

Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Centre Number				
	Can	didat	e Nu	mber

Software Systems Development

Unit AS1:

Introduction to Object Oriented Development



[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

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	

envii	•	_	ements about ar e appropriate wo	•	ted programming es from the list	Examin Marks	er Only Remark		
over	loading	interfaces	inheritance	classes	polymorphism				
signa	atures c	overriding	implements	methods	late binding				
new	Object	early bin	ding object	instantia	tion				
(i) .	a class.	i	s the creation o	f an object to	the design of				
(ii)		i	s the base build	ling block of a	an object-oriented				
:	system and	all	a	are derived fro	om it.				
(iii)		(occurs where tw	o or more m	ethods have the				
;	same name but different, even if their return								
1	types differ.								
		g a super / b	ase method wit	hin a derived	/sub class is				
` ,	·	eritance is ir	nplemented in (C#/Java throu	igh the use				
			ject-oriented pro	ogramming					
i	is		It allows sub/	derived class	methods to be				
i	invoked thro	ough a supe	r / base class re	eference durir	ng run-time.				
-	This is enat	oled through		-	[9]			

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.

Examiner Only

Marks Remark

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;
                       noHours:
    private int
    private double
                       materialCost:
                                        // examples – paint, material
            double
                       specialismCost;
    private
   constant variable to hold the value 20 for the hourlyRate.
                                                                [2]
```

	private private private private private private private private private	descript category jobDate saleDate noHours material	ion = null; / = ' '; = new Date e = default(D)ateTime);	// sets tod // sets da	ay's date te to 01/01/	/0001	Examir Marks	er Only Remark
} // 	GET and	SET	(Property	/Methods)	for the fie	d noHours	s only		
	A method	d to deter	mine the pr e	oduction(Cost due d	n a job.	 [4]		
							[3]		

	//	A method to determine the salePrice for a job.		Examir Marks	ner Only Remark
			[4]		
			[4]		
(b)	Ар	rogram using the class Job has the following line of code:			
		Job [] jobArray = new Job[150] ;			
	(i)	Explain the terms in bold.			
			[2]		

(ii)	The array has been populated and currently has the details of 72 finished items recorded. Write the section of code which will display details of the lamps available for sale. Finally output the overall total for the production costs for these unsold items.	Examiner Only Marks Remark
	The category for lamps is A .	
	Available items have the default saleDate of 01/01/0001.	
	Assume a toString method exists in the class Job that returns jobNo, description, production cost and the sale price.	
	[8]	

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(Questions continue overleaf)

(a) (i)	Name and describe a simple sorting method.		Marks
		[5]	

(ii)	Using the following set of numbers illustrate the contents after each pass of your chosen sort.	Examin Marks	er Only Remark
	Indicate the number of swaps at each pass.		
	5, 16, 11, 7, 26		
		_	
		_	
		-	
		-	
		-	
		-	
	[5]		

#	and Java provide a SORT class to facilitate sorting requirements.	Examiner Only Marks Rema
or	mplete the sentence below.	marks Rema
(i)	To allow use of the SORT facility a class header must implement	
	the called [2]	
	رکا	
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 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.	
	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.	
	the two String objects being compared. Hint: the price only needs to be considered if the two product	

		Examine Marks	er Only Remark
	_		
	,		
	-		
	-		
	-		
	_		
[11]			

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Details of stock for sale are defined in a class Stock as shown below: **Examiner Only** Marks Remark class Stock { // maximum 8 chars private String stockNo; String model; // maximum 12 chars private qtyInStock; // range 0-6private int double // range 1200 - 35000 private price; } (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]

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(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.

Examiner Only

Marks Remark

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();
```

10655

catch(

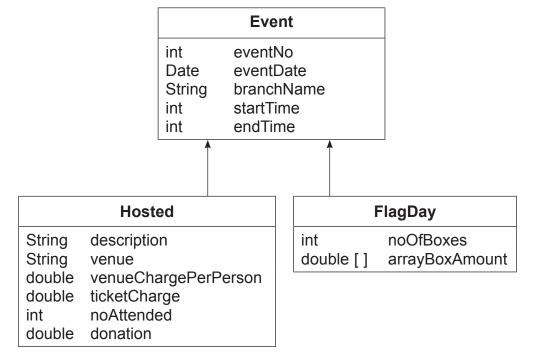
		Exami	ner Only
		Marks	Remark
(d)	Exception Handling must be implemented for the Input/Output of data to files.		
	Name the two Exceptions which would be applicable for the section of code given in part (c).		
	[2]		

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]		

Ass	 suming the class Event has been designed with the following elements field definitions; default and field/parameterised constructors; GET and SET (Properties/Methods); toString() method. 	Examiner Only Marks Remark
(b)	Write the code for a method HostedIncome that will return the income generated from a Hosted Event.	
	Income is calculated as profit on a ticket, multiplied by noAttended, plus donations. The profit on a ticket is calculated as the ticketCharge minus the venueChargePerPerson.	
	[4]	

(c)	Write the code for the derived class FlagDay giving the following:	Exa	miner Only
-	• class header;	Mark	s Remark
	• field definitions;		
	 field constructor (parameterised constructor); 		
	 GET and SET (Property/Method) for noOfBoxes only. 		
	Note that the noOfBoxes value is used to instantiate the		
	arrayBoxAmount.		
	[11]		

		[7]	

10655 **19 [Turn over**

Information from a system takes many forms such as reports (operational, analytical, financial) and results of enquiries.	Examiner Only Marks Remark
The charity described in question 5 has a program that tracks up to a maximum of 300 events across the country in an array called arrayEvent and currently holds data for 84 events denoted by currentSize .	
A common enquiry from a fund-raising branch is for the total amount raised from their events to date.	
Complete the body of code for the method defined below that will return the total income for an individual fund-raising branch. Call the method HostedIncome or FlagDayIncome as appropriate.	
<pre>public double BranchIncome (Event [] arrayEvent, String requiredBranch, int currentSize) {</pre>	
[7]	
THIS IS THE END OF THE QUESTION PAPER	
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