GradeMax

CAMBRIDGE
International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9618/43**

Paper 4 Practical **May/June 2026**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **46** printed pages.

© Cambridge University Press & Assessment 2026

[Turn over

GradeMax

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: • the specific **content** defined in the mark scheme • the specific **skills** defined in the mark scheme or in the level descriptions • the **standard of response** required as exemplified by the standardisation scripts.
2	Examiners must award **whole marks** (not half marks, or other fractions).
3	Examiners must award marks **positively**. This means that: • marks are not deducted for errors or omissions • marks are awarded for correct/valid answers as defined in the mark scheme and also for **other valid answers** which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate • the quality of spelling, punctuation and grammar are judged **only** when the mark scheme indicates that these features are **specifically assessed** in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must **consistently** apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the **full range of marks** defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and **must not** award marks with grade thresholds or grade descriptions in mind.

© Cambridge University Press & Assessment 2026

GradeMax

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	Benefit of the doubt
	To indicate where a key word/phrase/code is missing
	Incorrect
	Follow through
	Indicate a point in an answer
Highlighted text	To draw attention to a particular aspect or to indicate where parts of an answer have been combined
	Ignore
	Not answered question
	No benefit of doubt given
	No examples or not enough

© Cambridge University Press & Assessment 2026

GradeMax

Annotation	Meaning
	Not relevant or used to separate parts of an answer
Off-page comment	Allows comments to be entered at the bottom of the RM marking window and then displayed when the associated question item is navigated to.
	Repetition
	Indicates that work or a page has been seen including blank answer spaces and blank pages.
	Correct
	Too vague

© Cambridge University Press & Assessment 2026

GradeMax

- **Bold** in mark scheme means that idea is required.
- / in mark scheme means alternative.
- // in mark scheme means alternative solution that gains the same mark point.
- … at the end of one mark point without a … at the start of the next just means the sentence follows on. There is no dependency.
- … at the end of one mark point and … at the start of the next, this means the second cannot be awarded without the first.
- () means what is in the brackets is not required, or it is not required in some languages but may be required in others.

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
1(a)	1 mark for 1D array (of 15 strings)	**1**	

Example program code

Python
```
DataArray = [] #15 strings
```

VB.NET
```
Dim DataArray(14) As String
```

Java
```
public static String[] DataArray = new String[15];
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
1(b)	1 mark each • Procedure header (and end) • Taking 15 strings as input • … converting to lower case • … storing in array	**4**	

Example program code

Python

```
def CreateArray():
    for x in range(15):
        DataArray.append(input("Enter a word ").lower())
```

VB.NET

```
Sub CreateArray()
   For x = 0 To 14
       Console.WriteLine("Enter a word ")
       DataArray(x) = Console.ReadLine().ToLower()
   Next
End Sub
```

Java

```
public static void CreateArray(){
  Scanner scanner = new Scanner(System.in);
  for(Integer x = 0; x < 15; x++){
      System.out.println("Enter a word");
      DataArray[x] = (scanner.nextLine()).toLowerCase();
  }
}
```

© Cambridge University Press & Assessment 2026

9618/43 Mark Scheme June 2026

GradeMax

Question	Answer	Marks	Guidance
1(c)	1 mark each • Procedure header (and end) and outputting all data • … on one line with a space between each element	**2**	

Example program code

Python

```
def OutputArray():
    StringOutput = ""
    for x in range(15):
        StringOutput = StringOutput + " " + DataArray[x]
    print(StringOutput)
```

VB.NET

```
Sub OutputArray()
    Dim StringOutput As String = ""
    For x = 0 To 14
        StringOutput = StringOutput + " " + DataArray(x)
    Next
    Console.WriteLine(StringOutput)
End Sub
```

Java

```
public static void OutputArray(){
    String StringOutput = "";
    for(Integer x = 0; x < 15; x++){
        StringOutput += " " + DataArray[x];
    }
    System.out.println(StringOutput);
}
```

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance
1(d)(i)	1 mark for calling both procedures in the given order	1	

Example program code
Python
```
CreateArray()
OutputArray()
```

VB.NET
```
CreateArray()
OutputArray()
```

Java
```
CreateArray();
OutputArray();
```

1(d)(ii)	1 mark for showing the 15 inputs and all data output on the same line	1	Outputs must be lowercase

e.g.
```
Enter a word 1
Enter a word One
Enter a word 2
Enter a word TWO
Enter a word three
Enter a word ??
Enter a word house
Enter a word 99987
Enter a word popping
Enter a word green
Enter a word eleven
Enter a word 12
Enter a word Twenty
Enter a word THIRTY
Enter a word 16
 1 one 2 two three ?? house 99987 popping green eleven 12 twenty thirty 16
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
1(e)	1 mark each • Procedure header (and end) taking string as input and converting to lower • Looping through all elements in the array • … comparing to input • … counting number of times it occurs • Outputting final count	**5**	

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance

Example program code

Python

```
def FindWords():
    WordFind = input("Enter the word you want to find ").lower()
    Counter = 0
    for x in range(15):
        if(DataArray[x] == WordFind):
            Counter = Counter + 1
    print("It was found ", Counter, " times")
```

VB.NET

```
  Sub FindWords()
      Console.WriteLine("Enter the word you want to find")
      Dim WordFind As String = Console.ReadLine().ToLower()
      Dim Counter As Integer = 0
      For x = 0 To 14
          If DataArray(x) = WordFind Then
              Counter = Counter + 1
          End If
      Next
      Console.WriteLine("It was found " & Counter & " times")
  End Sub
```

Java

```
public static void FindWords(){
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter the word you want to find");
        String WordFind = (scanner.nextLine()).toLowerCase();
        Integer Counter = 0;
        for(Integer x = 0; x < 15; x++){
            if(DataArray[x].equals(WordFind)){
                Counter++;
            }
        }
        System.out.println("It was found " + Counter + " times");
    }
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
1(f)(i)	1 mark each • Procedure header (and end) and iterating through each element (first loop) • Inner loop • Stopping the loop when in order (any method) • Comparing by length … • … and swapping correctly	**5**	

PapaCambridge papacambridge.com

GradeMax

Question	Answer	Marks	Guidance

Example program code

Python

```
def SortLength():
    Swap = True
    Count = 0

    while(Count < 14 and Swap):
        Swap = False
        for y in range(14):
            if(len(DataArray[y]) > len(DataArray[y+1])):
                DataArray[y], DataArray[y+1] = DataArray[y+1], DataArray[y]
                Swap = True
        Count = Count + 1
```

VB.NET

```
Sub SortLength()
    Dim Temp As String
    Dim Swap As Boolean = True
    Dim Count As Integer = 0
    While Count < 15 And Swap = True
        Swap = False
        For y = 0 To 13
            If DataArray(y).Length > DataArray(y + 1).Length Then
                Temp = DataArray(y)
                DataArray(y) = DataArray(y + 1)
                DataArray(y + 1) = Temp
                Swap = True
            End If
        Next
        Count = Count + 1
    End While
End Sub
```

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance

	Java
	`public static void SortLength(){`
	`  String Temp;`
	`  Boolean Swap = true;`
	`  Integer Count = 0;`
	`  while(Count < 14 && Swap){`
	`  Swap = false;`
	`  for(Integer y = 0; y < 14; y++){`
	`  if(DataArray[y].length() > DataArray[y+1].length()){`
	`  Temp = DataArray[y];`
	`  DataArray[y] = DataArray[y+1];`
	`  DataArray[y+1] = Temp;`
	`  Swap = true;`
	`  }`
	`  }`
	`  Count++;`
	`  }`
	`}`		

1(f)(ii)	1 mark for calling the 3 procedures in order	1	

	Example program code
	Python
	`FindWords()`
	`SortLength()`
	`OutputArray()`
	
	VB.NET
	`FindWords()`
	`SortLength()`
	`OutputArray()`
	
	Java
	`FindWords();`
	`SortLength();`
	`OutputArray();`		

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance
1(f)(iii)	1 mark for screenshot showing inputs and outputs	1	Ignore output of array content in order first. Allow ordering if correct for the data but not matching screenshot.

e.g.

```
Enter a word one
Enter a word One
Enter a word 1
Enter a word three
Enter a word three
Enter a word One
Enter a word house
Enter a word 99987
Enter a word popping
Enter a word green
Enter a word eleven
Enter a word One
Enter a word Twenty
Enter a word THIRTY
Enter a word One
Enter the word you want to find one
It was found  5  times
 1 one one one one three three house 99987 green eleven twenty thirty popping
```

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance
2(a)(i)	1 mark each • Class header (and end) • Five attributes with the correct data types • Constructor header (and end) taking five parameters • Assigning parameters to each attribute	4	

Example program code

Python

```
class Character():
    def __init__(self, pCharacterName, pColour, pSuperStrength, pFly, pInvisible):
        self.__CharacterName = pCharacterName
        self.__Colour = pColour
        self.__SuperStrength = pSuperStrength
        self.__Fly = pFly
        self.__Invisible = pInvisible
```

VB.NET

```
Class Character
     Dim CharacterName As String
     Dim Colour As String
     Dim SuperStrength As String
     Dim Fly As String
     Dim Invisible As String

     Public Sub New(pCharacterName, pColour, pSuperStrength, pFly, pInvisible)
         CharacterName = pCharacterName
         Colour = pColour
         SuperStrength = pSuperStrength
         Fly = pFly
         Invisible = pInvisible
     End Sub

End Class
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance

Java

```
public class Character {
    public String CharacterName;
    public String Colour;
    public String SuperStrength;
    public String Fly;
    public String Invisible;
    public Character(String pCharacterName, String pColour, String pSuperStrength, String pFly, String
pInvisible){
        CharacterName = pCharacterName;
        Colour = pColour;
        SuperStrength = pSuperStrength;
        Fly = pFly;
        Invisible = pInvisible;
    }
}
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
2(a)(ii)	1 mark each • 1 get method header (and end) with no parameter ... • … returning correct attribute • Remaining 4 get methods correct	3	

Example program code

Python

```
    def GetCharacterName(self):
        return self.__CharacterName
    def GetColour(self):
        return self.__Colour
    def GetSuperStrength(self):
        return self.__SuperStrength
    def GetFly(self):
        return self.__Fly
    def GetInvisible(self):
        return self.__Invisible
```

VB.NET

```
Public Function GetCharacterName()
    Return CharacterName
End Function
Public Function GetColour()
    Return Colour
End Function
Public Function GetSuperStrength()
    Return SuperStrength
End Function
Public Function GetFly()
    Return Fly
End Function
Public Function GetInvisible()
    Return Invisible
End Function
```

© Cambridge University Press & Assessment 2026

9618/43 Mark Scheme June 2026

GradeMax

Question	Answer	Marks	Guidance

	Java
	`public String GetCharacterName(){`
	`  return CharacterName;`
	`}`
	`public String GetColour(){`
	`  return Colour;`
	`}`
	`public String GetSuperStrength(){`
	`  return SuperStrength;`
	`}`
	`public String GetFly(){`
	`  return Fly;`
	`}`
	`public String GetInvisible(){`
	`  return Invisible;`
	`}`		

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
2(b)	1 mark each • `ReadData()` header (and end) returning populated array • Opening file to read and closing file in appropriate place • Exception handling for file handling including appropriate output • Looping through each line in file and reading data… • … (stripping and) splitting file correctly (as appropriate) • Creating new instance of `Character` with correct values … • … storing in array	**7**	

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance

Example program code

Python

```
def ReadData():
    AllCharacters = []
    try:
        with open("Characters.txt") as TheFile:
            for Line in TheFile:
                Line = Line.strip()
                Line = Line.split(",")
                AllCharacters.append(Character(Line[0],Line[1],Line[2],Line[3],Line[4]))
    except:
        print("Cannot open file")
    return AllCharacters
```

VB.NET

```
Public Function ReadData()
    Dim AllCharacters(14) As Character
    Dim Line(4) As String
    Dim Count As Integer = 0

    Try
        Dim FileReader As New System.IO.StreamReader("Characters.txt")
        While Not FileReader.EndOfStream

            Line = (FileReader.ReadLine()).Split(",")
            AllCharacters(Count) = New Character(Line(0), Line(1), Line(2), Line(3), Line(4))

            Count = Count + 1
        End While
        FileReader.Close()

    Catch ex As Exception
        Console.WriteLine("Cannot open or read from file")
    End Try
    Return AllCharacters
End Function
```

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance

Java

```
public static Character[] ReadData(){
    Character[] AllCharacters = new Character[15];
    try{
        Scanner Scanner1 = new Scanner(new File("Characters.txt"));
        String[] Line = new String[5];
        Integer Count = 0;
        while(Scanner1.hasNextLine()){
           Line = Scanner1.nextLine().split(",");
           AllCharacters[Count] =  new Character(Line[0],Line[1],Line[2],Line[3], Line[4]);
                Count++;
           }
            Scanner1.close();
     } catch(FileNotFoundException ex){
            System.out.println("No file found");
     }
        return AllCharacters;
    }
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
2(c)	1 mark each • Procedure header (and end) taking array parameter and outputting character data using get methods • Looping through all characters and outputting data on same line … • … in correct format	3	

PapaCambridge papacambridge.com

GradeMax

Question	Answer	Marks	Guidance

Example program code

Python

```
def OutputCharacters(CharacterArray):
    for Item in CharacterArray:
        print("Name: ", Item.GetCharacterName(), " Colour: ", Item.GetColour(), " Super Strength: ",
Item.GetSuperStrength(), " Fly: ", Item.GetFly(), " Invisible: ", Item.GetInvisible())
```

VB.NET

```
Public Sub OutputCharacters(CharacterArray() As Character)
    Dim Count As Integer = 0

    While (Not (CharacterArray(Count) Is Nothing))
        Console.WriteLine("Name: " & CharacterArray(Count).GetCharacterName() & " Colour: " &
CharacterArray(Count).GetColour() & " Super strength: " & CharacterArray(Count).GetSuperStrength() & " Fly:
" & CharacterArray(Count).GetFly() & " Invisible: " & CharacterArray(Count).GetInvisible())
        Count = Count + 1
    End While

End Sub
```

Java

```
public static void OutputCharacters(Character[] CharacterArray){
        System.out.println("Remaining characters: ");
        Integer Count = 0;

        while(CharacterArray[Count] != null){
            System.out.println("Name: " + CharacterArray[Count].GetCharacterName() + " Colour: " +
CharacterArray[Count].GetColour() + " Super strength: " + CharacterArray[Count].GetSuperStrength() + " Fly:
" + CharacterArray[Count].GetFly() + " Invisible: " + CharacterArray[Count].GetInvisible());
            Count++;
        }
    }
```

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance
2(d)(i)	1 mark each • Calling `ReadData()` and storing returned array • Calling `OutputCharacters()` with returned array	2	

Example program code

Python

```
CharacterOptions = ReadData()
OutputCharacters(CharacterOptions)
```

VB.NET

```
Dim CharacterOptions(19) As Character
CharacterOptions = ReadData()
OutputCharacters(CharacterOptions)
```

Java

```
Character[] CharacterOptions = ReadData();
OutputCharacters(CharacterOptions);
```

2(d)(ii)	1 mark for screenshot showing all characters output (in correct format)	1	

e.g.

```
Name:  Jet  Colour:  Black  Super Strength:  Yes  Fly:  No  Invisible:  No
Name:  Chewie  Colour:  Grey  Super Strength:  No  Fly:  Yes  Invisible:  No
Name:  Nymph  Colour:  Brown  Super Strength:  No  Fly:  No  Invisible:  Yes
Name:  Copper  Colour:  Brown  Super Strength:  Yes  Fly:  Yes  Invisible:  No
Name:  Seti  Colour:  White  Super Strength:  Yes  Fly:  No  Invisible:  Yes
Name:  Epie  Colour:  Black  Super Strength:  No  Fly:  Yes  Invisible:  Yes
Name:  Silk  Colour:  Yellow  Super Strength:  No  Fly:  Yes  Invisible:  No
Name:  Menth  Colour:  Green  Super Strength:  No  Fly:  No  Invisible:  Yes
Name:  Thet  Colour:  Black  Super Strength:  Yes  Fly:  Yes  Invisible:  Yes
Name:  Vaze  Colour:  White  Super Strength:  Yes  Fly:  Yes  Invisible:  No
Name:  Lithe  Colour:  Grey  Super Strength:  Yes  Fly:  Yes  Invisible:  No
Name:  Benny  Colour:  Grey  Super Strength:  Yes  Fly:  Yes  Invisible:  No
Name:  Meryl  Colour:  Yellow  Super Strength:  No  Fly:  No  Invisible:  Yes
Name:  Cookie  Colour:  Brown  Super Strength:  Yes  Fly:  No  Invisible:  No
Name:  Robin  Colour:  Red  Super Strength:  Yes  Fly:  No  Invisible:  Yes
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
2(e)(i)	1 mark each • Prompt and input for two criteria … • … taking input as two separate inputs // each in one input and splitting appropriately • Looping through each character and comparing attribute to one choice… • … repeating for a second choice … (could be AND in if statement) • … storing matching characters in new array // removing characters from the list // other appropriate method of limiting/identifying • Counting and outputting the number of characters • Calling `OutputCharacters()` with updated array • Using get methods correctly throughout	**8**	

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance

Example program code
Python

```
print("You can use 2 choices to limit the characters available")
for x in range(2):
    TempArray = []
    print("Choice ", x+1)
    TheOption = int(input("Enter 1 to select a colour, 2 for strength, 3 for fly and 4 for invisibility "))

    if(TheOption == 1):
        Choice = input("Which colour would you like to select a character ")
        for Item in CharacterOptions:
            if Item.GetColour() == Choice:
                TempArray.append(Item)
        CharacterOptions = TempArray



    elif TheOption == 2:
        Choice = input("Enter 1 to select characters with super strength, anything else for those without
select super strength ")
        if Choice == "1":
            Choice = "Yes"
        else:
            Choice = "No"
        for Item in CharacterOptions:
            if Item.GetSuperStrength() == Choice:
                TempArray.append(Item)
        CharacterOptions = TempArray


    elif TheOption == 3:
        Choice = input("Enter 1 to select characters that fly, anything else for those that cannot fly ")
        if Choice == "1":
            Choice = "Yes"
```

Question	Answer	Marks	Guidance

```
        else:
            Choice = "No"
        for Item in CharacterOptions:

            if Item.GetFly() == Choice:

                TempArray.append(Item)
        CharacterOptions = TempArray


    else:
        Choice = int(input("Enter 1 to select characters with invisibility, anything else for those without
invisibility "))
        if Choice == "1":
            Choice = "Yes"
        else:
            Choice = "No"
        for Item in CharacterOptions:
            if Item.GetInvisible() == Choice:
                TempArray.append(Item)
        CharacterOptions = TempArray



NumberCharacters = len(CharacterOptions)
print("There are", NumberCharacters, "characters that match your choice")
OutputCharacters(CharacterOptions)
```

VB.NET

```
Console.WriteLine("You can use 2 choices to limit the characters available")
Dim TheOption As String
Dim Choice As String
Dim Count As Integer
Dim TempCount As Integer
```

GradeMax

Question	Answer	Marks	Guidance

```
For x = 1 To 2
    Dim TempArray(20) As Character
    TempCount = 0

    Console.WriteLine("Choice " & x)
    Console.WriteLine("Enter 1 to select a colour, 2 for strength, 3 for fly and 4 for invisibility ")
    TheOption = Console.ReadLine()

    If TheOption = "1" Then
        Console.WriteLine("Which colour would you like to select a character ")
        Choice = Console.ReadLine()
        Count = 0

        While (Not (CharacterOptions(Count) Is Nothing))
            If (CharacterOptions(Count).GetColour() = Choice) Then
                TempArray(TempCount) = CharacterOptions(Count)
                TempCount = TempCount + 1
            End If
            Count = Count + 1
        End While
        CharacterOptions = TempArray


    ElseIf TheOption = "2" Then
        Console.WriteLine("Enter 1 to select characters with super strength, anything else for those
without select super strength ")
        Choice = Console.ReadLine()
        Count = 0
        If Choice = "1" Then
            Choice = "Yes"
        Else
            Choice = "No"
        End If
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance

```
        While (Not (CharacterOptions(Count) Is Nothing))
            If (CharacterOptions(Count).GetSuperStrength() = Choice) Then
                TempArray(TempCount) = CharacterOptions(Count)
                TempCount = TempCount + 1
            End If
            Count = Count + 1
        End While
        CharacterOptions = TempArray


    ElseIf TheOption = "3" Then
        Console.WriteLine("Enter 1 to select characters that fly, anything else for those that cannot fly
")
        Choice = Console.ReadLine()
        Count = 0
        If Choice = "1" Then
            Choice = "Yes"
        Else
            Choice = "No"
        End If
        While (Not (CharacterOptions(Count) Is Nothing))
            If (CharacterOptions(Count).GetFly() = Choice) Then
                TempArray(TempCount) = CharacterOptions(Count)
                TempCount = TempCount + 1
            End If
            Count = Count + 1
        End While
        CharacterOptions = TempArray


    Else
        Console.WriteLine("Enter 1 to select characters with invisibility, anything else for those without
invisibility ")
        Choice = Console.ReadLine()
        Count = 0
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance

```
        If Choice = "1" Then
            Choice = "Yes"
        Else
            Choice = "No"
        End If
        While (Not (CharacterOptions(Count) Is Nothing))
            If (CharacterOptions(Count).GetInvisible() = Choice) Then
                TempArray(TempCount) = CharacterOptions(Count)
                TempCount = TempCount + 1
            End If
            Count = Count + 1
        End While
        CharacterOptions = TempArray
    End If

Next
Console.WriteLine("There are " & TempCount & " characters")
OutputCharacters(CharacterOptions)
```

Java

```
System.out.println("You can use 2 choices to limit the characters available");
        String TheOption;
        String Choice;
        Integer Count;
        Integer TempCount = 0;
        for(Integer x = 1; x < 3; x++){
            Character[] TempArray = new Character[20];
            TempCount = 0;
            System.out.println("Choice" + x);
            System.out.println("Enter 1 to select a colour, 2 for strength, 3 for fly and 4 for
invisibility ");
            TheOption = Scanner1.nextLine();
            if(TheOption.equals("1")){
                System.out.println("Which colour would you like to select a character ");
                Choice = Scanner1.nextLine();
                Count = 0;
```

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance

```
                while(CharacterOptions[Count] != null){
                    if ((CharacterOptions[Count].GetColour()).equals(Choice)){
                        TempArray[TempCount] = CharacterOptions[Count];
                        TempCount++;
                    }
                    Count++;
                }
                CharacterOptions = TempArray;
            }else if(TheOption.equals("2")){
                System.out.println("Enter 1 to select characters with super strength, anything else for
those without select super strength ");
                Choice = Scanner1.nextLine();
                if(Choice.equals("1")){
                    Choice = "Yes";
                }else{
                    Choice = "No";
                }
                Count = 0;
                while(CharacterOptions[Count] != null){
                    if ((CharacterOptions[Count].GetSuperStrength()).equals(Choice)){
                        TempArray[TempCount] = CharacterOptions[Count];
                        TempCount++;
                    }
                    Count++;
                }
                CharacterOptions = TempArray;
            }else if(TheOption.equals("3")){
                System.out.println("Enter 1 to select characters that fly, anything else for those that
cannot fly ");
                Choice = Scanner1.nextLine();
                if(Choice.equals("1")){
                    Choice = "Yes";
                }else{
                    Choice = "No";
                }
                Count = 0;
```

Question	Answer	Marks	Guidance

```
                while(CharacterOptions[Count] != null){
                    if ((CharacterOptions[Count].GetFly()).equals(Choice)){
                        TempArray[TempCount] = CharacterOptions[Count];
                        TempCount++;
                    }
                    Count++;
                }
                CharacterOptions = TempArray;
            }else{
                System.out.println("Enter 1 to select characters with invisibility, anything else for those
without invisibility ");
                Choice = Scanner1.nextLine();
                if(Choice.equals("1")){
                    Choice = "Yes";
                }else{
                    Choice = "No";
                }
                Count = 0;
                while(CharacterOptions[Count] != null){
                    if ((CharacterOptions[Count].GetInvisible()).equals(Choice)){
                        TempArray[TempCount] = CharacterOptions[Count];
                        TempCount++;
                    }
                    Count++;
                }
                CharacterOptions = TempArray;
            }
        }
        System.out.println("Number of characters " + TempCount);
        OutputCharacters(CharacterOptions);
```

GradeMax

Question	Answer	Marks	Guidance
2(e)(ii)	1 mark for screenshot showing correct inputs and outputs	1	

e.g.

```
You can use 2 choices to limit the characters available
Choice  1
Enter 1 to select a colour, 2 for strength, 3 for fly and 4 for invisibility 1
Which colour would you like to select a character Black
Choice  2
Enter 1 to select a colour, 2 for strength, 3 for fly and 4 for invisibility 3
Enter 1 to select characters that fly, anything else for those that cannot fly 1
There are 2 characters that match your choice
Remaining characters:
Name:  Epie  Colour:  Black  Super Strength:  No  Fly:  Yes  Invisible:  Yes
Name:  Thet  Colour:  Black  Super Strength:  Yes  Fly:  Yes  Invisible:  Yes
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
3(a)	1 mark each • Global array with space for 100 × 3 elements … • … all initialised to `-1` • `TreeRootPointer` to `-1` and `FirstFreeNodePointer` initialised to `0`	**3**	

Example program code

Python

```
for x in range(100):
    BinaryTree.append([-1,-1,-1])
TreeRootPointer = -1
FirstFreeNodePointer = 0
```

VB.NET

```
Dim BinaryTree(100, 3) As Integer
 Dim FirstFreeNodePointer As Integer
 Dim TreeRootPointer As Integer
Sub Main()
        For x = 0 To 99
            BinaryTree(x, 0) = -1
            BinaryTree(x, 1) = -1
            BinaryTree(x, 2) = -1
        Next
        TreeRootPointer = -1
        FirstFreeNodePointer = 0
End Sub
```

Java

```
for(Integer x = 0; x < 100; x++){
    BinaryTree[x][0] = -1;
    BinaryTree[x][1] = -1;
    BinaryTree[x][2] = -1;
}
TreeRootPointer = -1;
FirstFreeNodePointer = 0;
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
3(b)	1 mark each to max 7 • Procedure header (and end) take integer parameter and incrementing `FirstFreeNodePointer` • Checking if tree is empty, storing in first element and updating root pointer • Checking if the tree is full and outputting message • (if not full) stores the data in `FirstFreeNodePointer` with parameter (and pointers `-1`) • Comparing to root pointer … • … repeating with left pointer if less than • … repeating with right pointer if greater than • … repeating until leaf node found … • … updating correct parent node pointer to new node	**7**	

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance

Example program code
Python

```
def AddNode(NodeData):
    global FirstFreeNodePointer
    global TreeRootPointer
    if FirstFreeNodePointer <= 99:

        BinaryTree[FirstFreeNodePointer][0] = -1
        BinaryTree[FirstFreeNodePointer][1] = NodeData
        BinaryTree[FirstFreeNodePointer][2] = -1

        if TreeRootPointer == -1:
            TreeRootPointer = 0
        else:
            Placed = False
            CurrentNode = TreeRootPointer
            while Placed == False:

                if NodeData < BinaryTree[CurrentNode][1]:
                    if BinaryTree[CurrentNode][0] == -1:
                        BinaryTree[CurrentNode][0] = FirstFreeNodePointer
                        Placed = True
                    else:
                        CurrentNode = BinaryTree[CurrentNode][0]
                else:
                    if BinaryTree[CurrentNode][2] == -1:
                        BinaryTree[CurrentNode][2] = FirstFreeNodePointer
                        Placed = True
                    else:
                        CurrentNode = BinaryTree[CurrentNode][2]
        FirstFreeNodePointer = FirstFreeNodePointer + 1
    else:
        print("The tree is full")
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance

VB.NET

```
Sub AddNode(NodeData)
     If FirstFreeNodePointer <= 99 Then
         BinaryTree(FirstFreeNodePointer, 0) = -1
         BinaryTree(FirstFreeNodePointer, 1) = NodeData
         BinaryTree(FirstFreeNodePointer, 2) = -1

         If (TreeRootPointer = -1) Then
             TreeRootPointer = 0
         Else
             Dim Placed As Boolean = False
             Dim CurrentNode As Integer = TreeRootPointer

             While (Placed = False)
                 If (NodeData < BinaryTree(CurrentNode, 1)) Then
                     If (BinaryTree(CurrentNode, 0) = -1) Then
                         BinaryTree(CurrentNode, 0) = FirstFreeNodePointer
                         Placed = True
                     Else
                         CurrentNode = BinaryTree(CurrentNode, 0)
                     End If
                 Else
                     If (BinaryTree(CurrentNode, 2) = -1) Then
                         BinaryTree(CurrentNode, 2) = FirstFreeNodePointer
                         Placed = True
                     Else
                         CurrentNode = BinaryTree(CurrentNode, 2)
                     End If
                 End If
             End While
         End If
         FirstFreeNodePointer = FirstFreeNodePointer + 1
     Else
         Console.WriteLine("The tree is full")
     End If
End Sub
```

© Cambridge University Press & Assessment 2026

9618/43 Mark Scheme June 2026

Question	Answer	Marks	Guidance

Java

```
public static void AddNode(Integer NodeData){
    if(FirstFreeNodePointer <= 99){
        BinaryTree[FirstFreeNodePointer][0] = -1;
        BinaryTree[FirstFreeNodePointer][1] = NodeData;
        BinaryTree[FirstFreeNodePointer][2] = -1;

        if(TreeRootPointer == -1){
            TreeRootPointer = 0;

        }else{
            boolean Placed = false;
            Integer CurrentNode = TreeRootPointer;

            while(Placed == false){
                if(NodeData < BinaryTree[CurrentNode][1]){
                    if(BinaryTree[CurrentNode][0] == -1){
                        BinaryTree[CurrentNode][0] = FirstFreeNodePointer;
                        Placed = true;
                    }else{
                        CurrentNode = BinaryTree[CurrentNode][0];
                    }
                }else{
                    if(BinaryTree[CurrentNode][2] == -1){
                        BinaryTree[CurrentNode][2] = FirstFreeNodePointer;
                        Placed = true;
                    }else{
                        CurrentNode = BinaryTree[CurrentNode][2];
                    }
                }
            }
        }
        FirstFreeNodePointer= FirstFreeNodePointer + 1;
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance

	`}else{`
	`  System.out.println("The tree is full");`
	`}`
	`}`		

3(c)	1 mark each • Procedure header (and end) looping 10 times • Outputting array data in correct format	2	

Example program code

Python

```
def OutputArray():
    for x in range(10):
        print(BinaryTree[x][0], "    ", BinaryTree[x][1], "    ", BinaryTree[x][2])
```

VB.NET

```
    Sub OutputArray()
        For x = 0 To 9
            Console.WriteLine(BinaryTree(x, 0) & "    " & BinaryTree(x, 1) & "    " & BinaryTree(x, 2))
        Next
    End Sub
```

Java

```
public static void OutputArray(){
    for(Integer x = 0; x < 10; x++){
        System.out.println(BinaryTree[x][0] + "    " + BinaryTree[x][1] + "    " + BinaryTree[x][2]);
    }
}
```

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance
3(d)(i)	1 mark each • Taking 10 numbers as input … • … calling `AddNode()` with each value • Calling `OutputArray()`	3	

Example program code

Python

```
for x in range(10):
    AddNode(int(input("Enter a number ")))
OutputArray()
```

VB.NET

```
        For x = 0 To 9
            Console.WriteLine("Enter a number")
            AddNode(Console.ReadLine())
        Next
        OutputArray()
```

Java

```
for(Integer x = 0; x < 10; x++){
        System.out.println("Enter a number ");
        AddNode(Integer.parseInt(scanner.nextLine()));
}
OutputArray();
```

PapaCambridge papacambridge.com

GradeMax

Question	Answer	Marks	Guidance
3(d)(ii)	1 mark for screenshot show array contents	1	

e.g.

```
Enter a number 50
Enter a number 26
Enter a number 120
Enter a number 236
Enter a number 2
Enter a number 16
Enter a number 67
Enter a number 49
Enter a number 165
Enter a number 15
1       50      2
4       26      7
6       120      3
8       236      -1
-1       2       5
9       16      -1
-1       67      -1
-1       49      -1
-1       165      -1
-1       15      -1
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
3(e)(i)	1 mark each • Recursive procedure `InOrder()` header and end with parameter • Checking if left pointer is null … • … if not, recursive call with left pointer • Outputting data at parameter • Checking if right pointer is null … • … if not, recursive call with right pointer • Correct order	**7**	

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance

Example program code

Python

```
def InOrder(TheRoot):
    if(BinaryTree[TheRoot][0] != -1):
        InOrder(BinaryTree[TheRoot][0])
    print(BinaryTree[TheRoot][1])
    if(BinaryTree[TheRoot][2] != -1):
        InOrder(BinaryTree[TheRoot][2])
```

VB.NET

```
    Sub InOrder(TheRoot)
        If (BinaryTree(TheRoot, 0) <> -1) Then
            InOrder(BinaryTree(TheRoot, 0))
        End If
        Console.WriteLine(BinaryTree(TheRoot, 1))
        If (BinaryTree(TheRoot, 2) <> -1) Then
            InOrder(BinaryTree(TheRoot, 2))
        End If
    End Sub
```

Java

```
public static void InOrder(Integer TheRoot){
    if(BinaryTree[TheRoot][0] != -1){
        InOrder(BinaryTree[TheRoot][0]);
    }
    System.out.println(BinaryTree[TheRoot][1]);
    if(BinaryTree[TheRoot][2] != -1){
       InOrder(BinaryTree[TheRoot][2]);
    }
}
```

© Cambridge University Press & Assessment 2026

GradeMax

Question	Answer	Marks	Guidance
3(e)(ii)	1 mark for calling `InOrder()` with root pointer	1	

Example program code
Python
```
InOrder(TreeRootPointer)
```

VB.NET
```
InOrder(TreeRootPointer)
```

Java
```
InOrder(TreeRootPointer);
```

© Cambridge University Press & Assessment 2026

Question	Answer	Marks	Guidance
3(e)(iii)	1 mark for screenshot showing data input and output in correct order	1	

e.g.

```
Enter a number 50
Enter a number 26
Enter a number 120
Enter a number 236
Enter a number 2
Enter a number 16
Enter a number 67
Enter a number 49
Enter a number 165
Enter a number 15
1       50      2
4       26      7
6       120      3
8       236      -1
-1       2      5
9       16      -1
-1       67      -1
-1       49      -1
-1       165      -1
-1       15      -1
2
15
16
26
49
50
67
120
165
236
```

© Cambridge University Press & Assessment 2026