



Rewarding Learning

ADVANCED

General Certificate of Education

2019

Centre Number

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Candidate Number

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# Software Systems Development

## Unit AS 1

Introduction to Object Oriented Development



SDV11

[SDV11]

WEDNESDAY 22 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 seven** 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	18		
3	18		
4	20		
5	14		
6	5		
7	16		
<b>Total</b>	<b>100</b>		

1 Underline the most appropriate word from those given in the brackets that will correctly complete each statement.

An object is an (**example, instance**) of a class that can perform a set of related activities that define its (**behaviour, operation**).

Abstract classes (**can, cannot**) be instantiated.

An abstract class can only be used as a (**super / base class, interface, derived / subclass**) for other classes that (**change, extend**) it.

A class can inherit from (**one, many**) abstract class(es) and must (**overload, override**) all its methods/properties that are declared to be (**abstract, virtual**) methods/properties.

Polymorphism at run-time is a primary concept of object-oriented programming which is enabled through (**early binding, late binding**).

[9]

Examiner Only	
Marks	Remark



(c) Two arrays, **Months** (1-dimensional), and **MonthlyBookings** (2-dimensional), have been designed to hold related data for the annual use of an activity centre.

An example of the contents of each array is shown below.

<b>Months</b>	<b>MonthlyBookings</b>	
	<b>(Adult)</b>	<b>(Child)</b>
Jan	154	241
Feb	238	367
Mar	261	475
Apr	258	493
...	...	
...	...	
Dec	188	395

The price for an adult is £2.50 and for a child £1.50. Income is calculated as the number of Adult bookings multiplied by the adult price plus the number of Child bookings multiplied by the child price.

Assuming the **Months** and **MonthlyBookings** arrays are fully populated, write **methods** to:

(i) **Return** the average income for the year;

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[6]

Examiner Only	
Marks	Remark

(ii) **Output** the names of the months with income greater than or equal to the average income for the year.

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[6]

Examiner Only	
Marks	Remark

3 Exception Handling is implemented to ensure that a system will not crash due to user entry error.

(a) Name the basic catch-all exception.

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(b) Describe how Exception Handling would be implemented to prevent a crash if a date is entered incorrectly.

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 \_\_\_\_\_ [5]

(c) Many organisations ensure that their customers are 18 years of age or over to secure a higher level of legal security for the organisation.

**A range of date methods for C# and Java**

**C# DateTime methods:**

DateTime.Now.Date	date part of current date;
myDate.AddYears(n)	add or subtract years from a date;

**Java methods Date format:**

Date()	current date;
myDate.before(newDate)	returns true / false
myDate.after(newDate)	returns true / false

**methods Calendar format:**

Calendar.getInstance();	current date
cDate.add(Calendar.YEAR, n);	add or subtract years
// convert Date to Calendar format	
cDate.setTime(currentDate);	where cDate is a Calendar instance
// convert Calendar to Date format	
Date dd = cDate.getTime()	

**Comparing dates- C#, Java**

myDate.CompareTo(newDate)	returns 0 if equal -ve if invoking date less +ve if greater
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Examiner Only	
Marks	Remark

- (i) Write the method, **ValidAdult()**, that will return true if the date of birth passed to the method satisfies this criteria and false if not. Note: Assume the date passed to the method has a valid format.

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[6]

Examiner Only	
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- 4 (a) Using examples for illustration describe what you understand by the following class terms.

**overloading**

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**example**

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**interface**

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**example**

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[8]

Examiner Only	
Marks	Remark

(b) A class **Book** has been designed to hold data about available books for a school sale.

```
public class Book
{
    private String      bookNo;    //ISBN No
    private String      author;
    private String      title;
    private double      price;
    private int         noCopies;
    private int         noSold;
}
```

(i) Write code to instantiate an array, arrBook, capable of holding data on 50 books.

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[4]

Examiner Only	
Marks	Remark



5 The following class method has been designed to validate a book code made up of ten characters.

```
public boolean validBookCode( string bookCode)
{
    if( validBookFormat( string bookCode)
        if( validBookRelationship( string bookCode)
            return true;
    return false;
}
```

(a) Giving your reason, select an appropriate visibility option, from the list given below in brackets, for the methods validBookFormat and validBookRelationship. Underline your selection.

( public   private   protected)

Reason \_\_\_\_\_  
 \_\_\_\_\_ [2]

(b) Write the code for the method validBookFormat() that will return true if the **format** of a book code consists of 10 digits or 9 digits followed by the character X.

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Examiner Only	
Marks	Remark

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**(Questions continue overleaf)**

(c) Write the code for the method `validBookRelationship()` that will return true if a remainder of zero is given after the following process:

- Multiply each digit of the book code by the numbers 10 to 1 descending from left to right.  
(If the final character is an X it should be replaced with the number 10 for the process)
- Sum the result of each product.
- Divide the sum by 11.
- Determine if the remainder is zero.

Example 0201530813 is a valid code.

(if character X  
replace with 10)

Book Code	0	2	0	1	5	3	0	8	1	3
Multiply book code digit by	10	9	8	7	6	5	4	3	2	1
Sum products	0+	18+	0+	7+	30+	15+	0+	24+	2+	3 = 99
Divide by 11	99 / 11 = 9 <b>Remainder 0</b>									

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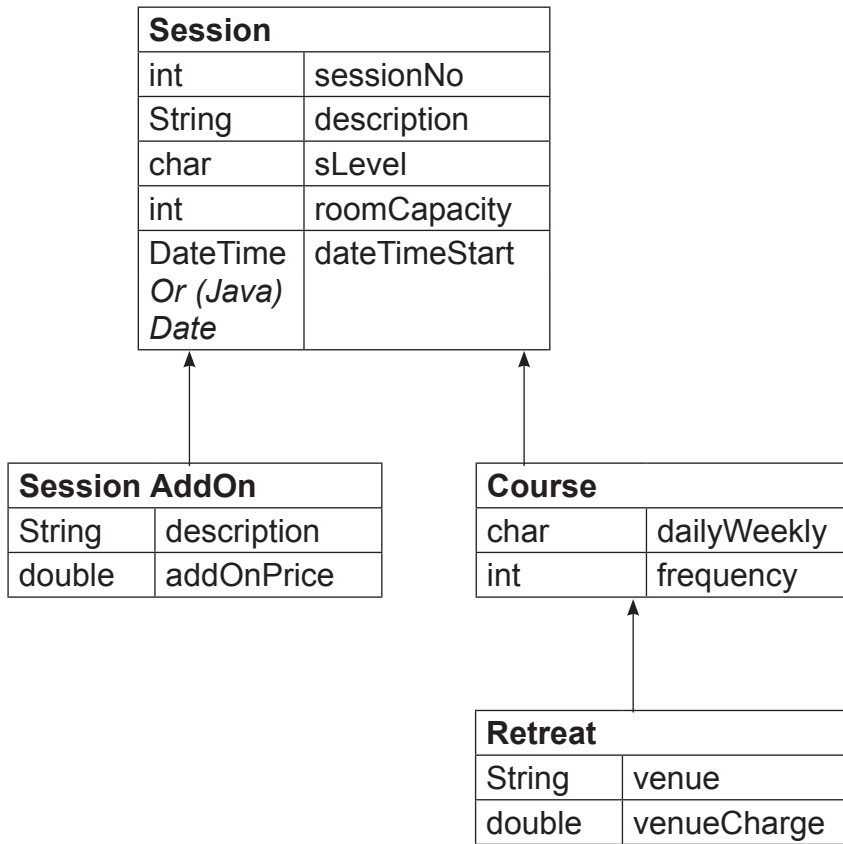
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 [8]

Examiner Only	
Marks	Remark

- 6 YogaLife is a centre offering Yoga from beginner to trainer level. Add-ons such as consultations or meditations are also available. Apart from one-off taster sessions, clients can prepay for courses of 4, 6 or 8 sessions. A Retreat is a course held at an off-site venue.

### Inheritance Diagram for YogaLife



Examiner Only	
Marks	Remark





7 Using the Inheritance Diagram for YogaLife given in question 6:

(a) Complete the following code for the class **Course**:

- class header;
- field definitions;
- field / parameterised constructor;

```
public class Course  
{
```

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Examiner Only	
Marks	Remark



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