FOR OFFICIAL USE

National
Qualifications
SPECIMEN ONLY

Mark

S816/76/01 Computing Science

Date — Not applicable

Duration — 2 hours 30 minutes

S8167601

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 — 110

SECTION 1 — 25 marks

Attempt ALL questions.

SECTION 2 — 85 marks

Attempt ALL questions.

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.

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 ©

S8167601

SECTION 1 — 25 marks

Attempt ALL questions

1. Convert the following 16-bit two's complement number into denary. **1**

1111 1110 1110 1011

2. A developer and their client are based in different time zones in the world.

Explain the impact that this can have when using an agile methodology compared to an iterative one. **1**

3. A website is subject to a DOS attack.

State two symptoms users experience when this happens. **2**

4. A database table is shown below.

Table: Model				
category	**partID**	**partName**	**stockQuantity**	**price**
A	23	25cm straight track	7	5.99
B	56	passenger	9	2.99
B	34	luggage	42	2.79
A	98	15cm curve track	15	6.99
B	69	dog	6	0.50
A	29	15cm straight track	20	3.50
A	64	t-shaped junction	18	2.00

Complete the table below showing the output from the following SQL statement. **2**

```
SELECT category, MAX(price) AS [Most expensive item]
FROM Model
GROUP BY category;
```

category	Most expensive item

5. Describe one problem that can occur when using global variables in a program. **1**

_____

_____

[Turn over

6. A text file stores the names of players and the time (in seconds) that they took to complete a game. Players who played the game more than once appear more than once in the file, as shown below.

```
...
Harry,1745
Gemma,1028
Jeremy,1209
Harry,1358
...
```

The following algorithm is used to access data in the file.

```
1.  Enter target player's name
2.  Open file
3.  Start conditional loop
4.      Read name and time from file
5.      If name is equal to target player's name then
6.          store time as fastest time
7.      End if
8.  Repeat until first instance of target player's name is found in the data file
9.  Start conditional loop from current position in file
10.     Read name and time from file
11.     If name is equal to target player's name then
12.         If time is less than stored fastest time
13.             store new fastest time
14.         End if
15.     End if
16. Repeat until end of file
17. Display target player's name and fastest time
18. Close file
```

(a) Describe the purpose of the following steps in the algorithm.

(i) Steps 3 to 8 _____ **1**

_____

(ii) Steps 9 to 16 _____ **1**

_____

(b) A program is written using the above algorithm. A user enters a name in step 1 that is not present in the text file.

State the execution error that would occur. **1**

_____

_____

7. The following HTML code and JavaScript functions change the size of a graphic as the mouse arrow passes over and out of the graphic.

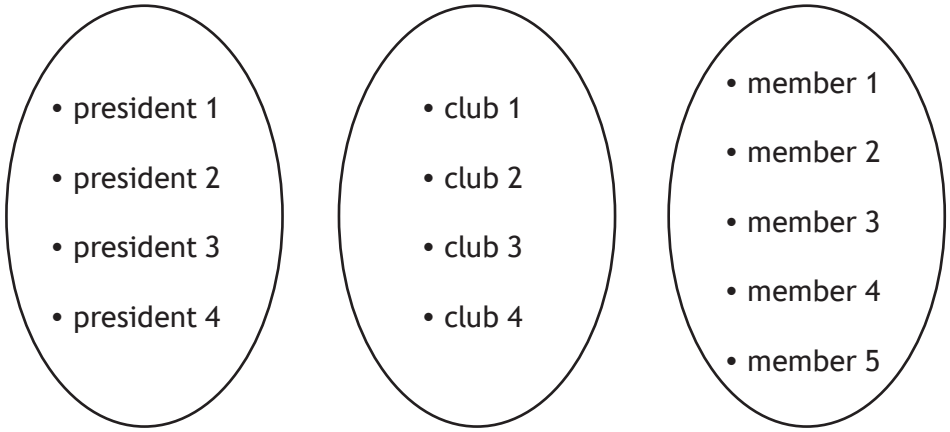
```
<img src="guitar.jpg" onmouseover="displayLarger(this)"
onmouseout="displaySmaller(this)">

<script>

    function displayLarger(my_image)

    {my_image.style.width='150px';
    my_image.style.height='150px';}

    function displaySmaller(my_image)
    {my_image.style.width='100px';
    my_image.style.height='100px';}

</script>
```

Write HTML code with a JavaScript function that would permanently display the graphic at 300 × 300 pixels when the graphic is clicked. **3**

[Turn over

8. Many sports clubs in Scotland have one president but they have many members. A member can only belong to one club.

Complete the entity-occurrence diagram below to represent the relationship between clubs, presidents and members. **2**



9. Convert 0·001011 to floating-point representation. There are 16 bits for the mantissa and 8 bits for the exponent. **3**

Space for working

sign	mantissa	exponent

10. Wireframe designs of web pages show the position and characteristics of media to be used.

State one other element that could be shown on a wireframe design. **1**

11. Two computer systems have the same number of processor cores, the same width of data bus and the same clock speed.

(a) State one other factor that could account for one computer system performing better than the other, when tested for processing speed. **1**

(b) Explain why increasing the width of the data bus will improve the system performance. **2**

12. Describe the role of public and private keys when transferring secure data. **2**

13. Describe how a walkthrough of a low-fidelity prototype of a website can identify problems with the navigation design. **1**

DO NOT WRITE IN THIS MARGIN

SECTION 2 — 85 MARKS

Attempt ALL questions

14. The International Bowling Federation maintains a relational database that consists of three linked tables, storing data on players, tournaments and tournament entries.

Extracts from these tables are shown below.

Tournament			
tournamentID	**country**	**place**	**eventDate**
1	UK	Preston	13/05/2017
2	France	Le Mans	29/08/2017
3	USA	Miami	08/09/2017
4	Germany	Berlin	12/03/2018
...	...	...	...

Player				
playerID	**forename**	**surname**	**rating**	**playerCountry**
1645	Barry	Simpson	1756	USA
1873	Sue	Pollock	1260	Australia
2093	Ahmed	Ali	1934	UK
...	...	...	...	...

Entry			
tournamentID	**position**	**prizeMoney**	**playerID**
1	1	15000	1645
1	2	7000	1873
1	3	1000	9834
2	1	12000	1873
2	2	6000	1842
2	3	1500	9023
3	1	30000	1873
3	2	22000	1009
3	3	15000	0293
3	4	5000	3742
...	...	...	...

14. (continued)

(a) Identify the compound key used in the Federation's database. **2**

(b) Sue Pollock asks for a list of all the prize money she has won, along with the position she finished in when she won each prize.

The Federation implements the design shown below:

Query 1 — All entries for Sue Pollock

Field(s) and calculation(s)	position, prizeMoney
Table(s) and query	Player, Entry
Search criteria	forename = "Sue", surname = "Pollock"
Grouping	
Sort order	

The answer table from Query 1 could then be used in Query 2 to find the largest amount of money Sue Pollock won when she finished first in a tournament (position 1).

Complete the design for Query 2 to find this value. **3**

Query 2 — Display largest amount of money when finishing first

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

[Turn over

MARKS

DO NOT WRITE IN THIS MARGIN

(c) The Federation writes the following SQL statement to find how many times each country has awarded prizes of over 7000.

```
SELECT country, COUNT(prizeMoney)
FROM Tournament, Entry
WHERE prizeMoney > 7000
AND Tournament.tournamentID = Player.tournamentID
GROUP BY country;
```

(i) State the purpose of the `GROUP BY` line of the SQL statement. **1**

(ii) The expected output of the SQL statement is shown below.

Country	Over 7000
USA	17
Canada	5
Australia	6
UK	12

When the SQL statement was tested, the actual output did not match the expected output.

Identify two errors in the SQL statement. **2**

Error 1 _____

Error 2 _____

MARKS

DO NOT WRITE IN THIS MARGIN

(d) The Federation retains 10% of the total prize money.

Write the SQL statement that would produce the following output. **3**

Retained prize money
1700000

(e) Each player can only be a member of one bowling club.

Complete the entity-relationship diagram below to show how the club could be added to the database. **2**

Club

[Turn over

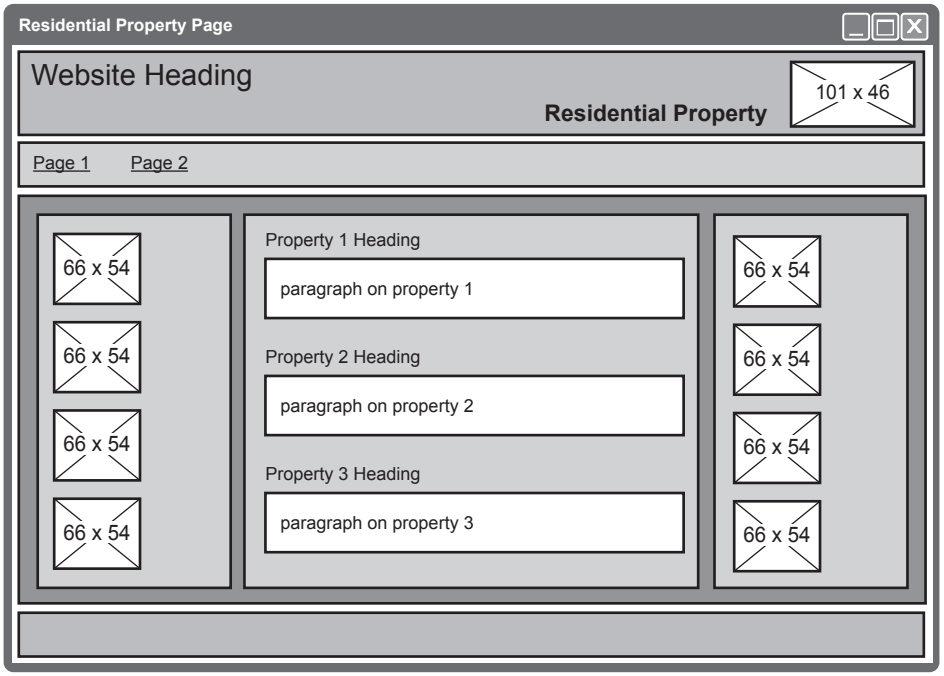
15. An estate agent is developing a website. A horizontal navigation bar will include links to two departments: residential property and commercial property. Customers should be able to read department pages for either renting or buying.

(a) Design a multi-level structure for the estate agent's website. **2**

MARKS

DO NOT WRITE IN THIS MARGIN

(b) A wireframe design for the residential property page is shown below.



When the page is implemented, the margins and padding are coded as follows:

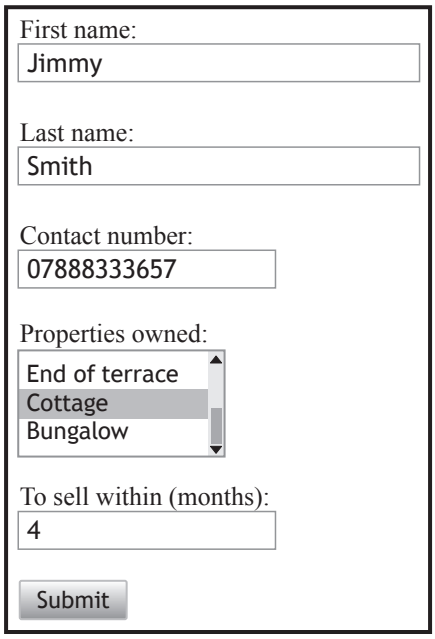
```
header {margin-top:5px; margin-bottom:5px;
padding:10px}
nav {margin-top:5px; margin-bottom:5px; padding:10px}
main {margin-top:5px; margin-bottom:5px; padding:10px}
footer {margin-top:5px; padding:5px}
section {margin-left:10px; margin-top:10px;
padding:5px}
```

Using grouping selectors to remove any repetition, re-write the code to make it more efficient. **4**

15. (continued)

DO NOT WRITE IN THIS MARGIN

(c) Property sellers can register with the estate agent using a form on the website.



The HTML code for the form is shown below.

```
<form>
First name:<br>
<input type="text" name="firstname" size="30"
maxlength="15" required> <br><br>
Last name:<br>
<input type="text" name="lastname" size="30"
maxlength="15" required> <br><br>
Contact Number:<br>
<input type="text" name="class" size="20" maxlength="11"
required> <br><br>
Properties Owned:<br>
<select name="propertyType" multiple size="3">
    <option value="flat">Flat</option>
    <option value="detached">Detached</option>
    <option value="semiDetached">Semi-detached
    </option>
    <option value="terrace">Terrace</option>
    <option value="endTerrace">End of terrace
    </option>
    <option value="cottage">Cottage</option>
    <option value="bungalow">Bungalow</option>
</select> <br><br>
To Sell Within (months):<br>
<input type="number" name="sale"> <br><br>
<input type="submit" onclick="alert('Form Entered')"
value="Submit">
</form>
```

15. (c) (continued)

(i) Identify two types of data validation used in the form code. **2**

Type 1 _____

Type 2 _____

(ii) State the number of property types that a seller can select. **1**

_____

_____

(iii) Cottages always sell quickly, so the estate agent wishes to limit the maximum value that can be entered into 'To sell within (months)' to 3.

To achieve this, they edit the form as shown below.

```
To sell within (months):<br>
<input type="number" name="sale" max="3">
```

Evaluate if this change makes the form fit for purpose. **1**

_____

_____

_____

_____

(d) Before the website goes live, it needs to be tested.

(i) State two compatibility tests that could be carried out. **2**

Test 1 _____

Test 2 _____

(ii) Explain the role of personas and test cases in usability testing. **2**

Personas _____

_____

Test cases _____

_____

[Turn over

16. The Caesar cypher is a simple encryption method that takes each letter in a message and changes it to a different letter.

The program below asks the user to enter a message and an integer used to change the letters in the string.

Both inputs are passed to a function that generates and returns an encrypted version of the message.

```
...
Line 11    FUNCTION encryptString (STRING messageText,
           INTEGER change) RETURNS STRING
Line 12        DECLARE newMessage INITIALLY ""
Line 13        DECLARE characterValue INITIALLY 0
Line 14        DECLARE character INITIALLY ""
Line 15        FOR index FROM 0 TO LEN(messageText)-1
Line 16            SET character TO messagetext[index]
Line 17            SET characterValue TO <ascii value of
                   character> + change
Line 18            SET newMessage TO newMessage & <character
                   equivalent of characterValue>
Line 19        END FOR
Line 20        RETURN newMessage
Line 21    END FUNCTION
...
...
Line 52    RECEIVE message FROM STRING KEYBOARD
Line 53    RECEIVE shiftLettersBy FROM INTEGER KEYBOARD
Line 54    SET message TO
           encryptString(message,shiftLettersBy)
Line 55    DISPLAY message
...
```

(a) The above code contains actual parameters and formal parameters.

Identify an actual parameter in the code. **1**

_____

(b) A breakpoint is set at line 19.

The function is tested by entering the two inputs shown below.

Input 1: cab

Input 2: 3

Complete the table below to show the values of `character` and `newMessage` each time execution is stopped. **3**

Break in execution	Character	newMessage
First		
Second		
Third		

16. (continued)

MARKS DO NOT WRITE IN THIS MARGIN

(c) Using a programming language of your choice, state the pre-defined function used to convert:

(i) Character to ASCII _____ **1**

(ii) ASCII to Character _____ **1**

(d) An execution error occurs for some values of `message` or `shiftLettersBy`.

Explain why this happens. **1**

_____

_____

_____

[Turn over

MARKS

DO NOT WRITE IN THIS MARGIN

(e) The function could be re-written to reverse the characters in the message string. For example, inputting 'jfx' would produce the output 'xfj'.

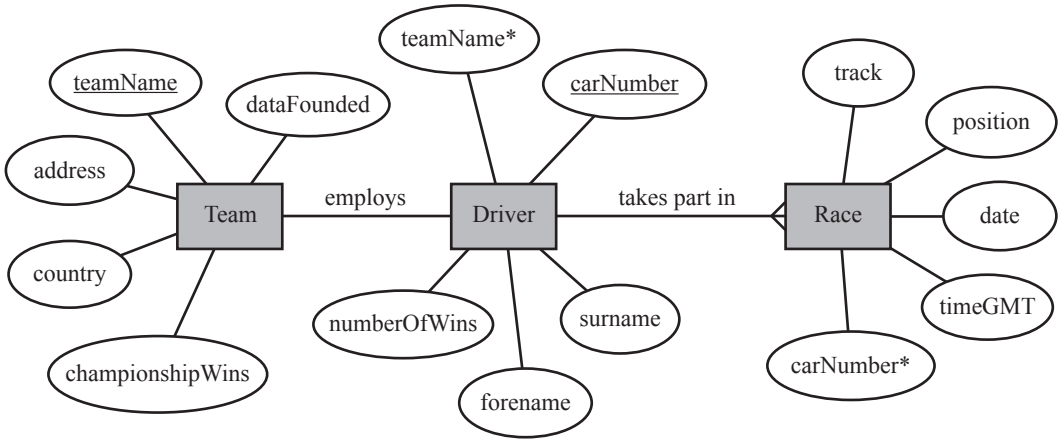
Using a recognised design technique, design an algorithm to reverse and store the new message. **3**

17. In Formula One motor racing, teams can enter two drivers for each race. Every driver has a unique number on their car, which is allocated annually at the start of each new racing season.

A database is required to store data on the teams, drivers and race results since the sport started in 1950. Users would be able to collate information on team or driver wins to find the most successful racers or find how the success of teams has changed over the years.

(a) State two functional requirements of the above database. **2**

(b) The entity-relationship diagram below shows how information on the teams, drivers and the races since 1950 could be stored. There are errors in the design.



Describe three errors in the above design. **3**

Error 1 _____

Error 2 _____

Error 3 _____

[Turn over

MARKS

DO NOT WRITE IN THIS MARGIN

(c) The Team table is shown below.

Table: Team			
teamName	**country**	**dateFounded**	**championshipWins**
Red Bull	Austria	13/08/2005	4
Ferrari	Italy	01/10/1950	15
Lotus	UK	30/05/1967	6
Force India	India	02/02/2008	0
Benetton	UK	09/10/1986	2
Maserati	Italy	10/01/1950	6
McLaren	UK	07/07/1966	12
Matra	France	30/06/1962	1
Toro Rosso	Italy	12/11/2006	0
Williams	UK	09/11/1978	7
Renault	France	28/03/1977	2
Brawn GP	UK	01/04/2009	1
Mercedes	Germany	29/12/1954	6

(i) Complete the table below to show the output from the following SQL statement. **2**

```
SELECT country, SUM(championshipWins)
FROM Team
GROUP BY country
ORDER BY country ASC;
```

country	**championshipWins**
Austria	4
	3
Germany	6
India	0
Italy	
UK	28

MARKS

DO NOT WRITE IN THIS MARGIN

(ii) Design a query using wildcards, to find and display all the teams formed in the 1950s. **2**

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

[Turn over

18. The BigIQ Company stores the results for an intelligence test in an external csv file. The data includes each participant's unique ID number, name, town and score.

An extract, is shown below.

0622737819,Jim,Smith,Stirling,73
0872267103,Alison,Jones,Fort William,81
2289448103,Ali,Khan,Dumfries,51

There are 5000 participants listed in the csv file. The BigIQ Company wants to find and display the name of the town for the participant with the highest score.

(a) The data from the file is imported into an array of records.

(i) Using a programming language of your choice, define a suitable record structure. **3**

(ii) Using a programming language of your choice, declare a variable that can store the data for 5000 participants. **2**

MARKS

DO NOT WRITE IN THIS MARGIN

(b) Using a programming language of your choice, write the code to find the position of the highest score. **4**

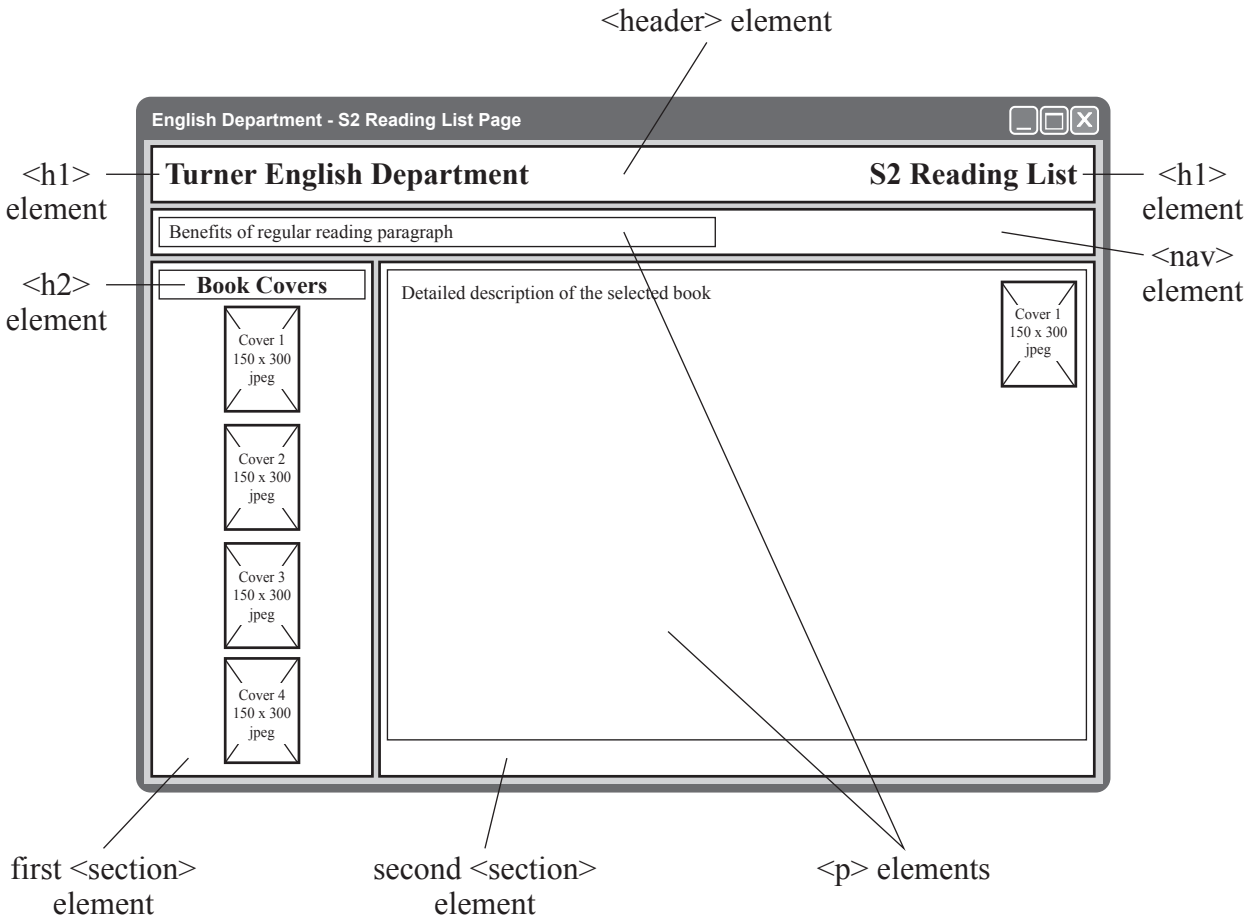
(c) A participant manages to access the file and change their own score.

State two different offences the participant has committed under the Computer Misuse Act 1990. **2**

[Turn over

19. Turner High School's English department has designed a website to suggest home reading lists for each year group. Students can access the website on multiple device types.

An annotated wireframe design for one page of the website is shown below.



MARKS DO NOT WRITE IN THIS MARGIN

(a) Describe two flaws in the above design that could result in an ineffective user interface. **2**

MARKS

DO NOT WRITE IN THIS MARGIN

(b) The detailed description text will wrap around the image by floating the image to the right of the paragraph.

Identify two other layout requirements shown in the wireframe where a CSS float property may be required. **2**

Area 1 _____

_____

Area 2 _____

_____

(c) The web page is coded using an external CSS file. Part of the code is shown below.

```
…
body {background-color:LightGreen;margin:auto}
header, nav, section {margin-bottom:5px;background-
color:LightGrey}
p {margin-top:5px;background-color:White;display:inline}
h1, h2, h3, p {font-family:Helvetica;color:Black}
section p {color:DarkGreen;padding:10px}
…
```

The book descriptions are tested by displaying the page in a browser.

Describe the expected results for the book descriptions, using the code and the annotations on the wireframe.

You should describe both the expected look and relative positions of the text. **4**

_____

_____

_____

_____

_____

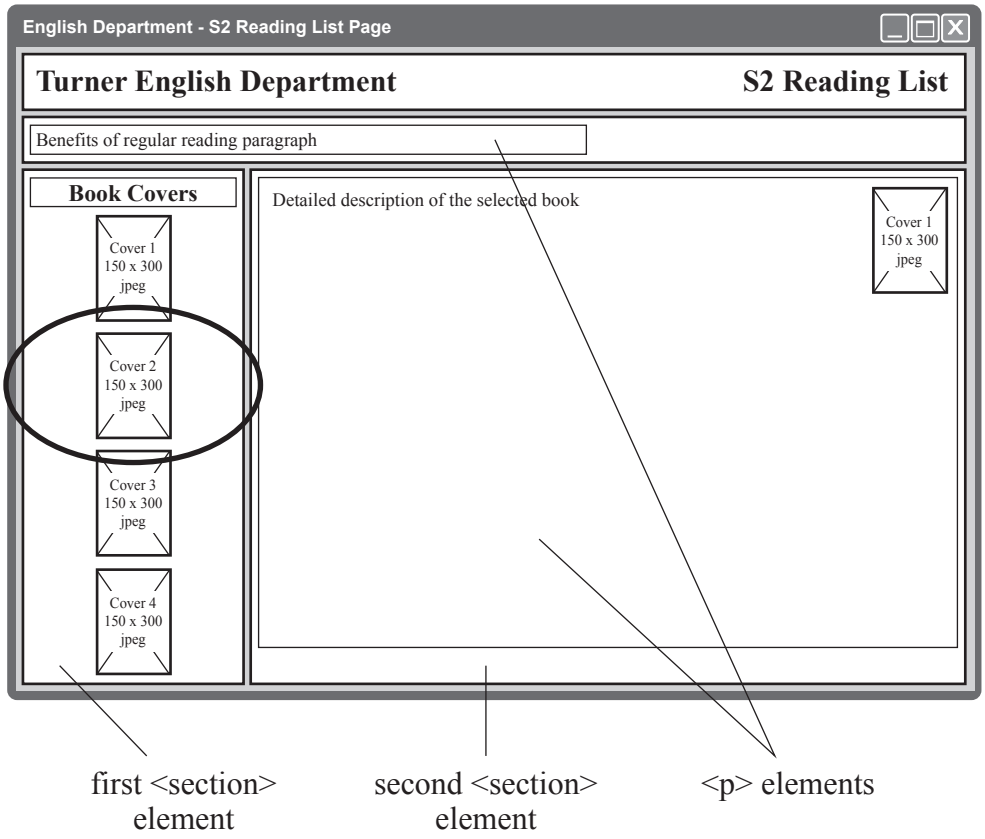
_____

[Turn over

19. (continued)

DO NOT WRITE IN THIS MARGIN

(d) When visiting the web page, users can click on a book cover to see a description of the book. The description, along with a copy of the book cover, will then appear in the main area of the page.



Part of the HTML and JavaScript code from the web page is shown below:

```
…
<img class="coverImage" src="cover2.jpg" onclick="displayBook2()">
…
<script>
…
function displayBook2() {
document.getElementById("bookDescription1").style.display="none";
document.getElementById("bookDescription2").style.display="block";
document.getElementById("bookDescription3").style.display="none";
document.getElementById("bookDescription4").style.display="none";
}
…
</script>
```

19. (d) (continued)

(i) State the type of element that has the ID `"bookDescription1"`. **1**

(ii) Describe the purpose of the JavaScript code shown above. **3**

(iii) One of the book descriptions contains Unicode characters.

State one advantage of using Unicode characters rather than ASCII characters in web pages. **1**

(e) The web page uses bit-mapped graphic files for the book covers.

State one advantage of using bit-mapped graphic files rather than vector graphic files on this web page. **1**

[Turn over

20. A science department has 120 candidates taking courses in biology, chemistry and physics. The school wishes to identify how many candidates gained a grade 'A' in all three sciences and to save their names to a separate file.

An extract of the data is shown below:

```
...
Ann Smith,A,B,B
Peter Irwin,B,C,A
Dan Wu,B,B,C
Stacey Williams,A,A,A
Callum Reid,A,F,B
Kevin Richardson,A,A,A
...
```

The top-level design for the program is shown below.

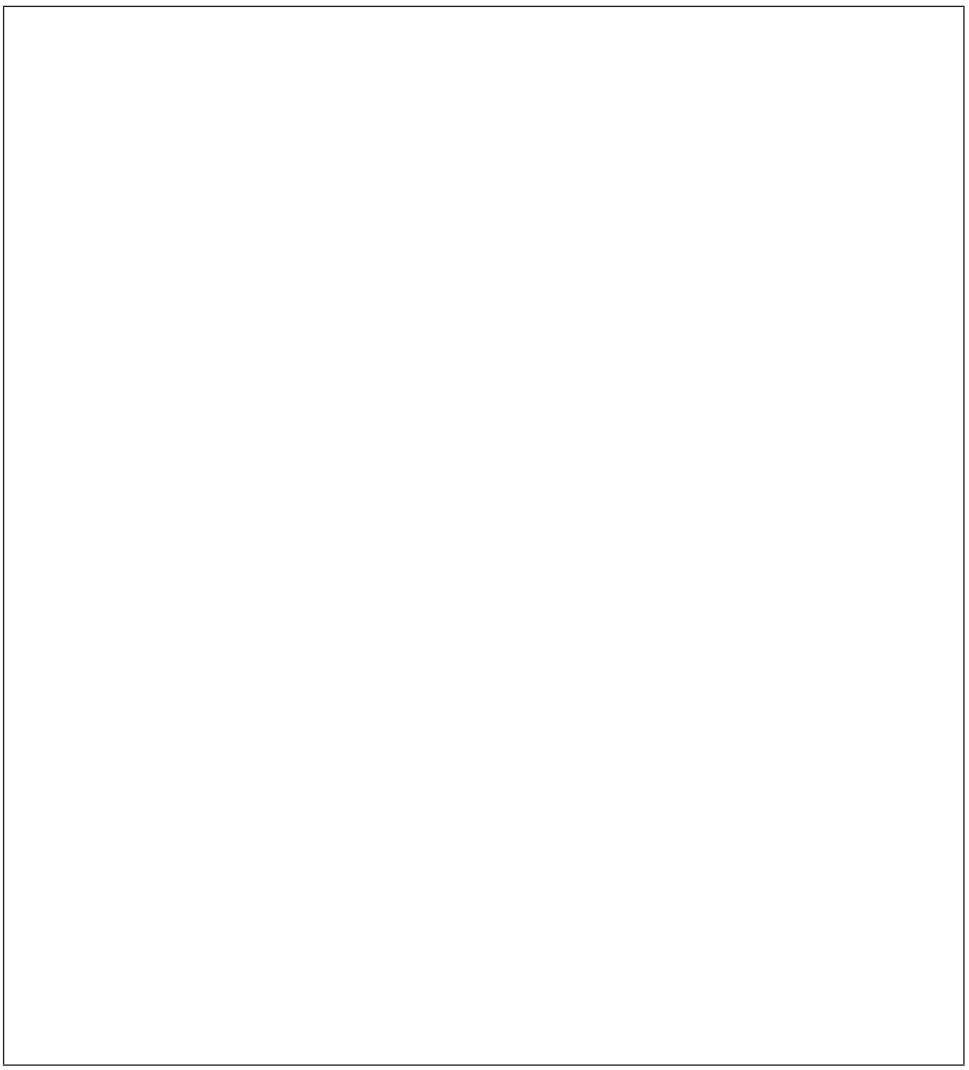
1. Get details from file
2. Find and count names of students with three As
3. Display number of students with three As
4. Save three As in file

(a) Complete the table below to show the data flow in and out of steps 2 and 3. **4**

Step	In/out	Data flow
1	IN	
	OUT	name(), bio(), che(), phy()
2	IN	
	OUT	
3	IN	
	OUT	
4	IN	threeA()
	OUT	

20. (continued)

(b) Using a recognised design technique, refine step 2. **5**



[Turn over

20. (continued)

(c) Using a recognised design technique, refine step 4. **4**

(d) The program is modular and uses procedures.
Describe one benefit of designing a modular solution to this program. **1**

[END OF SPECIMEN QUESTION PAPER]

MARKS | DO NOT WRITE IN THIS MARGIN

ADDITIONAL SPACE FOR ANSWERS

MARKS DO NOT WRITE IN THIS MARGIN

ADDITIONAL SPACE FOR ANSWERS

National
Qualifications
SPECIMEN ONLY

S816/76/01 **Computing Science**

Marking Instructions

These marking instructions have been provided to show how SQA would mark this specimen question paper.

SQA
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General marking principles for Higher Computing Science

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

(a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.

(b) If a candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you must seek guidance from your team leader.

(c) Award marks regardless of spelling, as long as the meaning is unambiguous.

(d) Candidates may answer programming questions in any appropriate programming language or pseudocode. Award marks regardless of minor syntax errors, as long as the intention of the coding is clear.

(e) For a **describe** question, candidates must provide a statement or structure of characteristics and/or features. This will be more than an outline or a list. It may refer to, for example, a concept, process, experiment, situation, or facts, in the context of and appropriate to the question. Candidates must make the same number of factual/appropriate points as there are marks available in the question.

(f) For an **explain** question, candidates must relate cause and effect and/or make relationships between things clear, in the context of the question or a specific area within the question.

Marking instructions for each question

SECTION 1

<table>
<tr><th colspan="3">Question</th><th>Expected response</th><th>Max mark</th><th>Additional guidance</th></tr>
<tr><td>1.</td><td></td><td></td><td>-277</td><td>1</td><td></td></tr>
<tr><td>2.</td><td></td><td></td><td>Either one from:

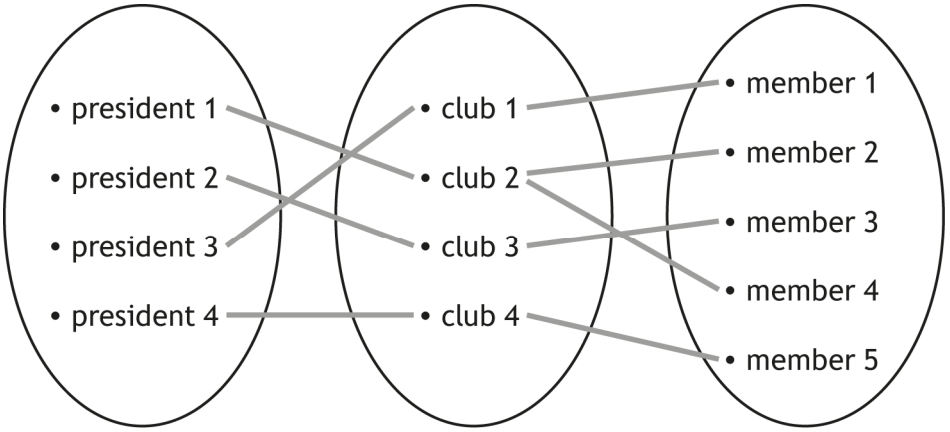
• It is harder to manage the project when you cannot meet the client regularly.
• The agile methodology requires more client interaction throughout the whole project, than the iterative one does.</td><td>1</td><td></td></tr>
<tr><td>3.</td><td></td><td></td><td>Award 1 mark each for:

• slow performance
• inability to access data</td><td>2</td><td></td></tr>
<tr><td>4.</td><td></td><td></td><td>Award 1 mark for each correct row.
<table><tr><th>category</th><th>Most expensive item</th></tr><tr><td>A</td><td>6.99</td></tr><tr><td>B</td><td>2.99</td></tr></table></td><td>2</td><td></td></tr>
<tr><td>5.</td><td></td><td></td><td>Either one from:

• Accidental use of the same variable in different modules.
• It may be difficult for more than one programmer to work on the code.</td><td>1</td><td></td></tr>
<tr><td>6.</td><td>(a)</td><td>(i)</td><td>To find and store the time for the first instance the chosen player completed the game.</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>To find the other times the chosen player completed the game and continually store their fastest time (find minimum).</td><td>1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>An end-of-file error will occur.</td><td>1</td><td></td></tr>
</table>

Question			Expected response	Max mark	Additional guidance

7.			Award 1 mark each for:
			
			• onmouseclick
			• width and height 300 pixels
			• function created
				3	`<imgsrc="guitar.jpg" onmouseclick="displayBig(this)"`
					
					`<script>`
					`function displayBig(my_image)`
					`{my_image.style.width='300px';`
					`my_image.style.height='300px';}`
					`</script>`

8.			Award 1 mark each for: • showing each president to one club • showing each club to one or more members For example  	**2**	

Question			Expected response	Max mark	Additional guidance
9.			Mantissa sign bit = 0 Mantissa magnitude = 101 1000 0000 0000 Exponent = 1111 1110 0101 1000 0000 0000 1111 1110 Award 1 mark each for: • sign bit — 0 • mantissa — 1011 0000 0000 000 • exponent (two's complement) — 1111 1110	**3**	$0.001011 = 0.1011 \times 2^{-2}$
10.			Either one from: • navigation bars • user inputs	**1**	Additional acceptable answers: • hyperlinks • input types (including radio buttons, text box)
11.	(a)		Either one from: • increased cache memory • faster cache memory	**1**	Additional acceptable answers: • faster memory bus speed
	(b)		The greater the bus width, the more bits can be fetched (1 mark) in a single operation (1 mark).	**2**	
12.			Award 1 mark each for: • A public key is used to encrypt data. • A private key is used to decrypt data.	**2**	
13.			It allows missing links and/or orphan links to be found.	**1**	

SECTION 2

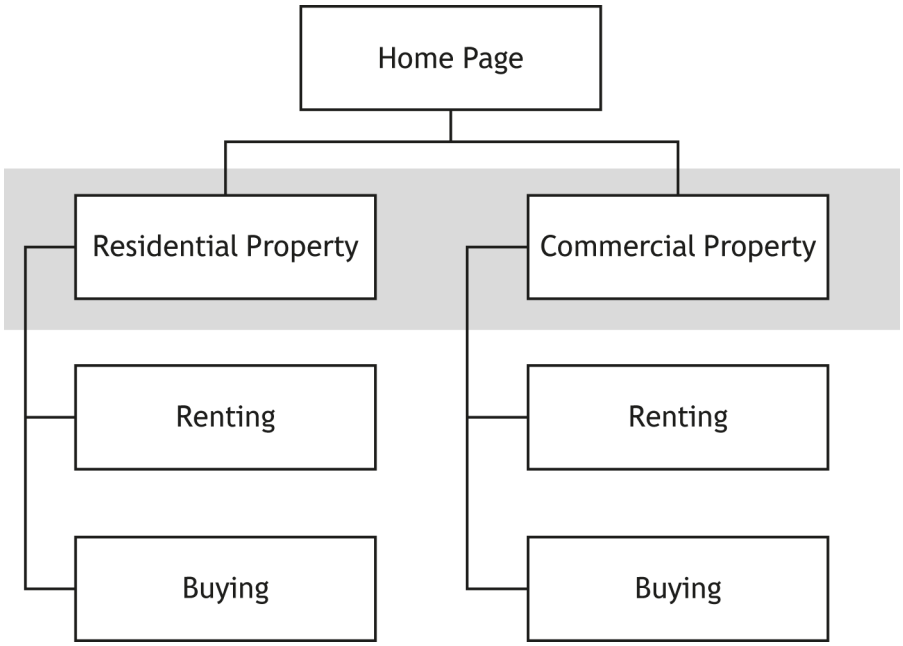
<table>
<tr><th colspan="3">Question</th><th>Expected response</th><th>Max mark</th><th>Additional guidance</th></tr>
<tr><td>14.</td><td>(a)</td><td></td><td>Award 1 mark each for:

• tournamentID in Entry
• playerID in Entry</td><td>2</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>Award 1 mark for each row from:

<table><tr><td>Field(s) and calculation(s)</td><td>Maximum Prize Money for First = MAX(prizeMoney)</td></tr><tr><td>Table(s) and query</td><td>[All entries for Sue Pollock]</td></tr><tr><td>Search criteria</td><td>position = 1</td></tr><tr><td>Grouping</td><td></td></tr><tr><td>Sort order</td><td></td></tr></table></td><td>3</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>So that each country only appears once.</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Award 1 mark each for:

• (AS) [Over 7000] is missing from SQL.
• The second half of JOIN should be = Entry.tournamentID.</td><td>2</td><td></td></tr>
<tr><td></td><td>(d)</td><td></td><td>SELECT SUM (1mark)
(prizemoney*0.1) (1 mark)
AS [Retained prize money](1 mark)
FROM Entry;</td><td>3</td><td></td></tr>
<tr><td></td><td>(e)</td><td></td><td>Award 1 mark each for:

• cardinality – one club to many players
• relationship – player is “member of” a club or similar</td><td>2</td><td></td></tr>
</table>

Question			Expected response	Max mark	Additional guidance
15.	(a)		Award 1 mark each for: • first level including box to represent navigation bar: residential property and commercial property • second level linked from each department: renting and buying with correct links  	**2**	

	(b)		Award 1 mark for each line of code:
			
			`header, nav, main {margin-top:5px; margin-bottom:5px; padding:10px}`
			
			`footer, section {padding:5px}`
			
			`footer {margin-top:5px}`
			
			`section {margin-left:10px; margin-top:10px}`
				4	

	(c)	(i)	Award 1 mark each for: • length • presence	**2**	
		(ii)	7	**1**	

Question			Expected response	Max mark	Additional guidance
15.	(c)	(iii)	The change would mean that all property types would be restricted to a maximum of 3 months and therefore the form would not be fit for its intended purpose.	**1**	
	(d)	(i)	Award 1 mark each for: • using different devices • using different browsers	**2**	
		(ii)	Personas: a type of user with a specific age and experience Test cases: a set of actions to verify a particular feature or function	**2**	

<table>
<tr><th colspan="3">Question</th><th>Expected response</th><th>Max mark</th><th>Additional guidance</th></tr>
<tr><td>16.</td><td>(a)</td><td></td><td>Either one from:

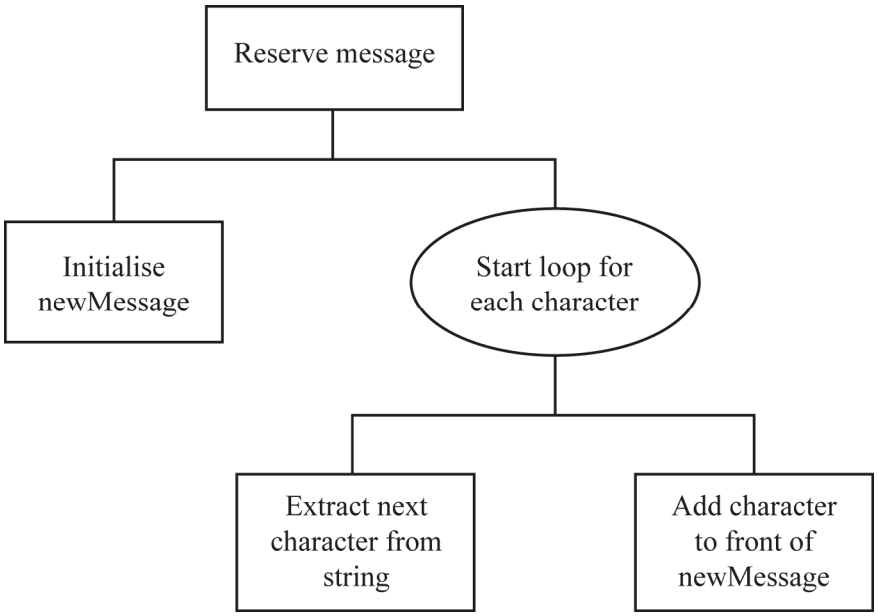
• message
• shiftLettersBy</td><td>1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>Award 1 mark for each row.

<table><tr><th>Break in execution</th><th>character</th><th>newMessage</th></tr><tr><td>First</td><td>c</td><td>f</td></tr><tr><td>Second</td><td>a</td><td>fd</td></tr><tr><td>Third</td><td>b</td><td>fde</td></tr></table></td><td>3</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>See ‘Additional guidance’.</td><td>1</td><td>This will be a pre-defined function to change ASCII to character.

In the majority of languages this will be ORD.</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>See ‘Additional guidance’.</td><td>1</td><td>This will be a pre-defined function to change ASCII to character.

In the majority of languages this will be CHR.</td></tr>
<tr><td></td><td>(d)</td><td></td><td>The shiftLetterBy value entered may take the character beyond the bounds of ASCII values (0–255).</td><td>1</td><td></td></tr>
<tr><td></td><td>(e)</td><td></td><td>Award 1 mark each for:

• loop for each character
• extract next character
• concatenate onto new message</td><td>3</td><td>There are a variety of ways of solving this problem that would be acceptable. See two examples on page 10.</td></tr>
</table>

Question			Expected response	Max mark	Additional guidance
16.	(e)		Pseudocode example answer: 1. Initialise newMessage 2. Start fixed loop for each character 3. Extract next character from message 4. Add next character to the front of newMessage 5. End fixed loop Structure diagram example answer:  		

<table>
<tr><th colspan="3">Question</th><th>Expected response</th><th>Max mark</th><th>Additional guidance</th></tr>
<tr><td>17.</td><td>(a)</td><td></td><td>Award 1 mark each for any two valid answers. For example:

• database should store every race/team/driver from 1950 to most recent
• database should be searchable for number of team wins
• database should be searchable for number of driver wins
• database should be searchable for a team’s results over the years
• database should be searchable for a driver’s results over the years
• database should be sortable to find most and least successful team in order</td><td>2</td><td>Award 1 mark for any unlisted but valid answer.</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Award 1 mark each for any three from:

• cardinality of Team — Driver (should be one-to-many)
• no unique identifier in the Race entity
• car number can’t be a unique field, as it is allocated each year
• noOFWins is not required, as this can be calculated from position</td><td>3</td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>Award 1 mark for each correct entry.

<table>
<tr><th>country</th><th>championshipWins</th></tr>
<tr><td>Austria</td><td>4</td></tr>
<tr><td>France</td><td>3</td></tr>
<tr><td>Germany</td><td>6</td></tr>
<tr><td>India</td><td>0</td></tr>
<tr><td>Italy</td><td>21</td></tr>
<tr><td>UK</td><td>28</td></tr>
</table>
</td><td>2</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Question</th><th>Expected response</th><th>Max mark</th><th>Additional guidance</th></tr>
<tr><td>17.</td><td>(c)</td><td>(ii)</td><td>Award 1 mark for each correct row.

<table>
<tr><td>Field(s) and calculation(s)</td><td>teamName</td></tr>
<tr><td>Table(s)</td><td>Team</td></tr>
<tr><td>Search criteria</td><td>dateFounded = _ _/_ _/195_</td></tr>
<tr><td>Grouping</td><td></td></tr>
<tr><td>Sort order</td><td></td></tr>
</table>
</td><td>2</td><td></td></tr>
</table>

Question			Expected response	Max mark	Additional guidance
18.	(a)	(i)	Award 1 mark each for: • record declaration • five variables • correct data type for variables	**3**	

			SQA Reference Language example answer:
			
			`RECORD participant IS`
			`{STRING idNumber, STRING firstname, STRING, lastname, STRING town, INTEGER score}`		

		(ii)	Award 1 mark each for: • array • of 5000 records	**2**	
			SQA Reference Language example answer: `DECLARE participants AS array of participant * 5000 INITIALLY[]`		
	(b)		Award 1 mark each for: • set highposition to first position • fixed loop: 1 TO 4999 • condition: check current score is greater than score at current highest position • store new position if condition true	**4**	Answer may use 1D array, as candidate may not have answered the previous questions correctly.

			SQA Reference Language example answer:
			
			`SET highposition TO 0`
			`FOR loop FROM 1 TO 4999 DO`
			`IF participants[loop].score > participants[highposition].score THEN`
			`  SET highposition TO loop`
			`END IF`
			`NEXT`		

	(c)		Award 1 mark each for any two from: • unauthorised access to computer material • unauthorised access with intent to commit a further offence • unauthorised modification of data on a computer	**2**	

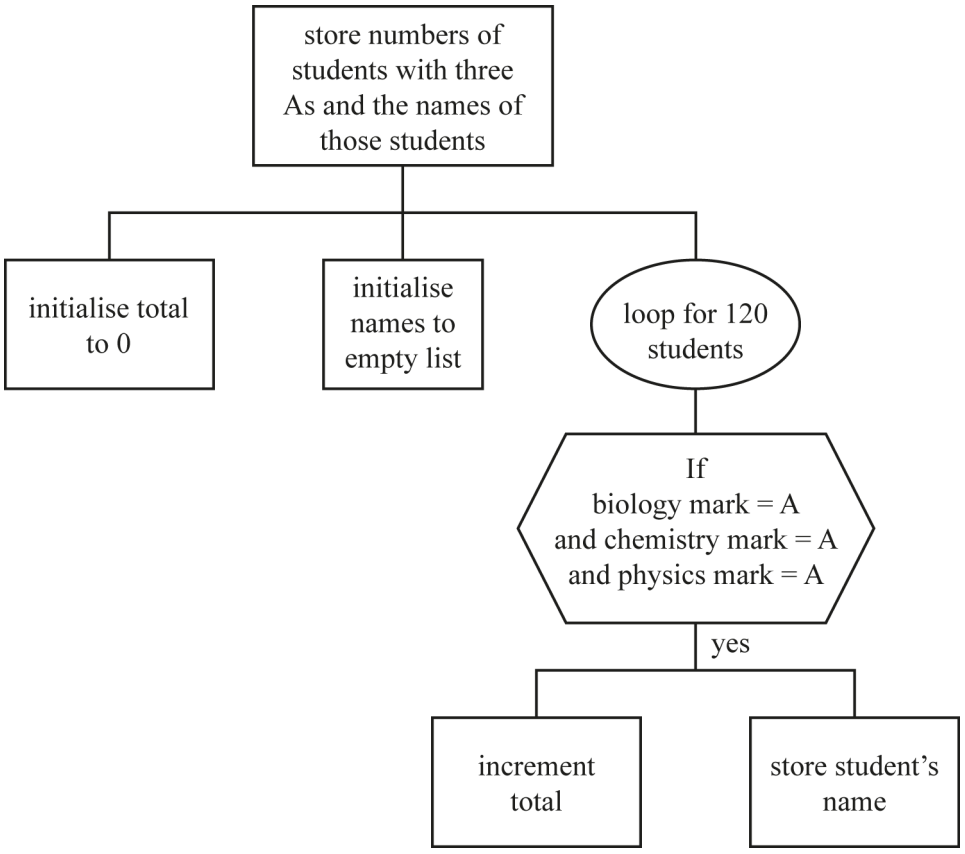
Question			Expected response	Max mark	Additional guidance
19.	(a)		Award 1 mark each for any two from: • no navigation • too much information for a smart phone screen • landscape design does not suit smartphone use	**2**	
	(b)		Award 1 mark each for: • to position the two <h1> headings either side of the page • to position the two <section> elements side-by-side	**2**	
	(c)		Award 1 mark each for: • white background • dark green text colour • fits the width of the section • text is 10px in from the edge of the paragraph element boundary and an additional 5px from the top of the section	**4**	
	(d)	(i)	<p> or paragraph	**1**	
		(ii)	Award 1 mark each for: • when the book cover is clicked, the function is called • it shows one of four paragraphs • while hiding the other three	**3**	
		(iii)	More characters can be represented.	**1**	
	(e)		They produce more realistic photographic images.	**1**	

<table>
<tr><th colspan="3">Question</th><th>Expected response</th><th>Max mark</th><th>Additional guidance</th></tr>
<tr><td>20.</td><td>(a)</td><td></td><td>
<table>
<tr><th>Module</th><th>In/out</th><th>Data flow</th><th></th></tr>
<tr><td rowspan="2">2</td><td>IN</td><td>bio(), che(), phy(), name()</td><td>1 mark</td></tr>
<tr><td>OUT</td><td>total
threeA()</td><td>1 mark
1 mark</td></tr>
<tr><td rowspan="2">3</td><td>IN</td><td>total</td><td>1 mark</td></tr>
<tr><td>OUT</td><td></td><td></td></tr>
</table>
</td><td>4</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>Award 1 mark each for:

• initialise total
• use of fixed loop (120 times)
• complex selection statement (all three subjects = A)
• incrementing total
• store three A candidate names

Pseudocode example answer:

1. Initialise total to 0
2. Start fixed loop for 120 candidates
3. If biologyMark = A and chemistryMark = A and physicsMark = A
4. Increment total
5. Store candidate name
6. End if
7. End fixed loop</td><td>5</td><td></td></tr>
</table>

Question			Expected response	Max mark	Additional guidance
20.	(b)		Structure diagram example answer:  		
	(c)		Award 1 mark each for: • creating a file • fixed loop for number of three A candidates • writing threeA names to file • closing file	**4**	
			Pseudocode example answer: 1. Create Science File 2. Start fixed loop for number of Three "A" candidates 3. write candidate names to file 4. End fixed loop 5. Close file		
	(d)		Award 1 mark for any one from: • different programmers can implement different parts of the design • each part of the design can be tested separately when implemented • design shows main processes	**1**	

[END OF SPECIMEN MARKING INSTRUCTIONS]

Published: August 2018

Change since last published:

Front cover rubric amended

Changes to question stem and marking instructions (Question: 14).