FOR OFFICIAL USE

National Qualifications 2026

Mark

X816/76/01 Computing Science

WEDNESDAY, 20 MAY
9:00 AM – 11:00 AM

X8167601

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 — 80

SECTION 1 — Software design and development, and Computer systems — 55 marks
Attempt ALL questions.

Attempt EITHER Section 2 OR Section 3

SECTION 2 — Database design and development — 25 marks

SECTION 3 — Web design and development — 25 marks

You may use a calculator.
Show all workings.

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.

Do not remove any exam materials. You must leave this booklet on your desk; if you do not, you could lose all the marks for this paper.

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MARKS | DO NOT WRITE IN THIS MARGIN

SECTION 1 — SOFTWARE DESIGN AND DEVELOPMENT, AND COMPUTER SYSTEMS

— 55 marks

Attempt ALL questions

1. (a) Convert the 8-bit two's complement number 1010 1010 into denary. 1

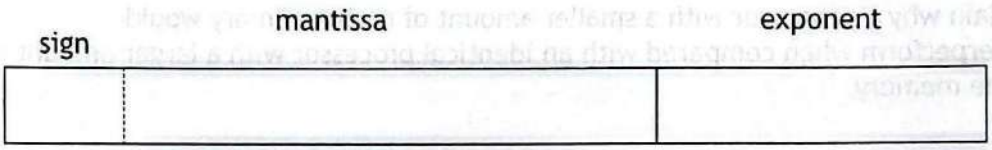
(b) State how many bits would be required to represent the number −273 using two's complement notation. 1

2. (a) Convert the binary number below into floating-point representation:

1.11

There are 16 bits for the mantissa (including the sign bit) and 8 bits for the exponent. **3**

Space for working



(b) Describe how the 24 bits allocated in part (a) can be changed to increase the precision of floating-point numbers that can be represented. Your answer should refer to both the mantissa and exponent. **1**

[Turn over

3. Formal and actual parameters are used in the code below.

```
Line 1    FUNCTION discount(REAL price, REAL percentage)
          RETURNS REAL
Line 2      DECLARE discountAmount AS REAL INITIALLY 0.0
Line 3      SET discountAmount TO price * (percentage/100)
Line 4      SET price TO price - discountAmount
Line 5      RETURN price
Line 6    END FUNCTION
...       ...
Line 66   SET newPrice TO discount(originalPrice, discountRate)
```

Identify one formal parameter and its associated actual parameter. 2

Formal parameter _____

Actual parameter _____

4. Explain why a processor with a smaller amount of cache memory would underperform when compared with an identical processor with a larger amount of cache memory. 2

_____

_____

_____

_____

MARKS | DO NOT WRITE IN THIS MARGIN

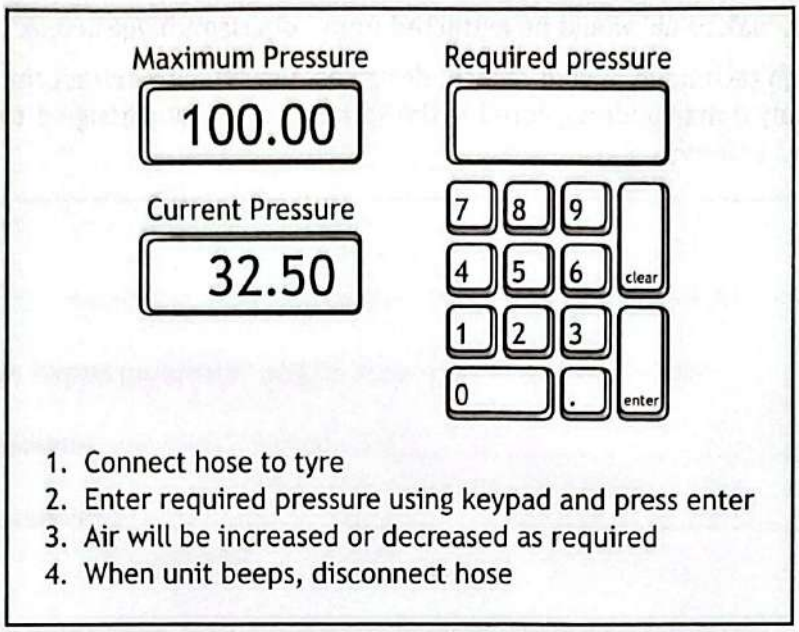
5. A company wants to extract the domain name from e-mail addresses. The domain name is the part after the '@' in the e-mail address.

For example, 'qas.co.uk' would be extracted from 'robertsmith@qas.co.uk'.

Using a design technique of your choice, design an algorithm to extract the domain name from any e-mail address stored in the variable `email` and assign it to the variable `domainName`. 3

[Turn over

6. A motorway service station has a tyre inflation machine controlled by a program.



The machine measures the current tyre pressure. The machine then asks the user to enter their required tyre pressure and the program determines if the machine should inflate or deflate the tyre accordingly.

(a) During the analysis stage boundaries are identified.

State one boundary for this program. 1

_____

_____

_____

6. (continued)

(b) The owners have a website which shows the location of the service station. They discover that the website's digital certificate has expired.

Other than the expiry date, state one other piece of information contained within a digital certificate. 1

(c) The owners send an e-mail to a supplier.

Explain why both a digital certificate and a digital signature are needed. 2

Digital certificate

Digital signature

(d) Describe how intelligent traffic control systems can reduce the environmental impact of a motorway. 1

[Turn over

DO NOT WRITE IN THIS MARGIN

7. Staff at an event use an app to record the number of times they serve tea, coffee and water. The details of the drinks served are collected and stored in parallel arrays named `drinkTypes` and `numOrders` as shown below.

drinkTypes	Tea	Coffee	Tea	Water	Coffee	Water	Tea
numOrders	1	3	2	6	1	4	2

The app will count and store the number of times each type of drink has been served in an array called `totals`.

For example, using the data above there are 5 teas, 4 coffees and 10 waters.

The expected values in the `totals` array would be [5,4,10].

The code below is used to implement this. When the code was tested an error was found.

```
Line 1   FUNCTION checkItems(ARRAY OF STRING drinkTypes,
         ARRAY OF INTEGER numOrders) RETURNS ARRAY OF INTEGER
Line 2     DECLARE currentItem INITIALLY ""
Line 3     DECLARE drinks INITIALLY AS ["Tea","Coffee","Water"]
Line 4     DECLARE currentTotal INITIALLY 0
Line 5     FOR index FROM 0 TO length(numOrders)-1 DO
Line 6       DECLARE totals INITIALLY [0] * 3
Line 7       SET currentDrink TO drinks[index]
Line 8       SET currentDrinkTotal TO
             countItems(drinkTypes,numOrders,currentDrink)
Line 9       SET totals[index] TO currentDrinkTotal
Line 10    END FOR
Line 11    RETURN totals
Line 12  END FUNCTION
...
Line 20  FUNCTION countItems (ARRAY OF STRING drinkTypes,
         ARRAY OF INTEGER numOrders, STRING currentDrink)
         RETURNS INTEGER
Line 21    DECLARE total INITIALLY 0
Line 22    FOR counter FROM 0 TO length(drinkTypes)-1 DO
Line 23      IF drinkTypes[counter] = currentItem THEN
Line 24         SET total TO total + numOrders[counter]
Line 25      END IF
Line 26    END FOR
Line 27    RETURN total
Line 28  END FUNCTION
```

7. (continued)

MARKS | DO NOT WRITE IN THIS MARGIN

(a) The contents of the `drinkTypes` and `numOrders` arrays are shown below.

drinkTypes	Tea	Coffee	Tea	Water	Coffee	Water	Tea
numOrders	1	3	2	6	1	4	2

Using the data above, complete the trace table below by identifying the missing values in the highlighted boxes. 4

Line number	index	totals	currentDrink	currentDrinkTotal
5	0			
6		[0,0,0]		
7				
8				5
9		[5,0,0]		
5	1			
6				
7				
8				
9				

(b) Identify the line number causing the error and describe the change required to make the code fit for purpose. 2

Line number _____

Change _____

(c) Describe how a watchpoint could be used to test code. 2

8. A Harshad number is an integer that is exactly divisible by the sum of its digits.

For example:

132 is a Harshad number.

The digits of 132 are 1, 3 and 2 and the sum of these digits is 6.

132 is exactly divisible by 6 (132 ÷ 6 = 22).

251 is not a Harshad number.

The digits of 251 are 2, 5 and 1 and the sum of these digits is 8.

251 is not exactly divisible by 8 (251 ÷ 8 = 31.375).

The algorithm below is used to check if a number is a Harshad number or not.

```
Line 1    FUNCTION checkHarshad(INTEGER number) RETURNS INTEGER
Line 2      DECLARE numberString AS STRING INITIALLY ""
Line 3      SET numberString TO <parameter number converted to a
            string of digits>
Line 4      DECLARE total AS INTEGER INITIALLY 0
Line 5      FOR index FROM 0 TO length(numberString) DO
Line 6        SET digitChar TO numberString[index]
Line 7        SET digit TO <digitChar converted to an integer>
Line 8        SET total TO total + digit
Line 9      END FOR
Line 10     <Divide number by total and store the remainder in
            the variable named result>
Line 11     RETURN result
Line 12   END FUNCTION
...
Line 40   RECEIVE checkNo FROM INTEGER KEYBOARD
Line 41   ____________________________________________________
Line 42   IF finalResult = 0 THEN
Line 43     SEND checkNo & "is a Harshad number" TO DISPLAY
Line 44   ELSE
Line 45     SEND checkNo & "is not a Harshad number" TO DISPLAY
Line 46   END IF
```

(a) Using a programming language of your choice, write the code for line 10. 2

8. (continued)

(b) The function `checkHarshad` is used to assign a value to the variable `finalResult`.

Using a programming language of your choice, write the missing code at Line 41 to call the function. 2

(c) The program makes use of local variables.

(i) Explain why the scope of the variable `total` is local. 1

(ii) Explain why the use of local variables makes programs more efficient. 1

[Turn over

9. An online streaming service that offers TV shows, movies and documentaries, uses a program to manage its media library.

The program stores data in four parallel 1D arrays called: `title`, `type`, `genre`, `releaseYear`.

A sample of the data is shown below.

Grace, TV Show, Thriller, 2024

Beneath the Blue Sky, Movie, Drama, 2023

Life in the City, TV Show, Drama, 2020

Echoes of Yesterday, Movie, Thriller, 2022

West Street, Movie, Action, 2018

Marine Life, Documentary, Nature, 2024

(a) The procedure below is used to display the position of all 'Thriller' titles in the `genre` array.

```
Line 1   PROCEDURE search (ARRAY OF STRING genre)
Line 2     DECLARE position INITIALLY 0
Line 3     FOR index FROM 0 TO length(genre)-1 DO
Line 4        IF genre[index] = "Thriller" THEN
Line 5              SET position TO index
Line 6        END IF
Line 7     END FOR
Line 8     SEND position TO DISPLAY
Line 9   END PROCEDURE
```

(i) Using the sample data provided, state the output from this procedure. 1

(ii) Explain why this procedure is not fit for purpose. 1

(iii) Describe the changes needed to make this procedure fit for purpose. 1

MARKS | DO NOT WRITE IN THIS MARGIN

9. (continued)

(b) The streaming service wants to analyse the number of TV dramas in their full library.

Using a design technique of your choice, design an algorithm to calculate the number of TV dramas and write this number to an external file called 'tvDramas.txt'. 5

9. (continued)

(c) The software developer has used Unicode to represent the text in the program instead of extended ASCII.

Describe one advantage of using Unicode instead of extended ASCII to represent text. 1

(d) The streaming service uses tracking cookies.

Describe how tracking cookies can impact users' privacy. 1

10. A book shop has a collection of 2000 books. The title, author, publication year and price of each book is stored in a text file. MARKS DO NOT WRITE IN THIS MARGIN

(a) A program is required to store and process the book data.

A sample of the data stored is shown below.

Title	Author	Publication Year	Price
The Diary	Ann Laird	1917	15.98
Animal Park	George Smith	1995	9.99
Animal Park	George Smith	1945	9.51
Animal Park	George Smith	1937	12.99
Coding 101	Aisha Khan	2005	12.34
Coding 101	Joe Brand	2013	14.99
Pride	Julia Workman	2001	11.45
Pride	Julia Workman	2015	15.29
...	...	...	...

(i) Using a programming language of your choice, define a suitable record data structure to store a book's data. 2

(ii) Using a programming language of your choice, declare a variable that could be used to store data for 2000 books.

Your answer should make use of the record data structure defined in part (i). 2

10. (continued)

(b) An author can publish a book under the same title in different years.

One feature of the program is to display the earliest publication year of a book when the user enters a title and author.

The top-level design for this feature is shown below.

1. Read the data from a text file into an array of records.
2. Ask user to enter the title and author to search for.
3. Find the position in the array of records of the earliest publication year of the book with the title and author entered in step 2.
4. Display the earliest publication year of the book with the title and author entered in step 2. If no match is found, display a message indicating this.

Complete the table below to show the missing data flow for steps 1, 3 and 4. 3

Step	IN	OUT
1		
2		searchTitle, searchAuthor
3		foundPosition
4		

MARKS | DO NOT WRITE IN THIS MARGIN

10. (continued)

(c) Using a programming language of your choice, write the code for step 3.

Your answer should use the record data structure and variable declared in part (a). 6

[END OF SECTION 1]

SECTION 2 — DATABASE DESIGN AND DEVELOPMENT — 25 marks

Attempt ALL questions

11. A car repair business uses a database to manage details of all the work carried out in their garage. The entities and attributes for the database are shown below.

Vehicle	Customer	Job	Mechanic
regNo	customerID	jobID	mechanicID
type	forename	regNo*	forename
make	surname	mechanicID*	surname
model	address	date	hoursWorked
customerID*	telephone	workRequested	
	email		

Draw an entity-relationship diagram to show the relationships that exist in this database.

Your answer should only show the entity names and cardinality. **3**

MARKS | DO NOT WRITE IN THIS MARGIN

12. The database table below contains some sample data on various walking tours around Scotland.

Tour					
tourID	tourName	season	location	miles	guided
E2	Spooktacular	Autumn	Edinburgh	5	False
E5	Tay Forest Walk	Summer	Pitlochry	7	False
W1	Cobbler's Way	Spring	Arrochar	7	True
E4	Tentsmuir Trek	Summer	St Andrews	9	True
N7	Rocks and Shoals	Spring	Thurso	4	True
S3	Hen's Farm	Spring	Galashiels	3	False
W4	Loch Ryan Tour	Summer	Stranraer	14	False
N8	Deeside Walk	Winter	Aberdeen	1	False
N2	Ski Country	Winter	Aviemore	10	False
C6	Castle Tour	Autumn	Stirling	7	False
C1	Lornty Nature Trail	Summer	Blairgowrie	8	True
W3	Storr's View	Autumn	Skye	9	True
W2	Festive Lights	Winter	Glasgow	6	False
...	...	...	...	...	...

The following SQL statement is used to display the shortest guided tour for each season.

```
SELECT season, MIN(miles) AS [Shortest route]
FROM Tour
WHERE guided = True
GROUP BY season
ORDER BY MIN(miles) DESC;
```

Using the sample data provided, write the expected output from the SQL statement above. **2**

season	Shortest route

MARKS | DO NOT WRITE IN THIS MARGIN

13. A decorating company uses a database to keep track of the work they carry out.

Sample data from the database is shown below.

Job			
jobID	**jobDescription**	**billedCost**	**expenses**
AT44	Exterior walls painted	800.00	600.00
PD27	Chandelier polished and rehung	400.00	175.00
BC99	Lounge wallpapered	350.00	180.00
BF89	3 bedrooms wallpapered	750.00	475.00
BH49	2 exterior doors painted	320.00	100.00
NF77	Exterior woodwork varnished	470.00	300.00
AB73	Windowsill repainting	80.00	42.00
BD14	Kitchen ceiling painted	250.00	150.00
SC45	Repaint hallway ceiling	250.00	136.00
HL19	Painting of stairway banister	400.00	250.00
WE99	3 ceilings plastered and painted	550.00	375.00
HT83	Install and paint balcony banister	700.00	100.00
KL65	Dining room painted	375.00	180.00
NV22	Varnish dining room floor	350.00	100.00
GH99	Wallpaper entrance hallway	1000.00	650.00
...	...	...	...

The company wants to know the total profit from all jobs involving paint. Profit is calculated by subtracting the expenses from the billed cost.

Write the SQL statement to calculate the total profit and display it as shown below. 3

Total profit
1792.00

14. An archery club runs an annual tournament. The entries and scores for the tournament are held in three database tables.

Sample data from each table is shown below.

Event			
eventID	eventName	type	extraMarshals
Ev1	10 m Shot	Lawn	False
Ev2	20 m Shot	Lawn	False
Ev3	Target Shoot	Forest	True
Ev4	Mountain Range	Hills	True
...	...	...	...

Archer			
archerID	forename	surname	style
A1	Euan	Dilloway	Right-handed
A2	Pandora	Audley	Right-handed
A3	Kelsie	Buckthorpe	Left-handed
A4	Locke	Turfus	Left-handed
...	...	...	...

Result		
eventID	archerID	points
Ev1	A1	50
Ev1	A2	45
Ev1	A3	45
Ev1	A4	40
Ev2	A1	20
Ev2	A2	30
Ev2	A3	35
Ev2	A4	40
Ev3	A1	67
Ev3	A2	55
Ev3	A3	60
Ev3	A4	40
Ev4	A1	40
Ev4	A2	57
Ev4	A3	58
Ev4	A4	65
...	...	...

DO NOT WRITE IN THIS MARGIN

14. (continued)

(a) Identify the primary key used in the `Result` table. 1

(b) A query was created to display the average number of points from the whole tournament. This query was saved as 'OverallAverage' and the output is shown below.

AveragePoints
46.69

Using the query 'OverallAverage', complete the SQL statement below to display the archers' names and the events where they scored more than the average points. 3

The expected output is shown below.

forename	surname	eventName	points
Euan	Dilloway	10 m Shot	50
Euan	Dilloway	Target Shoot	67
Pandora	Audley	Target Shoot	55
Kelsie	Buckthorpe	Target Shoot	60
Pandora	Audley	Mountain Range	57
Kelsie	Buckthorpe	Mountain Range	58
Locke	Turfus	Mountain Range	65

```
SELECT forename, surname, eventName, points
```

14. (continued)

(c) The organisers want to know the number of times a left-handed archer competed in a lawn event.

The expected output from the query is shown below.

Left-handed lawn archers
4

Design a query to display the output above. 3

Field(s) and calculation(s)	
Table(s)	
Search criteria	
Grouping	
Sort order	

MARKS | DO NOT WRITE IN THIS MARGIN

15. Caledonia Boating has a number of small boats that customers can book to take them on trips around Loch Lomond. They would like to make use of a relational database to manage their bookings.

(a) Some of the end-user requirements used to create the system were to find and display the:

- name of the customer who has booked the most expensive trip
- name of the captain of the boat with most bookings
- total number of boat trips on a specific date.

Using the end-user requirements above, create two functional requirements of the relational database. 2

Functional requirement 1 _____

_____

_____

_____

Functional requirement 2 _____

_____

_____

_____

[Turn over

X8167601 25

15. (continued)

DO NOT WRITE IN THIS MARGIN

Sample data from the implemented database tables is shown below.

Boat			
boatID	boatName	capacity	captain
B022	Flying Fish	7	Helen Anderson
B060	The Aurora	6	Malcolm Smith
B102	Maid of the Myth	10	Jabari Mensah
B117	Big Blue	20	Jimmy McMenemy
B123	Pride of Scotland	8	Lucy McWilliam
...	...	...	...

Customer				
custID	forename	surname	address	telNo
19	Jason	Summers	4 Warden Drive	01332 825671
20	Sue	Robertson	12 North Street	01332 321546
21	Fred	Cooper	121 Windmill Road	01332 772859
22	Mateusz	Popescu	86 View Road	01332 828451
...	...	...	...	...

Booking						
bookRef	custID	tripDate	partySize	timeOut	timeIn	price
R27	22	16/06/2026	6	09:00	12:00	130.00
R28	19	20/06/2026	12	12:00	14:00	260.00
R29	21	22/06/2026	24	10:00	15:00	440.00
R30	20	25/06/2026	23	12:00	16:00	495.00
...	...	...	...	...	...	...

BoatBooking		
bookRef	boatID	passengers
R27	B060	6
R28	B123	8
R28	B022	4
R29	B117	19
R29	B060	5
R30	B102	10
R30	B123	8
R30	B022	5
...	...	...

15. (continued)

(b) Caledonia Boating decide to lower the price by £15.00 for any booking where the party size is less than 10 and the trip starts before 12:00.

Write the SQL statement for a single query that would change the price for these bookings. 2

(c) Caledonia Boating want to calculate and display the average number of passengers that are booked for a trip on each boat.

The expected output is shown below.

boatName	Average passengers
Big Blue	19
Flying Fish	4.5
Maid of the Myth	10
Pride of Scotland	8
The Aurora	5.5

Write an SQL statement to produce this output. 3

15. (continued)

(d) A query is produced to show the lowest number of passengers on any boat with a capacity of less than 10 and where the price is greater than £200.

The expected output is shown below.

boatName	Least passengers
Pride of Scotland	8
The Aurora	5
Flying Fish	4

The following SQL statement is executed.

```
SELECT boatName, passengers AS [Least passengers]
FROM Boat, Booking, BoatBooking
WHERE Boat.boatID = BoatBooking.boatID
AND capacity < 10
AND price > 200
GROUP BY boatName;
```

When tested, the actual output did not match the expected output.

Describe the three errors in the above SQL statement. 3

Error 1 _____

_____

Error 2 _____

_____

Error 3 _____

_____

[END OF SECTION 2]

SECTION 3 — WEB DESIGN AND DEVELOPMENT — 25 marks

Attempt ALL questions

MARKS | DO NOT WRITE IN THIS MARGIN

16. A volleyball club are developing a website. The home page will allow users to create an account and log in using their e-mail address and password.

Once they have logged in, users should be able to navigate to one of four pages — a news page, a staff page, a tickets page and a shop page.

From the staff page users should be able to navigate to a manager page and a player page where they can view player profiles. When users select an image of a player, the player's details will appear next to the image.

From the tickets page users should be able to navigate to a domestic page and a European page.

(a) State two functional requirements of this website. 2

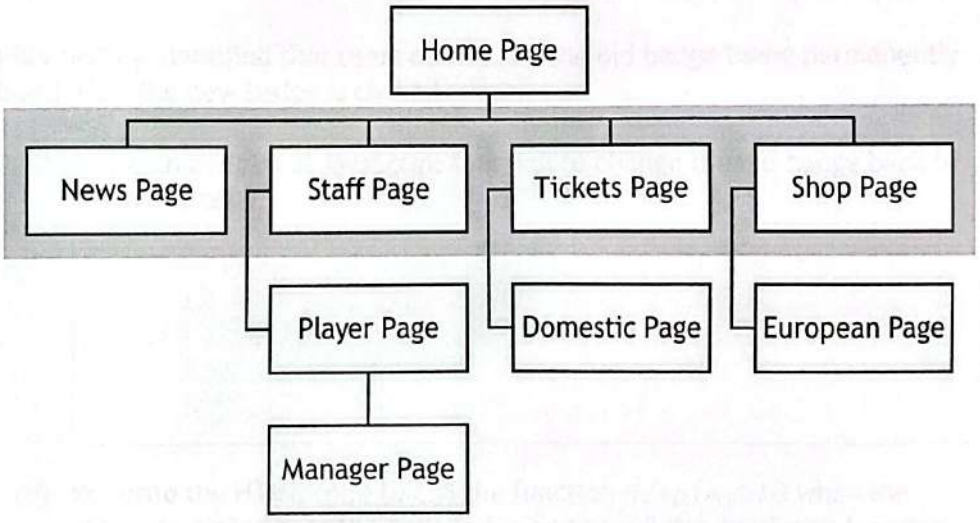
Functional requirement 1 _____

_____

Functional requirement 2 _____

_____

(b) The following navigational structure was proposed for the website.



Explain why this structure does not meet the end-user requirements. 2

_____

_____

_____

_____

X8167601 29

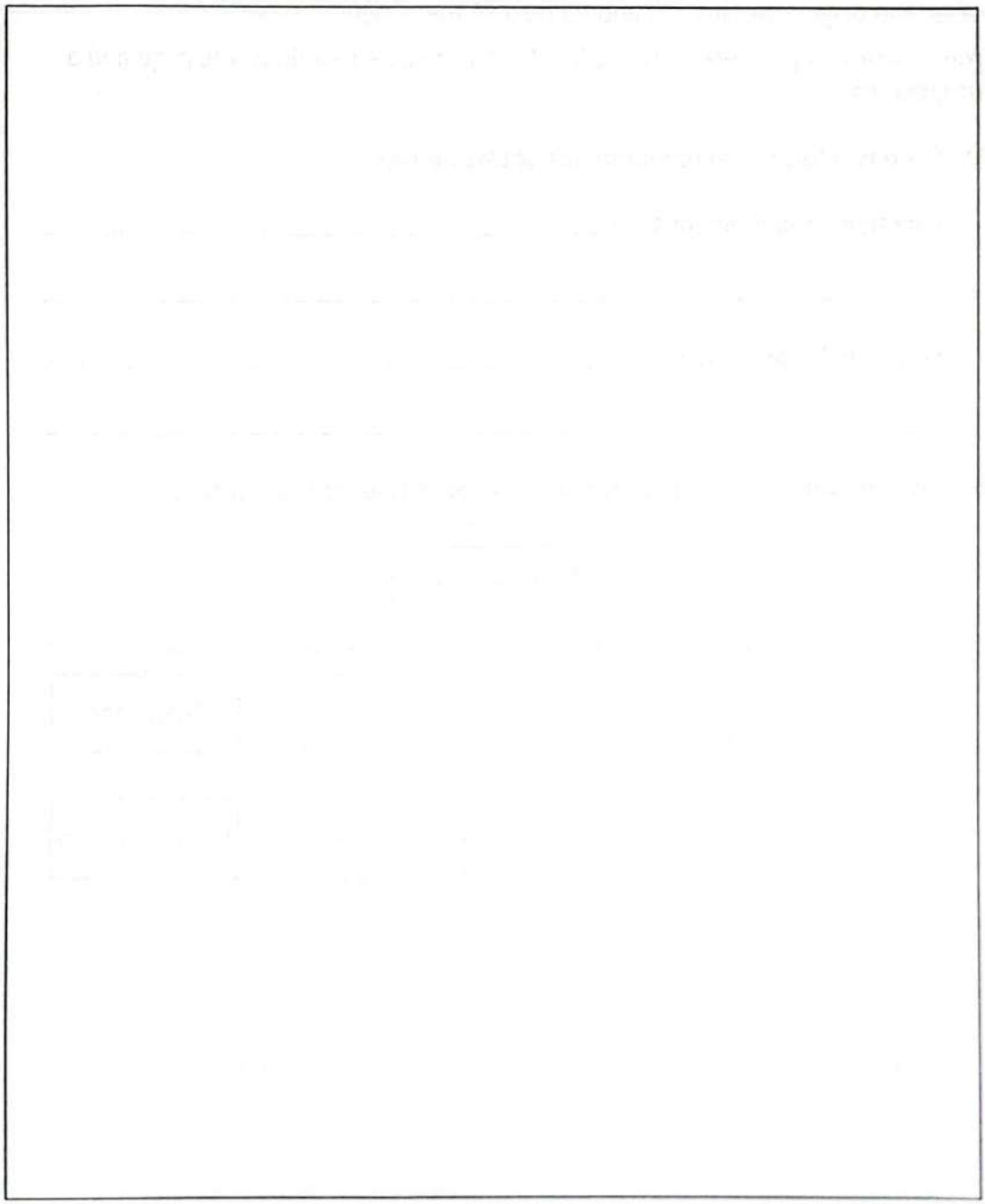
MARKS | DO NOT WRITE IN THIS MARGIN

17. A photography group has a registration form where users can create an account to log into the website.

Users are required to enter a contact name, address, e-mail address and mobile phone number.

Users can also choose their favourite type of photography from landscape, portrait or macro.

Draw a suitable wireframe for this form that indicates validation. 3



MARKS | DO NOT WRITE IN THIS MARGIN

18. Morelands Football Club are launching a new badge on the home page of their website.

oldBadge.png

newBadge.png

When the image of the new badge is clicked it is permanently changed to an image of the old badge. The HTML code and JavaScript function to implement this is shown below.

HTML

```
<img src="newBadge.png" onclick="displayOld(this)" >
```

JavaScript

```
function displayOld(my_image){
     my_image.src = '../images/oldBadge.png';
}
```

Usability testing identified that users do not like the old badge being permanently displayed after the new badge is clicked.

(a) (i) Write an additional JavaScript function to change the old badge back to the new badge. 1

(ii) Re-write the HTML code to call the function `displayOld` when the mouse is placed over the new badge and to call the JavaScript function from part (i) when the mouse moves off the image. 2

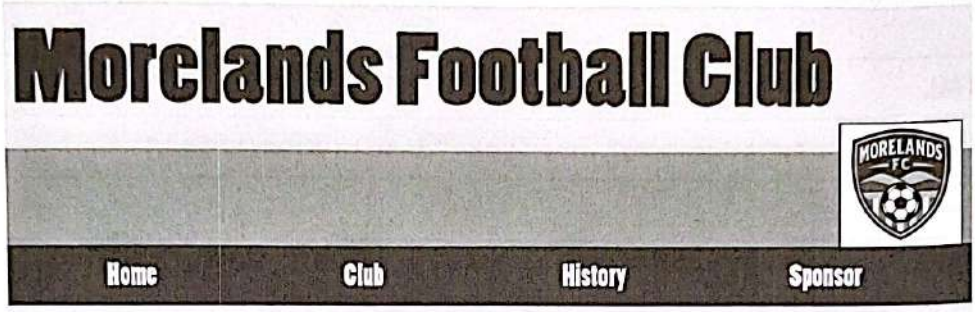
18. (continued)

DO NOT WRITE IN THIS MARGIN

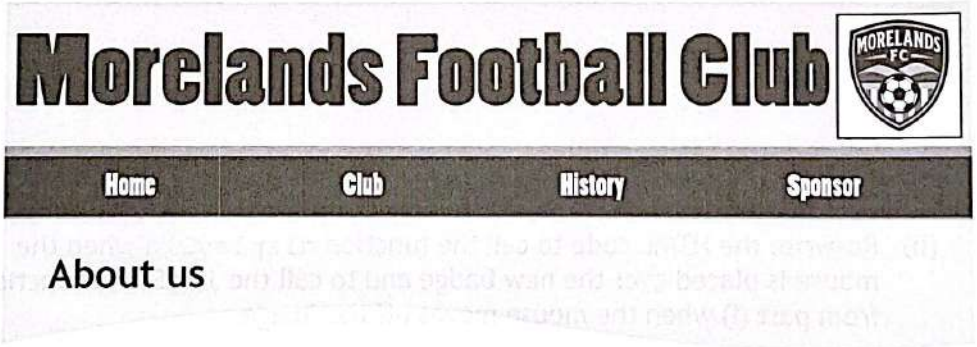
(b) Part of the HTML code for the 'About us' web page is shown below.

```
...
<header>
<h1>Moreland Football Club</h1>
<img src="morelandsNB.png">
  <link rel="stylesheet" type="text/css" href="style.css">
</header>
<nav>
<body>
<h1>About us</h1>
...
```

When tested, this code displays the header of the web page as shown below.



The club badge should be displayed beside the name of the club as shown below.



X8167601 32

18. (b) (continued)

Write the CSS rule for the `h1` tag within the `header` element to display the club badge beside the name of the club. 2

(c) Some CSS rules for the website are shown below.

```
header {height: 200px; margin-top: 10px;}
footer {margin-top: 10px; height: 40px;}
#stadiumImg {float:left; width:590px; height:600px}
#infoSection {float:left; width:590px; height:600px}
```

Using grouping selectors re-write this code to make it more efficient. 3

(d) The 'Sponsor' page contains a form that allows users to sponsor one or more of the club's 20 players. The form element that allows users to choose who to sponsor is a drop-down list.

Describe two reasons for using a drop-down list rather than radio buttons for this element. 2

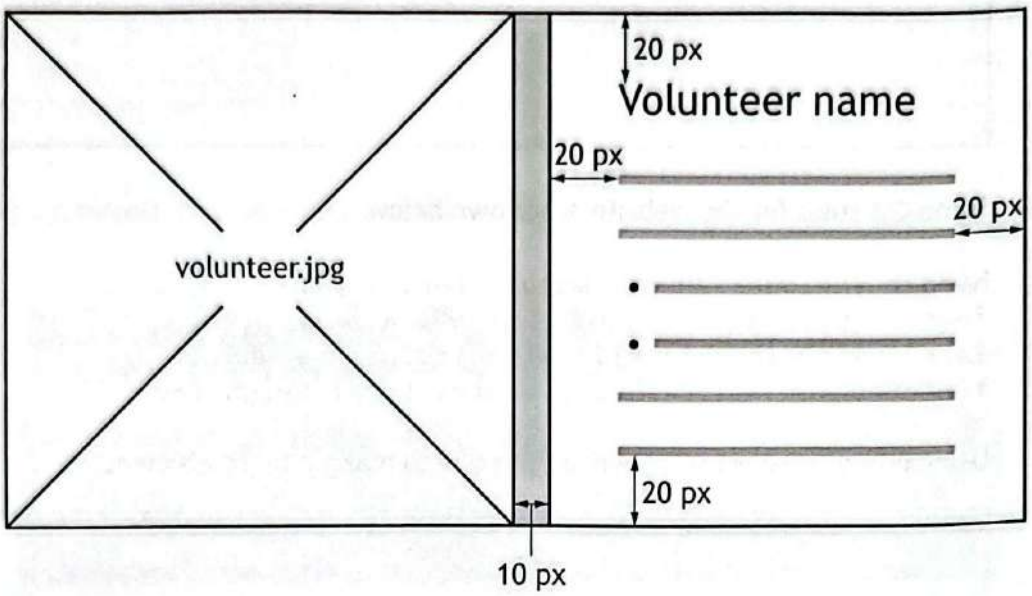
[Turn over

DO NOT WRITE IN THIS MARGIN

19. A community club is creating a website to display information about the volunteers who have been nominated for their volunteer of the year award.

(a) Each volunteer will have their own web page that will display their photo and information about them.

The wireframe design to be applied to each of these pages is shown below.



The HTML code used to implement this design for the page for the volunteer named Max is shown below.

```
...
<div id="leftSection">
     <img src = "max.jpg">
</div>

<div id="rightSection">
     <h2>Max</h2>
     <p>.....</p>
</div>
```

During evaluation it is discovered that the implemented web page does not match this design.

19. (a) (continued)

Complete the CSS rules below to alter the margin and padding properties of each volunteer's web page to match the wireframe. 2

```
#leftSection {  width: 480px; height: 500px;
                float: left;




}

#rightSection {  width: 480px; height: 500px;
                 float: left;




}
```

(b) The CSS rule below is contained within the stylesheet as part of the styling for the navigation bar.

```
nav ul li {
  float: left;
  width: 250px;
  text-align: center;
}
```

State the type of selector used in the code above and explain which elements it would style. 2

[Turn over

(c) The 'Vote' page contains a form where members vote for one volunteer to be the volunteer of the year.

The HTML code for the form is shown below.

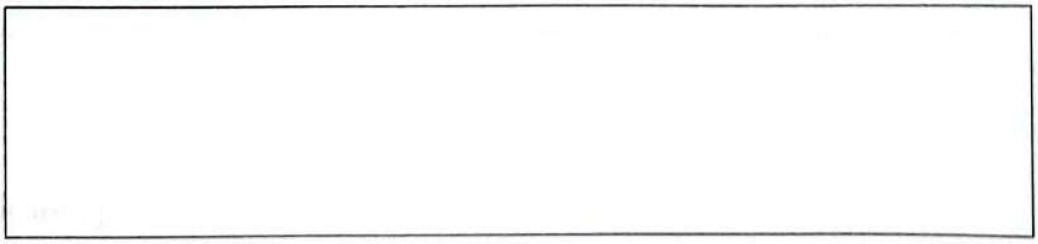
```
<form>
    <h1>Register your vote for Volunteer of the Year</h1>

    Name:<br>
    <input type="text" name="name" size="50"><br>

    Membership Number:<br>
    <input type="number" name="member"><br>

    Email address:<br>
    <input type="text" name="email" size="50"><br>

    Member Category:<br>
    <input type="radio" name="category">Junior<br>
    <input type="radio" name="category">Adult<br>
    <input type="radio" name="category">Senior<br>
    <br>

    Best Volunteer<br>
    <select name="volunteer" multiple>
        <option>Max</option>
        <option>Daniel</option>
        <option>Rocco</option>
    </select>
    <br>

    <input type="submit" value="Vote">

</form>
```

Usability testing of the form identified the following issues:

- members could choose more than one volunteer
- members would prefer to see all the volunteer names in the vote at the same time.

Re-write the line of HTML code below to correct the issues found. 2

```
<select name="volunteer" multiple>
```



MARKS | DO NOT WRITE IN THIS MARGIN

19. (continued)

(d) When testing the website, personas and test cases are used.
Describe what is meant by a persona and a test case. 2

Persona _____

_____

_____

Test case _____

_____

_____

[END OF QUESTION PAPER]