1(a)(i)

1 mark each
- Class `EventItem` header (and end where appropriate)
- 3 **private** 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
```
class EventItem():
    def __init__(self, pName, pType, pDifficulty):
        self.__EventName = pName #String
        self.__EventType = pType #String
        self.__Difficulty = pDifficulty #Integer
```

VB.NET
```
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
```

1(a)(i)

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;

     }
}
```

1(a)(ii)

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
```


1(a)(ii)

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;
}
```

1(b)(i)

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];
```

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);`

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

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
```

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

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
```

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
```


1(d)

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;
           }
       }
}
```

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);`

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

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")
```

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
```


1(e)(ii)

Java

```
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");
}
```

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
```

6(a)

```
FUNCTION IsRA(x1, y1, x2, y2, x3, y3 : INTEGER) RETURNS
BOOLEAN
   DECLARE Len1, Len2, Len3 : INTEGER

   Len1 ← (x1 - x2) ^ 2 + (y1 - y2) ^ 2
   Len2 ← (x1 - x3) ^ 2 + (y1 - y3) ^ 2
   Len3 ← (x2 - x3) ^ 2 + (y2 - y3) ^ 2

   IF (Len1 = Len2 + Len3) OR__
      (Len2 = Len1 + Len3) OR__
      (Len3 = Len1 + Len2) THEN
      RETURN TRUE
   ELSE
      RETURN FALSE
   ENDIF

ENDFUNCTION
```

Mark as follows:

1 Calculate the square of the length of at least one side
2 Calculation of all three lengths squared correctly
3 **One** correct comparison of square of three lengths
4 **All three** comparisons…
5 combined using logical operators / nested `IF` // completely correct selection
6 Return result correctly in both cases

6(b)

1 mark for statement of problem:

Problem:
- The function will return an incorrect value // the test will fail

1 mark for solution:

Solution:
- Round the calculated values (to a known number of decimal places)
- Define a threshold below which any difference can be ignored