



FOR OFFICIAL USE

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National
Qualifications
SPECIMEN ONLY

Mark

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SQ09/H/01

Computing Science

Date — Not applicable

Duration — 2 hours



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

D	D
---	---

M	M
---	---

Y	Y
---	---

Scottish candidate number

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Total marks — 90

SECTION 1 — 20 marks

Attempt ALL questions.

SECTION 2 — 70 marks

Attempt ALL questions.

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.



SECTION 1 – 20 marks

Attempt ALL questions

1. (a) A company is developing a new software package. State when the company would use beta testing.

1

- (b) State two reasons why the client should be involved in the testing.

2

2. Clare has just started programming and has created an algorithm to search the array `cars` which holds one hundred car registration numbers.

Clare wishes to search for a specific registration number each time she uses the program. Clare’s algorithm is shown below.

line

```

1   SET check TO 0
2   SET counter TO 1
3   RECEIVE registration FROM KEYBOARD
4   REPEAT
5       IF cars[counter] = registration THEN
6           SET check TO 1
7       END IF
8       SET counter TO counter + 1
9   UNTIL check = 1 OR counter = 101

```

Clare could have used a Boolean variable called “found” as part of this algorithm. She alters line 1 to read:

```

1   SET found TO false

```



2. (continued)

With reference to the line numbers shown, state the other changes that Clare would need to make if she wished to use this Boolean variable.

2

3. Jade is writing a program on her PC that is intended to run on her mobile phone.

Explain why an emulator is required in the programming environment.

2

4. Scottish Airways operate a real-time booking system. To ensure the security of the data they make a daily backup of the whole system.

Explain what additional backups would be required to ensure no loss of data in the event of a system failure.

2



MARKS

DO NOT
WRITE IN
THIS
MARGIN

5. SN is a software development company. They have been invited to bid for the contract to develop software for a multinational supermarket chain.

(a) Explain why using a rapid application development (RAD) methodology could be beneficial to SN when bidding for the contract.

2

(b) Describe how Agile methodologies could be used in the effective production of the software.

2

6. A programming language uses 32 bits to represent real numbers such as the negative value -0.000000016 .

Explain how the 32 bits could be allocated to store such numbers.

3



* S Q 0 9 H 0 1 0 4 *

7. A section of code has been written to total the contents of an array of 100 values.

line

```
1   SET total TO 0
2   FOR index FROM 1 TO 100
3       SET total TO total + values[index]
4   END FOR
```

- (a) Explain why a compiler may be more efficient than an interpreter in the execution of this code. 2

- (b) Explain the benefit of this code being present in cache memory. 2



SECTION 2 – 70 marks

Attempt ALL questions

1. A program has been written to find the **position** of the maximum value in a list, however the program stops responding. The algorithm responsible is shown below.

```

line
1   SET source TO [71,76,66,67,89,72]
2   SET position TO 1
3   FOR counter FROM 2 TO 6
4       IF source[counter]>source[position] THEN
5           SET counter TO position
6       END IF
7   END FOR

```

- (a) Line 1 shows the use of a 1-D array to store the list of values, instead of six individual variables. Describe **two** advantages of using a 1-D array to store this list of values.

2

- (b) A trace table is being used to record the changes to variables when stepping through the code.

(Line 4 does not change a variable's value and so is not included.)

Line	Source	Position	Counter
1	[77,66,88,67,89,72]		
2			
3			
5			

- (i) Complete the information in the table above, recording the value assigned to the variable for line numbers 2, 3 and 5.

3

1. (b) (continued)

(ii) Explain why the loop never terminates.

2

(iii) Describe how the algorithm should be corrected.

2

(iv) The program stopped responding because the loop did not terminate. This is an example of an execution error. Describe another type of error that can occur when a program runs.

2

(c) Describe how a feature of the software development environment could have been used to locate the area of code with the error.

2

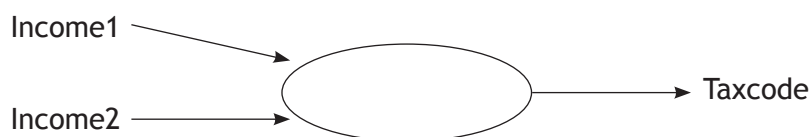
Total marks 13



2. CheckTax have developed a function to return the taxcode (A, B, C or D) that should be used for an employee's pay. The function is to be used for employees that have income from two different sources. For example:

Combined income	Taxcode
Less than 9000	A
9000 and over (but less than 43000)	B
43000 and over (but less than 60000)	C
60000 and over	D

The inputs and output of this function are show in the diagram below.



The function was developed using the following algorithm to determine a taxcode for any value of total income.

```

line
1   SET taxcode TO "Z"
2   SET salary TO (income1 + income2)
3   IF salary < 9000 THEN
4       SET taxcode TO "A"
5   END IF
6   IF salary > 9000 AND salary < 43000 THEN
7       SET taxcode TO "B"
8   END IF
9   IF salary > 43000 AND salary < 60000 THEN
10      SET taxcode TO "C"
11  END IF
12  IF salary > 60000 THEN
13      SET taxcode TO "D"
14  END IF
15  RETURN taxcode
  
```



MARKS

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2. (continued)

- (a) Explain why this algorithm would return an incorrect taxcode if income1 is 30000 and income2 is 30000.

2

- (b) The lead programmer comments that the use of a series of IF statements is inefficient.

Using pseudocode or a language with which you are familiar, rewrite the algorithm to correct the logic error and make the code more efficient.

3



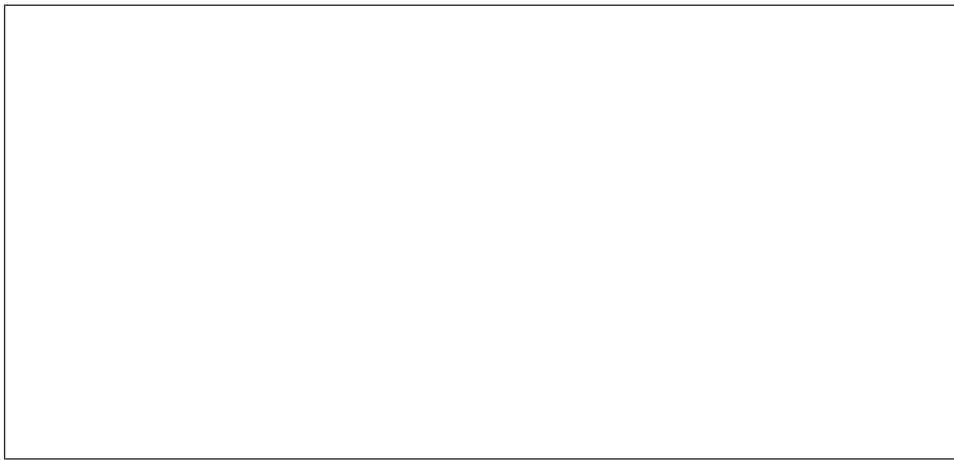
2. (continued)

- (c) Jeanette works for a bank and has downloaded the corrected function, `taxcode`, from CheckTax's online library. Bank employees receive an annual salary and bonus pay and Jeanette's program stores these values in variables `salary` and `bonus`. It also stores the employee's tax code in a variable called `code`.

Using pseudocode or a language with which you are familiar, write an algorithm for a subroutine that will:

- Ask the user for the values for variables `salary` and `bonus`
- Use the function to assign the variable `code`
- Display `code` on screen

3



- (d) Jeanette has commissioned CheckTax to create some software for the bank. Part of the software will be designed for a web-based system. CheckTax have decided to use wire-framing as part of the design process.

Describe **two** factors that CheckTax will have to consider while using wire-framing.

2



3. The weather statistics are recorded for each day of the 30 days of November. For each day, the statistics recorded include the rainfall in millimetres and the lowest temperature. Some of the data is shown below.

Day	Rainfall	Lowest temperature
1	12	8
2	5	4
3	0	-3
4	5	1
5	0	-4
...
30	21	6

- (a) The rainfall figures are held in an array called `rainfall` and the lowest temperatures in an array called `lowtemp`. Using pseudocode or a language with which you are familiar, write an algorithm to count the number of dry days below freezing and write this number of days to a text file called `drydays`.

5



MARKS

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3. (continued)

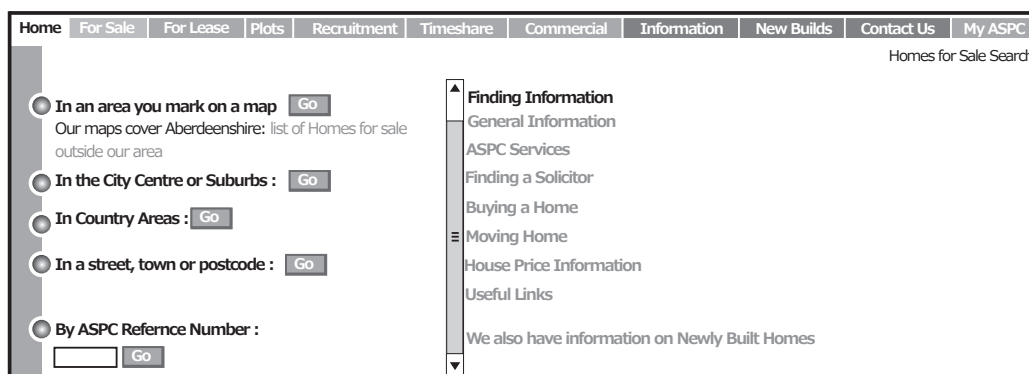
- (b) The algorithm used to count the number of dry days below freezing is implemented as a subroutine. Describe how the subroutine could make this value available to other parts of the program.

1



* S Q 0 9 H 0 1 1 2 *

4. Homeview is an estate agent which specialises in the sale of residential properties in Aberdeenshire. It uses a dynamic database-driven website to display the range of properties it has for sale. Details of each property are held within a relational database.



- (a) Describe **two** reasons why a dynamic database-driven website is a benefit for site visitors.

2

- (b) The managing director of Homeview wants to update the website and change the appearance of the text throughout all the web pages. He instructs his technical staff to make the following changes using cascading style sheets (CSS).

Text	Font	Size	Colour	Style
Headings	Verdana	20	Black	Bold
Sub Headings	Tahoma	16	Red	Bold
Body Text	Arial	12	Blue	Regular

Create a CSS rule that will implement the changes for the Sub Headings.

3

4. (continued)

- (c) To gain access to more detailed property information, users must complete a registration form to create a unique username and password.

Describe **one** example of input validation that could be applied to a **username** when it is first registered.

1

- (d) When registering, the user must enter a valid e-mail address. This validation process is carried out by code written in a scripting language.

In the language used, the syntax for an IF statement is:

```
if (expression)
{
    command(s)
}
```

and the OR comparator is written using the symbol ||

The following code is used to validate the e-mail address:

```
if (atpos<2 || dotpos<atpos+2 || dotpos+2>=length)
{
    alert("Not a valid e-mail address");
    return false;
}
```

In the code above:

- the variable `length` stores the number of characters in the e-mail address
- the variable `atpos` stores the position of the @ character
- the variable `dotpos` stores the position of the last dot

For example, if the e-mail address is `myname@sqa.com` then `length = 14`, `atpos = 7` and `dotpos = 11`

Explain how the code above would process the validation of the e-mail address: `my.name@net`

3

MARKS

DO NOT
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THIS
MARGIN

5. Choose a contemporary development in intelligent systems.

(a) Briefly describe the main features of this development.

2

(b) Describe **one** beneficial economic impact of this development.

1

(c) Describe **one** problem that this development might cause for society.

1



* S Q 0 9 H 0 1 1 5 *

6. Dog Walkers is a company that walks dogs when their owners are at work. The company has a database to store details of the dogs, their owners and the walkers. The data is stored in the following tables.

Dog	Owner	Walk	Walker
<u>Dog ID</u>	<u>Owner ID</u>	<u>Walk ID</u>	<u>Walker ID</u>
Dog name	Owner name	Dog ID*	Walker name
Dog type	Owner address	Walker ID*	Walker phone number
Gender	Owner phone	No. of days per week	
Walks well with others		Cost	
Photo			
Owner ID*			


- (a) State two one-to-many relationships that exist between the tables.

2

6. (continued)

The following form is used to enter each dog's details.

Dog walkers

Dog name	Buster
Dog type	Golden Labrador
Gender	Male
Walks well with others	Yes
Photo	
Owner ID*	123

(b) Describe **two** ways of improving the usability of this form.

2



* S Q 0 9 H 0 1 1 7 *

6. (continued)

(c) The following is produced for a walker.

Walker: Susan			
Dog name	Dog type	Owner address	Walks well with others
Bertie	Basset Hound	6 Flower Way	Yes
Buster	Golden Labrador	103 Mayflower	Yes
Goldie	Spaniel	65 Varley Road	Yes
Ralph	German Shepherd	The Drive	Yes

Describe how the company would use the database software to produce this report.

5



7. WebGo develop websites for mobile devices. WebGo have developed a site for a new university.

- (a) The university would like the website to incorporate an internal search engine. Search engines make use of crawler software.

Describe **two** ways that WebGo could ensure that the new website was optimised for indexing by crawler software.

2

- (b) Students have reported issues with one of the web pages that is returned following a search.

The web page is supposed to display images of the student union gym and cafeteria. When the page loads the images appear as follows.



Explain how the HTML code could be changed to make this web page more accessible in the event of images not appearing on screen.

2

7. (continued)

- (c) The university has a web page devoted to foreign exchange students. As part of this web page there is an image of a national flag. The image can be compressed using a lossless compression technique.



Explain why lossless compression results in a significant reduction in the file size for this image.

2

8. Vol4Ecosse is a non-profit organisation based in Scotland. The group send students to work on community-based projects throughout the country.

Students can access the Vol4Ecosse website and complete some user forms to update their current location and the status of each project.

(a) Vol4Ecosse decide to make use of server-side validation when handling forms that keep track of progress.

Describe **two** reasons why server-side validation may be more appropriate than client-side validation in this case.

2

(b) Whilst volunteering, the students are encouraged to update the status of different projects throughout the country by adding text and photographs to a shared web-based folder. Explain why cloud storage might be best suited for this purpose.

2

(c) The Regulation of Investigatory Powers Act 2000 (RIPA) has implications for Vol4Ecosse and their Internet Service Provider (ISP).

(i) Describe the financial implications of this Act for ISPs.

1

(ii) Describe **one** reason why RIPA is becoming increasingly difficult to enforce.

2



9. WebScape is a web design company. It is developing a website that will be accessible on many devices including tablets, laptops and smartphones. The site is hosted on their web server.

- (a) Describe how accessible design can be achieved using cascading style sheets (CSS).

2

- (b) A typical page in the website is tested and requires optimisation.

```
<body>
<script src="http://webscape.org.uk/js/jquery.js"></script>
<script src="http://webscape.org.uk/js/jquery.once.js"></script>
<script src="http://webscape.org.uk/js/drupal.js"></script>
<script <src="http://webscape.org.uk/js/panels.js"></script>
<style>
.center_div
{
border:1px solid gray;
margin-left:auto;
margin-right:auto;
width:90%;
background-color:#d0f0f6;
text-align:left;
padding:8px;
}
</style>




</body>
```



MARKS

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WRITE IN
THIS
MARGIN

9. (b) (continued)

- (i) Explain how the code above could be altered to optimise load times.

2

- (ii) Describe **two** ways that compression can be used to reduce the time to retrieve and display a web page.

2

[END OF SPECIMEN QUESTION PAPER]



* S Q 0 9 H 0 1 2 3 *

ADDITIONAL SPACE FOR ANSWERS



* S Q 0 9 H 0 1 2 4 *

ADDITIONAL SPACE FOR ANSWERS

Acknowledgement of Copyright

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* S Q 0 9 H 0 1 2 5 *



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Computing Science

Marking Instructions

These Marking Instructions have been provided to show how SQA would mark this Specimen Question Paper.

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General Marking Principles for Higher Computing Science

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key.

- (a) Marks for each candidate response must always be assigned in line with these General Marking Principles and the Detailed Marking Instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.
- (c) Marks should be awarded regardless of spelling as long as the meaning is unambiguous.
- (d) Candidates may answer programming questions in any appropriate programming language or pseudocode. Marks should be awarded, regardless of minor syntax errors, as long as the intention of the coding is clear.
- (e) Where a question asks the candidate to **describe**, the candidate must provide a statement or structure of characteristics and/or features. This should be more than an outline or a list. It may refer to, for instance, a concept, process, experiment, situation or facts in the context of, and appropriate to, the question. The candidates will normally be required to make the same number of factual/appropriate points as are awarded in the question.
- (f) Where a question asks the candidate to **explain**, marks should only be awarded where the candidate goes beyond a description, for example by giving a reason, or relating cause to effect, or providing a relationship between two aspects. These will be related to the context of the question or a specific area within a question.

Marking Instructions for each question

SECTION 1

Question		Expected response	Max mark	Additional guidance
1	a	Last stage of testing prior to release.	1	
1	b	<p>Any two of the following</p> <ul style="list-style-type: none"> • software can be tested on their own systems • software can be tested on eventual users • provide feedback to software development company • client needs to agree that software meets their needs before accepting/paying for it 	2	1 mark for each correct response.
2		<p>Line 6: found = true (1 mark).</p> <p>Line 9: UNTIL found = true or counter = 101 (1 mark).</p>	2	1 mark for each correct response.
3		To run the object code/exe/machine code (1 mark) for a different processor than the one in the computer (1 mark).	2	1 mark for each correct response.
4		Incremental backups (1 mark) would ensure no loss of transaction data in between the daily backups (1 mark).	2	Award first mark where description of backup is correct with or without word incremental.
5	a	<p>RAD involves the creation of prototypes/models/working software.</p> <p>Prototypes can stimulate user interest in the software as they can use/see a working copy with limited features.</p>	2	<p>1 mark for use of prototypes.</p> <p>1 mark for impact of prototypes on client interest.</p>
5	b	<p>Any two of the following</p> <ul style="list-style-type: none"> • regular opportunities to assess development/success • shorter iterations of work/quicker response to change • gather requirements at the same time as developing software • greater customer collaboration/cooperation 	2	1 mark for each correct response.

Question		Expected response	Max mark	Additional guidance
6		<p>Allocates 16 bits for the exponent (1 mark) and 16 bits for mantissa (1 mark).</p> <p>Two's complement for the mantissa would allow negative values (1 mark).</p> <p>OR</p> <p>Two's complement for the exponent to allow for small values (1 mark).</p>	3	This is one example, other allocations are acceptable.
7	a	<p>Compiler saves the object code (1 mark) and so does not retranslate on each pass through the loop (1 mark).</p> <p>OR</p> <p>Interpreter may retranslate (1 mark) on each pass through the loop using processor time (1 mark).</p> <p>OR</p> <p>Interpreter resident in memory (1 mark), compiler doesn't need to be in memory (1 mark).</p>	2	1 mark for each correct response.
7	b	<p>Faster access time (1 mark) than main memory (1 mark).</p> <p>OR</p> <p>Entire section of code will be present in cache (1 mark), and so cache misses will not occur (1 mark).</p>	2	1 mark for each correct response.

SECTION 2

Question		Expected response	Max mark	Additional guidance																				
1	a	<p>Any two of the following</p> <ul style="list-style-type: none"> only one line of code required to create multiple values can be traversed using loop structure parameter passing easily implemented with one line efficiency of code each individual element in the array can be referenced by indexing 	2	1 mark for each correct response.																				
1	b	<p>i</p> <table border="1"> <thead> <tr> <th>Line</th> <th>Source</th> <th>Position</th> <th>Counter</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>[77,66,88,67,89,72]</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td>1</td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td>2</td> </tr> <tr> <td>5</td> <td></td> <td></td> <td>1</td> </tr> </tbody> </table>	Line	Source	Position	Counter	1	[77,66,88,67,89,72]			2		1		3			2	5			1	3	1 mark for each correct response.
Line	Source	Position	Counter																					
1	[77,66,88,67,89,72]																							
2		1																						
3			2																					
5			1																					
1	b	<p>ii</p> <p>Counter goes back to 1 on every iteration of the loop (1 mark), causing the terminating condition of the loop never to be met (1 mark).</p>	2	1 mark for process. 1 mark for reason.																				
1	b	<p>iii</p> <p>Change line 5 (1 mark) to SET position TO counter (1 mark).</p>	2	1 mark for each correct response.																				
1	b	<p>iv</p> <p>A logic error where the program produces incorrect or undesired output (1 mark), possibly as the result of an incorrect formula or using an incorrect or wrong algorithm (1 mark).</p>	2	1 mark for each correct response.																				
1	c	<p>The use of breakpoints (1 mark) allows execution of code to be stopped at a pre-defined point (1 mark).</p>	2	1 mark for each correct response.																				
2	a	<p>The value of salary will be 60000; none of the IF statement conditions</p>	2	1 mark for cause.																				

Question		Expected response	Max mark	Additional guidance
		becomes true as 60000 is not less than or greater than 60000, so the variable taxcode will remain at "Z".		1 mark for reason.
2	b	<pre> SET taxcode TO "Z" SET salary TO (income1 + income2) IF salary < 9000 THEN SET taxcode to "A" ELSE IF salary >= 9000 AND salary < 43000 THEN SET taxcode to "B" ELSE IF salary >= 43000 AND salary < 60000 THEN SET taxcode to "C" ELSE IF salary >= 60000 THEN SET taxcode to "D" END IF RETURN taxcode SET taxcode TO "Z" SET salary TO (income1 + income2) SELECT CASE salary CASE < 9000: SET taxcode to "A" CASE 9000 to 43000: SET taxcode to "B" CASE > 43000 AND < 6000: SET taxcode to "C" CASE >= 60000: SET taxcode to "D" END SELECT RETURN taxcode </pre>	3	<p>1 mark for construct nested IF or CASE.</p> <p>1 mark for correct conditions .</p> <p>1 mark for correct use of variables.</p> <p>Answer can be given in any language or form of pseudocode.</p>
2	c	<pre> RECEIVE salary FROM KEYBOARD RECEIVE bonus FROM KEYBOARD code = taxcode (salary, bonus) SEND code TO DISPLAY </pre>	3	<p>1 mark for input of both variables.</p> <p>1 mark for making use of function with both input parameters.</p> <p>1 mark for assignment of taxcode and subsequent display.</p>

Question		Expected response	Max mark	Additional guidance
2	d	<p>Navigational structure – relationship between links and take account of the nature of navigation (1 mark). Accept examples of nature, eg local navigation to a page/global links to other parts of system.</p> <p>Presentation of data – placement of objects to maximise purpose of page for end user, eg priority of visual elements like a file player/image/legal information (1 mark).</p> <p>Interface design – matches hardware used to communicate with page or takes account of ease of use, eg check boxes instead of text boxes.</p>	2	<p>Naming alone, no marks.</p> <p>Any two descriptions for a maximum of 2 marks.</p>
3	a	<pre> SET frequency TO 0 FOR counter FROM 1 TO 30 IF rainfall[counter]=0 AND lowtemp[counter]<0 THEN SET frequency TO frequency+1 END IF END FOR OPEN drydays SEND frequency TO drydays CLOSE drydays </pre>	5	<p>Answer can be given in any language or form of pseudocode.</p> <p>1 mark for each of any five of the following:</p> <ul style="list-style-type: none"> • initialise and increment frequency • the FOR loop with END FOR • IF construct with END IF • correct complex condition with two variables • SEND frequency to drydays • OPEN and CLOSE.
3	b	By declaring it as a parameter which can pass a value to a corresponding parameter (1 mark)	1	

Question		Expected response	Max mark	Additional guidance
4	a	<p>Any two of the following</p> <ul style="list-style-type: none"> dynamic web pages will respond to information entered by the visitor information will always be recent/up to date. visitors will be presented with information that relates specifically to their needs. 	2	1 mark for each correct response.
4	b	<pre>H3 { font-family : Tahoma; font-size : 16px; color : red; font-weight : bold }</pre> <p>Acceptable alternatives to H3:</p> <pre>.subheading { rules }</pre> <p>OR</p> <pre>#subheading1 {rules}</pre>	3	<p>1 mark for H3 or similar.</p> <p>1 mark for correct attributes.</p> <p>1 mark for correct values.</p>
4	c	<ul style="list-style-type: none"> the username should be validated against the list of existing usernames when registering, the system must ensure that the username does not already exist in the database to check that no invalid characters are included 	1	1 mark for any correct response.
4	d	<p>atpos(8)<2 is false; dotpos(3)<atpos+2(10) is true dotpos+2 (5)>=length(11) is false as one condition is true, the expression is true, so alert message is displayed</p>	3	1 mark for each correct response.

Question		Expected response	Max mark	Additional guidance
5	a	<p>Candidate might describe an autonomous robotic device, or a game-playing program that can learn and develop strategies, or a system that replicates human conversation. Examples could be in commercial use, or at a research stage, or games-based.</p> <p>Note that the description should be of a contemporary development, so reference to historical programs like Eliza would not be appropriate.</p>	2	<p>1 mark to be awarded for a clear description of a system.</p> <p>1 mark for a clear indication of why it can be described as “an intelligent system”.</p>
5	b	Example must clearly show an economic benefit resulting from the system described.	1	
5	c	Example must clearly show a problem for society resulting from the system described.	1	
6	a	<p>Any two of the following:</p> <ul style="list-style-type: none"> walker and walk dog and walk owner and dog 	2	1 mark for each correct response.
6	b	<ul style="list-style-type: none"> make the gender/walks well with others options Boolean with a male/female and yes/no buttons create drop down lists for Dog type and Owner ID 	2	1 mark for each correct response.
6	c	<p>Create a query with the following fields:</p> <ul style="list-style-type: none"> Walker.walker name and criteria = “Susan” Dog.dogname Dog.dogtype Dog.walks well with others Owner.owner address <p>And then create a report using the data from the query.</p>	5	1 mark for each correct response.

Question		Expected response	Max mark	Additional guidance
7	a	<p>Any two of the following</p> <ul style="list-style-type: none"> • ensure that the title tag contains a concise description of the website's content • create a new title tag for each web page • use the description meta tag to add more detail about the page • use URLs that are as concise as possible • do not use generic titles for URLs, page titles or meta data, eg page1, etc • create an XML sitemap for submission to the software company managing the crawler <p>Or any other valid response</p>	2	1 mark for each correct response.
7	b	They could have used more appropriate alt tags (1 mark), to include a better description of each image (1 mark).	2	1 mark for solution. 1 mark for reason.
7	c	It has long runs of pixels of the same colour(1 mark), allowing the colour and the repetitions to be stored using just two values (1 mark).	2	1 mark for explanation. 1 mark for reason.
8	a	<p>Any two of the following</p> <ul style="list-style-type: none"> • updating centrally held data/data sources is not possible with client side scripting • validation cannot be disabled if it is handled at the server • can query SQL using PHP • less security issues as data is managed at server <p>Or any other valid response.</p>	2	1 mark for each correct response.
8	b	<p>Any two of the following</p> <ul style="list-style-type: none"> • allows multiple users to share, edit and save files/folders • accessible via the internet from any device • accessible via internet from any location 	2	1 mark for each correct response.

Question			Expected response	Max mark	Additional guidance
8	c	i	ISPs must implement technical systems for the storing and interception of information that may be requested by government.	1	
8	c	ii	Encryption is becoming more sophisticated/difficult to decrypt, etc (1 mark), requiring the cooperation of the individual to provide keys/information in order to decrypt (1 mark).	2	1 mark for each correct response.
9	a		CSS media queries are used to identify the target device/screen (1 mark). CSS rules are created for different devices/screen widths (1 mark).	2	1 mark for each correct response.
9	b	i	Any one of the following <ul style="list-style-type: none"> • Create a CSS file to hold the CSS rules so that less data is delivered with main page. • Merge the JavaScript files into one and include file to reduce fetches from the server. • Merge the images into one image and use CSS rules to display only the relevant area of the image. This reduces the number of fetches from server. 	2	1 mark for change . 1 mark for reason.
9	b	ii	<ul style="list-style-type: none"> • Compression is used when the page is served, thus reducing the amount of data sent to the browser. The browser will decompress the page data when received. OR <ul style="list-style-type: none"> • Compression reduces the amount of data exchanged from the server to the browser client, therefore reducing the time taken to load the data. 	2	1 mark for each correct answer.

[END OF SPECIMEN MARKING INSTRUCTIONS]