FOR OFFICIAL USE

N5

National Qualifications 2017

Mark

X716/75/01 Computing Science

TUESDAY, 16 MAY
1:00 PM – 2:30 PM

X7167501

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth
Day Month Year

Scottish candidate number

Total marks — 90

SECTION 1 — 20 marks

Attempt ALL questions.

SECTION 2 — 70 marks

Attempt ALL questions.

Show all working.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Use **blue** or **black** ink.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

SQA ©

X7167501 01

MARKS | DO NOT WRITE IN THIS MARGIN

SECTION 1 — 20 marks

Attempt ALL questions

1. Describe the difference between an internal and an external hyperlink. **2**

2. Describe how a real number is stored in a computer's memory. **2**

3. The validity of a password is checked as part of a program.

```
. . .
Line 8      SET passValid TO false
Line 9      RECEIVE userPassword FROM (STRING) KEYBOARD
Line10      IF userPassword = storedPassword THEN
Line 11             SET passValid TO true
Line 12     END IF
. . .
```

State the **data type** used to store the variable "passValid". **1**

4. Describe how vector graphics are stored in a computer. **2**

5. A graphic of a dog is placed in front of a coloured rectangle.

State a suitable file format for the dog graphic. **1**

_____

6. An example of a URL (Uniform Resource Locator) is shown below.

https://www.largebank.com/loanadvice.rtf

Identify the standard file format that would be downloaded when this URL is selected. **1**

_____

7. Part of a program is shown below.

```
Line 1:    DECLARE score AS REAL INITIALLY 0·0
Line 2:    RECEIVE score FROM KEYBOARD
Line 3:     IF score > 2·0 THEN
Line 4:         SEND "Congratulations. You are in the final" TO DISPLAY
Line 5:     ELSE
Line 6:         SEND "You have failed to qualify" TO DISPLAY
Line 7:     END IF
```

Describe what happens in Lines 3 to 6 when the value 1·4 is entered at Line 2. **2**

_____

_____

_____

_____

8. An example of a database record is shown below.

Employees					
Employee ID	**Forename**	**Surname**	**Full Time**	**Home Phone Number**	**Mobile Phone Number**
2365	Dee	Rossborough	True	01383 712345	07974 354267

(a) Explain why the Employee ID field requires a presence check. **1**

(b) Employee photographs are to be added to the database record.

State a field type which should be used to contain a photograph of each employee. **1**

9. State the component that enables a processor and a hard disk drive to communicate. **1**

10. Some digital video cameras allow videos to be downloaded to computer systems using both a wired and wireless connection.

State one advantage of each transmission media over the other when downloading video. **2**

Wired advantage

Wireless advantage

11. State the feature of a web browser that ensures that the history of websites visited by a user are not saved. **1**

12. A complex condition is used to decide if hotel customers qualify for a free night's stay. Part of the program is shown below.

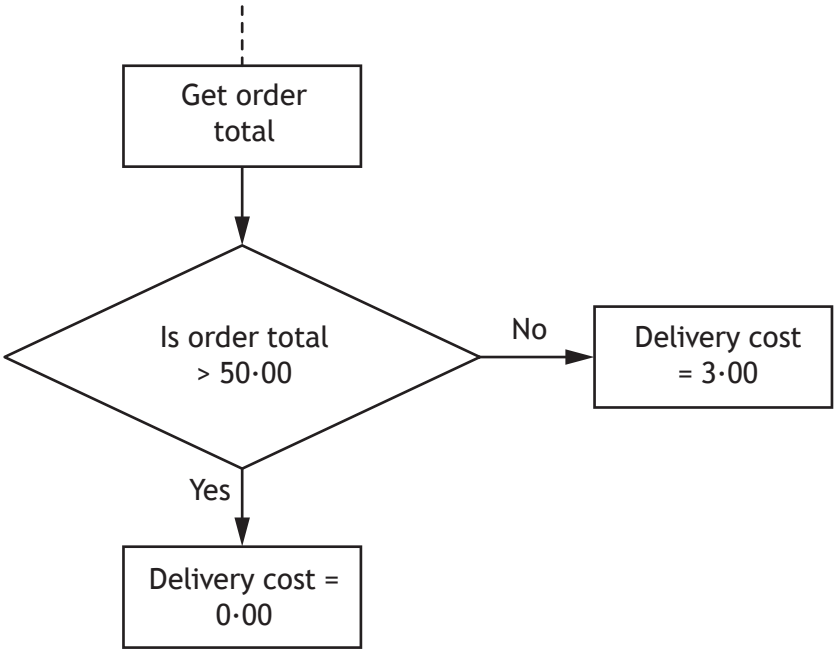
```
. . .
Line 21    IF nightsBooked >= 6  AND (NOT (cardType = Bronze)) THEN
Line 22          SEND custName TO DISPLAY
Line 23    END IF
. . .
```

State all possible outputs when the following test data is used in this program. **2**

custName	cardType	nightsBooked
J Kerr	Gold	3
P Singh	Silver	8
R Kroon	Bronze	7
H Smith	Gold	6

[Turn over

13. Part of the design of a program is shown below.



Identify the graphical design notation shown above. **1**

_____

SECTION 2 — 70 MARKS

Attempt ALL Questions

14. Bike Scotland uses a flat file database to store details of its members and affiliated cycling clubs.

Membership Number	Forename	Surname	Date of Birth	Club Code	Club Name	Founded	Number of Members
011-423	Alojzy	Czajka	15/03/1979	24FW05	Free Wheel	16/10/2000	67
192-033	Donny	Carruthers	20/02/1982	77SU22	Spokes United	29/04/1985	29
213-847	Salim	Hanif	09/06/1994	12DW39	District Wheelers	03/01/1954	45
624-536	Harry	Fence	01/02/1963	12DW39	District Wheelers	03/01/1954	45
018-253	Derrick	Smith	12/12/1970	77SU22	Spokes United	29/04/1985	29
773-362	Maria	Amonte	02/11/1999	24FW05	Free Wheel	16/10/2000	67
836-555	Fiona	Hewitt	20/02/1972	77SU22	Spokes United	29/04/1985	29
983-543	Samantha	Wellbeck	18/09/1975	77SU22	Spokes United	29/04/1985	29
098-133	Tracy	Uttley	30/05/2000	12DW39	District Wheelers	03/01/1954	45

(a) State the **field type** used to store each Membership Number. **1**

_____

(b) The database contains personal information.

(i) State the **Act** with which Bike Scotland must comply. **1**

_____

_____

(ii) Describe what Bike Scotland must do to ensure it complies with this Act when collecting this information. **1**

_____

_____

_____

14. (continued)

The database is redesigned and implemented as a relational database with two linked tables.

Cyclist

Membership Number	Forename	Surname	Date of Birth	Club Code
098-133	Tracy	Uttley	30/05/2000	12DW39
213-847	Salim	Hanif	09/06/1994	12DW39
624-536	Harry	Fence	01/02/1963	12DW39
011-423	Alojzy	Czajka	15/03/1979	24FW05
773-362	Maria	Amonte	02/11/1999	24FW05
018-253	Derrick	Smith	12/12/1970	77SU22
192-033	Donny	Carruthers	20/02/1982	77SU22
836-555	Fiona	Hewitt	20/02/1972	77SU22
983-543	Samantha	Wellbeck	18/09/1975	77SU22

Club

Club Code	Club Name	Founded	Number of Members
12DW39	District Wheelers	03/01/1954	45
24FW05	Free Wheel	16/10/2000	67
77SU22	Spokes United	29/04/1985	29

(c) Describe two advantages of using a relational database rather than a flat file database for storing the data. **2**

Advantage 1 _____

_____

Advantage 2 _____

_____

14. (continued)

(d) (i) Explain why the Club Code field is a primary key and a foreign key in the relational database. **2**

(ii) When adding a new club to the Club table the following error message is displayed:

Club code **12OYB22** is invalid, please re-enter

State the validation that has been applied to the field Club Code. **1**

(e) The Cyclist table has been sorted on two fields.

Describe how the table has been sorted. **2**

[Turn over

15. A program is being developed to monitor the availability of parking spaces in a multi-level car park. The car park has three levels, each with 50 numbered spaces and a digital display board that shows the number of spaces available on each level.

Level	Numbered Spaces
Red	1–50
Black	51–100
Yellow	101–150

Part of the program is shown below:

```
Line 1    DECLARE redAvailable AS INTEGER INITIALLY 50
Line 2    DECLARE blackAvailable AS INTEGER INITIALLY 50
Line 3    DECLARE yellowAvailable AS INTEGER INITIALLY 50
. . .
. . .
                < vehicle is detected occupying a space>
. . .
. . .

Line 22   IF spaceNumber ≥1 AND spaceNumber ≤50 THEN
Line 23       redAvailable = redAvailable – 1
Line 24   END IF

. . .
. . .
```

(a) Explain why integer data types are used in Lines 1 to 3. **1**

15. (continued)

(b) Name the part of the computer system that will carry out each of the following tasks during the execution of Line 23.

(i) Carries the location of redAvailable in main memory. **1**

_____

(ii) Transfers the value of redAvailable from main memory to the processor. **1**

_____

(iii) Calculates the new value of redAvailable. **1**

_____

[Turn over

15. (continued)

When a vehicle parks, the digital display board will be updated to show the number of available spaces on each level.

(c) (i) Complete the condition below, that will display the message "FULL" when all the spaces on the Red Level are occupied. **1**

IF_____THEN

SEND "FULL" TO DISPLAY

END IF

(ii) Each of the letters of the message **FULL** will be stored as an ASCII character.

Calculate the number of bits required to store this message. **1**

15. (continued)

(d) Each of the parking space numbers is stored in binary.

State the decimal equivalent of the binary number 01101100. **1**

(e) While the parking space program is being developed, it is executed using an interpreter.

(i) State one advantage of using an interpreter rather than a compiler at the development stage of a program. **1**

(ii) The finished program is compiled.

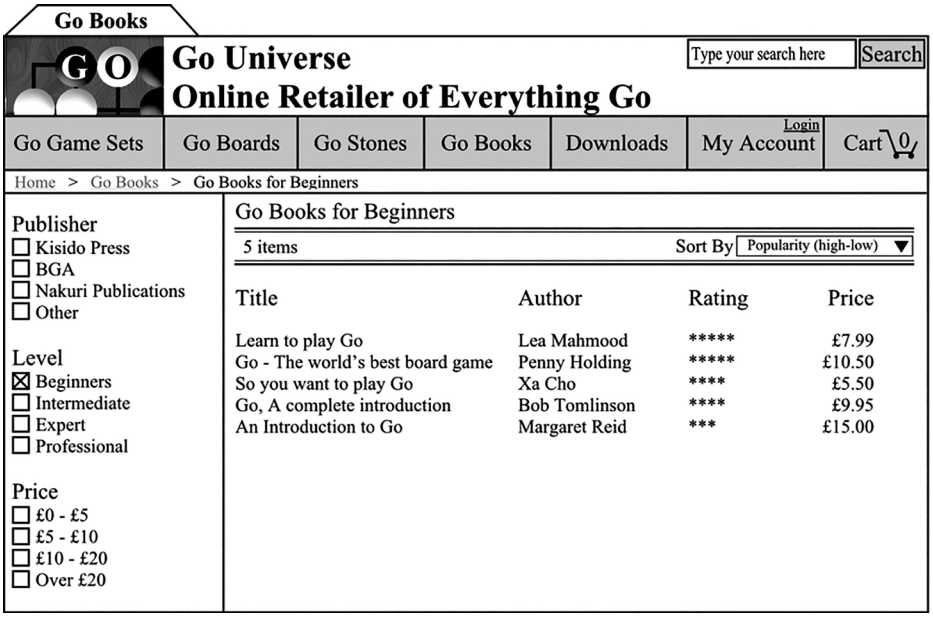
State two advantages of executing a compiled version compared to an interpreted version. **2**

Advantage 1 _____

Advantage 2 _____

16. Jenny works for a website design company. Her latest project is to design and implement a website for Go Universe.

She creates the website below.



(a) Identify two features of the user interface that Jenny included to aid navigation. **2**

Feature 1 _____

_____

Feature 2 _____

_____

(b) Identify one area of this website where Javascript has been used to add interactivity. **1**

_____

_____

16. (continued)

(c) Jenny used the simple template below when coding the HTML.

```
<!DOCTYPE html>
<html>

<head>
   <title> </title>
</head>

<body>
<div>
   <p>Page Heading</p>
</div>
</body>

</html>
```

Describe how the above HTML was edited to make the words "Go Books" appear at the top of the webpage. **1**

(d)

The above logo is added to each page using the following code.

```
<img src="graphics/logo.bmp" alt="Logo" style="width:120px;height:60px;">
```

(i) The code contains the link to the stored graphic file.

State the type of addressing used. **1**

[Turn over

16. (d) (continued)

(ii) The original graphic was saved with a colour depth of 24 bits.

Calculate, using appropriate units, the storage requirements of the graphic. **3**

Show your working in the box below.

(iii) Explain why compressing the graphic would benefit the **users** of the Go Universe website. **1**

(e) State one test that could be carried out on the website. **1**

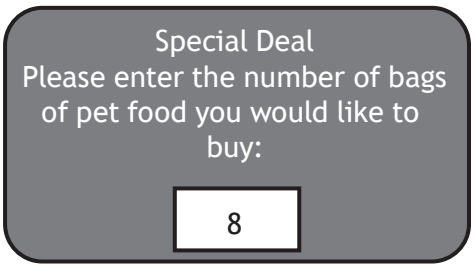
[Turn over for next question

DO NOT WRITE ON THIS PAGE

17. An online pet supply retailer is offering a special deal to customers buying at least **two**, but not more than **six**, bags of pet food. If customers try to buy any other quantity, a message is displayed.

For example:

Input



Output

(a) Show, using pseudocode or a programming language of your choice, how input validation could be used to ensure an acceptable number of bags is entered. **4**

17. (continued)

(b) The data in the table below will be used to test the program.

Complete the table. **2**

Type of Test Data	Test Data	Expected Results
Extreme		Proceed to next section of code
Exceptional	Three	Program cannot run! Invalid data type
	4	Proceed to next section of code

(c) When testing the program using the data from the table, "Three" is entered. As expected, an error message appears.

```
Program cannot run!
Invalid data type
```

(i) Name this type of error. **1**

(ii) Explain why this error occurred when testing the program. **1**

(d) A syntax error can occur when writing code.

(i) Explain what is meant by a syntax error. **1**

(ii) Explain how the editing features in software development environments can help identify syntax errors. **1**

18. Fass is an art dealer. When he visits an artist's studio, he uses a catalogue app on his mobile phone to store photographs and information about artworks he plans to sell.

(a) Fass has bought a new mobile phone.

Old Phone	
Processor	Dual-core 2·5GHz
Memory	1GB RAM
Camera	16 Megapixel Rear 2 Megapixel Front
Storage	32GB Solid State
Screen Size	1334x750 pixels
Additional Features	Biometric Security

New Phone	
Processor	Quad-core 2·5GHz
Memory	2GB RAM
Camera	16 Megapixel Rear 2 Megapixel Front
Storage	32GB Solid State 1TB Free Cloud
Screen Size	1920x1080 pixels
Additional Features	Biometric Security Automatic Cloud Backup

(i) State one feature found on the new phone that may allow the catalogue app to run faster than on his old phone. **1**

_____

_____

(ii) Fass uses cloud storage to store the photographs.

State one advantage and one disadvantage of cloud storage instead of his local phone storage. **2**

Advantage _____

_____

Disadvantage _____

_____

18. (continued)

(b) Explain why Fass must ask permission to store a digital copy of the artists' artwork. **1**

(c) Fass can record video using his new phone.

State a standard file format for storing video on his mobile phone. **1**

(d) State one biometric security method that would ensure that only Fass can access his mobile phone. **1**

(e) While visiting an artist's studio, Fass asks permission to use the studio's wireless network.

State the Act that Fass would have broken if he had used the wireless network without permission. **1**

(f) Fass is given a free laptop computer with his new phone.

(i) State one advantage of the phone's solid state storage compared to the magnetic hard disk drive in the laptop. **1**

(ii) Fass sends his old phone for disposal.

Describe how the correct disposal of his old phone reduces environmental impact. **2**

19. Louise is conducting a survey at her school to find out how many hours per week her class mates spend playing computer games. Louise will survey 100 pupils.

The program assigns 100 names to a 1-D array as shown below.

```
Line 1      DECLARE name AS ARRAY OF STRING INITIALLY []
Line 2      RECEIVE name[0] FROM KEYBOARD
Line 3      RECEIVE name[1] FROM KEYBOARD
Line 4      RECEIVE name[2] FROM KEYBOARD
. . .
. . .
Line 101    RECEIVE name[99] FROM KEYBOARD
```

(a) Louise realises that writing the code to read the data into the array like this is time consuming and not good practice.

Write, using pseudocode or a programming language of your choice, the code to show how the data can be entered into the 1-D array using repetition. **3**

19. (continued)

(b) Another section of the program is shown below.

```
. . .
Line 119    SET averageHours = totalHours / 7
Line 120    <use a pre-defined function to store averageHours to the
            nearest whole number>
Line 121    SEND "An average of " & averageHours & " hours" TO
            DISPLAY
```

(i) Identify the operator used to concatenate in the program above. **1**

(ii) Explain why averageHours should be stored as a real data type. **1**

(iii) The program is executed. At Line 119 the value 4·26 is assigned to averageHours.

Write the message that will be displayed when Line 121 is executed. **2**

(iv) State the pre-defined function that could be used when Line 120 is coded. **1**

19. (continued)

(c) Louise gives a copy of her finished program to her friend who tells her that the program code is difficult to read.

(i) Explain how indentation can help readability in the program. **1**

(ii) State one other programming technique used to improve readability of programs. **1**

[Turn over for next question

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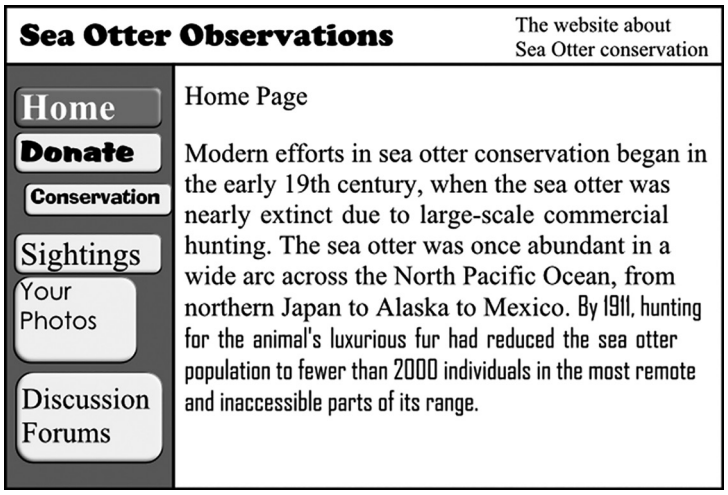
20. Sea Otter Observations uses a simple website to provide information about otters. The home page for the website is shown below.



(a) Identify two examples of poor consistency in the user interface above. **2**

Example 1 _____

_____

Example 2 _____

_____

(b) A high quality sound file of otters communicating with each other is edited for the website. The sound quality of the edited file is poor.

Describe one factor that has affected the quality of this sound. **1**

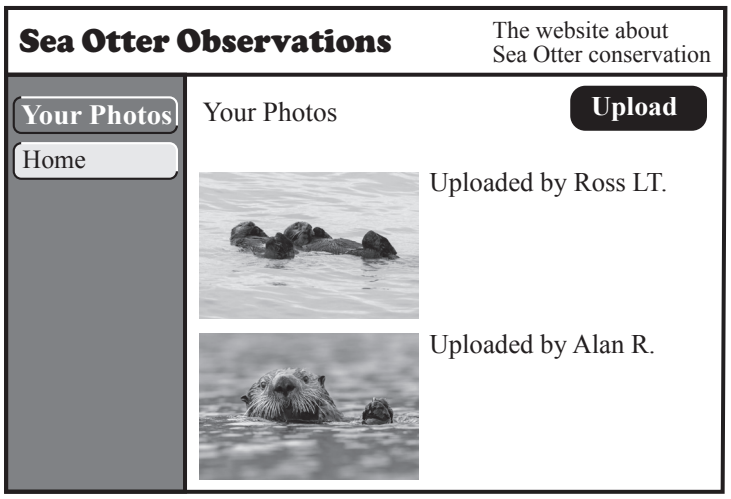
_____

_____

_____

20. (continued)

(c) When a user clicks on the 'Your Photos' button on the home page, they are directed to the page below.



(i) State two network hardware devices required to connect to the Internet to access the website. **2**

Device 1 _____

Device 2 _____

(ii) State the feature of a browser that would enable a user to view a close-up of the otters' whiskers. **1**

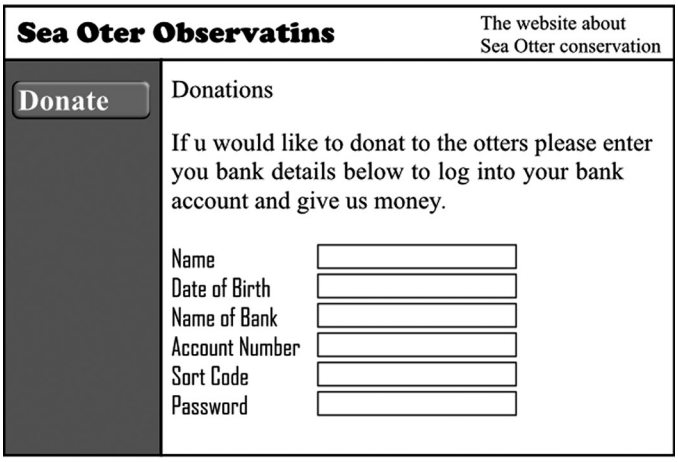
_____

(d) Draw, referring to the home page and the other pages as examples, a diagram to represent the navigation structure of the Sea Otter Observations website. **2**

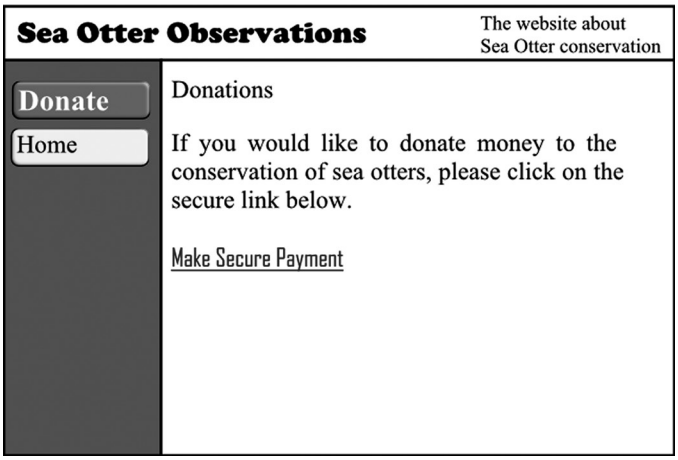
20. (continued)

(e) A hacker alters a link from the home page. The altered link now directs the user to the hacker's version of the donations page shown below.

Hacker's Version



Official



(i) Explain why the hacker's version is an example of phishing. **1**

(ii) Identify one item on the hacker's version that could make the user suspect that it is not genuine. **1**

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