basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN

INLIGTINGSTEGNOLOGIE V1

2023

NASIENRIGLYNE

PUNTE: 150

Hierdie nasienriglyne bestaan uit 24 bladsye.

ALGEMENE INLIGTING:

- Hierdie nasienriglyne moet as die basis vir die nasiensessie gebruik word. Dit is voorberei om deur nasieners gebruik te word. Daar word na alle nasieners verwag om 'n deeglike standaardiseringsvergadering by te woon om seker te maak dat die riglyne konsekwent geïnterpreteer en tydens die nasien van die kandidate se werk toegepas word.

- Let op dat leerders wat 'n alternatiewe korrekte oplossing as wat as voorbeeld van 'n oplossing in die nasienriglyne gegee word verskaf, volle krediet vir die relevante oplossing moet kry tensy die spesifieke instruksies in die vraestel nie gevolg is nie of die vereistes van die vraag nie nagekom is nie.

- **Bylaag A, B, C en D** (bladsy 3 tot 10) sluit die nasienrubriek vir elke om te gebruik vir enigeen van die twee programmeringstale in.

- **Bylaag E, F, G en H** (bladsy 11 tot 24) bevat voorbeelde in programmeringskode van oplossings vir **VRAAG 1** tot **VRAAG 4**.

- Kopieë van **Bylaag A, B, C, D en die opsomming van die leerder se punte** (bladsy 3 tot 10) moet vir elke leerder gemaak word en tydens die nasiensessie voltooi word.

BYLAAG A

VRAAG 1: NASIENRUBRIEK - ALGEMENE PROGRAMMERINGSVAARDIGHEDE

SENTRUMNOMMER:	**EKSAMENNOMMER:**		
VRAAG	**BESKRYWING**	**MAKS. PUNTE**	**LEERDER-PUNT**
1.1	**Knoppie [1.1 – Formatting]** Stel die skrifgrootte ('font size') van edtQ1_1 op 14 ✓ Stel die teks van edtQ1_1 op 'Hello world' ✓ Stel die skrifstyl ('font style') van edtQ1_1 op 'underline' ✓ Stel die kleur van edtQ1_1 op groen ('green') ✓	4	
1.2	**Knoppie [1.2 – Random number]** Genereer 'n lukraakheelgetal ✓ in die regte reeks (1 tot 99) ✓ Toets of ✓ lukraakgetal 'n enkelsyfergetal is (<=9) ✓ Vertoon die getal omgeskakel na 'n string ✓ en 'n boodskap in pnlQ1_2 ✓ wat aandui dat dit 'n enkelsyfergetal is Anders ✓ Vertoon die getal omgeskakel na 'n string en 'n boodskap in pnlQ1_2 ✓ wat aandui dat dit 'n tweesyfergetal is	8	
1.3	**Knoppie [1.3 – Area]** area = (3*sqrt(3) ✓ /2) ✓* sqr(rSide) ✓ - pi* ✓sqr(rSide/2) ✓ Regte waardes in formule ✓ Vertoon die waarde van area ✓ met een desimale plek ✓	8	
1.4	**Knoppie [1.4 – Find]** Verkry teks van edtQ1_4.text ✓ Skep en inisialiseer teller ✓ Terwyl NOT EOF(tekslêer) doen ✓ Lees sReel uit die lêer ✓ As sReel = edtQ1_4.text ✓ (of veranderlike) Ignoreer die geval ✓ Inkrementeer teller ✓ As teller > 0 ✓ Vertoon getal voorgekom ('occurences')✓ Anders ✓ (OF as teller = 0 is) Vertoon “Word not found” ✓	11	

1.5	**Knoppie [1.5 – Booster rocket]** Skep en inisialiseer teller ✓ Kry totale brandstof van input box omgeskakel na reële/heelgetal ✓ herhaal ('Loop') terwyl totale brandstof > 200 ✓ Inkrementeer teller ✓ Brandstof gekry = totale brandstof / 100 ✓ * 7.5 ✓ Totale brandstof = totale brandstof – brandstof gebruik ✓ Vertoon teller, brandstof gebruik en totale brandstof oor ✓ in netjiese kolomme ✓ geformatteer tot twee desimale plekke	9	
	TOTAAL AFDELING A:	**40**	

BYLAAG B

VRAAG 2: NASIENRUBRIEK - DATABASISPROGRAMMERING

SENTRUMNOMMER:	**EKSAMENNOMMER:**		
VRAAG	**BESKRYWING**	**MAKS. PUNTE**	**LEERDER-PUNT**
2.1	**SQL-stellings**		

2.1.1	**Knoppie [2.1.1 – iOS products]**
	`SELECT DeviceID, DeviceName ✓`
	`FROM tblDevices ✓`
	`WHERE OperatingSystem = "iOS" ✓`
		3	

2.1.2	**Knoppie [2.1.2 – Category selected]**
	`SELECT DeviceName, Category, NumInStock`
	`FROM tblDevices ✓`
	`WHERE Category LIKE ✓ "% + sDeviceType + " ✓`
		3	

2.1.3	**Knoppie [2.1.3 – Online support]**
	`SELECT DeviceName, Category, OperatingSystem ✓`
	`FROM tblDevices D, tblManufacturers M ✓`
	`WHERE D.ManufacturerID = M.ManufacturerID ✓`
	`AND ✓ OnlineSupport = True ✓`
	`ORDER BY DeviceName ✓`
		6	

2.1.4	**Knoppie [2.1.4 – Profit per manufacturer]**
	`SELECT ManufacturerID,`
	`FORMAT(SUM ✓ (NumInStock *`
	`(Price * 0.6)) ✓, "CURRENCY") ✓`
	`AS [Profit] ✓`
	`FROM tblDevices ✓`
	`GROUP BY ManufacturerID ✓`
		6	

2.1.5	**Knoppie [2.1.5 - Remove devices]**
	`Delete ✓ * FROM tblDevices ✓`
	`WHERE Category = "Smart speaker" AND ✓`
	`ManufacturerID = "M104" ✓`
		4	

	Subtotaal:	**22**	

VRAAG 2: NASIENRUBRIEK – VERVOLG

2.2	**Databasismanipulering deur Delphi-kode te gebruik**		
2.2.1	**Knoppie [2.2.1 – Display products]** Gaan na die eerste rekord in die tabel tblManufacturers ✓ Gebruik 'n lus om deur tblManufacturers te stap ✓ Vertoon ManufacturerName en ContactNumber ✓ Vertoon DeviceName, Instock en Price as opskrifte ✓ Gaan na die eerste rekord in die tabel tblDevices ✓ Gebruik 'n lus om deur die tabel tblDevices te stap ✓ Toets of (tblManufacturers ['ManufacturerID'] = tbldevices['ManufacturerID']) ✓ Vertoon DeviceName, NumInStock, omgeskakel na 'n string, ✓ en Price, omgeskakel na geldeenheid ('currency') ✓, in redQ2_2_1 ✓ tblDevices.Next ✓ Eindig lus (tblDevices) tblManufacturers.Next ✓ Eindig lus (tblManufacturers)	12	
2.2.2	**Knoppie [2.2.2 – Update stock]** Verkry iGetalVerkoop van input dialog box ✓ Toets of tblDevices['NumInStock'] – iGetalVerkoop > 0 ✓ tblDevices.Edit; ✓ tblDevices['InStock'] = tblDevices['InStock'] – iGetalVerkoop ✓ tblDevices.Post; ✓ anders ShowMessage "Not enough items in stock." ✓	6	
	Subtotaal:	**18**	

	TOTAAL AFDELING B:	**40**	

BYLAAG C

VRAAG 3: NASIENRUBRIEK - OBJEK-GEÖRIENTEERDE PROGRAMMERING

SENTRUMNOMMER:	**EKSAMENNOMMER:**		
VRAAG	**BESKRYWING**	**MAKS. PUNTE**	**LEERDER-PUNT**
3.1.1	**Konstruktor Create:** Opskrif met regte parameterwaardes ✓ (regte volgorde, data tipes) ✓ Ken `fSwitchID` , `fDevice` en `fPowerUsage` aan regte attribute toe ✓ Ken False aan `fSwitchStatus` toe ✓	5	
3.1.2	**getSwitchID-funksie** met 'n string terugstuurtipe ✓ Result := fSwitchID✓	2	
3.1.3	**energyUsed-funksie** met reële terugstuurtipe Funksie-opskrif met parameter ✓en regte terugstuurtipe ✓ Result = fPowerUsage ✓ * iUre / 1000 ✓	4	
3.1.4	**setSwitchStatus-prosedure:** Regte opskrif ✓ met Boolean parameter ✓ Ken parameterwaarde toe aan die fSwitchStatus-attribuut ✓	3	
3.1.5	**toString-funksie** net string terugstuurtipe ✓ Regte byskrifte en regte name van attribute ✓ Roep die determineSwitchStatus-metode ✓ Regte formattering ✓	4	
	Subtotaal: Objekklas	**18**	

VRAAG 3: NASIENRUBRIEK (VERVOLG)

VRAAG	BESKRYWING	MAKS. PUNTE	LEERDER - PUNT
3.2.1	**Button [3.2.1 – Instantiate object]** Verkry sSwitchID uit die comboBox Verkry die toestel wat gekies is uit die listbox sReel := lstQ3_2_1.Items[lstQ3_2_1.ItemIndex] ✓ sToestel := Copy(sReel, 1, pos('#', sReel ✓) – 1) ✓ Verkry kraggebruik uit sReel: iWatt := strToInt(Copy(sReel,pos('#', sReel) + 1)) ✓ *Instansieer die objek met waardes wat verkry is:* objSmartSwitch := ✓TSmartSwitch.create(sSwitchID, sToestel ✓,iWatt ✓) Gebruik toString-metode om inligting van die objek in richedit-komponent te vertoon ✓	8	
3.2.2	**Knoppie [3.2.2 – Change switch status]** Kry die ItemIndex wat gekies is uit die radio group Gebruik 'n case-/if-stelling om die setSwitchStatus-metode te roep met of true of false as argument ✓ case rgpQ3_2_2.ItemIndex of 0: ✓ objSmartSwitch.setSwitchStatus(true✓) 1: objSmartSwitch.setSwitchStatus(false) ✓ Vertoon die skakelaar se ID en status in die rich edit ✓	5	
3.2.3	**Knoppie [3.2.3 – Write to file]** Koppel die interne lêer met die eksterne leer en gebruik die Append-stelling om die lêer oop te maak: AssignFile(tFile, 'log.txt'); Append(tFile); ✓ Skryf die datum, tyd, skakelaar se ID en status na die leer Writeln(tFile, (Date(now) +'#'+ lblTime.Caption ✓ +'#'+ objSmartSwitch.getSwitchID()✓ +'#' + objSmartSwitch.determineSwitchStatus()✓)) Maak lêer toe ✓	6	
3.2.4	**Knoppie [3.2.4 – Power usage]** Verkry ure uit edtQ3_2_4 en skakel om na integer✓ Roep die energyUsed-metode met ure as argument✓ Vertoon die energie wat gebruik is in die rich edit met regte teks ✓ redQ3.Lines.Add ('Energy used is: '+ FloatToStr(rEnergy) + ' kWh')	3	
	Subtotaal: Vormklas	**22**	
	TOTAAL AFDELING C:	**40**	

BYLAAG D

VRAAG 4: NASIENRUBRIEK – PROBLEEMOPLOSSING

SENTRUMNOMMER:	**EKSAMENNOMMER:**		
VRAAG	**BESKRYWING**	**MAKS. PUNTE**	**LEERDER - PUNT**
4.1	**Knoppie [4.1 – Display]** Maak redQ4 skoon ✓ Vertoon opskrif en nommers van kolomme ✓ Lus van `I` tot lengte van skikking ✓ (of 5) Voeg `I` by afvoerstring ✓ Lus `J` van 1 tot lengte van skikking[I] ✓ (of 6) Voeg item by skikking[`I,J`] by die afvoerstring ✓ Vertoon afvoerstring in rich edit ✓	7	
4.2	**Knoppie [4.2 – Add access point]** Verkry die ry en kolom uit die spin edits ✓ Inisialiseer teller ✓ Lus `I` deur rye van skikking ✓ Toets of skikking by indeks [ry, `I`] = 'A' ✓ Inkrementeer teller ✓ Toets of teller 3 of minder as 3 is ✓ Toets of karakter by indeks van skikking nie `'A'` is nie ✓ Voeg 'n `'A'` in die regte indeks van skikking ✓ As dit 'n `'A'` is Vertoon dat daar reeds 'n toegangspunt is ✓ Anders Vertoon dat daar reeds 3 toegangspunte is✓	10	

4.3	**Knoppie [4.3 – Coverage]** **Bepaal waar 'n toegangspunt is:** Lus deur die rye van die skikking ✓ Lus deur die kolomme van die skikking ✓ Toets of daar 'n toegangspunt by die huidige indeks is ✓ Bepaal spasies rondom **Bepaal die spasies rondom:** Toets die ry bokant ✓ Toets die ry onderkant ✓ Toets die kolom aan linkerkant ✓ Toets die kolom aan regterkant ✓ Is die indeks van ry > 0 ✓ EN ✓ indeks van kolom > 0 ✓ Is skikking[ry, kolom] = '_' ✓ OF NIE 'A' Stel skikking[ry, kolom] = '*' ✓ **Vertoon** Vertoon skikking nadat die seine bygevoeg is ✓	13	

TOTAAL AFDELING D:	**30**	
GROOTTOTAAL:	**150**	

OPSOMMING VAN LEERDER SE PUNTE:

SENTRUMNOMMER:		**LEERDER SE EKSAMENNOMMER:**			
	AFDELING A	**AFDELING B**	**AFDELING C**	**AFDELING D**	
	VRAAG 1	**VRAAG 2**	**VRAAG 3**	**VRAAG 4**	**GROOT-TOTAAL**
MAKS. PUNTE	**40**	**40**	**40**	**30**	**150**
LEERDER SE PUNTE					

BYLAAG E: OPLOSSING VIR VRAAG 1

```
unit Question1_u;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls,
Forms,
  Dialogs, StdCtrls, ExtCtrls, ComCtrls, pngimage;

type
  TfrmQuestion1 = class(TForm)
    grpQ1_1: TGroupBox;
    edtQ1_1: TEdit;
    btnQ1_1: TButton;
    grpQ1_2: TGroupBox;
    btnQ1_2: TButton;
    pnlQ1_2: TPanel;
    grpQ1_5: TGroupBox;
    edtQ1_5: TEdit;
    redQ1_5: TRichEdit;
    Label1: TLabel;
    btn1_5: TButton;
    grpQ1_3: TGroupBox;
    grpQ1_4: TGroupBox;
    Image1: TImage;
    Label2: TLabel;
    edtQ1_3: TEdit;
    Label3: TLabel;
    btnQ1_3: TButton;
    pnlQ1_3: TPanel;
    btnQ1_4: TButton;
    redQ1_4: TRichEdit;
    procedure btnQ1_1Click(Sender: TObject);
    procedure btnQ1_2Click(Sender: TObject);
    procedure btn1_5Click(Sender: TObject);
    procedure btnQ1_3Click(Sender: TObject);
    procedure btnQ1_4Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;

var
  frmQuestion1: TfrmQuestion1;

implementation

{$R *.dfm}
```

```
// ============================================================
// 1.1  Formatting      4 punte
// ============================================================

procedure TfrmQuestion1.btnQ1_1Click(Sender: TObject);
begin
  edtQ1_1.Font.Size := 14;
  edtQ1_1.Text := 'Hello world';
  edtQ1_1.Font.Style := [fsUnderline];
  edtQ1_1.Color := clGreen;
end;

// ============================================================
// 1.2  Random number   8 punte
// ============================================================

procedure TfrmQuestion1.btnQ1_2Click(Sender: TObject);
var
  iRandom: integer;
begin
  iRandom := Random(99) + 1;
  if iRandom <= 9 then
    pnlQ1_2.Caption := IntToStr(iRandom) + ' is a single digit value'
  else
    pnlQ1_2.Caption := IntToStr(iRandom) + ' is a two digit value';
end;


// ============================================================
// 1.3  Area             8 punte
// ============================================================

procedure TfrmQuestion1.btnQ1_3Click(Sender: TObject);
var
  rSide, rArea: real;

const
  pi: real = 22 / 7;
begin
  rSide := StrToFloat(edtQ1_3.Text);
  rArea := (3 * sqrt(3) / 2) * sqr(rSide) -  pi * sqr(rSide / 2);
  pnlQ1_3.Caption := FloatToStrF(rArea, ffFixed, 7, 1) + ' cm squared';
end;

// ============================================================
// 1.4  Find            11 punte
// ============================================================

procedure TfrmQuestion1.btn1_4Click(Sender: TObject);
var
  tFile: textfile;
  sLine, sWord: String;
  iCount: integer;
begin
  redQ1_4.Clear;
  AssignFile(tFile, 'Words.txt');
  Reset(tFile);
```

```
  sWord := (edtQ1_4.Text);
  iCount := 0;
  while NOT EOF(tFile) do
  begin
    Readln(tFile, sLine);
    if UpperCase(sWord) = UpperCase(sLine) then
    begin
      inc(iCount);
    end;
  end;
  if iCount > 0 then
  begin
    redQ1_4.Lines.Add('Occurrences: ' + IntToStr(iCount));
  end
  else
  begin
    redQ1_4.Lines.Add('Word not found');
  end;
  CloseFile(tFile);
end;

// ============================================================
// 1.5  Booster rocket       9 punte
// ============================================================

procedure TfrmQuestion1.btnQ1_5Click(Sender: TObject);
var
  rTotalFuel, rFuel: real;
  iCounter: integer;
begin

  // Provided code
  redQ1_5.Paragraph.TabCount := 3;
  redQ1_5.Paragraph.tab[0] := 1;
  redQ1_5.Paragraph.tab[1] := 50;
  redQ1_5.Paragraph.tab[2] := 150;

  redQ1_5.Lines.Add('Second' + #9 + 'Fuel used' + #9 +'Fuel left ' );
  //1.5 Booster rocket

  rTotalFuel := StrToFloat(inputbox('Fuel', 'Total litres of fuel: ',
'550'));

  iCounter := 0;
  while rTotalFuel > 200 do
  begin
    inc(iCounter);
    rFuel := rTotalFuel / 100 * 7.5;
    rTotalFuel := rTotalFuel - rFuel;
    redQ1_5.Lines.Add(IntToStr(iCounter)+ #9+
                      FloatToStrF(rFuel,FFFixed,5,2)+#9+
                      FloatToStrF(rTotalFuel,FFFixed,5,2));
  end;
end;
end.
```

BYLAAG F: OPLOSSING VIR VRAAG 2

```
//=========================================================================
// 2.1 – Afdeling: SQL-stellings
//=========================================================================

//=========================================================================
//  2.1.1   iOS devices               3 punte
//=========================================================================

     sSQL1 := 'SELECT DeviceID, DeviceName FROM tblDevices ' +
              'WHERE OperatingSystem = "iOS"';
//=========================================================================
//  2.1.2   Category selected         3 punte
//=========================================================================

     sSQL2 := 'SELECT DeviceName, Category, NumInStock ' +
              'FROM tblDevices ' +
              'WHERE Category LIKE "%' + sDeviceType + '"';
//=========================================================================
//  2.1.3  Online support             6 punte
//=========================================================================

     sSQL3 := 'SELECT DeviceName, Category, OperatingSystem ' +
              'FROM tblDevices D, tblManufacturers M ' +
              'WHERE D.ManufacturerID = M.ManufacturerID ' +
              'AND OnlineSupport = True ' +
              'ORDER BY DeviceName';
//=========================================================================
//  2.1.4  Profit per manufacturer    6 punte
//=========================================================================

     sSQL4 := 'SELECT ManufacturerID, ' +
              'FORMAT(SUM(NumInStock * (Price * 0.6)), "CURRENCY") ' +
              'AS [Profit] ' +
              'FROM tblDevices GROUP BY ManufacturerID';
// =========================================================================
//  2.1.5  Remove devices             4 punte
//=========================================================================

     sSQL5 := 'Delete * FROM tblDevices ' +
              'WHERE Category = "Smart speaker" ' +
              'AND ManufacturerID = "M104"';
```

```
//=========================================================================
// 2.2 – Afdeling: Delphi-kode
//=========================================================================

//=========================================================================
// 2.2.1   Display products        12 punte
// ========================================================================
procedure TfrmQuestion2.btnQ2_2_1Click(Sender: TObject);
begin
  // Provided code
  redQ2_2_1.Clear;
  // Question 2.2.1
    tblManufacturers.First;
    while NOT tblManufacturers.Eof do
      begin
        redQ2_2_1.Lines.Add(tblManufacturers['ManufacturerName'] + ': ' +
                            tblManufacturers['ContactNumber']);
        redQ2_2_1.Lines.Add(#9 + 'Device name' + #9 + 'In stock' + #9 +
                            'Price');
        tblDevices.First;
        while NOT tblDevices.Eof do
          begin
            if (tblDevices['ManufacturerID'] =
                tblManufacturers['ManufacturerID']) then
              begin
                redQ2_2_1.Lines.Add(#9 + tblDevices['DeviceName'] + #9
                                    + IntToStr(tblDevices['NumInStock']) +
                                    #9 +
                                    FloatToStrF(tblDevices['Price'],
                                    ffCurrency, 8, 2));
            end;
          tblDevices.Next;
        end;
        redQ2_2_1.Lines.Add('');
      tblManufacturers.Next;
      end;
end;
// ========================================================================
// 2.2.2   Update stock      6 punte
// ========================================================================
procedure TfrmQuestion2.btnQ2_2_2Click(Sender: TObject);
var
  iNumSold: integer;
begin
  // Question 2.2.2
  iNumSold := StrToInt(InputBox('Products sold', 'Amount:', '50'));
    if tblDevices['NumInStock'] - iNumSold > 0 then
      begin
        tblDevices.Edit;
        tblDevices['NumInStock'] := tblDevices['NumInStock'] - iNumSold;
        tblDevices.Post;
      end
    else
        ShowMessage('Not enough items in stock.');
end;
```

```
// ======================================================
// {$ENDREGION}
// ======================================================
// {$REGION 'Provided code: Setup DB connections - DO NOT CHANGE!'}
// ======================================================

procedure TfrmQuestion2.FormClose(Sender: TObject; var Action:
TCloseAction);
begin
// Disconnects from database and closes all open connections
  dbCONN.dbDisconnect;
end;

procedure TfrmQuestion2.FormCreate(Sender: TObject);
begin
// Provided code
  redQ2_2_1.Paragraph.TabCount := 2;
  redQ2_2_1.Paragraph.Tab[0] := 100;
  redQ2_2_1.Paragraph.Tab[1] := 150;
  redQ2_2_1.Paragraph.Tab[2] := 200;
end;

procedure TfrmQuestion2.FormShow(Sender: TObject);
begin
// Sets up the connection to database and opens the tables.
  dbCONN := TConnection.Create;
  dbCONN.dbConnect;
  tblManufacturers := dbCONN.tblOne;
  tblProducts := dbCONN.tblMany;
  dbCONN.setupGrids(dbgManufacturers, dbgProducts, dbgrdSQL);
  pgcDBAdmin.ActivePageIndex := 0;
end;
// ======================================================
// {$ENDREGION}

end.
```

BYLAAG G: OPLOSSING VIR VRAAG 3

Objekklas:

```
// ============================================================================
//  3.1.1   Constructor      5 punte
// ============================================================================
constructor TSmartSwitch.create(sSwitchID: String; sDevice: String;
iPowerUsage: Integer);
begin
  fSwitchID := sSwitchID;
  fDevice:=sDevice;
  fPowerUsage := iPowerUsage;
  fSwitchStatus := False;
end;

// ============================================================================
//  3.1.2  getSwitchID       2 punte
// ============================================================================
function TSmartSwitch.getSwitchID: String;
begin
  Result := fSwitchID;
end;

// ============================================================================
//  3.1.3  energyUsed         4 punte
// ============================================================================
function TSmartSwitch.energyUsed(iHours: Integer): Real;
begin
 Result := fPowerUsage * iHours / 1000;
end;

// ============================================================================
//  3.1.4  setSwitchStatus    3 punte
// ============================================================================
procedure TSmartSwitch.setSwitchStatus(bStatus: Boolean);
begin
  fSwitchStatus := bStatus;
end;

// ============================================================================
//  3.1.5  toString           4 punte
// ============================================================================
function TSmartSwitch.toString: String;
begin
   Result := 'Switch ID: ' + fSwitchID + #13 +
    'Device: ' + fDevice + #13 +
    'Power usage: ' + intToStr(fPowerUsage) + ' W' + #13 +
    'Switch status:' +  determineSwitchStatus;
end;
```

```
// ============================================================================
//                      Kode wat voorsien is
// ============================================================================

function TSwitch.determineSwitchStatus: String;
var
  sStatus: String;
begin
case fSwitchStatus of
  True:sStatus := 'ON';
  False: sStatus := 'OFF';
end;
 Result := sStatus;
end;

//============================================================================
//                      Einde van kode wat voorsien is
// ============================================================================
```

Hoofvormeenheid:

```
unit Question3_u;

interface

uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls,
Forms,
  Dialogs,SmartSwitch_u, StdCtrls, ComCtrls, Spin, ExtCtrls;

type
  TfrmQuestion3 = class(TForm)
    redQ3: TRichEdit;
    btnQ3_2_1: TButton;
    Panel1: TPanel;
    btnQ3_2_2: TButton;
    GroupBox3: TGroupBox;
    Label3: TLabel;
    GroupBox2: TGroupBox;
    rgpQ3_2_2: TRadioGroup;
    Panel2: TPanel;
    GroupBox1: TGroupBox;
    lstQ3_2_1: TListBox;
    btnQ3_2_4: TButton;
    cmbQ3_2_1: TComboBox;
    Label1: TLabel;
    edtQ3_2_4: TEdit;
    Label2: TLabel;
    GroupBox4: TGroupBox;
    btnQ3_2_3: TButton;
    lblTime: TLabel;
    procedure btnQ3_2_1Click(Sender: TObject);
    procedure btnQ3_2_2Click(Sender: TObject);
    procedure btnQ3_2_4Click(Sender: TObject);
    procedure FormCreate(Sender: TObject);
    procedure Button1Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;

var
  frmQuestion3: TfrmQuestion3;
  objSmartSwitch:TSmartSwitch;


implementation

{$R *.dfm}
```

```
// ============================================================================
//  3.2.1   Instantiate object    8 punte
// ============================================================================
procedure TfrmQuestion3.btnQ3_2_1Click(Sender: TObject);
var
  sSwitchID, sLine, sDevice:String;
  iWatt:Integer;
begin
  redQ3.Clear;
  sSwitchID := cmbQ3_2_1.Text;
  sLine := lstQ3_2_1.Items[lstQ3_2_1.ItemIndex];
  sDevice := Copy(sLine, 1,  pos('#',sLine) - 1);
  iWatt := strToInt(Copy(sLine,pos('#',sLine)+1));

  objSmartSwitch := TSmartSwitch.create(sSwitchID,sDevice,iWatt);
  redQ3.Lines.Add(objSmartSwitch.toString);
end;

// ============================================================================
//  3.2.2  Change switch status  5 punte
// ============================================================================
procedure TfrmQuestion3.btnQ3_2_2Click(Sender: TObject);
begin
  redQ3.Lines.Clear;
  case rgpQ3_2_2.ItemIndex of
    0: objSmartSwitch.setSwitchStatus(True);
    1: objSmartSwitch.setSwitchStatus(False);
  end;
  redQ3.Lines.Add(objSmartSwitch.getSwitchID + ': ' +
objSmartSwitch.determineSwitchStatus);
end;

// ============================================================================
//  3.2.3  Write to file        6 punte
// ============================================================================

procedure TfrmQuestion3.Button1Click(Sender: TObject);
var
  tFile : textFile;
begin
  AssignFile(tFile, 'log.txt');
  Append(tFile);

writeln(tFile,DateToStr(now)+'#'+lblTime.Caption+'#'+objSmartSwitch.getSwit
chID+'#'+ objSmartSwitch.determineSwitchStatus);
  CloseFile(tFile);
end;
```

```
// ============================================================================
// 3.2.4  Power usage        3 punte
// ============================================================================

procedure TfrmQuestion3.btnQ3_2_4Click(Sender: TObject);
var
  iHours : Integer;
  rEnergy: Real;
begin
  redQ3.Lines.Clear;
  iHours := StrToInt(edtQ3_2_4.Text);
  rEnergy := objSmartSwitch.energyUsed(iHours);
  redQ3.Lines.Add('Energy used is: '+ FloatToStr(rEnergy) +' kWh');
end;

end.
```

BYLAAG H: OPLOSSING VIR VRAAG 4

```
unit Question4_u;

interface

uses
  Windows, Messages, SysUtils, Variants,
  Classes, Graphics,
  Controls, Forms, Dialogs, StdCtrls, ComCtrls,
  ExtCtrls, Buttons, Spin, pngimage;

type
  TfrmQuestion4 = class(TForm)
    Panel1: TPanel;
    Panel2: TPanel;
    btnQ4_1: TButton;
    redQ4: TRichEdit;
    btnQ4_2: TButton;
    btnQ4_3: TButton;
    gbxQ4_3: TGroupBox;
    sedQ4_2_Row: TSpinEdit;
    sedQ4_3_Col: TSpinEdit;
    Label1: TLabel;
    Label2: TLabel;
    gbxQ4_1: TGroupBox;
    gbxQ4_2: TGroupBox;
    Image1: TImage;
    procedure btnQ4_1Click(Sender: TObject);
    procedure btnQ4_2Click(Sender: TObject);
    procedure btnQ4_3Click(Sender: TObject);
  private
    { Private declarations }

  public
    { Public declarations }
  end;

var
  Form1: TfrmQuestion4;

  arrNetwork: array [1 .. 5, 1 .. 6] of char =
    (('_', 'A', '_', '_', '_', '_'), ('_', '_', '_', '_', '_', '_'),
    ('_', '_', '_', '_', 'A', '_'), ('_', '_', '_', '_', '_', '_'),
    ('_', 'A', '_', '_', '_', '_'));

implementation

{$R *.dfm}
```

```
// ========================================================================
//  4.1 Display                7 punte
// ========================================================================
procedure TfrmQuestion4.btnQ4_1Click(Sender: TObject);
var
  I: Integer;
  J: Integer;
  sLine: String;
begin
  redQ4.Clear;
  redQ4.Lines.Add('Access points');
  sLine := '  1 2 3 4 5 6' + #13;
  for I := 1 to Length(arrNetwork) do
  begin
    sLine := sLine + intToStr(I) + ' ';
    for J := 1 to Length(arrNetwork[I]) do
    begin
      sLine := sLine + arrNetwork[I, J] + ' ';
    end;

    sLine := sLine + #13;

  end;
  redQ4.Lines.Add(sLine);

end;

// ========================================================================
//  4.2  Add access point   10 punte
// ========================================================================
procedure TfrmQuestion4.btnQ4_2Click(Sender: TObject);
var
  I, iCounter, iRow, iCol: Integer;
begin
  redQ4.Clear;
  iRow := sedQ4_2_Row.Value;
  iCol := sedQ4_3_Col.Value;

  iCounter := 0;

  for I := 1 to Length(arrNetwork[iCol]) do
  begin
    if arrNetwork[iRow, I] = 'A' then
      inc(iCounter);
  end;

  if iCounter < 3 then
  begin
    if arrNetwork[iRow, iCol] in ['*', '_'] then
    begin
      arrNetwork[iRow, iCol] := 'A';
    end
    else
    begin
      ShowMessage('Access point already on this location.');
    end;
```

```
  end
  else
  begin
    ShowMessage('There are already 3 access points in the row.');
  end;

  btnQ4_1.Click;

end;

// ============================================================================
//  4.3 Coverage                13 punte
// ============================================================================
procedure TfrmQuestion4.btnQ4_3Click(Sender: TObject);
var
  I: Integer;
  J: Integer;
  K: Integer;
  L: Integer;
begin

  for I := 1 to Length(arrNetwork) do
  begin
    for J := 1 to Length(arrNetwork[I]) do
    begin
      if arrNetwork[I, J] = 'A' then
      begin
        for K := J - 1 to J + 1 do
        begin
          for L := I - 1 to I + 1 do
          begin
            if (K > 0) AND (L > 0) then
            begin
              if arrNetwork[L, K] = '_' then
              begin
                arrNetwork[L, K] := '*';
              end;
            end;
          end;
        end;
      end;
    end;
  end;

  btnQ4_1.Click;
end;
end.
```