



ADVANCED SUBSIDIARY (AS) General Certificate of Education 2014

Software Systems Development

Unit AS1:

Introduction to Object Oriented Development

[A1S11]

TUESDAY 20 MAY, AFTERNOON



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					

Ce	ntre	NUL	nper
71			

Candidate Number

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 th	e	of objects	, while objects					
are usable instance	s of classes.	The act of creating an c	bject is called					
	Inherita	nce, together with						
and polymorphism,	is one of the	three primary						
(or pillars) of object-	-oriented prog	gramming. Inheritance e	enables you to					
create a new class	that	, extends,	and modifies					
the	that	is defined in another cla	ass.					
Encapsulation mean	ns that a grou	ıp of	properties,					
methods, and other								
or object. Polymorp	hism means	that you can have						
classes that can be	used intercha	angeably, even though e	each class					
	the sam	e properties or methods	s in different					
ways.			[10]					

1

olic static int er	nter_No_Of_Iten	ns(int min, int	max)		
blic static void	displayMessage	e(int row, int co	oi, String mess	age)	
				101	
				[6]	

2

(b)	Write the body of code for the method:	Examiner Only Marks Remark
	public static int enter_No_Of_Items(int min, int max)	
	which will allow the user to enter a value for the number of items bought. The value should be validated in the range min to max . Your answer should include:	
	 data declaration; prompt and Input statements; range check; error message control. 	
	[8]	
	[-]	

(c)	Write the body of code which will validate a telephone number for the method:	Examin Marks	er Only Remark
	C# public static bool validTelephoneNo(String telNo)		
	Java public static boolean validTelephoneNo(String telNo)		
	 to ensure that: the telephone number has a minimum length of nine characters; the first character may be the '+' character; all characters must be digits with the possible exception of the first character; the method should return true or false. 		
	Your answer should include:		
	 data declaration; length check; '+' character check; digit check; 		
	 true / false returned. 		
	[7]		

(d)	Write the code in the class method main() for the call statements to the two methods below:	Examiner Only Marks Remark
	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]	

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(Questions continue overleaf)

Examiner Only

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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).

weight;

nextDayDelivery;

```
class Hamper{
```

```
private double
private char
```

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

// field constructor

// GET and SET (Properties/Methods)		Examiner Only Marks Remar
	[6]	
// A method to determine delivery cost		
	[8]	

b)	Write the co type Hampe following va	Examiner Only Marks Remark	
	double char	hamperWeight; nextDayDelivery;	
	instantiate	object	
		[2]	
		[2]	
	output cos	t of delivery for the hamper	
		[2]	
		[4]	

(a)	Describe an array structure clearly identifying:	
	 three key aspects; how an array can be instantiated; how the first item within an array structure can be accessed. 	
	[5]	

Examiner Only Marks Remark

(b) An array structure **rainfall** is used to store the rainfall figures (in millimetres) over a period of one week, as shown below.

6	10	17	2	0	12	7

Assuming that the array has been instantiated with the figures, write the code that will:

 calculate the average rainfall for the week; output the number of days with below average rainfall.
[7]

9562

(c) Searching is often carried out on arrays. The linear method shown Examiner Only below exits if the required number is found or if the search reaches the Marks Remark end of the array. public static int search(int[] nums, int numRequired) { for (int x=0; x <nums.Length; x++)</pre> { 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]

large array of sorted numbers and why the bin would improve efficiency.	Market Market Market
	[3]
	[3]

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.
 - (2) Fill in the expression which will terminate the search if the target number is not in the array. [1]

(1) Target n	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	
4	0	10	17	21	50	42	
Start =	(iii)					
mid =	(iv)					
last =	(v)					
(2) Terminat (target n	te search ot in arra		found or	last	s	tart	

overloading			
overloading	encapsulation		
overloading			
overloading			
overriding		 	
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Give three advantages of inheritance.			er Only
advantage 1		Marks	Remark
advantage 2			
auvantage 2			
advantage 3			
	[3]		
17		[Turi	n over

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.

		ArtWork	
	int	artWorkNo	
	String	title	
	double	price	
	String	artist	
	Î		
P	ainting		Sculpture
double	length	String	material
double	breadth	double	height
String	medium	double	weight

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.

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[10]	1	
[10	1	

(b) (i)	Define an array named, artWorksArray , that is capable of holding details for 50 items of Artwork.	Examiner (Marks R
(ii)	Populate artWorksArray[0] with sample details of a sculpture. artWorksArray[0] =	
тні	S IS THE END OF THE QUESTION PAPER	

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