



Ce	ntre Number
71	
Cano	didate Number

ADVANCED SUBSIDIARY (AS) General Certificate of Education 2014

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 Available Number Marks			s 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.

Examir		er Only
	Marks	Remark
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multiple	reuses	implementation	related			
single	type	encapsulation	implements			
characteristics	static	instantiation	behaviour			
Classes describe the		of objects, w	hile objects			
are usable instances	of classes. The	e act of creating an obje	ect is called			
	Inheritance	e, together with				
and polymorphism, is	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 m	nembers are tre	eated as a	unit			
or object. Polymorphis	sm means that	you can have				
classes that can be us	sed interchang	eably, even though ead	ch class			
	the same p	roperties or methods in	different			
ways.			[10]			

(a)	Methods or Functions are common features of programs. Explain the structure of a Method or Function referencing the two examples given below to illustrate your answer.	Examin Marks	l
pul pul	olic static int enter_No_Of_Items(int min, int max) olic static void displayMessage(int row, int col, String message)		
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		-	
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		-	
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		-	
	[6]	I	

(b)	Write the body of code for the method:	Examin Marks	er Only 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:	Examiner Only Marks 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:	Examin Marks	er Only 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]		
		1	

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(Questions continue overleaf)

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
```

// GET and SET (Properties/Methods)	Examin Marks	ner Only Remark
[6]		
// A method to determine delivery cost		
,		
[8]		

(b)	type Hampe	ode, in the class method main() , to instantiate an object of er and output the cost of delivery for the object. Assume the ariables have been declared and assigned values.	Examiner Only Marks Remark
	double char	hamperWeight; nextDayDelivery;	
	instantiate	object	
		[2]	
	output cos	t of delivery for the hamper	
		[2]	

	array is a static structure which is efficient in the processing of large ounts of data.		Examine Marks	er Only Remark
(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]		

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6	10	17	2	0	12	7		
the	code that w	vill: ne average	nas been in e rainfall for days with	the week;				
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						[7]	

(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]

would improve eff	10101103.			
			[3]	

(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	r
	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
١		laiget	Hallibel		ocai oi ica	101	\circ

4	6	10	17	21	30	42

Start = 0

	4	6	10	17	21	30	42
- 1							

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

encapsulation		
overloading		
avo unidin a		
overriding	[6]	
overriding	[6]	
overriding		
overriding		
overriding	[6]	

Give three advantages of inheritance.		Examir Marks	ner Only Remark
advantage 1		Walks	Kemark
advantage 2			
advantage 3			
	[3]		

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.

Examiner Only

Marks Remark

	ArtWork		
	int	artWorkNo	
	String	title	
	double	price	
	String	artist	
	†		
Painting	J		Sculpture

Painting			
double	length		
double	breadth		
String	medium		

Sculpture			
String	material		
double	height		
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.

	Examir Marks	ner Only Remark
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[40]	,	
[10]		

(b) (i)	Define an array named, artWorksArray , that is capable of holding details for 50 items of Artwork.	Examiner Only Marks Remar
		[2]
(ii	Populate artWorksArray[0] with sample details of a sculpture. artWorksArray[0] =	
		[2]
THI	S IS THE END OF THE QUESTION PAPER	

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