayDelivery;

    public Hamper( )
    {
        weight = 0;
        nextDayDelivery = ' ';
    }

    // field constructor
```

[3]

Examiner Only	
Marks	Remark

- (c) Searching is often carried out on arrays. The linear method shown below exits if the required number is found or if the search reaches the end of the array.

```
public static int search( int[] nums, int numRequired)
{
    for ( int x=0; x <nums.Length; x++ )
    {
        if ( nums[x] == numRequired )
            return x;
    }
    return - 1;
}
```

- (i) Arrays may be sorted to improve the search times. What improvement could be made to the linear search method above if the array passed as a parameter has the figures sorted in numerical order?

[2]

Examiner Only	
Marks	Remark

(iii) Using the diagram below:

- (1) fill in the missing values to illustrate how the binary search would be implemented for the array when the target number to be found is 30. [5]
- (2) Fill in the expression which will terminate the search if the target number is not in the array. [1]

(1) Target number to be searched for = 30

4	6	10	17	21	30	42
---	---	----	----	----	----	----

Start = 0

mid = (i _____)

last = (ii _____)

4	6	10	17	21	30	42
---	---	----	----	----	----	----

Start = (iii _____)

mid = (iv _____)

last = (v _____)

(2) Terminate search if target found or **last** _____ **start**
(target not in array)

Examiner Only

Marks Remark

5 Explain **how** each of the following facilitates inheritance in classes (object templates).

encapsulation

overloading

overriding

[6]

Examiner Only	
Marks	Remark

Give three advantages of inheritance.

advantage 1

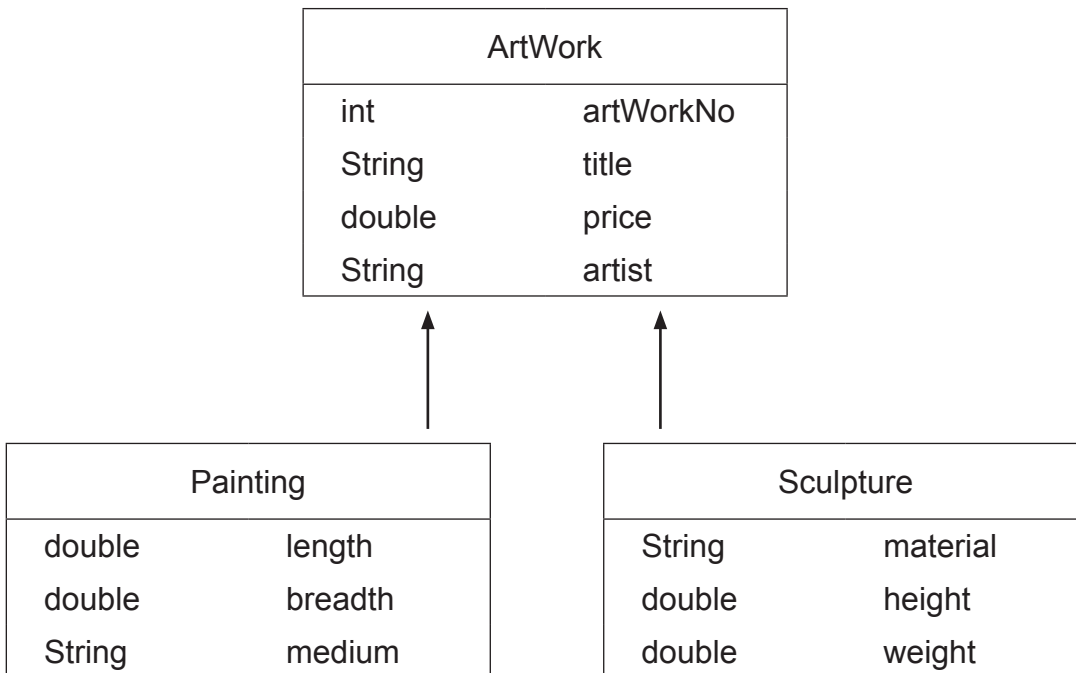
advantage 2

advantage 3

[3]

Examiner Only	
Marks	Remark

- 6 As part of an IT application for an Art Exhibition gallery, software is required to manipulate the sale of paintings and sculptures. The software collects details about the artwork such as its title and price. The diagram below shows the data structures.



Assume that the class ArtWork has been designed with the following:

- field definitions;
- default and field constructors;
- GET and SET (Properties/Methods);
- toString() method.

(a) Using the concept of inheritance, define the class **Sculpture**. Ensure the creation of:

- fields;
- constructors;
- GET and SET (Properties / Methods);
- a toString() method to return **full** details of the sculpture.

Examiner Only	
Marks	Remark

- (b) (i) Define an array named, **artWorksArray**, that is capable of holding details for 50 items of Artwork.

_____ [2]

- (ii) Populate `artWorksArray[0]` with sample details of a sculpture.

artWorksArray[0] = _____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark

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