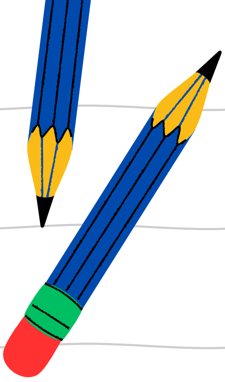

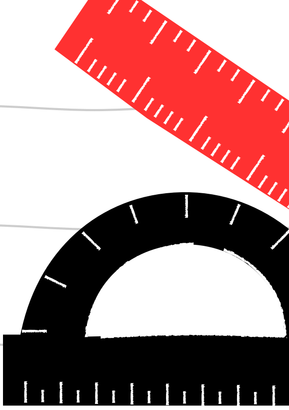

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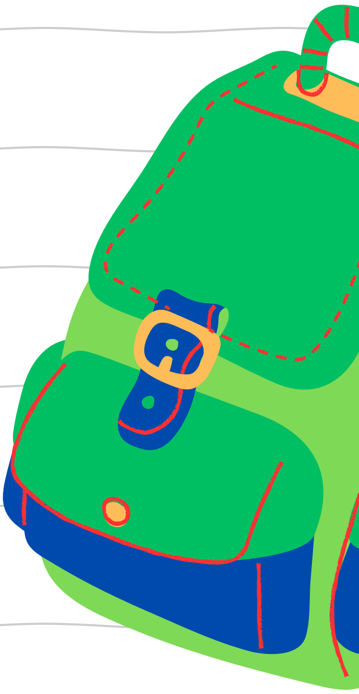
INFORMATION TECHNOLOGY PAPER 1 (2019)



QUESTION PAPER

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

INFORMATION TECHNOLOGY P1

NOVEMBER 2019

MARKS: 150

TIME: 3 hours

This question paper consists of 21 pages and 2 data pages.

INSTRUCTIONS AND INFORMATION

1. This question paper is divided into FOUR sections. Candidates must answer ALL the questions in each of the FOUR sections.

2. The duration of this examination is three hours. Because of the nature of this examination it is important to note that you will not be permitted to leave the examination room before the end of the examination session.

3. This question paper is set with programming terms that are specific to the Delphi programming language.

4. Make sure that you answer the questions according to the specifications that are given in each question. Marks will be awarded according to the set requirements.

5. Answer only what is asked in each question. For example, if the question does not ask for data validation, then no marks will be awarded for data validation.

6. Your programs must be coded in such a way that they will work with any data and not just the sample data supplied or any data extracts that appear in the question paper.

7. Routines, such as search, sort and selection, must be developed from first principles. You may NOT use the built-in features of Delphi for any of these routines.

8. All data structures must be declared by you, the programmer, unless the data structures are supplied.

9. You must save your work regularly on the disk/CD/DVD/flash disk you have been given, or on the disk space allocated to you for this examination session.

10. Make sure that your examination number appears as a comment in every program that you code, as well as on every event indicated.

11. If required, print the programming code of all the programs/classes that you completed. You will be given half an hour printing time after the examination session.

12. At the end of this examination session you must hand in a disk/CD/DVD/flash disk with all your work saved on it OR you must make sure that all your work has been saved on the disk space allocated to you for this examination session. Ensure that all files can be read.

13. The files that you need to complete this question paper have been given to you on the disk/CD/DVD/flash disk or on the disk space allocated to you. The files are provided in the form of password-protected executable files.

NOTE: Candidates must use the file **DataENGNov2019.exe**.

Do the following:

- Double click on the password-protected executable file: **DataENGNov2019.exe**.
- Click on the 'Extract' button.
- Enter the following password: **SPoRt@ScHOOL%**

Once extracted, the following list of files will be available in the folder **DataENGNov2019**:

SUPPLIED FILES

Question 1:
Question1_P.dpr
Question1_P.dproj
Question1_P.res
Question1_U.dfm
Question1_U.pas

Question 2:
ConnectDB_U.dcu
ConnectDB_U.pas
HockeyDB.mdb
Question2_P.dpr
Question2_P.dproj
Question2_P.res
Question2_U.dfm
Question2_U.pas

Question 3:
Player_U.pas
Question3_P.dpr
Question3_P.dproj
Question3_P.res
Question3_U.dfm
Question3_U.pas

Question 4:
Maze 1.txt
Maze 2.txt
Maze 3.txt
Question4_P.dpr
Question4_P.dproj
Question4_P.res
Question4_U.dfm
Question4_U.pas

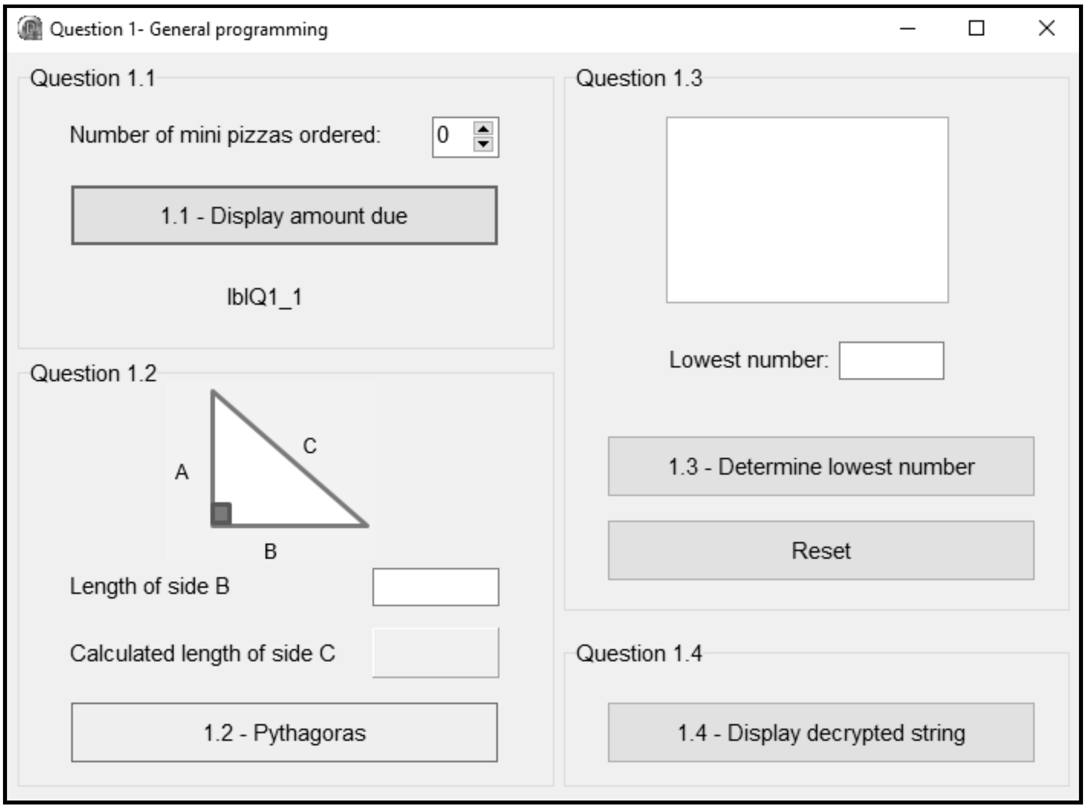
SECTION A

QUESTION 1: GENERAL PROGRAMMING SKILLS

Do the following:

- Open the incomplete project file called **Question1_P.dpr** in the **Question 1** folder.
- Enter your examination number as a comment in the first line of the **Question1_U.pas** file.
- Compile and execute the program. The user interface displays FOUR different sections named Question 1.1 to Question 1.4. The program has no functionality currently.

  Example of the graphical user interface (GUI):


Question 1- General programming
Question 1.1
Number of mini pizzas ordered:
0
1.1 - Display amount due
lblQ1_1
Question 1.2
C
A
B
Length of side B
Calculated length of side C
1.2 - Pythagoras
Question 1.3
Lowest number:
1.3 - Determine lowest number
Reset
Question 1.4
1.4 - Display decrypted string

- Complete the code for EACH section of QUESTION 1, as described in QUESTION 1.1 to QUESTION 1.4 that follow.

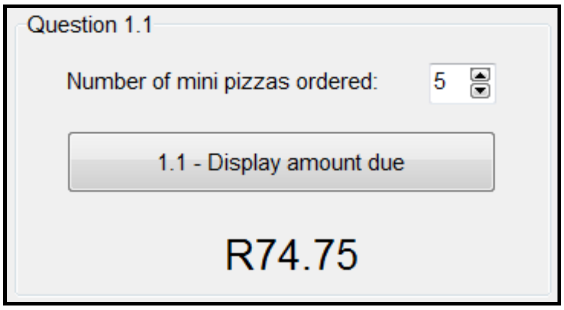
1.1 **Button [1.1 - Display amount due]**

Mini pizzas can be ordered from the tuck shop at a school at R14,95 each.

Write code to do the following:

- Declare a constant variable, **PRICE**, to contain the value 14.95.
- Declare TWO variables to store the number of mini pizzas ordered and the amount due respectively.
- Change the font size of label **lblQ1_1** to 20 pt.
- Retrieve the number of mini pizzas ordered from the **spnQ1_1** spin edit box.
- Calculate the amount due using the constant variable **PRICE** and the variable for the number of mini pizzas ordered.
- Display the amount due on the label **lblQ1_1**, formatted as currency.

Example of output if the number of mini pizzas ordered is 5:



Question 1.1

Number of mini pizzas ordered: 5

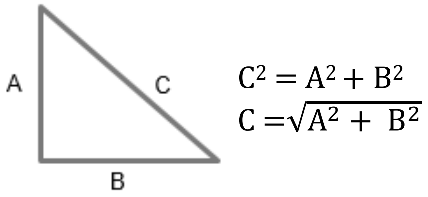
R74.75

(8)

1.2 **Button [1.2 - Pythagoras]**

In Mathematics, the Pythagorean theorem is a fundamental relation in Euclidean geometry with regard to the three sides of a right-angled triangle.

The formula $C^2 = A^2 + B^2$ is used to determine the length of the side opposite the right angle in the triangle below.

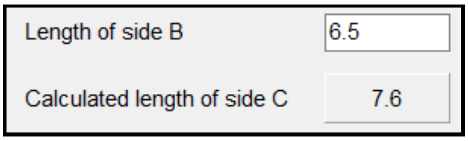


$$C^2 = A^2 + B^2$$
$$C = \sqrt{A^2 + B^2}$$

Write code to do the following:

- Declare variables for sides A, B and C.
- Assign the value of 4 to the variable for side A.
- Extract the length of side B from the **edtQ1_2** edit box and assign it to the variable for side B.
- Calculate the length of side C using the formula $C = \sqrt{A^2 + B^2}$.
- Display the length of side C on the **pnlQ1_2** component as a real value formatted to ONE decimal place.

Example of output if 6.5 was entered as the length of side B:



Length of side B 6.5

Calculated length of side C 7.6

(10)

1.3 **Button [1.3 - Determine lowest number]**

A global variable, **iLowest**, is declared and initialised to the value 100.

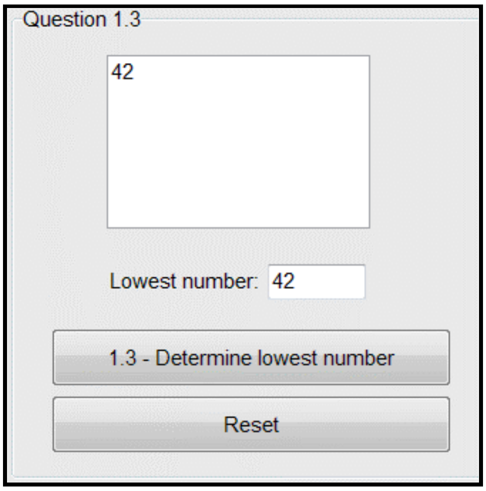
Write code to do the following when the **Determine lowest number** button is clicked:

- Generate and assign a random number in the range from 1 to 100 (inclusive) to a local variable **iNumber** provided.
- Display the number that was generated in the **redQ1_3** rich edit.
- Replace the current lowest number stored in the **iLowest** variable with the generated number if the generated number is lower than the number stored in the **iLowest** variable.
- Display the lowest number in the **edtQ1_3** edit box.

NOTE:

- The random number must be added to the rich edit with each click of the button.
- Code is provided in the **Reset** button to set the lowest number to the starting value of 100 and clear the content of the input and output components.

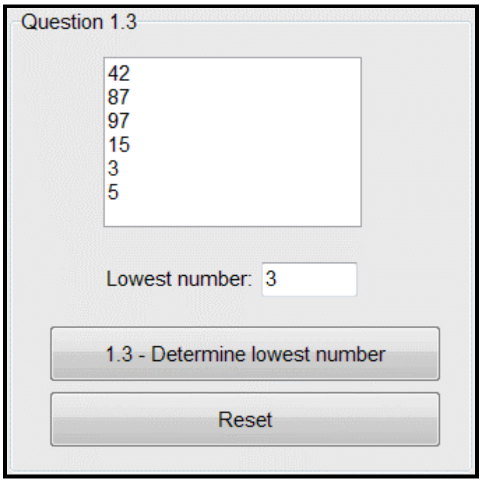
Example of output when the button is clicked once and the random number 42 is generated:



42

Lowest number: 42

Example of output when the button is clicked six times:



```
42
87
97
15
3
5
```

Lowest number: 3

NOTE: The output displayed by your program may differ from the example output, as random numbers are generated. (9)

1.4 **Button [1.4 - Display decrypted string]**

An encrypted string entered by the user must be decrypted and displayed. The encrypted string contains digits, as some of the alphabetical characters in the string have been replaced with digits according to the table below.

ALPHABETICAL CHARACTER	REPLACEMENT DIGIT
A	0
B	1
C	2
D	3
E	4
F	5
G	6
H	7
I	8
J	9

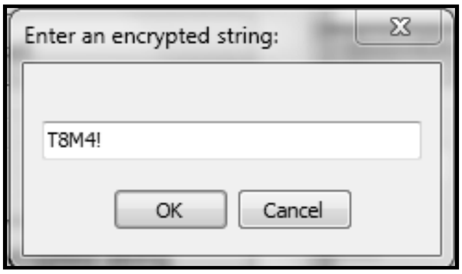
Example:

Encrypted version of the string: T8M4!
Original string (decrypted): TIME!

Write code to do the following to decrypt an encrypted string:

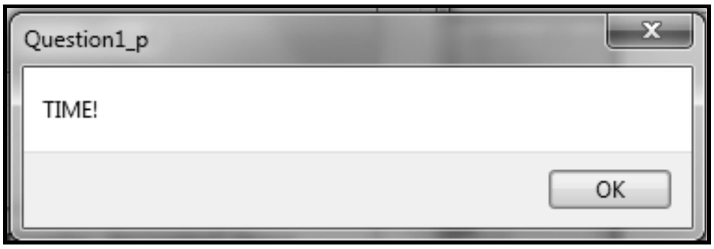
- Use an input box to enter an encrypted string.
- Replace each digit contained in the encrypted string with the alphabetical character it represents (see table above).
- Display the decrypted string in a message box.

Example of input if T8M4! was entered as an encrypted string:


Enter an encrypted string:

T8M4!

Output for the encrypted string T8M4!:


Question1_p

TIME!

Test your code using the following test data:

90R represents JAR
03V4NTUR4 T8M4! represents ADVENTURE TIME!
039024NT represents ADJACENT (13)

- Ensure that your examination number has been entered as a comment in the first line of the program file.
- Save your program.
- Print the code if required.

TOTAL SECTION A: 40

SECTION B

QUESTION 2: DATABASE PROGRAMMING

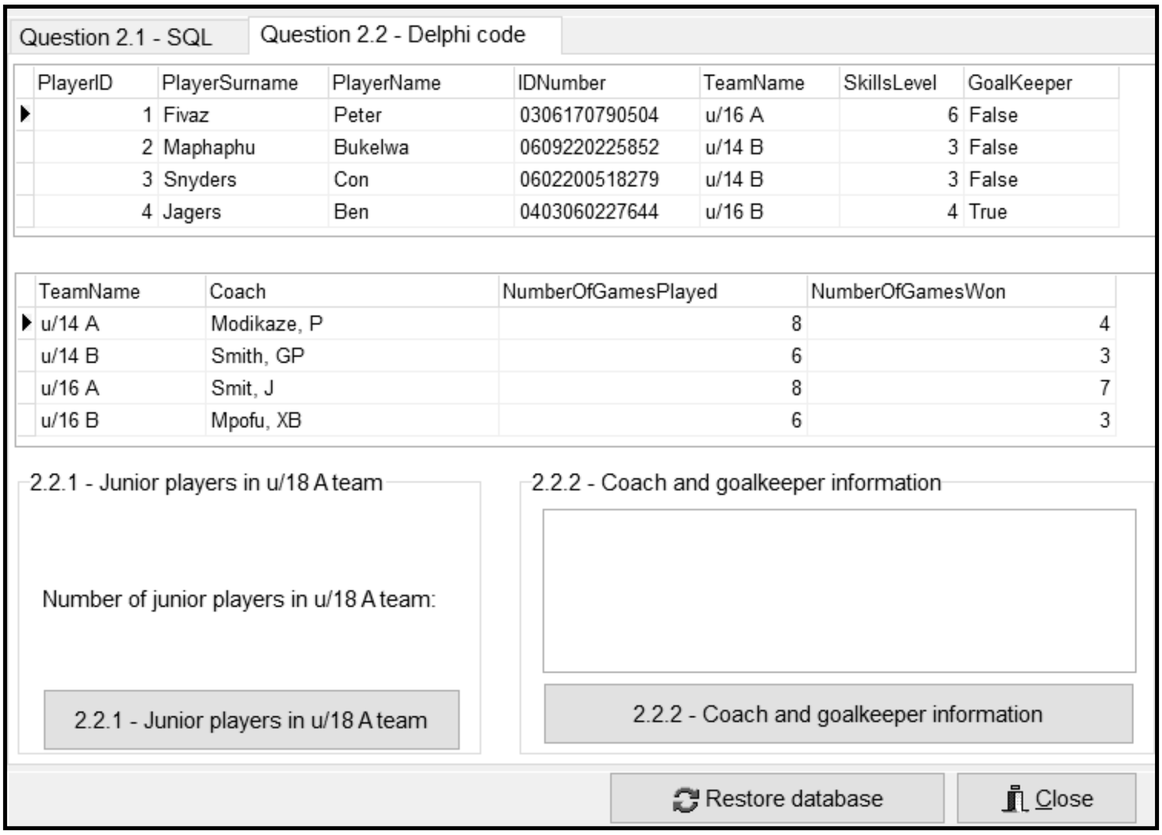
The hockey organiser at your school requires your assistance with the administration of the players, teams and coaches.

The database **HockeyDB** contains two tables called **tblPlayers** and **tblTeams.**

The data pages attached at the end of this question paper provide information on the design of the database and the content of the tables.

Do the following:

- Open the incomplete project file called **Question2_P.dpr** in the **Question 2** folder.
- Enter your examination number as a comment in the first line of the **Question2_U.pas** unit file.
- Compile and execute the program. The program has no functionality currently. The content of the tables is displayed as shown below on the selection of **Tabsheet Question 2.2 - Delphi code**.



PlayerID	PlayerSurname	PlayerName	IDNumber	TeamName	SkillsLevel	GoalKeeper
1	Fivaz	Peter	0306170790504	u/16 A	6	False
2	Maphaphu	Bukelwa	0609220225852	u/14 B	3	False
3	Snyders	Con	0602200518279	u/14 B	3	False
4	Jagers	Ben	0403060227644	u/16 B	4	True

TeamName	Coach	NumberOfGamesPlayed	NumberOfGamesWon
u/14 A	Modikaze, P	8	4
u/14 B	Smith, GP	6	3
u/16 A	Smit, J	8	7
u/16 B	Mpofu, XB	6	3

2.2.1 - Junior players in u/18 A team
Number of junior players in u/18 A team:
2.2.1 - Junior players in u/18 A team
2.2.2 - Coach and goalkeeper information
2.2.2 - Coach and goalkeeper information
Restore database
Close

- Follow the instructions below to complete the code for EACH section, as described in QUESTION 2.1 and QUESTION 2.2 that follow.
- Use SQL statements to answer QUESTION 2.1 and Delphi code to answer QUESTION 2.2.

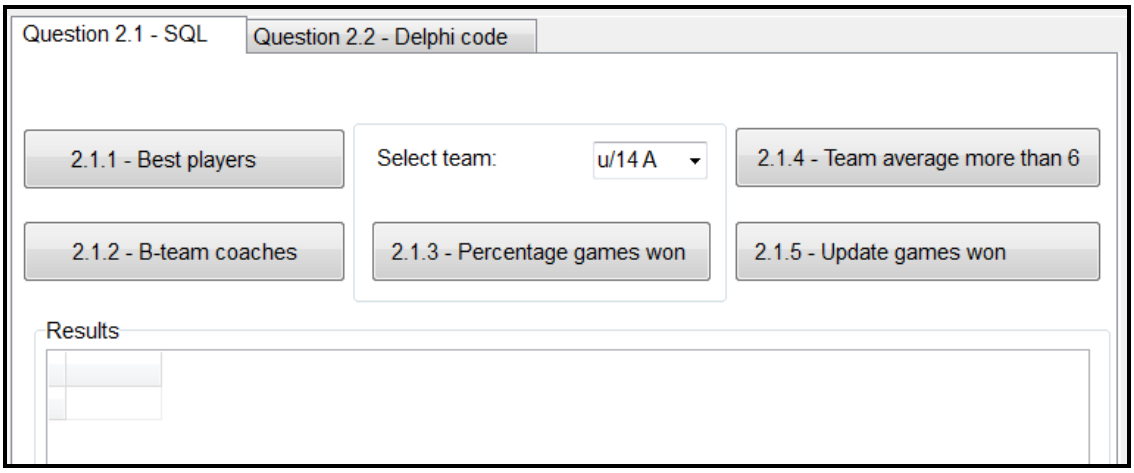
NOTE:

- The 'Restore database' button is provided to restore the data contained in the database to the original content.
- The content of the database is password protected, in other words you will not be able to gain access to the content of the database using Microsoft Access.
- Code is provided to link the GUI components to the database. Do NOT change any of the code provided.
- TWO variables are declared as global variables, as described in the table below.

Variable	Data type	Description
`tblTeams`	`TADOTable`	Refers to the table **tblTeams** in the database **HockeyDB**
`tblPlayers`	`TADOTable`	Refers to the table **tblPlayers** in the database **HockeyDB**

2.1 **Tab sheet [Question 2.1 - SQL]**

Example of the GUI for QUESTION 2.1:



NOTE:

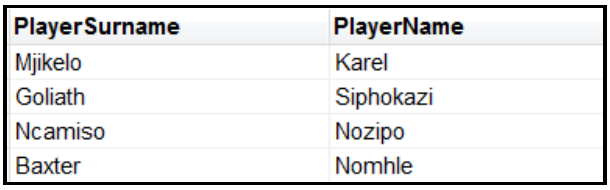
- Use ONLY SQL statements to answer QUESTION 2.1.1 to QUESTION 2.1.5.
- Code is provided to execute the SQL statements and display the results of the queries. The SQL statements assigned to the variables **sSQL1**, **sSQL2**, **sSQL3**, **sSQL4** and **sSQL5** are incomplete.

Complete the SQL statements to perform the tasks described in QUESTION 2.1.1 to QUESTION 2.1.5 that follow.

2.1.1 **Button [2.1.1 - Best players]**

Display the surnames and names of all players with a skills level of 10.

Example of output of the first four records:



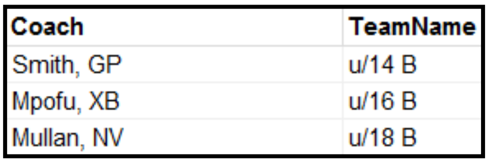
PlayerSurname	PlayerName
Mjikelo	Karel
Goliath	Siphokazi
Ncamiso	Nozipo
Baxter	Nomhle

(3)

2.1.2 **Button [2.1.2 - B-team coaches]**

Display the names of the coaches and teams of all the B-teams.

Example of output:



Coach	TeamName
Smith, GP	u/14 B
Mpofu, XB	u/16 B
Mullan, NV	u/18 B

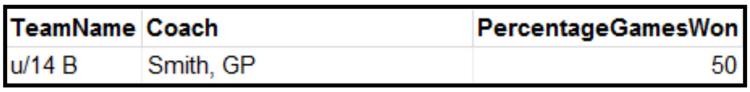
(4)

2.1.3 **Button [2.1.3 - Percentage games won]**

Code has been provided to extract a team name from the combo box, **cmbQ2_1_3**.

Display the name of the team, their coach and the **percentage** of games won by the team. Save the percentage of games won in a calculated field called **PercentageGamesWon**.

Example of output if the u/14 B team was selected:



TeamName	Coach	PercentageGamesWon
u/14 B	Smith, GP	50

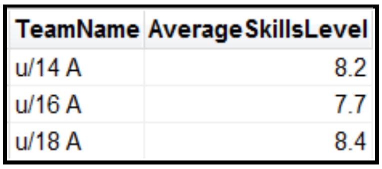
NOTE: You do NOT have to format the calculated value. (4)

2.1.4 **Button [2.1.4 - Team average more than 6]**

The average skills levels of teams are used to identify teams with the highest possibility of winning their games.

Display the names and average skills levels of all teams with an average skills level of more than 6. The average skills level per team must be saved in a calculated field called **AverageSkillsLevel**, formatted to ONE decimal place.

Example of output:



TeamName	AverageSkillsLevel
u/14 A	8.2
u/16 A	7.7
u/18 A	8.4

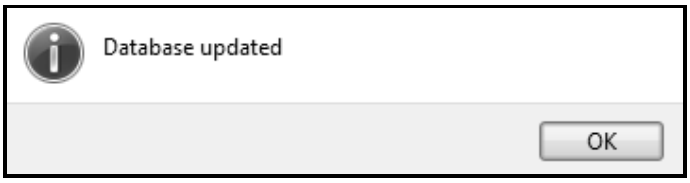
(5)

2.1.5 **Button [2.1.5 - Update games won]**

The results of the games won during the last sports day must be used to update the **NumberOfGamesWon** field. Only the u/14 B team lost their game.

Update the data in the **tblTeams** table by adding a value of 1 to the **NumberOfGamesWon** field for the teams who won their game.

Example of output:

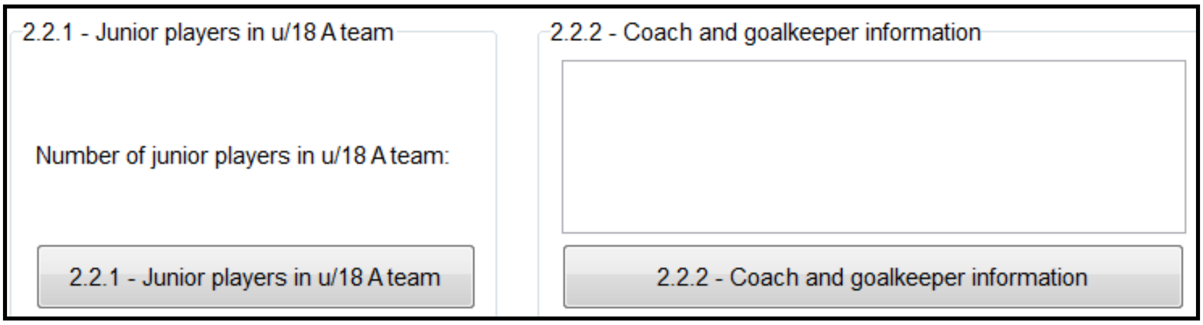


Database updated

(3)

2.2 **Tab sheet [Question 2.2 - Delphi code]**

Example of GUI for QUESTION 2.2:



2.2.1 - Junior players in u/18 A team
Number of junior players in u/18 A team:
2.2.1 - Junior players in u/18 A team
2.2.2 - Coach and goalkeeper information
2.2.2 - Coach and goalkeeper information

NOTE:

- Use ONLY Delphi programming code to answer QUESTION 2.2.1 and QUESTION 2.2.2.
- NO marks will be awarded for SQL statements in QUESTION 2.2.

2.2.1 Button [2.2.1 - Junior players in u/18 A team]

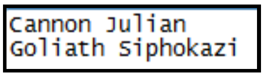
The u/18 A team includes some of the junior players that are exceptionally talented. Junior players are players that were born after the year 2002.

NOTE: The first two digits of the **IDNumber** field indicate the year of birth of a player.

Write code to do the following:

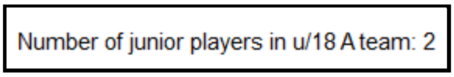
- Save the surnames and names of all the junior players who are members of the u/18 A team to a new text file called **Junior18A.txt**.
- Determine the total number of junior players in the u/18 A team and display the result in the **lblQ2_2_1** label.

Example of content of the **Junior18A** text file:



```
Cannon Julian
Goliath Siphokazi
```

Example of output to be displayed on the **lblQ2_2_1** label:



Number of junior players in u/18 A team: 2

(11)

2.2.2 Button [2.2.2 - Coach and goalkeeper information]

The coach and goalkeeper of all the teams are invited to a special training session.

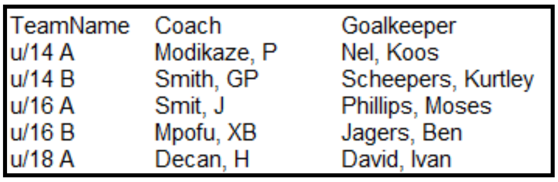
Code has been provided to set the various column widths and to display the headings, as shown in the example of output.

Write code to display a list containing the following information on each team:

- Name of the team
- Surname and initials of the coach
- Surname and name of the goalkeeper in the format:

```
<Surname>, <Name>
```

Example of output of the first five records:



```
TeamName   Coach          Goalkeeper
u/14 A     Modikaze, P    Nel, Koos
u/14 B     Smith, GP      Scheepers, Kurtley
u/16 A     Smit, J        Phillips, Moses
u/16 B     Mpofu, XB      Jagers, Ben
u/18 A     Decan, H       David, Ivan
```

(10)

- Ensure that your examination number has been entered as a comment in the first line of the program file.
- Save your program.
- Print the code if required.

TOTAL SECTION B: 40

SECTION C

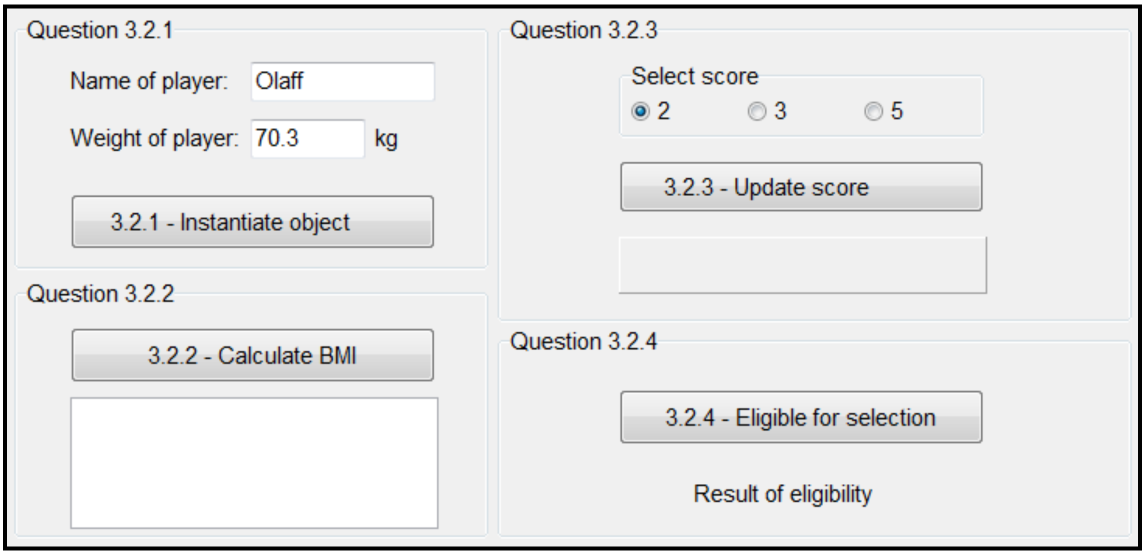
QUESTION 3: OBJECT-ORIENTATED PROGRAMMING

The school is designing software to calculate the body mass index (BMI) of the rugby players and to determine the eligibility of the rugby players for selection.

Do the following:

- Open the incomplete program in the **Question 3** folder.
- Open the incomplete object class **Player_U.pas**.
- Enter your examination number as a comment in the first line of both the **Question3_U.pas** file and the **Player_U.pas** file.
- Compile and execute the program. The program has no functionality currently.

Example of the GUI:



Question 3.2.1

Name of player: Olaff

Weight of player: 70.3 kg

Question 3.2.3

Select score: ● 2 ○ 3 ○ 5

- Complete the code as specified in QUESTION 3.1 for the **Player_U** object class and QUESTION 3.2 for the **Question3_U** form class.

3.1 The incomplete object class (**TPlayer**) provided contains the declarations of three attributes that define a **Player** object.

The attributes for the **Player** object have been declared as follows:

Names of attributes	Description
fPlayerName	The first name of the rugby player
fWeightOfPlayer	The weight of the player
fScore	The score achieved at a specific rugby game

3.1.1 Write code for a **constructor** method that will receive the player's name and weight as parameter values. Assign these values to the respective attributes. Set the score attribute to the value of zero. (4)

3.1.2 Write code for an accessor method called **getScore** for the **fScore** attribute. (2)

3.1.3 Write code for a method called **updateScore** that will receive an integer value as a parameter and add the received value to the **fScore** attribute. (3)

3.1.4 Write code for a method called **calculateBMI** that must receive the height of the player as a parameter and calculate and return the player's BMI based on the following formula:

BMI = weight of player/(height of player)^2 (3)

3.1.5 Write code for a method called **eligibleForSelection** that can be used to determine the possibility for selection to play at the Provincial Trials Tournament. Possible selection is determined by evaluating the content of **fScore** attribute according to the following categories:

Score	**Message**
0 to 7 points	Low possibility
8 to 14 points	Medium possibility
More than 14 points	High possibility

The method must return the relevant message. (4)

3.1.6 Write code for a **toString** method to display the attributes of the player object in the following format:

```
Name: <fPlayerName>

Weight: <fWeightOfPlayer>

Current score: <fScore>
```

Example:

```
Name: Olaff
Weight: 70.3
Current score: 0
```

(4)

3.2 An incomplete unit **Question3_U** has been provided and contains code for the object class to be accessible.

The following global variable has been declared:

The object **objPlayer**

Do the following to complete the code for QUESTION 3.2.1 to QUESTION 3.2.4 in the main form unit:

3.2.1 **Button [3.2.1 - Instantiate object]**

Write code to do the following:

- Use the name and weight of the player from the edit boxes provided to instantiate a Player object.
- Display a message, using a dialog box, to indicate that the object has been instantiated. (5)

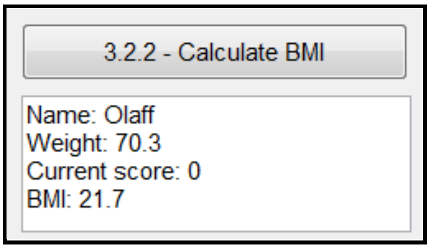
3.2.2 **Button [3.2.2 - Calculate BMI]**

The **redQ3_2_2** component must be used as the display area.

Write code to do the following:

- Use an input dialog box to enter the height of the player.
- Call the relevant method using the height as an argument to calculate the BMI of the player.
- Call the **toString** method to display the information of the player object.
- Display the BMI of the player, rounded off to ONE decimal place.

Example of output if the weight of the player is 70,3 kg and the height of the player is 1,80 m:



```
Name: Olaff
Weight: 70.3
Current score: 0
BMI: 21.7
```

(7)

3.2.3 **Button [3.2.3 - Update score]**

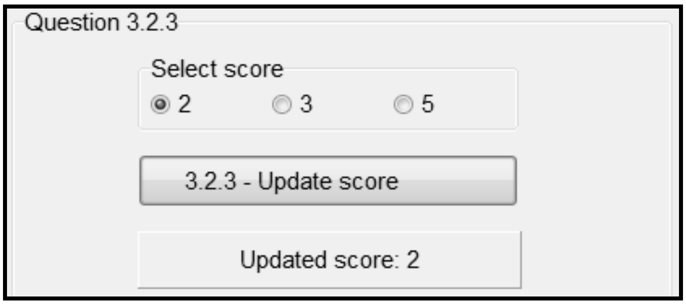
The score of a player is updated as the game progresses.

The user must select a score in the radio group called **rgpQ3_2_3** and click the **Update score** button each time the player scores points during the game.

Write code to do the following:

- Extract the score that was selected from the component **rgpQ3_2_3**.
- Call the correct method to update the score attribute.
- Call the correct method to return the score.
- Display the updated score of the player in the **pnlQ3_2_3** component.

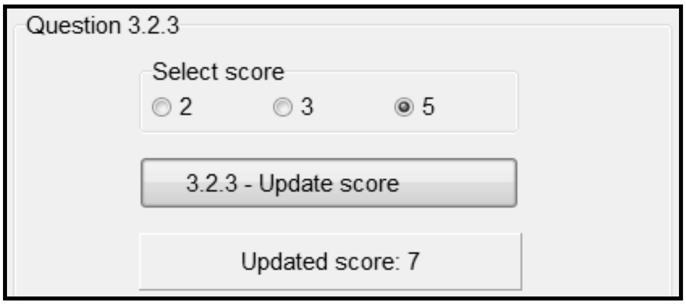
Example of output if the value of 2 was selected as the first score and the **Update score** button was clicked:



Select score
● 2 ○ 3 ○ 5

Updated score: 2

Example of output if the value of 5 was selected as the next score and the **Update score** button was clicked:



Select score
○ 2 ○ 3 ● 5

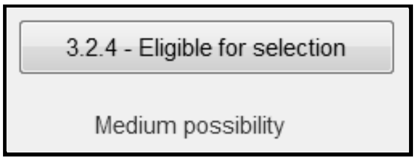
Updated score: 7

(6)

3.2.4 **Button [3.2.4 - Eligible for selection]**

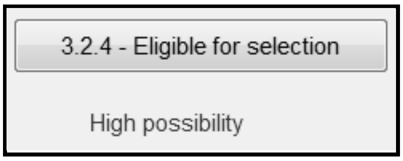
Write code to call the method that returns a message indicating the player's eligibility for selection. Display the message in the label **lblQ3_2_4**.

Example of output if the current score of the player is 8:



Medium possibility

Example of output if the current score of the player is 15:



High possibility

(2)

- Ensure that your examination number has been entered as a comment in the first line of the object class and the form class.
- Save all files.
- Print the code if required.

TOTAL SECTION C: 40

SECTION D

QUESTION 4: PROBLEM-SOLVING PROGRAMMING

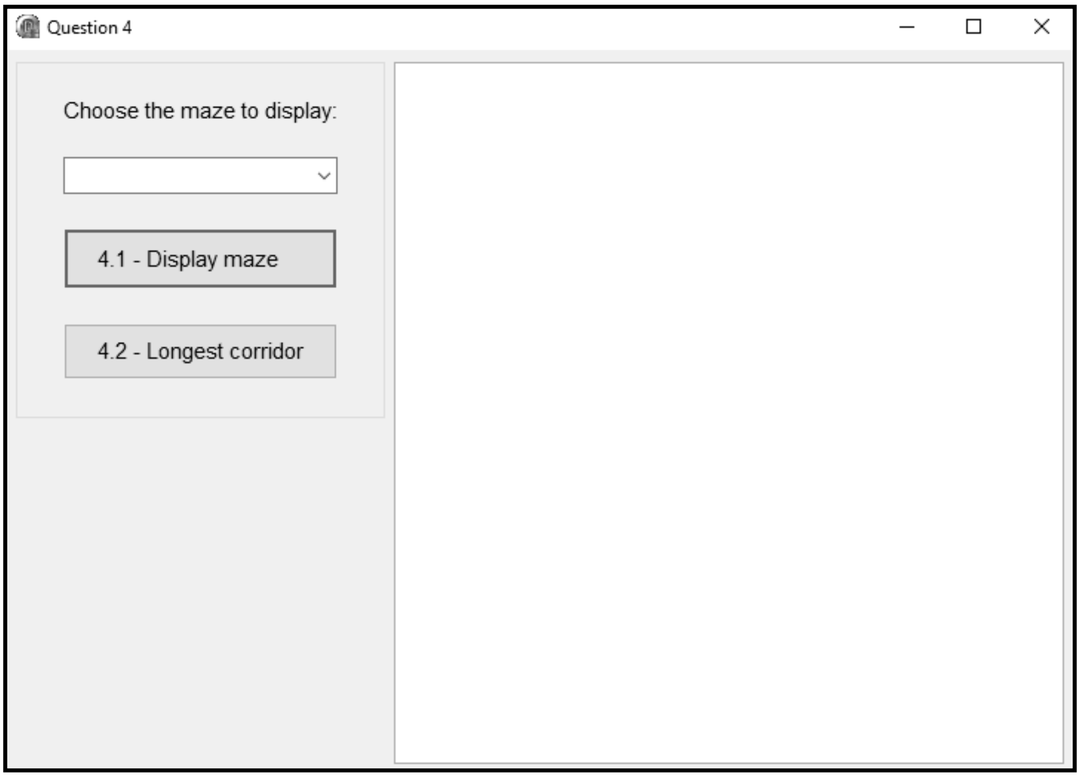
SCENARIO

A school uses a maze as a team-building activity for the rugby and netball first teams.

Do the following:

- Open the incomplete program in the **Question 4** folder.
- Enter your examination number as a comment in the first line of the **Question4_U.pas** file.
- Compile and execute the program. The program has no functionality currently.

Example of the GUI:



The following code has been provided:

```
const
  iRowCount = 16;
var
  arrMaze : array[1..iRowCount] of String;
```

The maze is represented using various characters as follows:

- The '@' character indicates the outer border of the maze.
- The '#' character indicates a barrier (wall).
- The dash ('-') character indicates an open space (corridor).

Complete the code for EACH section of QUESTION 4, as described in QUESTION 4.1 and QUESTION 4.2 that follow.

4.1 **Button [4.1 - Display maze]**

A combo box called **cmbQ4_1** has been populated with the names of the three mazes, namely **Maze 1**, **Maze 2** and **Maze 3**. Three text files called **Maze 1.txt**, **Maze 2.txt** and **Maze 3.txt** are provided. Each text file contains lines of characters that represent the layout of each maze respectively.

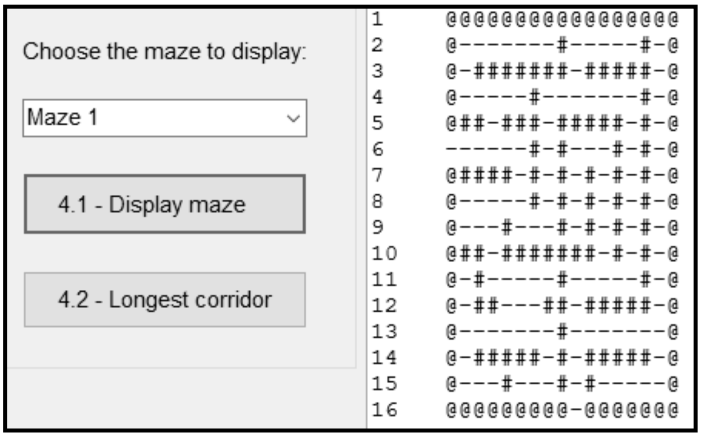
The user must select a maze from combo box **cmbQ4_1.**

Code has been provided to clear the component called **redQ4**.

Write code to do the following:

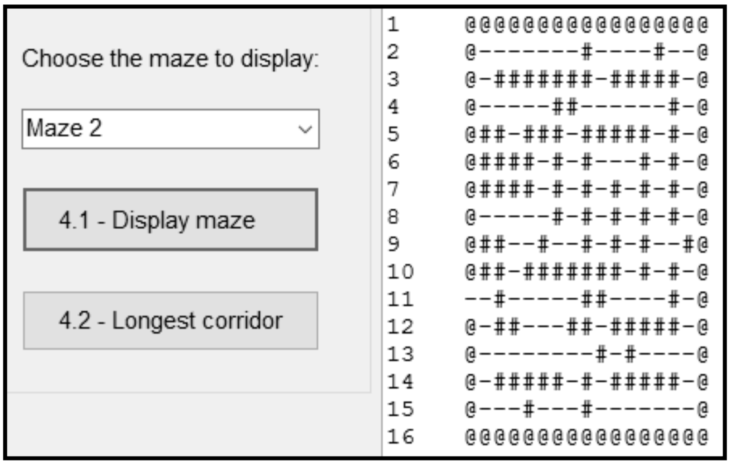
- Extract the name of the selected maze from combo box **cmbQ4_1**.
- Display a suitable message if a text file does NOT exist for the selected maze.
- Do the following if a text file for the selected maze does exist:
  - o Read ONE line at a time from the text file.
  - o Save EACH line at the correct index in the array **arrMaze** provided.
  - o Display EACH line of the maze with its corresponding line number in the output component **redQ4**.

Example of output if **Maze 1** was selected from the combo box:



```
1     @@@@@@@@@@@@@@@@@
2     @-------#-----#-@
3     @-#######-#####-@
4     @-----#-------#-@
5     @##-###-#####-#-@
6     ------#-#---#-#-@
7     @####-#-#-#-#-#-@
8     @-----#-#-#-#-#-@
9     @---#---#-#-#-#-@
10    @##-#######-#-#-@
11    @-#-----#-----#-@
12    @-##---##-#####-@
13    @-------#-------@
14    @-#####-#-#####-@
15    @---#---#-#-----@
16    @@@@@@@@@-@@@@@@@
```

Example of output if **Maze 2** was selected from the combo box:



```
1     @@@@@@@@@@@@@@@@@
2     @-------#----#--@
3     @-#######-#####-@
4     @-----##------#-@
5     @##-###-#####-#-@
6     @####-#-#---#-#-@
7     @####-#-#-#-#-#-@
8     @-----#-#-#-#-#-@
9     @##--#--#-#-#--#@
10    @##-#######-#-#-@
11    --#-----##----#-@
12    @-##---##-#####-@
13    @--------#-#----@
14    @-#####-#-#####-@
15    @---#---#-------@
16    @@@@@@@@@@@@@@@@@
```

(11)

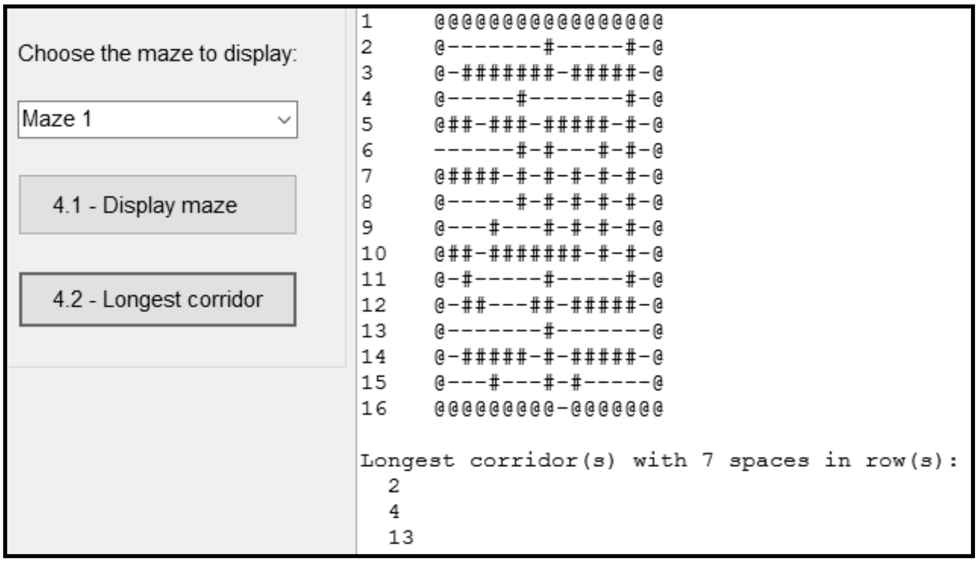
4.2 **Button [4.2 - Longest corridor]**

The longest corridor refers to the maximum number of consecutive horizontal open spaces in a row in the maze. An open space is represented by the dash ('-') character.

Write code to do the following:

- Determine the maximum number of consecutive horizontal open spaces in a row in the array **arrMaze**.
- Display the maximum number of consecutive horizontal open spaces as part of an output statement.
- Display a list of row(s) that contains a corridor with the maximum number of consecutive horizontal open spaces.

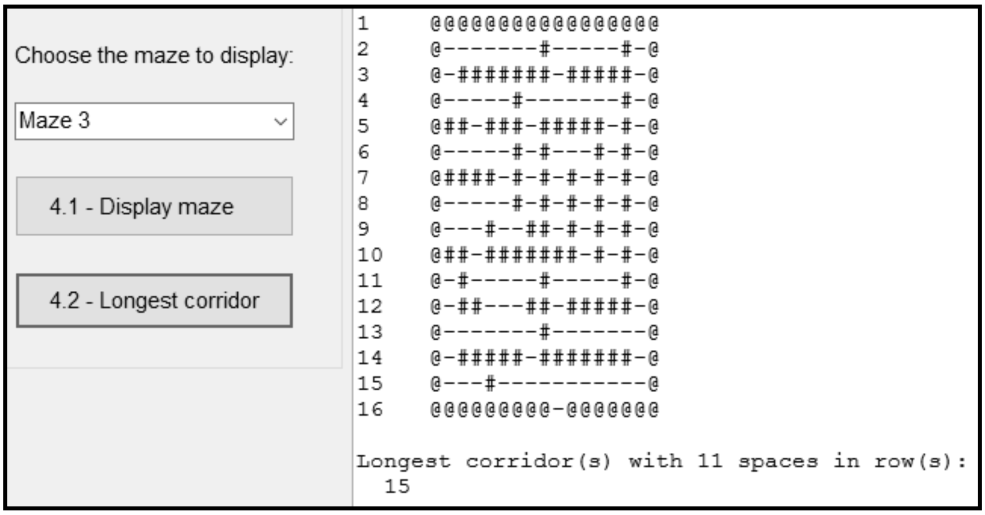
Example of output for **Maze 1**:



```
1     @@@@@@@@@@@@@@@@@
2     @-------#-----#-@
3     @-#######-#####-@
4     @-----#-------#-@
5     @##-###-#####-#-@
6     ------#-#---#-#-@
7     @####-#-#-#-#-#-@
8     @-----#-#-#-#-#-@
9     @---#---#-#-#-#-@
10    @##-#######-#-#-@
11    @-#-----#-----#-@
12    @-##---##-#####-@
13    @-------#-------@
14    @-#####-#-#####-@
15    @---#---#-#-----@
16    @@@@@@@@@-@@@@@@@

Longest corridor(s) with 7 spaces in row(s):
  2
  4
  13
```

Example of the output for **Maze 3**:



```
1     @@@@@@@@@@@@@@@@@
2     @-------#-----#-@
3     @-#######-#####-@
4     @-----#-------#-@
5     @##-###-#####-#-@
6     @-----#-#---#-#-@
7     @####-#-#-#-#-#-@
8     @-----#-#-#-#-#-@
9     @---#--##-#-#-#-@
10    @##-#######-#-#-@
11    @-#-----#-----#-@
12    @-##---##-#####-@
13    @-------#-------@
14    @-#####-#######-@
15    @---#-----------@
16    @@@@@@@@@-@@@@@@@

Longest corridor(s) with 11 spaces in row(s):
  15
```

(19)

- Ensure that your examination number has been entered as a comment in the first line of the program file.
- Save your program.
- Print the code if required.

TOTAL SECTION D: 30
GRAND TOTAL: 150

INFORMATION TECHNOLOGY P1

DATABASE INFORMATION OF HockeyDB FOR QUESTION 2:

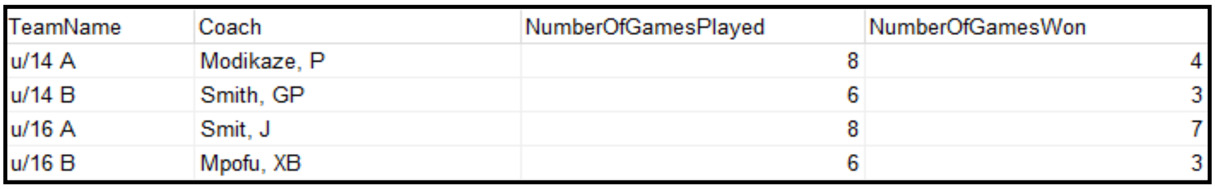
The design of the database tables is as follows:

Table: **tblTeams**

This table contains the data of all the hockey coaches.

Field name	**Data type**	**Description**
TeamName (PK)	Text (10)	A unique team name. A team name is saved in the format 'u/18 A', where A indicates an A-team, B indicates a B-team and so on. The number 18 is the age group of the team players.
Coach	Text (25)	The surname and initials of the team's coach
NumberOfGamesPlayed	Integer	The total number of games the team played this season
NumberOfGamesWon	Integer	The total number of games the team won this season

Example of the first four records of the **tblTeams** table:



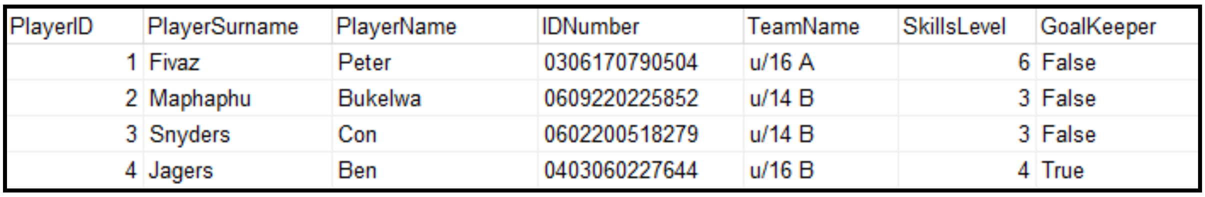
TeamName	Coach	NumberOfGamesPlayed	NumberOfGamesWon
u/14 A	Modikaze, P	8	4
u/14 B	Smith, GP	6	3
u/16 A	Smit, J	8	7
u/16 B	Mpofu, XB	6	3

Table: **tblPlayers**

This table contains the data of the hockey players of three different age groups:

Field name	**Data type**	**Description**
PlayerID (PK)	Autonumber	A unique number assigned to the player
PlayerSurname	Text (25)	The surname of the player
PlayerName	Text (25)	The name of the player
IDNumber	Text (20)	The South African ID number – first 6 digits is the person's date of birth in the format yymmdd.
TeamName	Text (10)	The team name that the player is a member of, e.g. 'u/18 A'
SkillsLevel	Integer	A value in the range 1 to 10 indicating the player's skills level. A value of 1 indicates a low skills level. A value of 10 indicates a high skills level.
GoalKeeper	Boolean	A value indicating whether the player is a goalkeeper (true) or not (false)

Example of the first four records of the **tblPlayers** table:

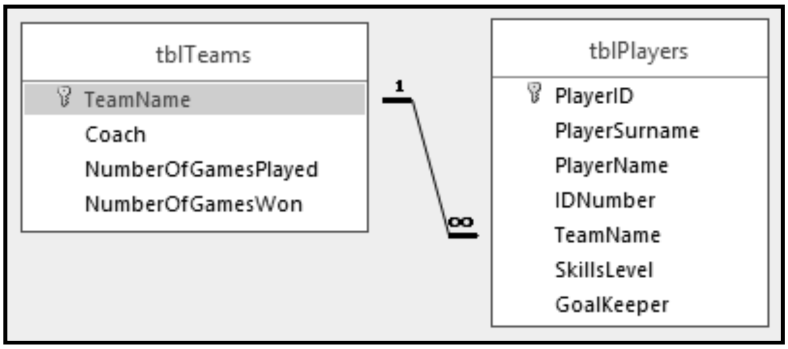


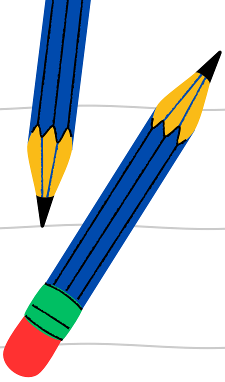
PlayerID	PlayerSurname	PlayerName	IDNumber	TeamName	SkillsLevel	GoalKeeper
1	Fivaz	Peter	0306170790504	u/16 A	6	False
2	Maphaphu	Bukelwa	0609220225852	u/14 B	3	False
3	Snyders	Con	0602200518279	u/14 B	3	False
4	Jagers	Ben	0403060227644	u/16 B	4	True

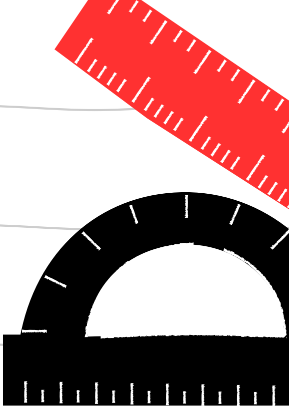
NOTE:

- Connection code has been provided.
- The database is password protected, therefore you will not be able to access the database directly.

The following one-to-many relationship with referential integrity exists between the two tables in the database:







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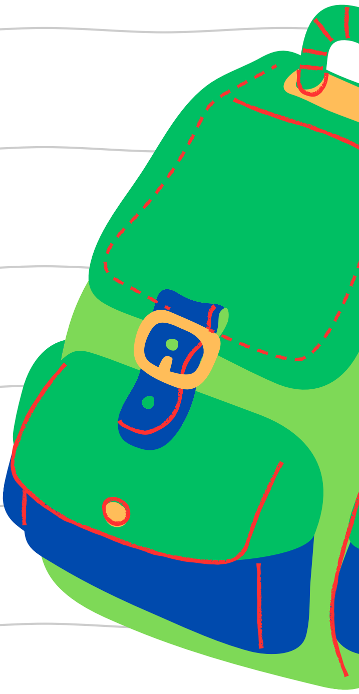
INFORMATION TECHNOLOGY PAPER 1 (2019)

ANSWER PAPER



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GRADE12

INFORMATION TECHNOLOGY P1

NOVEMBER 2019

MARKING GUIDELINES

MARKS: 150

These marking guidelines consist of 24 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 3-12) include the marking grid for each question for using a programming language.

- **Annexures E, F, G and H** (pages 13-24) contain examples of solutions for Questions 1 to 4 in programming code.

- Copies of **Annexures A, B, C, D and Summary of learner's marks** (pages 3-12) 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	**Button [1.1 - Display amount due]** Declare a constant variable PRICE and set it to 14.95 ✓ Declare a real variable for the amount due ✓ Declare a variable for the number of pizzas ✓ Retrieve number from spnQ1_1✓ Calculate amount using PRICE ✓ Change font size of label to 20pt ✓ Display amount on lblQ1_1✓ converted to string and currency format ✓	**8**	
1.2	**Button [1.2 – Pythagoras]** Create variables for sides A, B and C ✓ Assign length of 4 to A ✓ Extract length of side B ✓ and convert to number format✓ C = sqrt ✓ (sqr(A) + sqr(B)) correctly applied sqr(A) OR A * A✓ correctly applied sqr(rB) OR B * B✓ adding up the two values✓ Display length of side C on panel✓ formatted to one decimal place✓ **Accept**: Sqr: Power(A, 2) sqrt : Power((sqr(A) + sqr(B)),0.5)	**10**	
1.3	**Button [1.3 - Determine lowest number]** Assign random number ✓in the correct range✓ to variable Display number✓ convert to string✓ Test (if) ✓ number < lowest ✓ Assign number to lowest ✓ Display lowest in edtQ1_3✓ converted to string✓ **Accept**: RandomRange(1, 101) Random(100) + 1 Ceil(Random() * 100)	**9**	

1.4	**Button [1.4 - Display decrypted string]** Read input string using an input box ✓ With correct parameters ✓ Loop ✓ from first ✓ to last character ✓ Correct test performed (If/Case) ✓ Extract character at index ✓ Test against digit ✓ for all 10 digits ✓ Replace digit at correct index ✓ With correct character ✓ for all 10 digits ✓ Display✓ **Concepts** Getting input from input box (1) with correct parameters (1) Loop (1) from first (1) to last character (1) Correct test (If/Case) (1) Extract character at index (1) Test against digit (1) for all 10 digits (1) Replace digit at correct index (1) With correct character (1) for all 10 characters (1) Display (1)	**13**	
	TOTAL SECTION A:	**40**	

ANNEXURE B

QUESTION 2: MARKING GRID – SQL AND DATABASE

CENTRE NUMBER:	**EXAMINATION NUMBER:**		
QUESTION	**DESCRIPTION**	**MAX. MARKS**	**LEARNER'S MARKS**
2.1	**SQL statements**		
2.1.1	**Button [2.1.1 – Best players]**	**3**	

	`SELECT PlayerSurname, PlayerName FROM tblPlayers`
	`WHERE SkillsLevel = 10`		

	Concepts:
	SELECT PlayerSurname, PlayerName✓
	FROM tblPlayers ✓
	WHERE SkillsLevel = 10✓		

2.1.2	**Button [2.1.2 – B-team coaches]**	**4**	

	`SELECT Coach, TeamName FROM tblTeams WHERE`
	`TeamName Like "%B"`		

	Concepts:
	SELECT Coach, TeamName ✓
	FROM tblTeams ✓
	WHERE TeamName LIKE✓ "%B"✓		

2.1.3	**Button [2.1.3 – Percentage games won]**	**4**	

	`SELECT TeamName, Coach,`
	`(NumberOfGamesWon/NumberOfGamesPlayed*100)`
	`AS PercentageGamesWon`
	`FROM tblTeams`
	`WHERE TeamName = "' + sTeam + '"`		

	Concepts: SELECT TeamName, Coach, ✓ (NumberOfGamesWon/NumberOfGamesPlayed✓*100), ✓ AS PercentageGamesWon FROM tblTeams WHERE TeamName = " ' + sTeam + ' " '✓ **Alternative:** ‘WHERE TeamName = ‘ + QuotedStr(sTeam)		

2.1.4	**Button [2.1.4 - Team average more than 6]**	5	

	`SELECT TeamName, ROUND(AVG(SkillsLevel),1)`
	`AS AverageSkillsLevel`
	`FROM tblPlayers`
	`GROUP BY TeamName HAVING AVG(SkillsLevel) > 6`		

	Concepts:
	SELECT TeamName, ROUND(AVG(SkillsLevel) ✓,1) ✓
	AS AverageSkillsLevel ✓
	FROM tblPlayers
	GROUP BY TeamName✓
	HAVING AVG(SkillsLevel) > 6✓		

2.1.5	**Button [2.1.5 – Update games won]**	3	

	`UPDATE tblTeams`
	`SET NumberOfGamesWon = NumberOfGamesWon + 1`
	`WHERE TeamName <> "u/14 B"`		

	Concepts:
	UPDATE tblTeams ✓
	SET NumberOfGamesWon = NumberOfGamesWon +1 ✓
	WHERE teamName <> "u/14 B"✓		

	Subtotal:	**19**	

2.2	**Database manipulation using Delphi code**		
2.2.1	**Button [2.2.1 – Junior players in u/18 A team]** AssignFile ✓& Rewrite✓ Set tblPlayers to start reading first record✓ Loop while NOT tblPlayers.EOF✓ Test if teamName is ‘u/18 A’ ✓ AND if first 2 characters of IDnumber field is >=3✓ Write surname and name to file✓ Increment counter by 1✓ Go to next record in tblPlayers✓ End loop Close file✓ Display counter for number of junior players on label ✓	**11**	

2.2.2	**Button [2.2.2 – Coach and goalkeeper information]** Loop while NOT tblTeams.EOF✓ Set tblPlayers to start reading first record✓ Loop while NOT tblPlayers.EOF✓ Test if: the TeamName field in tblTeams equals the TeamName field in tblPlayers ✓ AND Goalkeeper = true✓ Add team name, coach name, ✓ player surname and name in the correct format to output string ✓ Go to next record in tblPlayers✓ Display output line✓ Go to next record in tblTeams✓ **Alternative:** Loop while NOT tblPlayers.EOF (1) Test Goalkeeper = true (1) Set tblTeams to start reading first record (1) Loop while NOT tblTeams.EOF (1) Test if the TeamName field in tblTeams equals the TeamName field in tblPlayers (1) Add team name, coach name, (1) player surname and name in the correct format to output string (1) Go to next record in tblTeams (1) Display output line (1) Go to next record in tblPlayers (1)	**10**	
	Subtotal:	**21**	

	TOTAL SECTION B:	**40**	

ANNEXURE C

QUESTION 3: MARKING GRID - OBJECT-ORIENTED PROGRAMMING

QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
3.1.1	**Constructor method:** Heading with correct parameters and data type✓ Assign name of player parameter value to fPlayerName ✓ Assign weight of player parameter value to fWeightOfPlayer ✓ Set fScore to 0 ✓	**4**	
3.1.2	**getScore method:** Function heading with integer as return data type ✓ fScore assigned to result ✓	**2**	
3.1.3	**updateScore method:** Procedure heading with integer parameter ✓ Increment fScore ✓ Using the parameter value ✓	**3**	
3.1.4	**calculateBMI method:** Function declared with real return data type and a real parameter for the height and return calculated BMI ✓ Calculation: fWeightOfPlayer / ✓ Sqr (parameter value height of player) ✓	**3**	
3.1.5	**eligibleForSelection method:** Test if score is a value between 0 and 7 (inclusive) ✓ result = Low possibility ✓ Test if score is between 8 and 14 (inclusive) result = Medium possibility ✓ Test if score is > 14 result = High possibility ✓	**4**	
3.1.6	**toString method:** Labels (Name, Weight, Current score) ✓ Correct attributes ✓ Correct conversions (weight – float; score – integer) ✓ Return string ✓	**4**	
	Subtotal: Object class	**20**	

QUESTION 3: MARKING GRID (CONT.)

QUESTION	DESCRIPTION	MAX. MARKS	LEARNER'S MARKS
3.2.1	**Button [3.2.1 - Instantiate object]** *Instantiate the objPlayer object:* objPlayer := ✓ TPlayer.Create ✓ Pass name and weight in correct order ✓ and correct data type (same as constructor) ✓ Use dialog box to indicate object has been instantiated✓	**5**	
3.2.2	**Button [3.2.2 - Calculate BMI]** Use Input Dialog box ✓ to enter height Call the method calculateBMI using the object✓ using the height as argument ✓ converted to float Display the information in **redQ3_2_2** ✓ using the toString method of the object ✓ Display the BMI in **redQ3_2_2** ✓ in the correct format to one decimal place ✓	**7**	
3.2.3	**Button [3.2.3 – Update score]** Retrieve itemindex from the radio group ✓ to get the score ✓ Call the updateScore method ✓ using correct argument ✓ Display the updated score in **pnlQ3_2_3** ✓ by using the getScore method ✓	**6**	
3.2.4	**Button [3.2.4 – Eligible for selection]** Call the relevant method as follows: Display on the label **lblQ3_2_4** ✓ Using objPlayer.eligibleForSelection ✓	**2**	
	Subtotal: Form class	**20**	
	TOTAL SECTION C:	**40**	

ANNEXURE D

QUESTION 4: MARKING GRID–PROBLEM SOLVING

CENTRE NUMBER:	**EXAMINATION NUMBER:**		
SECTION	**DESCRIPTION**	**MAX. MARKS**	**LEARNER'S MARKS**
4.1	**Button [4.1 – Display maze]** Select maze from combo box✓ Correct file name + ‘.txt’ ✓ Test and display a message if the text file does not exist ✓ Assign and reset the file ✓ Initialise index variable ✓ Loop through the text file ✓ Increment the value of index ✓ (position depends on initialisation) Read line ✓ Assign the line to the array arrMaze✓ Display the line number ✓ and line ✓	**11**	
4.2	**Button [4.2 – Longest corridor]** Initialize variable to save maximum value to 0✓ Loop through array✓ Initialize variable to keep longest corridor in line✓ Initialize variable to count consecutive ‘-‘ in line✓ Loop through each character ✓ on each line ✓ Test if character is dash (-)✓ Increment dash counter✓ If dash counter more than longest in line✓ Replace longest corridor in line with counter✓ Else if character is not –✓ Set dash counter to 0✓ Save longest corridor in line in array/string✓ If longest in line longer than overall longest ✓ – replace ✓ Display message with length of longest corridor✓ Loop through structure with longest corridors per line✓ Display line number✓ where length is same as maximum length✓ **CONCEPTS**: Initialise variable for longest corridor to 0 (1) Loop through the array (1) Initialise dash counter per line (1) and maximum number of continued dashes per line (1) Loop through each character in the line (2) Test if character is a dash (1) Increment the dash counter (1) Test if the dash counter is longest in that line (2) and save to maximum number (1) If character is not a dash (1) Reset the dash counter to zero (1)	**19**	

	Determine longest passage in all the lines in the maze (test and save max) (2) Display longest corridor in the maze (1) Test for lines with same length of longest corridor (2) Display line number(s) (1)		
	TOTAL SECTION D:	**30**	

GRAND TOTAL:	**150**	

SUMMARY OF LEARNER'S MARKS:

NUMBER OF CENTER:		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

```
unit Question1_u;

interface

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

type
  TfrmQ1 = class(TForm)
    gpbQ1_1: TGroupBox;
    gpbQ1_4: TGroupBox;
    gpbQ1_3: TGroupBox;
    btnQ1_1: TButton;
    btnQ1_4: TButton;
    edtQ1_3: TEdit;
    btnQ1_3: TButton;
    redQ1_3: TRichEdit;
    btnReset: TButton;
    GroupBox1: TGroupBox;
    btnQ1_2: TButton;
    Label1: TLabel;
    pnlQ1_2: TPanel;
    lblQ1_1: TLabel;
    lbl1_2Pizzas: TLabel;
    edtQ1_2Diameter: TEdit;
    Label2: TLabel;
    Label3: TLabel;
    edtQ1_2Width: TEdit;
    Label4: TLabel;
    spnQ1_1: TSpinEdit;
    Label5: TLabel;

    procedure btnResetClick(Sender: TObject);
    procedure btnQ1_1Click(Sender: TObject);
    procedure btnQ1_2Click(Sender: TObject);
    procedure btnQ1_3Click(Sender: TObject);
    procedure btnQ1_4Click(Sender: TObject);
    procedure FormActivate(Sender: TObject);

  private
    { Private declarations }
  public
    iLowest: integer; // global
    { Public declarations }
  end;

var
  frmQ1: TfrmQ1;

implementation

{$R *.dfm}
```

```
====================================================================
                     Question 1.1 = 8 marks
====================================================================
procedure TfrmQ1.btnQ1_1Click(Sender: TObject);
const
  PRICE = 14.95;
var
  iNumber: integer;
  rAmount: real;
begin
  lblQ1_1.Font.Size := 20;
  iNumber := spnQ1_1.Value;
  rAmount := iNumber * PRICE;
  lblQ1_1.Caption := FloatToStrF(rAmount, ffCurrency, 10, 2);
end;

====================================================================
                     Question 1.2 = 10 marks
====================================================================
procedure TfrmQ1.btnQ1_2Click(Sender: TObject);
var
  rA, rB, rC : real;
begin
  // Question 1.2
  rA := 4;
  rB := StrToFloat(edtQ1_2.Text);
  rC := Sqrt(Sqr(rA) + Sqr(rB));
  pnlQ1_2.Caption := FloatToStrF(rC,ffFixed,8,1);
end;
====================================================================
                     Question 1.3 = 9 marks
====================================================================
procedure TfrmQ1.btnQ1_3Click(Sender: TObject);
var // Provided code
  iNumber: integer;

begin
  iNumber := random(100) + 1;
  redQ1_3.lines.Add(IntToStr(iNumber));
  if iNumber < iLowest then
    iLowest := iNumber;
  edtQ1_3.Text := IntToStr(iLowest);
end;
```

```
===================================================================
                     Question 1.4 = 13 marks
===================================================================
procedure TfrmQ1.btnQ1_4Click(Sender: TObject);
const
  ALPHA = 'ABCDEFGHIJ';

var // Provided code
  sString, sDisplay: String;
  I, iIndex: integer;

begin
  // Provided code
  sString := InputBox('Enter an encrypted string: ', '', '');
  sDisplay := '';
  for I := 1 to Length(sString) do
    if sString[I] in ['0' .. '9'] then
      begin
        iIndex := strtoint(sString[I]) + 1;
        sDisplay := sDisplay + ALPHA[iIndex];
      end
    else
      sDisplay := sDisplay + sString[I];
  ShowMessage(sDisplay);

end;

==================================================================
                     Provided code
==================================================================
procedure TfrmQ1.btnResetClick(Sender: TObject);
begin
  // given code - do not change
  iLowest := 100;
  redQ1_3.Clear;
  edtQ1_3.Clear;
end;

procedure TfrmQ1.FormActivate(Sender: TObject);
begin
  // given code - do not change
  iLowest := 100;
  redQ1_3.Clear;
  edtQ1_3.Clear;
  CurrencyString := 'R';
end;

end.
```

ANNEXURE F: SOLUTION FOR QUESTION 2

QUESTION 2.1: SQL code

```
====================================================================
  Question 2.1: 2.1.1(3), 2.1.2(4), 2.1.3(4), 2.1.4(5), 2.1.5 (3)
====================================================================

2.1.1: SELECT PlayerSurname, PlayerName
       FROM tblPlayers WHERE SkillsLevel = 10

2.1.2: SELECT Coach, TeamName
       FROM tblTeams
       WHERE TeamName Like "%B"

2.1.3: SELECT TeamName, Coach,
       (NumberOfGamesWon/NumberOfGamesPlayed*100)
       AS [PercentageGamesWon]
       FROM tblTeams
       WHERE TeamName = "' + sTeam + '"

2.1.4: SELECT TeamName, ROUND(AVG(SkillsLevel),1)
       AS [AverageSkillsLevel]
       FROM tblPlayers
       GROUP BY TeamName HAVING AVG(SkillsLevel) > 6

2.1.5: UPDATE tblTeams
       SET NumberOfGamesWon = NumberOfGamesWon + 1
       WHERE TeamName <> "u/14 B"
```

QUESTION 2.2: DATABASE MANIPULATION using Delphi Code

```
// {$REGION 'QUESTION 2.2'}

=======================================================================
                        Question 2.2.1 = 11 marks
=======================================================================
procedure TfrmDBQuestion2.btnQ2_2_1Click(Sender: TObject);
var
  tFile: textfile;
  iCnt, iYear: integer;
begin
  AssignFile(tFile, 'Junior18A.txt');
  Rewrite(tFile);
  tblPlayers.first;
  iCnt := 0;
  while not tblPlayers.eof do
  begin
    iYear := strToInt(copy(tblPlayers['IDNumber'], 1, 2));
    if (tblPlayers['TeamName'] = 'u/18 A') AND(iYear >= 3) then
      begin
        Writeln(tFile,
         tblPlayers['PlayerSurname'] + ' ' + tblPlayers['PlayerName']);
        inc(iCnt);
      end;
    tblPlayers.Next;
  end;
  CloseFile(tFile);
  lblQ2_2_1.Caption := 'Number of young players: ' + IntToStr(iCnt);

  // Provided code
  dbCONN.setupGrids(dbgrdONE, dbgrdMANY, dbgrdSQL);
end;

 ===================================================================
                     Question 2.2.2 = 10 marks
 ===================================================================
procedure TfrmDBQuestion2.btnQ2_2_2Click(Sender: TObject);
var
  sOut: String; // variable to save selected team

begin
  // -- Provided code  ----
  redQ2_2_2.Clear;
  redQ2_2_2.Paragraph.TabCount := 2;
  redQ2_2_2.Paragraph.Tab[0] := 100;
  redQ2_2_2.Paragraph.Tab[1] := 200;
  redQ2_2_2.Lines.Add('TeamName' + #9 + 'Coach' + #9 + 'Goalkeeper');

  // --------------------------------------------------
  // Type your code here:

  tblTeams.first;
  while NOT tblTeams.eof do
  begin
    sOut := tblTeams['TeamName'] + #9 + tblTeams['Coach'] + #9;
    tblPlayers.first;
    while NOT tblPlayers.eof do
    begin
      if (tblTeams['TeamName'] = tblPlayers['TeamName']) AND
(tblPlayers['GoalKeeper'] = true)
        then
      begin
        sOut := sOut + tblPlayers['PlayerSurname'] + ', ' + tblPlayers
          ['PlayerName'];
      end;
      tblPlayers.Next;
    end;
    tblTeams.Next;
    redQ2_2_2.Lines.Add(sOut);
  end;
```

```
================================================================
{$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.setupControls(grpTB_1,grpTB_2);
  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
  CurrencyString := 'R';
end;

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

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

end.
```

ANNEXURE G: SOLUTION FOR QUESTION 3

Object class

```
unit Player_U;

interface

uses StdCtrls, SysUtils;

type
  TPlayer = class(TObject)

  //Provided code - do not modify
  private
      fPlayerName: String;
      fWeightOfPlayer : real;
      fScore : integer;

  public
    constructor create(sPlayerName : String; rWeightOfPlayer : real);
    function getScore : integer;
    function calculateBMI (rHeightOfPlayer : real) : real;
    procedure updateScore (iScore : integer);
    function eligibleForSelection: String;
    function toString : String;
end;

implementation

{ TPlayer }
===================================================================
                    Question 3.1.1 = 4 marks
===================================================================
constructor TPlayer.create(sPlayerName : String; rWeightOfPlayer :
real);
begin
   fPlayerName := sPlayerName;
   fWeightOfPlayer := rWeightOfPlayer;
   fScore := 0;
end;

===================================================================
                     Question 3.1.2 = 2 marks
===================================================================
function TPlayer.getScore: integer;
begin
  result := fScore;
end;

===================================================================
                     Question 3.1.3 = 3 marks
===================================================================
procedure TPlayer.updateScore(iScore: integer);
begin
  fScore := fScore  + iScore;
end;
```

```
====================================================================
                    Question 3.1.4 = 3 marks
====================================================================
function TPlayer.calculateBMI(rHeightOfPlayer: real) : real;
begin
  Result := fWeightOfPlayer / sqr(rHeightOfPlayer);
end;

====================================================================
                    Question 3.1.5 = 4 marks
====================================================================
function TPlayer.eligibleForSelection: String;
begin
 if fScore < 8 then
   result := 'Low possibility'
 else
   if fScore < 15 then
      result := 'Medium possibility'
   else
      result := 'High possibility'
end;

====================================================================
                    Question 3.1.6 = 4 marks
====================================================================
function TPlayer.toString : String;
begin
   result := 'Name: ' + fPlayerName + #13 + 'Weight: '+
FloatToStr(fWeightOfPlayer)+ #13+ 'Current score is: ' + intToStr
(fScore);
end;
end.
```

Main Form Unit

```
unit Question3_U;

interface

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

type
  TfrmQuestion3 = class(TForm)
    lblNameOfPlayer: TLabel;
    edtNameOfPlayer: TEdit;
    btnQ3_2_2: TButton;
    redQ3_2_2: TRichEdit;
    lblLatestScore: TLabel;
    pnlQ3_2_3: TPanel;
    btnQ3_2_3: TButton;
    btnQ3_2_1: TButton;
    rgpQ3_2_3: TRadioGroup;
    btnQ3_2_4: TButton;
    lblQ3_2_4: TLabel;
    Label1: TLabel;
    edtWeightOfPlayer: TEdit;
    Label3: TLabel;
    grpQ3_2_1: TGroupBox;
    grpQ3_2_2: TGroupBox;
    grpQ3_2_3: TGroupBox;
    grpQ3_2_4: TGroupBox;
    procedure btnQ3_2_2Click(Sender: TObject);
    procedure btnQ3_2_3Click(Sender: TObject);
    procedure btnQ3_2_1Click(Sender: TObject);
    procedure btnQ3_2_4Click(Sender: TObject);
  //  procedure FormCreate(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;

var
  frmQuestion3: TfrmQuestion3;
  // variables already declared
  objPlayer : TPlayer;
implementation

{$R *.dfm}
```

```
=====================================================================
                      Question 3.2.1 = 5 marks
=====================================================================
procedure TfrmQuestion3.btnQ3_2_1Click(Sender: TObject);
var
  sPlayerName : String;
  rPlayerWeight : real;
begin
      sPlayerName := edtNameOfPlayer.Text;
      rPlayerWeight := StrToFloat(edtWeightOfPlayer.Text);
      objPlayer := TPlayer.create(sPlayerName,rPlayerWeight);
      ShowMessage('Player object has been instantiated');
end;

=====================================================================
                      Question 3.2.2 = 7 marks
=====================================================================
procedure TfrmQuestion3.btnQ3_2_2Click(Sender: TObject);
var rHeightOfPlayer, rBMI : real;
    sBMI : String;

begin
  rHeightOfPlayer := StrToFloat(InputBox('Height of the player',
           'Enter the height of the player in meters: ',''));
  rBMI := objPlayer.calculateBMI(rHeightOfPlayer);
  sBMI := FloatToStrF(rBMI,ffFixed,3,1);
  redQ3_2_2.Lines.Add(objPlayer.toString);
  redQ3_2_2.Lines.Add ('BMI-index is '+ sBMI);
end;

=====================================================================
                      Question 3.2.3 = 6 marks
=====================================================================
procedure TfrmQuestion3.btnQ3_2_3Click(Sender: TObject);
var
  iScore: integer;
begin
   iScore := StrToInt(rgpQ3_2_3.Items[rgpQ3_2_3.ItemIndex]);
   objPlayer.updateScore(iScore);
   pnlQ3_2_3.Caption :=('New current score: ' +
           IntToStr(objPlayer.getScore));
end;

=====================================================================
                      Question 3.2.4 = 2 marks
=====================================================================
procedure TfrmQuestion3.btnQ3_2_4Click(Sender: TObject);
begin
  lblQ3_2_4.Caption := objPlayer.eligibleForSelection;
end;

end.
```

ANNEXURE H: SOLUTION FOR QUESTION 4

```
unit Question4_u;
interface
uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls,
Forms, Dialogs, StdCtrls, ComCtrls;
type
  TfrmQ4 = class(TForm)
    gpbQuestions: TGroupBox;
    btnQ4_1: TButton;
    btnQ4_3: TButton;
    cmbQ4_1: TComboBox;
    Label1: TLabel;
    redQ4: TRichEdit;
    procedure btnQ4_1Click(Sender: TObject);
    procedure btnQ4_2Click(Sender: TObject);
  private
    { Private declarations }
  public
    { Public declarations }
  end;
// Provided code
const
  iRowCount = 16;

var
  frmQ4: TfrmQ4;
  arrMaze: array [1..iRowCount] of String;

implementation
{$R *.dfm}
========================================================================
                        Question 4.1 = 11 marks
========================================================================
procedure TfrmQ4.btnQ4_1Click(Sender: TObject);
var
  iSelectMaze: integer;
  index: integer;
  sFileName, sLine: String;
  tNameFile: TextFile;
begin
========================================================================
                              Provided Code
========================================================================
  redQ4.Clear;
========================================================================
                        Code required to complete
========================================================================
index := 1; //first index in array arrMaze
sFileName := cmbQ4_1.Text + '.txt';
if FileExists(sFileName) then
  begin
    AssignFile(tNameFile, sFileName);
    Reset(tNameFile);
    While not(eof(tNameFile)) do
    begin
      Readln(tNameFile, sLine);
      arrMaze[index] := sLine;
       redQ4.Lines.Add(IntToStr(index) + #9 + sLine);
      Inc(index);
    end;
  end;
end;
```

```
========================================================================
                     Question 4.2 = 19 marks
========================================================================
procedure TfrmQ4.btnQ4_2Click(Sender: TObject);
var
  iRow, iCol, iCount, iLongestInLine, iMax: integer;
  arrRows: array [1..iRowCount] of integer;
  sRow: String;

begin
  iMax := 0;
  for iRow := 1 to iRowCount do
  begin
    sRow := arrMaze[iRow];

    iLongestInLine := 0;
    iCount := 0;
    for iCol := 1 to Length(sRow) do
    begin
      if sRow[iCol] = '-' then
      begin
        Inc(iCount);
        if iCount > iLongestInLine then
          iLongestInLine := iCount
      end
      else
        iCount := 0;
    end;
    arrRows[iRow] := iLongestInLine;

    if iMax < arrRows[iRow] then
      iMax := arrRows[iRow];
  end;

  redQ4.Lines.Add('');
  redQ4.Lines.Add('Longest corridor(s) with ' + IntToStr(iMax)
      + ' spaces in row(s):');
  for iRow := 1 to Length(arrRows) do
  begin
    if arrRows[iRow] = iMax then
      redQ4.Lines.Add('  ' + IntToStr(iRow));
  end;
end;

end.
```