Cambridge Assessment International Education

# Cambridge International AS & A Level

**COMPUTER SCIENCE** **9618/42**

Paper 4 Practical **May/June 2021**

MARK SCHEME

Maximum Mark: 75

**Published**

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## 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 descriptors 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.

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| GENERIC MARKING PRINCIPLE 5:<br><br>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:<br><br>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. |

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| Question | Answer | Marks |
|---|---|---|
| 1(a) | 1 mark per bullet point<br>• Declaring record/class with name node…<br>• …declaring data and next node (both as Integers)<br><br>Example code:<br><br>**Visual Basic**<br>`Structure node`<br>`    Dim Data As Integer`<br>`    Dim nextNode As Integer`<br>`End Structure`<br><br>**Python**<br>`class node:`<br>`    def __init__(self, theData, nextNodeNumber):`<br>`        self. Data = theData`<br>`        self.nextNode = nextNodeNumber`<br><br>**Java**<br>`class node{`<br>`  private Integer Data;`<br>`  private Integer nextNode;`<br>`  public node(Integer dataP, Integer nextNodeP){`<br>`    this.Data = dataP;`<br>`    this.nextNode = nextNodeP;`<br>`  }`<br>`}` | **2** |

| Question | Answer | Marks |
|---|---|---|
| 1(b) | 1 mark per bullet point<br>• Declaring array named `linkedList` with data type `node`<br>• Assigning all nodes correctly as record/object nodes …<br>• …with correct values stored<br>• declaring `startPointer` as 0, `emptyList` as 5<br><br>Example code:<br><br>**Visual Basic**<br>`Dim linkedList(9) As node`<br>`linkedList(0).data = 1`<br>`linkedList(0).nextNode = 1`<br>`linkedList(1).data = 5`<br>`linkedList(1).nextNode = 4`<br>`linkedList(2).data = 6`<br>`linkedList(2).nextNode = 7`<br>`linkedList(3).data = 7`<br>`linkedList(3).nextNode = -1`<br>`linkedList(4).data = 2`<br>`linkedList(4).nextNode = 2`<br>`linkedList(5).data = 0`<br>`linkedList(5).nextNode = 6`<br>`linkedList(6).data = 0`<br>`linkedList(6).nextNode = 8`<br>`linkedList(7).data = 56`<br>`linkedList(7).nextNode = 3`<br>`linkedList(8).data = 0`<br>`linkedList(8).nextNode = 9`<br>`linkedList(9).data = 0`<br>`linkedList(9).nextNode = -1`<br>`Dim startPointer As Integer = 0`<br>`Dim emptyList As Integer = 5` | **4** |

| Question | Answer | Marks |
|---|---|---|
| 1(b) | **Python**<br>`linkedList = [node(1,1),node(5,4),node(6,7),node(7,-1),node(2,2),node(0,6),`<br>`node(0,8),node(56,3),node(0,9),node(0,-1)]`<br>`startPointer = 0`<br>`emptyList = 5`<br><br>**Java**<br>`public static void main(String[] args){`<br>`node[] linkedList = new node[10];`<br>`linkedList[0] = new node(1,1);`<br>`linkedList[1] = new node(5, 4);`<br>`linkedList[2] = new node(6, 7);`<br>`linkedList[3] = new node(7,-1);`<br>`linkedList[4] = new node(2,2);`<br>`linkedList[5] = new node(0,6);`<br>`linkedList[6] = new node(0,8);`<br>`linkedList[7] = new node(56, 3);`<br>`linkedList[8] = new node(0,9);`<br>`linkedList[9] = new node(0,-1);`<br>`Integer startPointer = 0;`<br>`Integer emptyList = 5;`<br>`}` | |

| Question | Answer | Marks |
|---|---|---|
| 1(c)(i) | 1 mark per bullet point<br>• Procedure `outputNodes` …<br>• …taking linked list and start pointer as parameters<br>• Looping until `nextNode/pointer` is –1<br>• Outputting the node data in the correct order, i.e. following pointers<br>• Updating pointer to current node's `nextNode`<br>• Using the correct record/class field/properties throughout<br><br>Example code:<br><br>**Visual Basic**<br>`Sub outputNodes(ByRef linkedList, ByVal currentPointer)`<br>`  While (currentPointer <> -1)`<br>`  Console.WriteLine(linkedList(currentPointer).data)`<br>`  currentPointer = linkedList(currentPointer).nextNode`<br>`  End While`<br>`End Sub`<br><br>**Python**<br>`def outputNodes(linkedList, currentPointer):`<br>`  while(currentPointer != -1):`<br>`  print(str(linkedList[currentPointer].data))`<br>`  currentPointer = linkedList[currentPointer].nextNode`<br><br>**Java**<br>`public static void outputNodes(node[] linkedList, Integer currentPointer){`<br>`  while(currentPointer != -1){`<br>`  System.out.println(linkedList[currentPointer].data);`<br>`  currentPointer = linkedList[currentPointer].nextNode;`<br>`  }`<br>`}` | **6** |

| Question | Answer | Marks |
|---|---|---|
| 1(c)(ii) | Screenshot showing:<br>1<br>5<br>2<br>6<br>56<br>7 | **1** |
| 1(d)(i) | 1 mark per bullet point to **max 7**<br>• Function taking list and both pointers as parameters<br>• Taking (integer) data as input<br>• Checking if list is full …<br>• … and returning False<br>• Insert the input data to the empty list node's data<br>• Following pointers to find last node in Linked List …<br>• …and updating last node's pointer to empty list/location where new node is added<br>• Updating empty list to it's first elements pointer<br>• Returning true when added successfully<br><br>Example code:<br><br>**Visual Basic**<br>`Function addNode(ByRef linkedList() As node, ByVal currentPointer As Integer, ByRef emptyList As Integer)`<br>`Console.WriteLine("Enter the data to add")`<br>`Dim dataToAdd As Integer = Console.ReadLine()`<br>`Dim previousPointer As Integer = 0`<br>`Dim newNode As node`<br>`If emptyList < 0 Or emptyList > 9 Then`<br>`Return False`<br>`Else`<br>`newNode.data = dataToAdd`<br>`newNode.nextNode = -1` | **7** |

| Question | Answer | Marks |
|---|---|---|
| 1(d)(i) | linkedList(emptyList) = newNode<br>previousPointer = 0<br>While (currentPointer <> -1)<br>previousPointer = currentPointer<br>currentPointer = linkedList(currentPointer).nextNode<br>End While<br>Dim valueToWrite As Integer = emptyList<br>linkedList(previousPointer).nextNode = valueToWrite<br>emptyList = linkedList(emptyList).nextNode<br><br>Return True<br><br>End If<br><br>End Function<br><br>**Python**<br>def addNode(linkedList, currentPointer, emptyList):<br>dataToAdd = input("Enter the data to add")<br><br>if emptyList <0 or emptyList > 9:<br>return False<br>else:<br>newNode = node(int(dataToAdd), -1)<br>linkedList[emptyList] = (newNode)<br><br>previousPointer = 0<br>while(currentPointer != -1):<br>previousPointer = currentPointer<br>currentPointer = linkedList[currentPointer].nextNode<br>linkedList[previousPointer].nextNode = emptyList<br>emptyList = linkedList[emptyList].nextNode<br><br>return True | |

| Question | Answer | Marks |
|---|---|---|
| 1(d)(i) | **Java**<br>`public static Boolean addNode(node[] linkedList, Integer currentPointer,`<br>`Integer emptyList){`<br>`Integer dataToAdd;`<br>`Integer previousPointer;`<br>`node newNode;`<br>`Scanner in = new Scanner(System.in);`<br>`System.out.println("Enter the data to add");`<br>`dataToAdd = in.nextInt();`<br>`if(emptyList < 0 \|\| emptyList > 9){`<br>`return false;`<br>`}else{`<br>`newNode = new node(dataToAdd, -1);`<br>`linkedList[emptyList] = newNode;`<br>`previousPointer = 0;`<br>`while(currentPointer != -1){`<br>`previousPointer = currentPointer;`<br>`currentPointer = linkedList[currentPointer].nextNode;`<br><br>`}`<br>`linkedList[previousPointer].nextNode = emptyList;`<br>`emptyList = linkedList[emptyList].nextNode;`<br>`return true;`<br>`}`<br>`}` | |

| Question | Answer | Marks |
|---|---|---|
| 1(d)(ii) | 1 mark per bullet point<br>• Call `addNode()` with list, start and empty pointers and store/check return value …<br>• …output appropriate message if True returned and if False returned<br>• Calling `outputNodes()` with list and start pointer before and after `addNode()`<br><br>Example code:<br><br>**Visual Basic**<br>`Sub Main()`<br>`  Dim linkedList(10) As node`<br>`  linkedList(0).data = 1`<br>`  linkedList(0).nextNode = 1`<br>`  linkedList(1).data = 5`<br>`  linkedList(1).nextNode = 4`<br>`  linkedList(2).data = 6`<br>`  linkedList(2).nextNode = 7`<br>`  linkedList(3).data = 7`<br>`  linkedList(3).nextNode = -1`<br>`  linkedList(4).data = 2`<br>`  linkedList(4).nextNode = 2`<br>`  linkedList(5).data = -1`<br>`  linkedList(5).nextNode = 6`<br>`  linkedList(6).data = -1`<br>`  linkedList(6).nextNode = 7`<br>`  linkedList(7).data = 56`<br>`  linkedList(7).nextNode = 3`<br>`  linkedList(8).data = -1`<br>`  linkedList(8).nextNode = 9`<br>`  linkedList(9).data = -1`<br>`  linkedList(9).nextNode = -1`<br>`  Dim startPointer As Integer = 0`<br>`  Dim emptyList As Integer = 5`<br>`  outputNodes(linkedList, startPointer)`<br>`  Dim returnValue As Boolean`<br>`  returnValue = addNode(linkedList, startPointer,`<br>`  emptyList)` | **3** |

| Question | Answer | Marks |
|---|---|---|
| 1(d)(ii) | **Pseudocode**<br>`  If returnValue = True Then`<br>`  Console.WriteLine("Item successfully added")`<br>`  Else`<br>`  Console.WriteLine("Item not added, list full")`<br>`  End If`<br>`  outputNodes(linkedList, startPointer)`<br>`  Console.ReadLine()`<br>`End Sub`<br><br>**Python**<br>`linkedList = [node(1,1),node(5,4),node(6,7),node(7,-1),node(2,2),node(-1,6),`<br>`  node(-1,7),node(56,3),node(-1,9),node(-1,-1)]`<br>`startPointer = 0`<br>`emptyList = 5`<br>`outputNodes(linkedList, startPointer)`<br>`returnValue = addNode(linkedList, startPointer, emptyList)`<br>`if returnValue == True:`<br>`  print("Item successfully added")`<br>`else:`<br>`  print("Item not added, list full")`<br>`outputNodes(linkedList, startPointer)`<br><br>**Java**<br>`public static void main(String[] args){`<br><br>`  node[] linkedList = new node[10];`<br>`  linkedList[0] = new node(1,1);`<br>`  linkedList[1] = new node(5, 4);`<br>`  linkedList[2] = new node(6, 7);`<br>`  linkedList[3] = new node(7,-1);`<br>`  linkedList[4] = new node(2,2);`<br>`  linkedList[5] = new node(-1,6);`<br>`  linkedList[6] = new node(-1,7);`<br>`  linkedList[7] = new node(56, 3);`<br>`  linkedList[8] = new node(-1,9);` | |

| Question | Answer | Marks |
|---|---|---|
| 1(d)(ii) | `linkedList[9] = new node(-1,-1);`<br>`Integer startPointer = 0;`<br>`Integer emptyList = 5;`<br>`outputNodes(linkedList, startPointer);`<br>`Boolean returnValue;`<br>`returnValue = addNode(linkedList, startPointer, emptyList);`<br>`if (returnValue == true){`<br>`System.out.println("Item successfully added");`<br>`}else{`<br>`System.out.println("Item not added, list full");`<br>`}`<br>`outputNodes(linkedList, startPointer);`<br>`}` | |
| 1(d)(iii) | 1 mark for screenshot showing :<br>• Linked list output<br>• 5 input<br>• Message saying Successfully added or equivalent<br>• Linked list output with 5 at the end.<br><br>Example:<br>1<br>5<br>2<br>6<br>56<br>7<br>5 (being input)<br>1<br>5<br>2<br>6<br>56<br>7<br>5 | **1** |

| Question | Answer | Marks |
|---|---|---|
| 2(a) | 1 mark per bullet point<br>• Array with identifier `arrayData`<br>• correct 10 data items added<br><br>Example code:<br><br>**Visual Basic**<br>`  Dim arrayData(9) As Integer`<br>`Sub Main()`<br>`  arrayData(0) = 10`<br>`  arrayData(1) = 5`<br>`  arrayData(2) = 6`<br>`  arrayData(3) = 7`<br>`  arrayData(4) = 1`<br>`  arrayData(5) = 12`<br>`  arrayData(6) = 13`<br>`  arrayData(7) = 15`<br>`  arrayData(8) = 21`<br>`  arrayData(9) = 8`<br>`End Sub`<br><br>**Python**<br>`arrayData = [10, 5, 6, 7, 1, 12, 13, 15, 21, 8]`<br><br>**Java**<br>`int[] arrayData = new int[];`<br>`public static void main(String[] args){`<br>`  arrayData[0] = 10;`<br>`  arrayData[1] = 5;`<br>`  arrayData[2] = 6;`<br>`  arrayData[3] = 7;`<br>`  arrayData[4] = 1;`<br>`  arrayData[5] = 12;`<br>`  arrayData[6] = 13;` | **2** |

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| Question | Answer | Marks |
|---|---|---|
| 2(a) | `arrayData[7] = 15;`<br>`arrayData[8] = 21;`<br>`arrayData[9] = 8;`<br>} | |
| 2(b)(i) | 1 mark per bullet point<br>• function `linearSearch` with correct identifier<br>• …taking integer search value as a parameter<br>• Searching 10 times/through all array elements …<br>• …comparing each element to search value<br>• returning True if found<br>• returning False if not found<br><br>Example code:<br><br>**Visual Basic**<br>`Function linearSearch(ByRef searchValue As Integer)`<br>`  For x = 0 To 9`<br>`  If arrayData(x) = searchValue Then`<br>`  Return True`<br>`  End If`<br>`  Next`<br>`  Return False`<br>`End Function` | **6** |

| Question | Answer | Marks |
|---|---|---|
| 2(b)(i) | **Python**<br>`def linearSearch(searchValue):`<br>`  for x in range(0, 10):`<br>`  if arrayData[x] == searchValue:`<br>`  return True`<br>`  return False`<br><br>**Java**<br>`public static Boolean linearSearch(Integer searchValue){`<br>`  for (int x = 0; x < 10; x++){`<br>`  if(arrayData[x] == searchValue){`<br>`  return true;`<br>`  }`<br>`  }`<br>`  return false;`<br>`}` | |

| Question | Answer | Marks |
|---|---|---|
| 2(b)(ii) | 1 mark per bullet point to max 4<br>• Taking value as input…<br>• …checking/casting to Integer<br>• Calling `linearSearch` and sending input as parameter<br>• Storing and checking return value…<br>• …outputting appropriate message if found **and** if not found<br><br>Example code:<br><br>**Visual Basic**<br>`Dim arrayData(10) As Integer`<br>`Sub Main()`<br>`  arrayData(0) = 10`<br>`  arrayData(1) = 5`<br>`  arrayData(2) = 6`<br>`  arrayData(3) = 7`<br>`  arrayData(4) = 1`<br>`  arrayData(5) = 12`<br>`  arrayData(6) = 13`<br>`  arrayData(7) = 15`<br>`  arrayData(8) = 12`<br>`  arrayData(9) = 8`<br>`  Console.WriteLine("Enter a number to search for")`<br>`  Dim searchValue As Integer = Console.ReadLine()`<br>`  Dim returnValue As Boolean = linearSearch(searchValue)`<br>`  If returnValue = True Then`<br>`  Console.WriteLine("Found it")`<br>`  Else`<br>`  Console.WriteLine("Didn't find it")`<br>`  End If`<br>`End Sub` | **4** |

| Question | Answer | Marks |
|---|---|---|
| 2(b)(ii) | **Python**<br>`arrayData = [10, 5, 6, 7, 1, 12, 13, 15, 21, 8]`<br>`searchValue = int(input("Enter the number to search for"))`<br>`returnValue = linearSearch(searchValue)`<br>`if returnValue == True:`<br>`  print("It was found")`<br>`else:`<br>`  print("It was not found")`<br><br>**Java**<br>`Integer[] arrayData = new Integer[10];`<br>`public static void main(String[] args){`<br><br>`  arrayData[0] = 10;`<br>`  arrayData[1] = 5;`<br>`  arrayData[2] = 6;`<br>`  arrayData[3] = 7;`<br>`  arrayData[4] = 1;`<br>`  arrayData[5] = 12;`<br>`  arrayData[6] = 13;`<br>`  arrayData[7] = 15;`<br>`  arrayData[8] = 12;`<br>`  arrayData[9] = 8;`<br>`  System.out.println("Enter the number to search for");`<br>`  Integer searchValue;`<br>`  Scanner in = new Scanner(System.in);`<br>`  searchValue = in.nextInt();`<br>`  Boolean returnValue;`<br>`  returnValue = linearSearch(searchValue);`<br>`  if (returnValue == true){`<br>`  System.out.println("It was found");`<br>`  }else{`<br>`  System.out.println("It was not found");`<br>`  }`<br>`}` | |

| Question | Answer | Marks |
|---|---|---|
| 2(b)(iii) | 1 mark for screenshot showing input and output for number found<br>1 mark for screenshot showing input and output for number not found | **2** |
| 2(c) | 1 mark per bullet point<br>• Correct outer loop stop<br>• Correct inner loop stop<br>• Correct < in the IF<br>• Correct `theArray(y + 1)`<br>• Correct `temp`<br>• Remainder matching pseudocode<br><br>Example code:<br><br>**Visual Basic**<br>`Sub bubbleSort()`<br>`  Dim temp As Integer = 0`<br>`  For x = 0 To 9`<br>`    For y = 0 To 8`<br>`      If theArray(y) < theArray(y + 1) Then`<br>`        temp = theArray(y)`<br>`        theArray(y) = theArray(y + 1)`<br>`        theArray(y + 1) = temp`<br>`      End If`<br>`   Next`<br>` Next`<br>`End Sub` | **6** |

| Question | Answer | Marks |
|---|---|---|
| 2(c) | **Python**<br>`def bubbleSort():`<br>`  for x in range (0, 10):`<br>`  for y in range(0, 9):`<br>`  if theArray[y] < theArray[y + 1]:`<br>`  temp = theArray[y]`<br>`  theArray[y] = theArray[y + 1]`<br>`  theArray[y + 1] = temp`<br><br>**Java**<br>`public static void bubbleSort(){`<br>`  int temp;`<br>`  for (int x = 0; x < 10; x++){`<br>`  for (int y = 0; y < 9; y++){`<br>`  if(theArray[y] < theArray[y+1]){`<br>`  temp = theArray[y];`<br>`  theArray[y] = theArray[y+1];`<br>`  theArray[y+1] = temp;`<br>`  }`<br>`  }`<br>`  }`<br>`}` | |

| Question | Answer | Marks |
|---|---|---|
| 3(a) | 1 mark per bullet point<br>• Class named `treasureChest` and end<br>• Question declared as string as a class attribute<br>• Answer declared as integer as a class attribute<br>• Points declared as integer as a class attribute<br>• All 3 attributes are private<br><br>Example code:<br><br>**Visual Basic**<br>`Class treasureChest`<br>`  Private question As String`<br>`  Private answer As Integer`<br>`  Private points As Integer`<br><br>`  Sub New(questionP, answerP, pointsP)`<br>`    question = questionP`<br>`    answer = answerP`<br>`    points = pointsP`<br>`  End Sub`<br>`End Class`<br><br>**Python**<br>`class treasureChest:`<br>`    #Private question : String`<br>`    #Private answer : Integer`<br>`    #Private points : Integer`<br><br>`    def __init__(self, questionP, answerP, pointsP):`<br>`        self.__question = questionP`<br>`        self.__answer = answerP`<br>`        self.__points = points` | **5** |

| Question | Answer | Marks |
|---|---|---|
| 3(a) | **Java**<br>`import java.util.Scanner;`<br><br>`class treasureChest{`<br>`  private String question;`<br>`  private Integer answer;`<br>`  private Integer points;`<br><br>`  public treasureChest(String questionP, Integer answerP, Integer pointsP){`<br>`  question = questionP;`<br>`  answer = answerP;`<br>`  points = pointsP;`<br>`  }`<br>`}` | |
| 3(b) | 1 mark per bullet point to **max 8**<br>• procedure declared as `readData`<br>• declare array `arrayTreasure` with 4 elements type treasureChest<br>• opening correct file for read<br>• looping until EOF/5 questions …<br>• …reading in and storing each group of 3 lines appropriately<br>• creating object of type `treasureChest` …<br>• …with question, answer and points from file as parameters<br>• ..adding to next array element/appending<br>• … repeatedly for all 5 questions in correct order<br>• Use of appropriate exception handler…<br>• …appropriate output if file not found<br>• Closing correct file | **8** |

| Question | Answer | Marks |
|---|---|---|
| 3(b) | Example code:<br><br>**Visual Basic**<br>`Sub readData()`<br>`  Dim arrayTreasure(4) as treasureChest`<br>`  Dim filename As String = "treasureChestData.txt"`<br>`  Try`<br>`  Dim fileReader As New System.IO.StreamReader(filename)`<br>`  Dim question As String`<br>`  Dim answer, points As Integer`<br>`  Dim numberQuestions as Integer = 0`<br>`  While fileReader.Peek <> -1`<br>`  question = fileReader.ReadLine()`<br>`  answer = fileReader.ReadLine()`<br>`  points = fileReader.ReadLine()`<br>`  arrayTreasure(numberQuestions) = New treasureChest(question, answer, points)`<br>`  numberQuestions += 1`<br>`  End While`<br>`  fileReader.Close()`<br>`  Catch ex As Exception`<br>`  Console.WriteLine("Invalid file")`<br>`  End Try`<br>`End Sub`<br><br>**Python**<br>`# arrayTreasure(5) as treasureChest`<br>`def readData():`<br>`  filename = "treasureChestData.txt"`<br>`  try:`<br>`  file= open(filename,"r")`<br>`  dataFetched = (file.readline()).strip()`<br>`  while(dataFetched != "" ):`<br>`  question = dataFetched`<br>`  answer = (file.readline()).strip()` | |

| Question | Answer | Marks |
|---|---|---|
| 3(b) | **Java**<br>**Python**<br>**VB.Net** | |

```
            points = (file.readline()).strip()
            arrayTreasure.append(treasureChest(question, answer, points))
            dataFetched = (file.readline()).strip()
        file.close()
    except IOError:
        print("Could not find file")
```

```
public static void readData(){
       treasureChest[] arrayTreasure = new treasureChest[5]:
     String filename = "treasureChestData.txt";
     String dataRead;
     String question;
     String answer;
     String points;
      Integer numberQuestions = 0;
     try{
          FileReader f = new FileReader(filename);
          BufferedReader reader = new BufferedReader(f);
          dataRead = reader.readLine();

          while (dataRead != null){
               question = dataRead;
               answer = reader.readLine();
               points = reader.readLine();
               arrayTreasure[numberQuestions] = new treasureChest(question,
                                   Integer.parseInt(answer), Integer.parseInt(points));
               numberQuestions++;
               dataRead = reader.readLine();
          }
          reader.close();
     }
```

| Question | Answer | Marks |
|---|---|---|
| 3(b) | `catch(FileNotFoundException ex){`<br>`  System.out.println("No file found");`<br>`}`<br>`catch(IOException ex){`<br>`  System.out.println("No file found");`<br>`}`<br>`}` | |
| 3(c)(i) | 1 mark for `getQuestion` returning the value of question<br><br>Example code:<br><br>**Visual Basic**<br>`Function getQuestion()`<br>`  Return question`<br>`End Function`<br><br>**Python**<br>`def getQuestion(self):`<br>`  return self.__question`<br><br>**Java**<br>`public String getQuestion(){`<br>`  return question;`<br>`}` | **1** |

| Question | Answer | Marks |
|---|---|---|
| 3(c)(ii) | 1 mark per bullet point<br>• Function checkAnswer taking in the parameter, returning Boolean<br>• Comparing parameter to that object's answer…<br>• …returning True if correct and False otherwise<br><br>Example code:<br><br>**Visual Basic**<br>`Function checkAnswer(answerP)`<br>`  If answer = answerP Then`<br>`  Return True`<br>`  Else`<br>`  Return False`<br>`  End If`<br>`End Function`<br><br>**Python**<br>`def checkAnswer(self, answerP):`<br>`  if int(self.__answer) == answerP:`<br>`  return True`<br>`  else:`<br>`  return False`<br><br>**Java**<br>`public Boolean checkAnswer(Integer answerP){`<br>`  if (answer == answerP){`<br>`  return true;`<br>`  }else{`<br>`  return false;`<br>`  }`<br>`}` | **3** |

| Question | Answer | Marks |
|---|---|---|
| 3(c)(iii) | 1 mark per bullet point<br>• Function `getPoints` taking `attempts` as parameter and returning integer<br>• If `attempts` is 1 returning `points`<br>• If `attempts` is 2 returns `points` DIV 2<br>• If `attempts` is 3 or 4 returns `points` DIV 4<br>• otherwise returns 0<br><br>Example code:<br><br>**Visual Basic**<br>`Function getPoints(attempts)`<br>`  If attempts = 1 Then`<br>`  Return points`<br>`  ElseIf attempts = 2 Then`<br>`  Return points \ 2`<br>`  ElseIf attempts = 3 Or attempts = 4 Then`<br>`  Return points \ 4`<br>`  Else`<br>`  Return 0`<br>`  End If`<br>`End Function`<br><br>**Python**<br>`def getPoints(self, attempts):`<br>`  if attempts == 1:`<br>`  return int(self.__points)`<br>`  elif attempts == 2:`<br>`  return int(self.__points) // 2`<br>`  elif attempts == 3 or attempts == 4:`<br>`  return int(self.__points) // 4`<br>`  else:`<br>`  return 0` | **5** |

| Question | Answer | Marks |
|---|---|---|
| 3(c)(iii) | **Java**<br>`public Integer getPoints(Integer attempts){`<br>`  if (attempts == 1){`<br>`  return points;`<br>`  }else if(attempts == 2){`<br>`  return Math.round(points/2);`<br>`  }else if(attempts == 3 \|\| attempts == 4){`<br>`  return Math.round(points/4);`<br>`  }else{`<br>`  return 0;`<br>`  }`<br>`}` | |
| 3(c)(iv) | 1 mark per bullet point to **max 7**<br>• Call the procedure `readData()`<br>• Take the question number as input from user<br>• ..validated between 1 and 5<br>• Output the question stored at user's input value<br>• Read answer from user<br>• Check the answer input against question's answer<br>• …looping until the answer is correct<br>• Keeping track of the number of attempts using a variable<br>• Using `getPoints()` and sending the number of attempts as a parameter …<br>• …outputting the number of points returned<br>• Using `.getQuestion` and `.checkAnswer` to access question number input by user and answer input by used | **7** |

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| Question | Answer | Marks |
|---|---|---|
| 3(c)(iv) | Example code:<br><br>**Visual Basic**<br>`Sub Main()`<br>`  readData()`<br>`  Console.WriteLine("Pick a treasure chest to open")`<br>`  Dim choice As Integer = Console.ReadLine()`<br>`  Dim result As Boolean`<br>`  Dim answer As Integer`<br>`  Dim attempts As Integer = 0`<br>`  If choice > 0 And choice < 6 Then`<br>`  result = False`<br>`  attempts = 0`<br>`  While result = False`<br>`  Console.WriteLine(arrayTreasure(choice - 1).getQuestion())`<br>`  answer = Console.ReadLine`<br>`  result = arrayTreasure(choice - 1).checkAnswer(answer)`<br>`  attempts = attempts + 1`<br>`  End While`<br>`  Console.WriteLine(arrayTreasure(choice - 1).getPoints(attempts))`<br>`  End If`<br>`End Sub`<br><br>**Python**<br>`readData()`<br>`choice = int(input("Pick a treasure chest to open"))`<br>`if choice > 0 and choice < 6:`<br><br>`  result = False`<br>`  attempts = 0`<br>`  while result == False:`<br>`  answer = int(input(arrayTreasure[choice-1].getQuestion()))`<br>`  result = arrayTreasure[choice-1].checkAnswer(answer)`<br>`  attempts = attempts + 1`<br>`  print(int(arrayTreasure[choice-1].getPoints(attempts)))` | |

| Question | Answer | Marks |
|---|---|---|
| 3(c)(iv) | **Java**<br>`public static void main(String[] args){`<br><br>`readData();`<br>`Scanner scanner = new Scanner(System.in);`<br>`System.out.println("Pick a treasure chest to open");`<br>`Integer answer;`<br>`Integer choice;`<br>`choice= Integer.parseInt(scanner.nextLine());`<br>`Integer attempts;`<br>`if (choice> 0 && choice < 6){`<br>`Boolean result = false;`<br>`attempts = 0;`<br>`while (result == false){`<br>`System.out.println(arrayTreasure[choice-1].getQuestion());`<br>`answer = Integer.parseInt(scanner.nextLine());`<br>`result = arrayTreasure[choice-1].checkAnswer(answer);`<br>`attempts++;`<br><br>`}`<br>`System.out.println(arrayTreasure[choice-1].getPoints(attempts));`<br><br>`}`<br>`}` | |
| 3(c)(v) | 1 mark per screenshot<br>• Screenshot:<br>outputting 2*2<br>entering 4<br>outputting 10<br><br>• Screenshot:<br>outputting 3000+4000<br>entering an incorrect value<br>entering 7000<br>outputting 9 | **2** |

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