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Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

INFORMATION TECHNOLOGY P1

NOVEMBER 2021

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 23 pages.

GENERAL INFORMATION:

- These marking guidelines are to be used as the basis for the marking session. They were prepared for use by markers. All markers are required to attend a rigorous standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' work.
- Note that learners who provide an alternate correct solution to that given as example of a solution in the marking guidelines will be given full credit for the relevant solution, unless the specific instructions in the paper was not followed or the requirements of the question was not met
- **Annexures A, B, C and D** (pages 3 to 10) include the marking grid for each question.
- **Annexures E, F, G and H** (pages 11 to 22) contain examples of solutions for Questions 1 to 4 in programming code.
- Copies of **Annexures A, B, C, D and the summary for the marks of the learner** (pages 3 to 10) should be made for each learner and completed during the marking session.

ANNEXURE A**QUESTION 1: MARKING GRID – GENERAL PROGRAMMING SKILLS**

CENTRE NUMBER:		EXAMINATION NUMBER:	
QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
1.1	FormCreate event Set caption of lblQ1_1 to 'Coding is ' ✓ Set font colour of lblQ1_1 to green ✓ Set font size of lblQ1_1 to 16 ✓ Set font name to 'Arial' ✓	4	
1.2	Button - [1.2 – Number of rolls] Create constant SWEETS_PER_ROLL = 8 Declare integer variables ✓ Extract number of breaks from spin edit ✓ Calculate total number of sweets (breaks x 4) ✓ Calculate total number of rolls (sweets✓/SWEETS_PER_ROLL✓) //OR (sweets/8) Round up using the Ceil function ✓ Display number of rolls of sweets on lblQ1_2 ✓ converted to String ✓	8	
1.3	Button – [1.3 – Calculate volume] rRadius := 3; rVolume := rTetraVolume ✓ + 4/3 * PI ✓ * power (rRadius,3) ✓/2 ✓ Display Using a ShowMessage with “Volume” label✓ Value of volume ✓ Formatted to one decimal place ✓ Note: In the formula: Accept the value of 133 instead of rTetraVolume Accept the value of 3 instead of rRadius Instead of PI, accept 22/7 or 3.14 Instead of 4/3, accept 1.33 Accept any correct alternative to power(rRadius,3) where the answer = 27 Accept * 0.5 instead of /2	7	

1.4	<p>Button - [1.4 – Display pattern]</p> <p>Clear output area ✓ Extract symbol from combo box ✓ iSize = position of symbol in combo box ✓ //(index+1) Loop✓ rows from 0 ✓ to iSize ✓ // Loop from 1 to iSize Initialise output String ✓ (Or adding #13) Nested Loop ✓ columns from 0 to iSize ✓ Add symbol to output line ✓ Display output line ✓</p> <p>Note: The start value of the loop will depend on whether 1 was added to iSize (either 0 or 1) A correct solution that does not use a nested loop must be penalised by 1 mark The mark allocated to the nested loop range must be the same at the outer loop</p>	11	
1.5	<p>Button - [1.5 – Characters]</p> <p>Randomly generate an acceptable value ✓ Use the value to extract the corresponding character ✓ Loop ✓ Add random character ✓ to output String ✓ Set as previous character ✓ Generate new current character ✓ Until current character ✓ = previous character ✓ Display output String ✓</p> <p>Note: ASCII table in the range 65 to 91 String, array or case statement e.g. 1 to 26</p>	10	
	TOTAL SECTION A:	40	

ANNEXURE B**QUESTION 2: MARKING GRID – SQL AND DATABASE PROGRAMMING**

CENTRE NUMBER:		EXAMINATION NUMBER:	
QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
2.1	SQL statements		
2.1.1	Button [2.1.1 – Clubs from Gauteng and SA affiliated] SELECT ClubName, ClubTown FROM tblClubs ✓ WHERE Province = "GP" ✓ AND SA_Affiliated = True ✓ Accept WHERE Province LIKE "%GP%" OR ANY correct use of LIKE	3	
2.1.2	Button [2.1.2 – Birth year] SELECT MemberName, MemberSurname, BirthDate ✓ FROM tblMembers ✓ WHERE YEAR (BirthDate) = 2002 ✓ Alternatives for year: WHERE YEAR (BirthDate) = "2002" BETWEEN #2002/01/01/# and #2002/12/31# LEFT(BirthDate,4) MID(BirthDate,1,4) LIKE "%2002%" OR LIKE "2002%"	3	
2.1.3	Button [2.1.3 – Display members] SELECT MemberSurname, MemberName ✓ FROM tblClubs, tblMembers ✓ WHERE tblClubs.ClubId = tblMembers.ClubId ✓ AND tblClubs.ClubName = "'" + sClubName + "'" ✓ Also accept join SELECT MemberSurname, MemberName FROM tblClubs INNER JOIN tblMembers ON tblClubs.ClubId = tblMembers.ClubId WHERE tblClubs.ClubName = "'" + sClubName + "'" QuotedStr(sClubName) Accept the use of aliases	4	

2.1.4	Button [2.1.4 - Average membership fee]	6	
	SELECT Province, FORMAT (AVG (MemFee) ✓, "CURRENCY") ✓ AS AvgFee ✓ FROM tblClubs GROUP BY Province ✓ HAVING ✓ AVG (MemFee) > 400 ✓ Also accept: FORMAT (AVG (MemFee) , "R0.00")		
2.1.5	Button [2.1.5 - Change member name]	3	
	UPDATE tblMembers ✓ SET MemberName = "Ainsley" ✓ WHERE MemberName = "Aiensley" ✓		
	Subtotal:	19	

QUESTION 2: MARKING GRID (CONT.)

2.2	Database Manipulation		
2.2.1	Button [2.2.1 – Outstanding fees] Go to the first record in the tblClubs ✓ Use a loop to step through the tblClubs ✓ Display the club name and annual membership fee for each club ✓ Go to the first record of the tblMembers table ✓ Use a nested loop ✓ to step through tblMembers ✓ If the ClubID field in tblClubs ✓ = ClubID field in tblMembers ✓ Calculate the outstanding fee ✓ //(MemFee - AmountPaid) Display the surname, amount paid and the outstanding fee in the richedit ✓ Move to the next record in the tblMembers ✓ End loop (Members table) Move to the next record in the tblClubs ✓ End loop (tblClubs) Note: Also accept the repeat..until loop instead of the While loop with the correct conditions	12	
2.2.2	Button [2.2.2 – Update hikes completed] Edit mode ✓ Add 1 ✓ to HikesCompleted field ✓ Post ✓	4	
2.2.3	Button [2.2.3 – Add member] Retrieve the club Id from the radiogroup ✓ Insert mode ✓ Assign values to correct fields ✓ Assign retrieved club id to the ClubID field ✓ Post ✓ Accept tblMembers.Append	5	
	Subtotal:	21	
	TOTAL SECTION B:	40	

ANNEXURE C**QUESTION 3: MARKING GRID – OBJECT-ORIENTED PROGRAMMING**

CENTRE NUMBER:		EXAMINATION NUMBER:	
QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
3.1.1	getNumberOfDays function Function heading with integer value as return data type ✓ Result = fNumberOfDays ✓	2	
3.1.2	calcDistPerDay Function heading with integer as the return type ✓ Result = round ✓ (fDistance/fNumberOfDays) ✓	3	
3.1.3	determineLevel function distance per day = calcDistPerDay ✓ If distance per day > 15 ✓ AND (terrain type = 'Rocky' ✓ OR terrain type = 'Sandy') ✓ Result = 'Advanced' ✓ Else ✓ If distance per day is from 10 ✓ to 15 ✓ //inclusive Result = 'Moderate' ✓ Else Result = 'Easy' ✓ Also Accept: If distance per day > 15 //1 mark AND NOT(terrain type = 'Flat') // 2 marks	10	
3.1.4	calcTotalCost function Function heading with real value as return data type ✓ and integer parameter Result = ✓ fCost * parameter ✓ The answer in the Result is the same data type as the data type in the heading ✓ Also accept currency, string or integer as the return type provided it is used correctly	4	
3.1.5	toString method Function heading with String return data type ✓ Return trailName, terrainType, distance, number of days, cost ✓ Converted to correct format ✓ Correct text and line breaks ✓	4	
	Subtotal: Object class	23	

QUESTION 3: MARKING GRID (CONT.)

QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
3.2.1	Combobox - cmbHikingTrails Assignfile with extracted file name + '.txt' ✓ Reset file ✓ Read 4 lines from file ✓ <i>Instantiate the objHikingTrail object:</i> objHikingTrail✓:= THikingTrail.Create ✓ Use five arguments ✓ (sTrailName, sTerrainType, iNumDays, iDistance, rCost) with correct data types and in correct order ✓ Display message using a showMessage dialogue box ✓	8	
3.2.2	Button [3.2.2 – Display hiking trail details] Use the objHikingTrail.toString method ✓ to display hiking trail information in rich edit component ✓	2	
3.2.3	Button [3.2.3 – Display cost] Input number of members in group using an input box✓ Cost = ✓ objHikingTrail.calcTotalCost ✓ (group size✓) Accept calculateCost as the function name	4	
3.2.4	Button [3.2.4 – Calculate distance per day] Display number of km using IntToStr(objHikingTrail.calcDistPerDay) ✓ Display difficulty level using objHikingTrail.determineLevel ✓ Display number of days using IntToStr(objHikingTrail.getNumberOfDay) ✓ Accept the difficulty level displayed in small or capital letters	3	
	Subtotal Form class:	17	
	TOTAL SECTION C:	40	

ANNEXURE D**QUESTION 4: MARKING GRID – PROBLEM-SOLVING PROGRAMMING**

CENTRE NUMBER:		EXAMINATION NUMBER:	
SECTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
4.1	Button - [4.1 – Display distance chart] Loop from 1 to 5 ✓ Add name to output String ✓ Nested Loop from 1 to 5 ✓ Add distance to output String ✓ Display output String ✓ in rich edit Note: Two sets of brackets may be used instead of index values separated by a comma e.g. arrDistances[iR][iC]	5	
4.2	Button - [4.2 – Validation] Loop from 1 to 5 ✓ Loop from 1 to 5 ✓ Test if distance at [iRow,iCol] <> distance at [iCol,iRow] ✓ Test if distance at [iRow,iCol] < distance at [iCol,iRow] ✓ Distance at [iRow,iCol] =distance at [iCol,iRow] ✓ Build String with row and col index ✓ and distance ✓ Display output String ✓ Accept the length of the array instead of 5 used in loops Alternative test: // Test if distance at [iRow,iCol] < distance at [iCol,iRow] (2 marks)	8	

4.3	Button - [4.3 – Route planner] Extract route from combo box and initialise total distance ✓ Loop 4 times ✓ (extract all possible combinations) Extract the first check point ✓ (row index) Extract the second check point ✓ (column index) Delete first 2 characters ✓ (logic to start at next index) Read distance from 2D ✓ using row and column Update total distance ✓ (add distance from 2D) Calculate time (time X distance) ✓ Test if hike between points at 2 and 4 OR 4 and 2 ✓ multiply time with 2 ✓ Update time per day ✓ Display names of the two checkpoints ✓ Display distance and time ✓ (in any format) Test if time per day > 480 ✓ Display name of checkpoint to book ✓ Reset time per day to 0 ✓ Display total distance ✓	17	
	TOTAL SECTION D: GRAND TOTAL:	30 150	

SUMMARY OF LEARNER'S MARKS:

CENTER NUMBER:			LEARNER'S EXAMINATION NUMBER:		
	SECTION A	SECTION B	SECTION C	SECTION D	
	QUESTION 1	QUESTION 2	QUESTION 3	QUESTION 4	GRAND TOTAL
MAX. MARKS	40	40	40	30	150
LEARNER'S MARKS					

ANNEXURE E: SOLUTION FOR QUESTION 1

```
// =====
// Question 1.1          4 marks
// =====
procedure TfrmQuestion1.FormCreate(Sender: TObject);
begin
    lblQ1_1.Caption := 'Coding is ';
    lblQ1_1.Font.Color := clGreen;
    lblQ1_1.Font.Size := 16;
    lblQ1_1.Font.Name := 'Arial';
end;

// =====
// Question 1.2          8 marks
// =====
procedure TfrmQuestion1.btnQ1_2Click(Sender: TObject);
var
    iNumStops, iNumRolls, iTotalSweets: integer;
const
    SWEETS_PER_ROLL = 8;
begin
    iNumStops := spnQ1_2.Value;
    iTotalSweets := iNumStops * 4;
    iNumRolls := Ceil(iTotalSweets / SWEETS_PER_ROLL);
    lblQ1_2.Caption := IntToStr(iNumRolls);
end;

// =====
// Question 1.3          7 marks
// =====
procedure TfrmQuestion1.btnQ1_3Click(Sender: TObject);
var
    rVolume, rRadius, rTetraVolume: real;
begin
    rRadius := 3;
    rTetraVolume := 133;
    rVolume := rTetraVolume + 4/3 * PI * power(rRadius,3)/2;
    ShowMessage('Volume: ' + FloatToStrF(rVolume,ffFixed,10,1));
end;
```

```
// =====
// Question 1.4           11 marks
// =====
procedure TfrmQuestion1.btnQ1_4Click(Sender: TObject);
var
    sSymbol, sLine: String;
    iRows, iCol, iRepeat: integer;
begin
    redQ1_4.Clear;
    sSymbol := cmbQ1_4.Text;
    iRepeat := cmbQ1_4.ItemIndex + 1;

    for iRows := 1 to iRepeat do
    begin
        sLine := '';
        for iCol := 1 to iRepeat do
            sLine := sLine + sSymbol + ' ';
        redQ1_4.Lines.Add(sLine);
    end;

//Alternative solution

    for iRows := 1 to iRepeat do
        sLine := sLine + sSymbol + ' ';
    for iRows := 1 to iRepeat do
        redQ1_4.Lines.Add(sLine);
    end;

// =====
// Question 1.5           10 marks
// =====
procedure TfrmQuestion1.btnQ1_5Click(Sender: TObject);
var
    cCharCurr: char;
    cCharPrev: cChar;
    sOut: String;
begin
    //Provided code
    redQ1_5.Clear;
    sOut := ''; //variable for output String

    cCharCurr := Char(random(90 - 65 + 1) + 65);
    repeat
        sOut := sOut + cCharCurr;
        cCharPrev := cCharCurr;
        cCharCurr := Char(random(90 - 65 + 1) + 65);
    until (cCharCurr = cCharPrev);
    sOut := sOut + cCharCurr;
    redQ1_5.Lines.Add(sOut);
end;

end.
```

ANNEXURE F: SOLUTION FOR QUESTION 2

```
//=====
// Question 2.1 – Section: SQL statements
//=====

//=====
// Question 2.1.1          3 marks
//=====
sSQL1 := 'SELECT ClubName, ClubTown
          FROM tblClubs
          WHERE Province = "GP"
          AND SA_Affiliated = true ';
// or without = true

//=====
// Question 2.1.2          3 marks
//=====
sSQL2 := 'SELECT MemberName, MemberSurname, BirthDate
          FROM tblMembers
          YEAR (BirthDate) = 2002';
// Alternative for year: BETWEEN #01/01/2002# AND #31/12/2002#

//=====
// Question 2.1.3          4 marks
//=====
sSQL3 := 'SELECT MemberSurname, MemberName FROM tblClubs,tblMembers
          WHERE tblClubs.ClubId = tblMembers.ClubID
          AND tblClubs.ClubName = '' + sClubName +''';

//=====
// Question 2.1.4          6 marks
//=====
sSQL4 := 'SELECT Province, FORMAT(AVG(MemFee), "Currency") AS
          AvgFee FROM tblClubs
          GROUP BY Province HAVING AVG(MemFee) > 400';

//=====
// Question 2.1.5          3 marks
//=====
sSQL5 := 'UPDATE tblMembers
          SET MemberName = "Ainsley"
          WHERE MemberName = "Aiensley"';

//=====
// Question 2.2 – Section Delphi code
//=====

//=====
// Question 2.2.1          12 marks
// =====
procedure TfrmDBQuestion2.btnQ2_2_1Click(Sender: TObject);
var
    rDifference : real;
begin
    // Question 2.2.1
    tblClubs.First;
```

```

while NOT(tblClubs.EOF) do
begin
    redQ2_2_1.Lines.Add(tblClubs['ClubName']+', '+ 'annual fee='+
                        FloatToStrF(tblClubs['MemFee'], ffCurrency, 3, 2)+
                        '=====');
    redQ2_2_1.Lines.Add(#13+'Surname'+#9+'Paid'+#9+'Outstanding');
    tblMembers.First;
    while NOT(tblMembers.EOF) do
        begin
            if tblClubs['ClubID'] = tblMembers['ClubID'] then
                begin
                    rDifference := tblClubs['MemFee']-tblMembers['AmountPaid'];
                    redQ2_2_1.Lines.Add(tblMembers['MemberSurname'] + #9 +
                                        FloatToStrF(tblMembers['AmountPaid'],
                                        ffCurrency, 3, 2) + #9 +
                                        FloatToStrF(rDifference, ffCurrency, 3, 2));
                end;
                tblMembers.Next;
            end;
            redQ2_2_1.Lines.Add('');
            tblClubs.Next;
        end;
    // Provided code
    dbCONN.SetupGrids(dbgrdONE, dbgrdMany, dbgrdSQL);
end;

// =====
// Question 2.2.2           4 marks
// =====
procedure TfrmDBQuestion2.btnQ2_2_2Click(Sender: TObject);
begin
    // Question 2.2.2

    tblMembers.Edit;
    tblMembers['HikesCompleted'] := tblMembers['HikesCompleted'] + 1;
    tblMembers.Post;
end;

// =====
// Question 2.2.3           5 marks
// =====
procedure TfrmDBQuestion2.btnQ2_2_3Click(Sender: TObject);
var
    sSurName, sName, sYear, sMemberCode : String;
    dBirthDate : TDateTime;
    iHikesCompleted, iClubID : integer;
    rAmountPaid : real;
begin
    //Provided code
    sSurname := 'Nkosi';
    sName := 'Mothupi';
    dBirthDate := 18-08-2003;
    sMemberCode := 'Nko2140';

    //Question 2.2.3

```

```

iClubID := rgpQ2_2_3.ItemIndex + 1;
tblMembers.Insert;

tblMembers['MemberCode'] := sMemberCode;
tblMembers['MemberSurName'] := sSurname;
tblMembers['MemberName'] := sName;
tblMembers['BirthDate'] := dBirthDate;
tblMembers['ClubID'] := rgpQ2_2_3.Items[rgpQ2_2_3.ItemIndex][1];
tblMembers.Post;
tblMembers.Refresh;
end;

// =====
// {$ENDREGION}
// =====
// {$REGION 'Provided code: Setup DB connections - DO NOT CHANGE!'}
// =====
procedure TfrmDBQuestion2.bmbRestoreDBClick(Sender: TObject);
begin
    // Restore the Database
    dbCONN.RestoreDatabase;
    redQ2_2_2.Clear;
    dbCONN.SetupGrids(dbgrdONE, dbgrdMany, dbgrdSQL);
end;

// =====
procedure TfrmDBQuestion2.FormClose(Sender: TObject;
    var Action: TCloseAction);
begin // Disconnect from database and close all open connections
    dbCONN.dbDisconnect;
end;

procedure TfrmDBQuestion2.FormCreate(Sender: TObject);
begin
    redQ2_2_2.Paragraph.TabCount := 4;
    redQ2_2_2.Paragraph.Tab[0] := 70;
    redQ2_2_2.Paragraph.Tab[1] := 150;
    redQ2_2_2.Paragraph.Tab[2] := 300;
    redQ2_2_2.Paragraph.Tab[3] := 400;
end;

// =====
procedure TfrmDBQuestion2.FormShow(Sender: TObject);
begin // Sets up the connection to database and opens the tables.
    dbCONN := TConnection.Create;
    dbCONN.dbConnect;
    tblClubs := dbCONN.tblOne;
    tblMembers := dbCONN.tblMany;

    dbCONN.setupGrids(dbgrdONE, dbgrdMany, dbgrdSQL);
    pgcDBAdmin.ActivePageIndex := 0;
end;
// =====
// {$ENDREGION}

end.

```

ANNEXURE G: SOLUTION FOR QUESTION 3**Object class**

```

unit HikingTrail_U;

interface

uses SysUtils;

type

  THikingTrail = class(TObject)

  private
    var
      // Provided code
      fTrailName, fTerrainType: String;
      fNumberOfDays: integer;
      fDistance: integer;
      fCostPP: real;

  public
    constructor create(sTrailName, sTerrainType: String; iNumDays: integer;
                      rDistance: integer; rCost: real);
    function getNumberOfDays: integer;
    function calcDistPerDay: integer;
    function determineLevel: String;
    function calcTotalCost(iNum: integer): real;
    function toString: String;
  end;

implementation

{ THikingTrail }

// Provided code

constructor THikingTrail.Create(sTrailName, sTerrainType: String;
                               iNumDays: integer; rDistance: integer; rCost: real);
begin
  fTrailName := sTrailName;
  fTerrainType := sTerrainType;
  fNumberOfDays := iNumDays;
  fDistance := rDistance;
  fCostPP := rCost;
end;

// =====
// Question 3.1.1           2 marks
// =====
function THikingTrail.getNumberOfDays: integer;
begin
  Result := fNumberOfDays;
end;

```

```
// =====
// Question 3.1.2           3 marks
// =====
function THikingTrail.calcDistPerDay: integer;
begin
    Result := (Round(fDistance/fNumberOfDays));
end;
// =====
// Question 3.1.3           10 marks
// =====
function THikingTrail.determineLevel: String;
var
    distPday : real;
begin
    //distPday := fDistance / fNumberOfDays;
    distPday := calcDistPerDay; // call function
    if ( dPday > 15 ) and ((fTerrainType = 'Rocky') or
        (fTerrainType = 'Sandy')) then
        Result := 'Advanced'
    else if (distPday >=10) and (distPday <=15) then
        Result := 'Moderate'
    else Result := 'Easy' ;
end;
// =====
// Question 3.1.4           4 marks
// =====
function THikingTrail.calcTotalCost(iNum: integer): real;
begin
    Result := fCostPP * iNum;
end;
// =====
// Question 3.1.5           4 marks
// =====
function THikingTrail.toString: String;
begin
    Result := fTrailName + ': ' + fTerrainType + #13 +
        intToStr(fDistance) + ' km in ' +
        IntToStr(fNumberOfDays) + ' days' + #13 +
        'Cost per person: ' + FloatToStrF(fCostPP,ffCurrency,8,2);
end;

end.
```

Main Form Unit

```
// =====
// Question 3.2.1           8 marks
// =====
procedure TfrmHiking.cmbQ3_2_1Change(Sender: TObject);
var
    tFile: TextFile;
    sTrail, sType, sDist, sNumber, sCost: String;
    rDist, iNumDays: integer;
    rCost: real;
begin
    //Provided code - do not change
    sTrail := cmbQ3_2_1.Text;
    imgTrail.Picture.LoadFromFile(sTrail + '.jpg');

    //Question 3.2.1
    assignFile(tFile, sTrail+'.txt');
    reset(tFile);
    readln(tFile, sType);
    readln(tFile, sDist);
    readln(tFile, sNumber);
    readln(tFile, sCost);

    objHikingTrail := THikingTrail.create(sTrail, sType, StrToInt(sNumber),
                                           StrToInt(sDist), StrToFloat(sCost));
    MessageDlg('Object has been instantiated.', mtInformation, [mbOk], 0);
    //Provided code
    btnQ3_2_2.Enabled := True;
    btnQ3_2_3.Enabled := True;
    btnQ3_2_4.Enabled := true;
end;
// =====
// Question 3.2.2           2 marks
// =====
procedure TForm2.btnQ3_2_2Click(Sender: TObject);
begin
    //Question 3.2.2
    redQ3_2_2.Lines.Clear;
    redQ3_2_2.Lines.Add(objHikingTrail.toString);
end;
// =====
// Question 3.2.3           4 marks
// =====
procedure TForm2.btnQ3_2_3Click(Sender: TObject);
var
    iNum : integer;
    rCost: real;
begin
    //Question 3.2.3
    iNum := StrToInt(InputBox('Enter number of people', '', '7'));
    rCost := objHikingTrail.calcTotalCost(iNum);

    //Provided code
    pnlQ3_2_4.Caption := FloatToStrF(rCost, ffCurrency, 10, 2);
end;
```

```
// =====  
// Question 3.2.4           3 marks  
// =====  
procedure TForm2.btnQ3_2_4Click(Sender: TObject);  
begin  
    //Question 3.2.4  
    redQ3_2_4.Lines.Clear;  
    redQ3_2_4.Lines.Add('You have to cover at least ' +  
        IntToStr(objHikingTrail.calcDistPerDay) + ' km per day to complete  
        this ' + UpperCase(objHikingTrail.DetermineLevel) + ' hiking trail  
        in ' + IntToStr(objHikingTrail.getNumberOfDays) + ' days.' );  
end;  
  
end.
```

ANNEXURE H: SOLUTION FOR QUESTION 4

```
// =====
// Question 4.1           5 marks
// =====
procedure TfrmQuestion4.btnQ4_1Click(Sender: TObject);
var
    iRow, iCol: integer;
    sOut: String;
begin
    // Provided code
    redQ4.Lines.Add(sHeading);
    redQ4.Lines.Add(' ');

    // Question 4.1

    for iRow := 1 to 5 do
    begin
        sOut := #13 + arrNames[iRow] + #9;
        for iCol := 1 to 5 do
        begin
            sOut := sOut + FloatToStr(arrDistances[iRow, iCol]) + #9;
        end;
        redQ4.Lines.Add(sOut);
    end;
end;
// =====
// Question 4.2           8 marks
// =====
procedure TfrmQuestion4.btnQ4_2Click(Sender: TObject);
var
    iRow, iCol: integer;
    sOut: String;
begin
    // Provided code
    redQ4.Clear;
    redQ4.Lines.Add('Replace distance at:');

    // Question 4.2

    // Question 4.2
    for iRow := 1 to 5 do
    begin
        for iCol := 1 to 5 do
        begin
            if arrDistances[iRow, iCol] < arrDistances[iCol, iRow] then
            begin
                arrDistances[iRow, iCol] := arrDistances[iCol, iRow];
                redQ4.Lines.Add([' ' + IntToStr(iRow) + ', ' + IntToStr(iCol)
                    + ' ] with ' + FloatToStr(arrDistances[iCol, iRow])));
            end;
        end;
    end;
end;

//=====
```

// Question 4.3 17 marks

```
// =====
procedure TfrmQuestion4.btnQ4_3Click(Sender: TObject);
var
    iCnt, iRow, iCol: integer;
    rTotalDistance, rTimePerDay, rTimeMin: real;
    sRoute: String;

begin
    // Provided code
    redQ4.Clear;

    // Question 4.3
    sRoute := cmbRoutes.Text;
    redQ4.Lines.Add('Route: ' + sRoute + #13);
    rTotalDistance := 0;
    rTimePerDay := 0;
    for iCnt := 1 to 4 do
    begin
        iRow := StrToInt(copy(sRoute, 1, 1));
        iCol := StrToInt(copy(sRoute, 3, 1));
        Delete(sRoute, 1, 2);

        if (iRow IN [2, 4]) AND (iCol IN [2, 4]) then
            rTimeMin := 20 * 2 * arrDistances[iRow, iCol]
        else
            rTimeMin := 20 * arrDistances[iRow, iCol];

        redQ4.Lines.Add(arrNames[iRow] + ' to ' + arrNames[iCol] + ': ' +
            + FloatToStr(arrDistances[iRow, iCol]) +
            ' (' + FloatToStr(rTimeMin) + ' minutes)');

        rTotalDistance := rTotalDistance + arrDistances[iRow, iCol];

        rTimePerDay := rTimePerDay + rTimeMin;

        if rTimePerDay > 480 then
        begin
            redQ4.Lines.Add('Book at ' + arrNames[iCol] + #13);
            rTimePerDay := 0;
        end;
    end;

    redQ4.Lines.Add(#13 + 'Total distance: ' + FloatToStrF
        (rTotalDistance, ffFixed, 8, 1));
end;
```

```
// =====  
// Provided code - do not change  
// =====  
procedure TfrmQuestion4.FormActivate(Sender: TObject);  
var  
    i, iPos: integer;  
begin  
    redQ4.Paragraph.TabCount := 6;  
    iPos := 78;  
    for i := 1 to 6 do  
        begin  
            redQ4.Paragraph.Tab[i] := iPos;  
            inc(iPos, 78);  
        end;  
    sHeading := '' + #9 + 'Morgan' + #9 + 'Haga Haga' + #9 + 'Cintsa' + #9 +  
        'Beacon' + #9 + 'Gonubie';  
end;  
  
end.
```