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COMPUTER SCIENCE **9618/42**

Paper 4 Practical **October/November 2024**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

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This document consists of **39** printed pages.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)(i)</td><td>1 mark each
• Class <code>EventItem</code> header (and end where appropriate)
• 3 <b>private</b> attributes with suitable data types
• Constructor header (and end where appropriate) with 3 (min) parameters within class declaration …
• … assigning parameters to attributes within constructor

e.g.
Python<pre>
class EventItem():
    def __init__(self, pName, pType, pDifficulty):
        self.__EventName = pName #String
        self.__EventType = pType #String
        self.__Difficulty = pDifficulty #Integer
</pre>VB.NET<pre>
Class EventItem
    Private EventName As String
    Private EventType As String
    Private Difficulty As Integer
    Sub New(pName, pType, pDifficulty)
       EventName = pName
       EventType = pType
       Difficulty = pDifficulty
    End Sub
End Class
</pre></td><td><b>4</b></td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)(i)</td><td>

Java

```
class EventItem{
     private String EventName;
     private String EventType;
     private Integer Difficulty;

     public EventItem(String pName, String pType, Integer pDifficulty){
          EventName= pName;
          EventType = pType;
          Difficulty = pDifficulty;

     }
}
```

</td><td></td></tr>
<tr><td>1(a)(ii)</td><td>

1 mark each

- 1 get method with **no** parameter …
- … return correct attribute (without changing)
- Remaining 2 correct get methods returning the attributes

e.g.
Python

```
    def GetName(self):
        return self.__EventName
    def GetEventType(self):
        return self.__EventType
    def GetDifficulty(self):
        return self.__Difficulty
```

</td><td><b>3</b></td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)(ii)</td><td>

VB.NET

```
Function GetName()
    Return EventName
End Function
Function GetEventType()
    Return EventType
End Function
Function GetDifficulty()
    Return Difficulty
End Function
```

Java

```
public String GetName(){
      return EventName;
}
public String GetEventType(){
      return EventType;
}
public Integer GetDifficulty(){
      return Difficulty;
}
```

</td><td></td></tr>
<tr><td>1(b)(i)</td><td>

1 mark each:

- 1D array name `Group` with (min 5 elements and of type `EventItem`)

e.g.
Python

```
Group = [] #type Event, 5 spaces
```

VB.NET

```
Dim Group(4) As EventItem
```

Java

```
EventItem[] Group = new EventItem[5];
```

</td><td>1</td></tr>
</table>

Question	Answer	Marks

1(b)(ii)	1 mark each
	• Any 1 instance of `EventItem` declared with values passed in correct order …
	• … stored in the array `Group` …
	• … remaining 4 correctly instantiated and stored in `Group`
	
	e.g.
	Python
	`Group.append(EventItem("Bridge", "jump", 3))`
	`Group.append(EventItem("Water wade", "swim", 4))`
	`Group.append(EventItem("100 mile run", "run", 5))`
	`Group.append(EventItem("Gridlock", "drive", 2))`
	`Group.append(EventItem("Wall on wall", "jump", 4))`
	
	VB.NET
	`Group(0) = New EventItem("Bridge", "jump", 3)`
	`Group(1) = New EventItem("Water wade", "swim", 4)`
	`Group(2) = New EventItem("100 mile run", "run", 5)`
	`Group(3) = New EventItem("Gridlock", "drive", 2)`
	`Group(4) = New EventItem("Wall on wall", "jump", 4)`
	
	Java
	`Group[0] = new EventItem("Bridge", "jump", 3);`
	`Group[1] = new EventItem("Water wade", "swim", 4);`
	`Group[2] = new EventItem("100 mile run", "run", 5);`
	`Group[3] = new EventItem("Gridlock", "drive", 2);`
	`Group[4] = new EventItem("Wall on wall", "jump", 4);`
		3

1(c)	1 mark each • Class `Character` declared (and end where appropriate) • 5 private attributes with correct data types • Constructor header (and end) taking (min) 5 parameters and parameters assigned to attributes • Get method (with no parameter) returning name attribute	**4**

Question	Answer	Marks
1(c)	e.g.	

Python

```
class Character():
    def __init__(self, pName, pJump, pSwim, pRun, pDrive):
        self.__CName = pName #string
        self.__Jump = pJump #integer chance of success
        self.__Swim = pSwim #integer chance of success
        self.__Run = pRun #integer chance of success
        self.__Drive = pDrive #integer chance of success
    def GetName(self):
        return self.__CName #STRING
```

VB.NET

```
Class Character
        Private CName As String
        Private Jump As Integer
        Private Swim As Integer
        Private Run As Integer
        Private Drive As Integer
        Sub New(pName, pJump, pSwim, pRun, pDrive)
            CName = pName
            Jump = pJump
            Swim = pSwim
            Run = pRun
            Drive = pDrive
        End Sub

       Function GetName()
            Return CName
       End Function

End Class
```

Question	Answer	Marks

1(c)	Java
	`class Character{`
	`      private String CName;`
	`      private Integer Jump;`
	`      private Integer Swim;`
	`      private Integer Run;`
	`      private Integer Drive;`
	
	`      public Character(String pName, Integer pJump, Integer pSwim, Integer pRun, Integer pDrive){`
	`            CName= pName;`
	`            Jump = pJump;`
	`            Swim = pSwim;`
	`            Run = pRun;`
	`            Drive = pDrive;`
	
	`      }`
	
	`         public String GetName(){`
	`      return CName`
	`         }`
	`}`	

1(d)	1 mark each to max 4: • **Method** header `CalculateScore` (and end where appropriate) taking (min) 2 parameters • Selection on the type of event using the **parameter** • … if skill value is > = difficulty **return** `100` • …otherwise subtracting skill value from the difficulty and **return** correct value `80` (diff 1), `60` (diff 2), `40` (diff 3) and `20` (diff 4) • Using the correct attributes and parameters throughout	**4**

Question	Answer	Marks
1(d)	e.g. Python	

```
def CalculateScore(self, Type, Difficulty):
        if Type == "jump":
            Chance = self.__Jump
        elif Type == "swim":
            Chance = self.__Swim
        elif Type == "run":
            Chance = self.__Run
        else:
            Chance = self.__Drive
        if Chance >= Difficulty:
            return 100
        else:
            Difference = Difficulty - Chance
            if Difference == 1:
                return 80
            elif Difference == 2:
                return 60
            elif Difference == 3:
                return 40
            elif Difference == 4:
                return 20
            else:
                return 0
```

Question	Answer	Marks
1(d)	VB.NET	

```
 Function CalculateScore(Type, Difficulty)
    Dim Chance As Integer
    Dim Difference As Integer
    If Type = "jump" Then
        Chance = Jump
    ElseIf Type = "swim" Then
        Chance = Swim
    ElseIf Type = "run" Then
        Chance = Run
    Else
        Chance = Drive
    End If
    If Chance >= Difficulty Then
        Return 100
    Else
        Difference = Difficulty - Chance
        If Difference = 1 Then
            Return 80
        ElseIf Difference = 2 Then
            Return 60
        ElseIf Difference = 3 Then
            Return 40
        ElseIf Difference = 4 Then
            Return 20
        Else
            Return 0
        End If
    End If
End Function
```

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(d)</td><td>

Java

```
public Integer CalculateScore(String Type, Integer Difficulty){
       Integer Chance = 0;
       Integer Difference = 0;
       if(Type.equals("jump")){
           Chance = Jump;
       }else if(Type.equals("swim")){
           Chance = Swim;
       }else if(Type.equals("run")){
           Chance = Run;
       }else{
           Chance = Drive;
       }
       if(Chance >= Difficulty){
           return 100;
       }else{
           Difference = Difficulty - Chance;
           if(Difference == 1){
                return 80;
           }else if(Difference == 2){
                return 60;
           }else if(Difference == 3){
                return 40;
           }else if(Difference == 4){
                return 20;
           }
       }
}
```

</td><td></td></tr>
</table>

Question	Answer	Marks

1(e)(i)	1 mark each
	• Creating one new instance of `Character` with correct name and values for 1 character and storing
	• 2nd correct instance of `Character` and storing
	
	e.g.
	Python
	`P1 = Character("Tarz", 5, 3, 5, 1)`
	`P2 = Character("Geni", 2, 2, 3, 4)`
	
	VB.NET
	`Dim P1 As Character = New Character("Tarz", 5, 3, 5, 1)`
	`Dim P2 As Character = New Character("Geni", 2, 2, 3, 4)`
	
	Java
	`Character P1 = new Character("Tarz", 5, 3, 5, 1);`
	`Character P2 = new Character("Geni", 2, 2, 3, 4);`
		2

1(e)(ii)	1 mark each • Looping through each event in `Group` (or checking each of the 5 events manually) • Using `CalculateScore()` for each `Character` object with parameters of type and difficulty • …comparing the **return** values from the two function calls … • …incrementing points for winning player **and** outputting their name **and** message stating they have won **for each event**. • …outputting message if it's a draw. • Comparing the total points for each character after all events checked **and** outputting name of player with most points (and their points) **and** outputting message if it's a draw • Using get methods correctly throughout	**7**

Question	Answer	Marks
1(e)(ii)	e.g.	

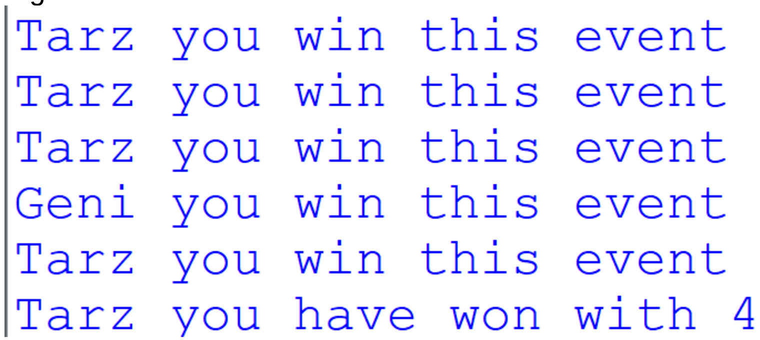
Python

```
P1Points = 0
P2Points = 0
for x in range(0, 5):
    P1EventScore = P1.CalculateScore(Group[x].GetEventType(), Group[x].GetDifficulty())
    P2EventScore = P2.CalculateScore(Group[x].GetEventType(), Group[x].GetDifficulty())
    if P1EventScore > P2EventScore:
        P1Points = P1Points + 1
        print(P1.GetName(), "you win this event")
    elif P2EventScore > P1EventScore:
        P2Points = P2Points + 1
        print(P2.GetName(), "you win this event")
    else:
        print("This event is a draw")

if P1Points > P2Points:
    print(P1.GetName(), "you have won with", P1Points)
elif P2Points> P1Points:
    print(P2.GetName(), "you have won with", P2Points)
else:
    print("It's a draw")
```

Question	Answer	Marks
1(e)(ii)	VB.NET	

```
Dim P1 As Character = New Character("Tarz", 5, 3, 5, 1)
Dim P2 As Character = New Character("Geni", 2, 2, 3, 4)
Dim P1Points As Integer = 0
Dim P2Points As Integer = 0
Dim P1EventScore As Integer = 0
Dim P2EventScore As Integer = 0
For x = 0 To 4
    P1EventScore = P1.CalculateScore(Group(x).GetEventType(), Group(x).GetDifficulty())
    P2EventScore = P2.CalculateScore(Group(x).GetEventType(), Group(x).GetDifficulty())
    If P1EventScore > P2EventScore Then
        P1Points = P1Points + 1
        Console.WriteLine(P1.GetName() & " you win this event")
    ElseIf P2EventScore > P1EventScore Then
        P2Points = P2Points + 1
        Console.WriteLine(P2.GetName() & " you win this event")
    Else
        Console.WriteLine("This event is a draw")
    End If
Next x
If P1Points > P2Points Then
    Console.WriteLine(P1.GetName() & " you have won with " & P1Points)
ElseIf P2Points > P1Points Then
    Console.WriteLine(P2.GetName() & " you have won with " & P2Points)
Else
    Console.WriteLine("It's a draw")
End If
```

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(e)(ii)</td><td>Java
<pre><code>Integer P1Points = 0;
Integer P2Points = 0;
Integer P1EventScore = 0;
Integer P2EventScore = 0;
for(Integer x = 0; x < 5; x++){
       P1EventScore = P1.CalculateScore(Group[x].GetEventType(), Group[x].GetDifficulty());
       P2EventScore = P2.CalculateScore(Group[x].GetEventType(), Group[x].GetDifficulty());
       System.out.println("P1 " + P1EventScore + " P2 " + P2EventScore);
       if(P1EventScore > P2EventScore){
           P1Points++;
           System.out.println(P1.GetName() + " you win this event");
       }else if(P2EventScore > P1EventScore){
           P2Points++;
           System.out.println(P2.GetName() + " you win this event");
       }else{
           System.out.println("This event is a draw");
       }
}
if(P1Points > P2Points){
       System.out.println(P1.GetName() + " you have won with " + P1Points);
}else if(P2Points > P1Points){
       System.out.println(P2.GetName() + " you have won with " + P2Points);
}else{
       System.out.println("It's a draw");
}</code></pre></td><td></td></tr>
</table>

Question	Answer	Marks
1(e)(iii)	1 mark for output showing the correct winner for each event, the final winner's name (and their points) e.g.  Tarz you win this event Tarz you win this event Tarz you win this event Geni you win this event Tarz you win this event Tarz you have won with 4	**1**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td rowspan="2">2(a)</td><td>1 mark each to max
• Record structure or class with constructor <code>Queue</code> (and end where appropriate) …
• … containing a 1D array of (100) integers <code>QueueArray</code>
• … containing <code>HeadPointer</code> and <code>TailPointer</code> as integers</td><td rowspan="2">3</td></tr>
<tr><td>e.g.
Python<pre>
class Queue:
    def __init__(self):
        self.QueueArray = []
        HeadPointer = 0 #integer
        TailPointer = 0 #integer
        for x in range(0, 100):
            self.QueueArray.append(-1)
</pre>VB.NET<pre>
Structure Queue
    Dim QueueArray() As Integer
    Dim HeadPointer As Integer
    Dim TailPointer As Integer
End Structure
</pre>Java<pre>
class queue{
     private static Integer[] QueueArray = new Integer[100];
     private static Integer HeadPointer;
     private static Integer TailPointer;

     public queue(){
     }
}
</pre></td></tr>
</table>

Question	Answer	Marks
2(b)	1 mark each • New Queue record/object created/instance of class • Queue **field/attribute** head pointer initialised to -1, tail pointer to 0 • All 100 array **field/attribute** elements initialised with -1	3

e.g.
Python

```
class Queue:
    def __init__(self):
        self.QueueArray = []
        for x in range(0, 100):
            self.QueueArray.append(-1)

        self.HeadPointer = -1
        self.TailPointer = 0
TheQueue= Queue()
```

VB.NET

```
 Dim TheQueue As New Queue
        TheQueue.HeadPointer = -1
        TheQueue.TailPointer = 0
        ReDim TheQueue.QueueArray(100)
        For x = 0 To 99
            TheQueue.QueueArray(x) = -1
        Next
```

Java

```
class queue{
     private static Integer[] QueueArray = new Integer[100];
     private static Integer HeadPointer;
     private static Integer TailPointer;
```

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(b)</td><td>

```
    public queue(){
        HeadPointer = -1;
        TailPointer = 0;
        for(Integer x = 0; x < 100; x++){
            QueueArray[x] = -1;
        }
    }
}
public static void main(String args[]){
    queue TheQueue = new queue();
}
```

</td><td></td></tr>
<tr><td>2(c)</td><td>

1 mark for each completed statement to max 3
1 mark for correct values returned in correct places
1 mark for function header taking (at least) one parameter and the rest of function correct and using the record/class data structure accurately.

Pseudocode

```
FUNCTION Enqueue(BYREF AQueue : Queue, BYVAL TheData : INTEGER)
                  RETURNS INTEGER
   IF AQueue.HeadPointer = -1 THEN
      AQueue.QueueArray[AQueue.TailPointer] ← TheData
      AQueue.HeadPointer ← 0
      AQueue.TailPointer ← AQueue.TailPointer + 1
      RETURN 1
   ELSE
      IF AQueue.TailPointer > 99 THEN
        RETURN -1
      ELSE
        AQueue.QueueArray[AQueue.TailPointer] ← TheData
        AQueue.TailPointer ← AQueue.TailPointer + 1
        RETURN 1
      ENDIF
   ENDIF
ENDFUNCTION
```

</td><td>5</td></tr>
</table>

Question	Answer	Marks
2(c)	e.g.	

Python

```
def Enqueue(AQueue, TheData):

    if AQueue.HeadPointer == -1:
        AQueue.HeadPointer = 0
        AQueue.QueueArray[AQueue.HeadPointer] = TheData
        AQueue.TailPointer +=1
        return AQueue, 1
    elif AQueue.TailPointer > 99:
        return AQueue, -1
    else:
        AQueue.QueueArray[AQueue.TailPointer] = TheData
        AQueue.TailPointer = AQueue.TailPointer + 1
        return AQueue, 1
```

VB.NET

```
Function Enqueue(ByRef AQueue As Queue, ByVal TheData As Integer)
     If AQueue.HeadPointer = -1 Then
         AQueue.QueueArray(AQueue.TailPointer) = TheData
         AQueue.HeadPointer = 0
          AQueue.TailPointer += 1
         Return 1
     ElseIf AQueue.TailPointer > 99 Then
         Return -1
     Else
         AQueue.QueueArray(AQueue.TailPointer) = TheData
         AQueue.TailPointer += 1
         Return 1
     End If

End Function
```

Question	Answer	Marks

2(c)	Java
	`public static Integer Enqueue(Integer TheData){`
	`      if(GetHeadPointer() == -1){`
	`            SetData(TheData);`
	`            SetHeadPointer(0);`
	`            SetTailPointer(GetTailPointer() + 1);`
	`            return 1;`
	`      }else if(GetTailPointer() > 99){`
	`            return -1;`
	`      }else{`
	`            SetData(TheData);`
	`            SetTailPointer(GetTailPointer() + 1);`
	`            return 1;`
	`      }`
	`}`	

2(d)	1 mark each to max 3
	• Function header (and end) iterating through each element in the queue
	• Starting at `HeadPointer` and incrementing until `TailPointer – 1` …
	• … concatenating and returning all integer values with a space between
	
	e.g.
	Python
	
	`def ReturnAllData(TheQueue):`
	`    Temp = ""`
	
	`    for X in range(TheQueue.HeadPointer, TheQueue.TailPointer):`
	`        Temp = Temp + str(TheQueue.QueueArray[X]) + " "`
	`    return Temp`
		3

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(d)</td><td>

VB.NET

```
 Function ReturnAllData(AQueue As Queue)
        Dim Temp As String = ""
        For X = AQueue.HeadPointer To AQueue.TailPointer - 1
            Temp = Temp & AQueue.QueueArray(X).ToString() & " "
        Next X
        Return Temp
  End Function
```

Java

```
public static String ReturnAllData(){
      String Temp = "";
      Integer Counter = 0;
       for(int X = HeadPointer; X < TailPointer; X++){
       Temp = Temp + Integer.toString(QueueArray[X]) + " ";
      }
      return Temp;
}
```

</td><td></td></tr>
<tr><td>2(e)(i)</td><td>

1 mark each

- Taking only **10** inputs in loop/one at a time
- Calling `Enqueue()` with each input (min) **and** storing/using return value …
- … only calling `Enqueue()` **once** when each input is an integer > = 0. Do **not** award if this validation stops 10 valid inputs being enqueued.
- Outputting message if each item is inserted **and** outputting a message if queue is full
- Calling `ReturnAllData()` and outputting return value at the end

</td><td>5</td></tr>
</table>

Question	Answer	Marks
2(e)(i)	e.g. Python	

```
for x in range(0, 10):
    Continue = True
    while(Continue == True):
        DataInput = int(input("Enter an integer that is 0 or more"))
        if DataInput > -1:
            Continue = False

    TheQueue, ReturnValue = Enqueue(TheQueue, DataInput)

    if(ReturnValue == -1):
        print("Queue full")
    else:
        print("Item inserted")

print(ReturnAllData(TheQueue))
```

VB.NET

```
Dim ContinueLoop As Boolean
Dim DataInput As Integer
Dim ReturnValue As Integer
For x = 0 To 9
    ContinueLoop = True
    While ContinueLoop = True
        Console.WriteLine("Enter an integer that is 0 or more")
        DataInput = Console.ReadLine
        If DataInput > -1 Then
            ContinueLoop = False
```

Question	Answer	Marks

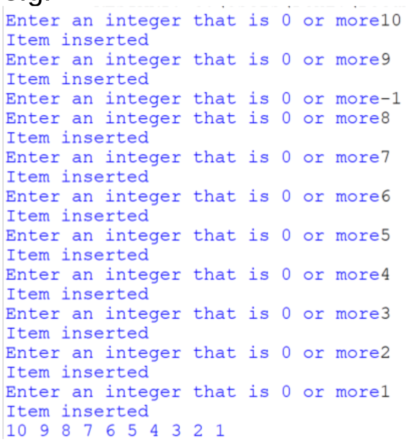
2(e)(i)	
	```
	        End If
	    End While
	    ReturnValue = Enqueue(TheQueue, DataInput)
	    If ReturnValue = 2 Then
	        Console.WriteLine("Queue full")
	    Else
	        Console.WriteLine("Item inserted")
	    End If
	Next

	Console.WriteLine(ReturnAllData(TheQueue))
	```
	Java
	```
	Boolean Continue = true;
	Integer DataInput = -1;
	Scanner scanner = new Scanner(System.in);
	Integer ReturnValue;

	for(Integer x = 0; x < 10; x++){
	      Continue = true;
	      while(Continue == true){
	            System.out.println("Enter an integer that is 0 or more");
	            DataInput = Integer.parseInt(scanner.nextLine());
	            if(DataInput > -1){
	                  Continue = false;
	            }
	      }
	      ReturnValue = Enqueue(DataInput);
	      if(ReturnValue == -1){
	            System.out.println("Queue full");
	      }else{
	            System.out.println("Item inserted");
	      }
	}
	System.out.println(ReturnAllData());
	```

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(e)(ii)</td><td>

1 mark for each

- All values input and 10 messages ‘Inserted’ (i.e. –1 is not inserted)
- Screenshot show 10 9 8 7 6 5 4 3 2 1 on one line with a space between each number

e.g.



```
Enter an integer that is 0 or more10
Item inserted
Enter an integer that is 0 or more9
Item inserted
Enter an integer that is 0 or more-1
Enter an integer that is 0 or more8
Item inserted
Enter an integer that is 0 or more7
Item inserted
Enter an integer that is 0 or more6
Item inserted
Enter an integer that is 0 or more5
Item inserted
Enter an integer that is 0 or more4
Item inserted
Enter an integer that is 0 or more3
Item inserted
Enter an integer that is 0 or more2
Item inserted
Enter an integer that is 0 or more1
Item inserted
10 9 8 7 6 5 4 3 2 1
```

</td><td>2</td></tr>
<tr><td>2(f)</td><td>

1 mark each

- Function `Dequeue()` (head and close), returning a value in all cases
- Checking if empty **and** returning –1
- Returning item at `HeadPointer` **without deleting**/changing it
- Incrementing `HeadPointer`

Example program code:
Python

```
def Dequeue(AQueue):
    if AQueue.HeadPointer= 100 or AQueue.HeadPointer == -1 or AQueue.HeadPointer ==
AQueue.TailPointer:
        return AQueue, -1
    else:
        Temp = AQueue.QueueArray[AQueue.HeadPointer]
        AQueue.HeadPointer = AQueue.HeadPointer + 1
        return AQueue, Temp
```

</td><td>4</td></tr>
</table>

Question	Answer	Marks
2(f)	VB.NET	

```
  Function Dequeue(ByRef AQueue As Queue)
        If AQueue.HeadPointer= 100 or AQueue.HeadPointer = -1 or AQueue.HeadPointer =
AQueue.TailPointer Then
            Return -1
        Else
            Dim Temp As Integer = AQueue.QueueArray(AQueue.HeadPointer)
            AQueue.HeadPointer += 1
            Return Temp
        End If
  End Function
```

Java

```
public static Integer Dequeue(){
      if(GetHeadPointer() = 100 || GetTailpointer() == -1 || GetHeadPointer() ==
GetTailpointer()){
            return -1;
      }else{
            Integer Temp = GetData(GetHeadPointer());
            SetHeadPointer(GetHeadPointer() + 1);
            return Temp;
      }
}
```

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(g)(i)</td><td>

1 mark each

- Calls `Dequeue()` **twice and** stores/uses return value
- Outputs "Queue empty" when each return values is –1 and outputs return value otherwise
- Calls `ReturnAllData()` at the end

e.g.
Python

```
TheQueue, ReturnValue = Dequeue(TheQueue)
if ReturnValue == -1:
    print("Queue empty")
else:
    print(ReturnValue, " is returned")
TheQueue, ReturnValue = Dequeue(TheQueue)
if ReturnValue == -1:
    print("Queue empty")
else:
    print(ReturnValue, " is returned")
print(ReturnAllData(TheQueue))
```

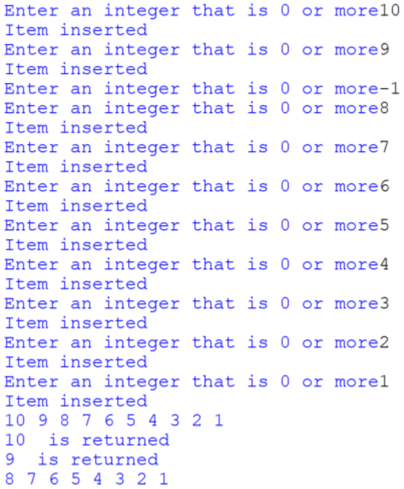
VB.NET

```
ReturnValue = Dequeue(TheQueue)
If ReturnValue = -1 Then
    Console.WriteLine("Queue empty")
Else
    Console.WriteLine(ReturnValue, " is returned")
End If
```

</td><td>3</td></tr>
</table>

Question	Answer	Marks

2(g)(i)	`ReturnValue = Dequeue(TheQueue)`
	`If ReturnValue = -1 Then`
	`    Console.WriteLine("Queue empty")`
	`Else`
	`    Console.WriteLine(ReturnValue, " is returned")`
	`End If`
	`Console.WriteLine(ReturnAllData(TheQueue))`
	
	Java
	`ReturnValue = Dequeue();`
	`if(ReturnValue == -1){`
	`      System.out.println("Queue empty");`
	`}else{`
	`      System.out.println(ReturnValue + " is returned");`
	`}`
	
	`ReturnValue = Dequeue();`
	`if(ReturnValue == -1){`
	`      System.out.println("Queue empty");`
	`}else{`
	`      System.out.println(ReturnValue + " is returned");`
	`}`
	`ReturnAllData(TheQueue);`	

Question	Answer	Marks
2(g)(ii)	1 mark each • Screenshot shows the input of 10 9 8 7 6 5 4 3 2 1 Output for 10 returned Output for 9 is returned e.g.  Enter an integer that is 0 or more10 Item inserted Enter an integer that is 0 or more9 Item inserted Enter an integer that is 0 or more-1 Enter an integer that is 0 or more8 Item inserted Enter an integer that is 0 or more7 Item inserted Enter an integer that is 0 or more6 Item inserted Enter an integer that is 0 or more5 Item inserted Enter an integer that is 0 or more4 Item inserted Enter an integer that is 0 or more3 Item inserted Enter an integer that is 0 or more2 Item inserted Enter an integer that is 0 or more1 Item inserted 10 9 8 7 6 5 4 3 2 1 10 is returned 9 is returned 8 7 6 5 4 3 2 1	**1**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>

1 mark each

- `HighScores` created as 2D array, (of strings) with (min) 7 × 3 elements (local to main) …
- … all elements initialised to empty string ("")

e.g.
Python

```
HighScores = [] #String, 7 x 3
HighScores = [['' for x in range(3)] for y in range(7)]
```

VB.NET

```
Dim HighScores(7, 3) As String
For(X = 0 to 7)
    For(Y = 0 to 3)
       HighScores(X, Y) = ""
  Next Y
Next X
```

Java

```
String[][] HighScores = new String[7][3];
for(Int X = 0; X <7; X++){
    for(Int Y = 0; Y < 3; Y++){
       HighScores[X][Y] = "";
  }
}
```

</td><td>2</td></tr>
<tr><td>3(b)</td><td>

1 mark each

- Function header (and end where appropriate) that returns populated array
- Opening text file to read and closing the file in an appropriate place
- Looping through 7 players/to EOF/21 times …
- … reading in each group of 3 data items and storing each in separate element in 2D array for each player
- Exception handling with all file handling within the try, appropriate catch and an output

</td><td>5</td></tr>
</table>

Question	Answer	Marks
3(b)	e.g. Python	

```
def ReadData():
    Temp = []
    HighScores = []
    try:
        File = open("HighScoreTable.txt")
        Temp = File.read().split("\n")
        File.close()
    except:
        print("No file found")
    NumberRecords = len(Temp)-1
    Counter = 0

    while Counter < NumberRecords:

        HighScores.append([Temp[Counter], Temp[Counter+1], Temp[Counter+2]])
        Counter = Counter + 3

    return HighScores
```

VB.NET

```
  Function ReadData()
        Dim TextFile As String = "HighScoreTable.txt"

        Dim HighScores(7, 3) As String
        Try
            Dim FileReader As New System.IO.StreamReader(TextFile)
            Dim Counter As Integer = 0
```

Question	Answer	Marks
3(b)		

```
            While Counter < 8
                HighScores(Counter, 0) = FileReader.ReadLine()
                HighScores(Counter, 1) = FileReader.ReadLine()
                HighScores(Counter, 2) = FileReader.ReadLine()

                Counter = Counter + 1


            End While
            FileReader.Close()
        Catch ex As Exception
            Console.WriteLine("No file found")
        End Try
        Return HighScores
  End Function
```

Java

```
public static String[][] ReadData(){
     String TextFile = "HighScoreTable.txt";
     String[][] HighScores = new String[7][3];

     try{
           FileReader f = new FileReader(TextFile);
           BufferedReader Reader = new BufferedReader(f);
           for(Integer X = 0; X < 7; X++){
                try{
```

Question	Answer	Marks

3(b)

```
                    HighScores[X][0] = Reader.readLine();
                    HighScores[X][1] = Reader.readLine();
                    HighScores[X][2] = Reader.readLine();
               }catch(IOException ex){}
          }
          try{
               Reader.close();
          }catch(IOException ex){}
          return HighScores;
     }catch(FileNotFoundException e){
          System.out.println("File not found");
     }
     return HighScores;
}
```

3(c) — Marks: **2**

1 mark each

- Procedure (header and end) taking (min) 1 parameter (2D array), looping through each of the first dimension in array …
- … outputting all data in correct format

e.g.
Python

```
def OutputHighScores(HighScores):
    for x in range(0, len(HighScores)):
        print(HighScores[x][0], "reached level", HighScores[x][1], "with a score of",
HighScores[x][2])
```

VB.NET

```
  Sub OutputHighScores(HighScores(,))
        For x = 0 To 6
            Console.WriteLine(HighScores(x, 0) & " reached level " & HighScores(x, 1) & "
with a score of " & HighScores(x, 2))
        Next
  End Sub
```

Question	Answer	Marks

3(c)

Java

```
public static void OutputHighScores(String[][] HighScores){
       for(Integer x = 0; x < 7; x++){
           System.out.println(HighScores[x][0] + " reached level " + HighScores[x][1] + "
with a score of " + HighScores[x][2]);
       }
}
```

3(d) — **4**

1 mark each

- Function header (and end taking array as parameter) returning sorted array.
- Comparing the levels and swapping **all** dimensions when in incorrect order
- Comparing scores when levels are the same and swapping **all** dimensions when in incorrect order
- Correct loops and comparisons to put data in correct order

e.g.

Python

```
def SortScores(HighScores):
    Counter = 0
    ArrayLength = len(HighScores)

    for x in range(ArrayLength-1):
        for y in range(0, ArrayLength-x-1):
            if int(HighScores[y][1]) < int(HighScores[y + 1][1]):
                HighScores[y], HighScores[y + 1] = HighScores[y + 1], HighScores[y]
            elif int(HighScores[y][1]) == int(HighScores[y+1][1]):
                if int(HighScores[y][2]) < int(HighScores[y+1][2]):
                    HighScores[y], HighScores[y + 1] = HighScores[y + 1], HighScores[y]
    return HighScores
```

VB.NET

```
  Function SortScores(HighScores)
        Dim ArrayLength As Integer = 6
        Dim Temp1 As String
```

Question	Answer	Marks
3(d)		

```
    Dim Temp2 As String
    Dim Temp3 As String
    For x = 0 To ArrayLength - 1
      For y = 0 To ArrayLength - x - 1
        If Integer.Parse(HighScores(y, 1)) < Integer.Parse(HighScores(y + 1, 1))
Then
          Temp1 = HighScores(y, 0)
          Temp2 = HighScores(y, 1)
          Temp3 = HighScores(y, 2)
          HighScores(y, 0) = HighScores(y + 1, 0)
          HighScores(y, 1) = HighScores(y + 1, 1)
          HighScores(y, 2) = HighScores(y + 1, 2)
          HighScores(y + 1, 0) = Temp1
          HighScores(y + 1, 1) = Temp2
          HighScores(y + 1, 2) = Temp3
        ElseIf Integer.Parse(HighScores(y, 1)) = Integer.Parse(HighScores(y + 1,
1)) Then
          If Int(HighScores(y, 2)) < Int(HighScores(y + 1, 2)) Then
            Temp1 = HighScores(y, 0)
            Temp2 = HighScores(y, 1)
            Temp3 = HighScores(y, 2)
            HighScores(y, 0) = HighScores(y + 1, 0)
            HighScores(y, 1) = HighScores(y + 1, 1)
            HighScores(y, 2) = HighScores(y + 1, 2)
            HighScores(y + 1, 0) = Temp1
            HighScores(y + 1, 1) = Temp2
            HighScores(y + 1, 2) = Temp3
          End If
        End If
      Next y
    Next x
    Return HighScores
  End Function
```

Java

```
public static String[][] SortScores(String[][] HighScores){
```

Question	Answer	Marks
3(d)		

```
      Integer ArrayLength = 6;
      String Temp1;
      String Temp2;
      String Temp3;

      for(Integer x = 0; x < ArrayLength; x++){
           for(Integer y = 0; y < ArrayLength - x; y++){
                 if(Integer.parseInt(HighScores[y][1]) <
Integer.parseInt(HighScores[y+1][1])){
                      Temp1 = HighScores[y][0];
                      Temp2 = HighScores[y][1];
                      Temp3 = HighScores[y][2];
                      HighScores[y][0] = HighScores[y+1][0];
                      HighScores[y][1] = HighScores[y+1][1];
                      HighScores[y][2] = HighScores[y+1][2];
                      HighScores[y+1][0] = Temp1;
                      HighScores[y+1][1] = Temp2;
                      HighScores[y+1][2] = Temp3;
                 }else if(Integer.parseInt(HighScores[y][1]) ==
Integer.parseInt(HighScores[y+1][1])){
                      if(Integer.parseInt(HighScores[y][2]) <
Integer.parseInt(HighScores[y+1][2])){
                            Temp1 = HighScores[y][0];
                            Temp2 = HighScores[y][1];
                            Temp3 = HighScores[y][2];
                            HighScores[y][0] = HighScores[y+1][0];
                            HighScores[y][1] = HighScores[y+1][1];
                            HighScores[y][2] = HighScores[y+1][2];
                            HighScores[y+1][0] = Temp1;
                            HighScores[y+1][1] = Temp2;
                            HighScores[y+1][2] = Temp3;
                      }
                 }
```

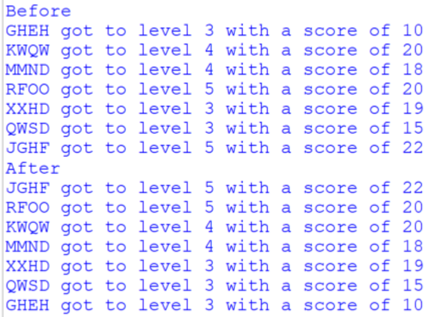
Question	Answer	Marks

3(d)	`}`
	`}`
	`return HighScores;`
	`}`	

3(e)(i)	1 mark each
	• Code statements in order:
	`HighScores = ReadData()`
	`HighScores = SortScores(HighScores)` // `HighScores = SortScores()`
	
	• Code statements in order:
	`OUTPUT "Before"`
	`OutputHighScores(HighScores)` unsorted
	`OUTPUT "After"`
	`OutputHighScores(HighScores)` sorted
	
	e.g.
	Python
	`HighScores = []`
	`HighScores = ReadData()`
	`print("Before")`
	`OutputHighScores(HighScores)`
	`HighScores = SortScores(HighScores)`
	`print("After")`
	`OutputHighScores(HighScores)`
	
	VB.NET
	`Sub Main(args As String())`
	`Dim HighScores(7, 3) As String`
	`HighScores = ReadData()`
	`Console.WriteLine("Before")`
	`OutputHighScores(HighScores)`
	`HighScores = SortScores(HighScores)`
	`Console.WriteLine("After")`
	`OutputHighScores(HighScores)`
	`End Sub`
		2

Question	Answer	Marks

3(e)(i)	Java
	`public static void main(String args[]){`
	`      String[][] HighScores = new String[7][3];`
	`      HighScores = ReadData();`
	`      System.out.println("Before");`
	`      OutputHighScores(HighScores);`
	`      HighScores = SortScores(HighScores);`
	`      System.out.println("After");`
	`      OutputHighScores(HighScores);`
	`}`	

3(e)(ii)	Output showing 'Before' and players and scores in correct format before sorting
	Output showing 'After' players and scores in correct order and format after sorting
	
	e.g.
	
	`Before`
	`GHEH got to level 3 with a score of 10`
	`KWQW got to level 4 with a score of 20`
	`MMND got to level 4 with a score of 18`
	`RFOO got to level 5 with a score of 20`
	`XXHD got to level 3 with a score of 19`
	`QWSD got to level 3 with a score of 15`
	`JGHF got to level 5 with a score of 22`
	`After`
	`JGHF got to level 5 with a score of 22`
	`RFOO got to level 5 with a score of 20`
	`KWQW got to level 4 with a score of 20`
	`MMND got to level 4 with a score of 18`
	`XXHD got to level 3 with a score of 19`
	`QWSD got to level 3 with a score of 15`
	`GHEH got to level 3 with a score of 10`
		2