

# Computer Science (A Level)

## Coding for the Web

Mr Johnston

OCR ExamBuilder process constraints mean you may see slight differences between this paper and the original.

Candidates answer on the Question Paper.  
A calculator may be used in this paper.

**OCR supplied materials:**

Additional resources may be supplied with this paper.

**Other materials required:**

- Pencil
- Ruler (cm/mm)

**Duration: Not set**

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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### INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

### INFORMATION FOR CANDIDATES

- The quality of written communication is assessed in questions marked with a pencil or an asterisk.
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **33**.

Answer **all** the questions.

1. Laser Tag is a game where teams of players move round an arena shooting each other with infrared guns. Players wear sensors that keep track of how many times they have been hit by the laser. This is known as being 'tagged'.

Below is an extract from a Laser Tag company's website:

## Reasons to Choose Us

Come play *Laser Tag* with us for:

- State of the art equipment
- Friendly staff
- Match recordings available to purchase
- Buy two games get one free.

The web page is written in HTML.

Write some HTML code which could have been used to produce this extract. You can assume it is already inside <body> tags.

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[4]

2. The Big Brains exam board has produced a website that allows students to access revision videos.

All pages in the site contain the following tag in the head section.

```
<link href="themes/standard.css" rel="stylesheet" type="text/css" />
```

Describe **one** advantage of storing the CSS in an external file rather than it being embedded within HTML files.

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**[3]**

3(a). A website has the following HTML code.

```
<html>
<head>
<title>My Stamp Collection - European Stamps</title>
</head>
<body>
<h1 style="font-family:Arial; color:darkGreen">United
Kingdom</h1>
<p>These are my stamps from the uk.</p>
<!-- Code A -->

<!-- Code B -->

</body>
</html>
```

the site's owner wants to add the photo UKstamps.jpg in place of the comment

```
<!-- Code A -->
```

Write the code that should go in place of the comment <!-- Code A -->:

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**[2]**

(b). The site uses styling set out as attributes in tags rather than a linked CSS file.

(i) Give **one** disadvantage of this to the site's owner.

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**[1]**

(ii) Give **one** disadvantage of this to the site's visitors.

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**[1]**

- (c). The site needs a light green (web colour lightGreen) background.  
Explain what change needs to be made to the current page in order to do this.

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**[3]**

4(a). A website has the following code.

```
<p>
<form action="checkUser.php">
  Username:<br>
  <input type="text" name="username">
  <br>
  Password:<br>
  <input type="password" name="password">
  <br><br>
  <input type="submit" value="Submit">
</form>

<p id="warning">Unauthorised access to this system will be
prosecuted</p>
```

The page is linked to a style sheet. The message Unauthorised access to this system will be prosecuted is red with a monospace font. (Note this is the only text on the page that has this formatting)

Write the segment of CSS code that would appear on the style sheet to make the message appear in the way described.

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[3]

(b). Explain the meaning of the HTML line `<input type="text" name="username">`

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[2]



```
01 username = valueFromForm("username")
02 password = valueFromForm("password")
03 statement = "SELECT passwordHash FROM users WHERE name = '"
    + username + "'"
04 hashInDB = RunSQL(statement, siteDatabase)
05 if hashInDB == hash(password) then
06     //TO ADD: Generate success webpage
07 else
08     //TO ADD: Store IP address of user in database.
09 endif
```

**Fig. 8.1**



5. Part of the program checks that the HTML tags are well formed.  
Well formed HTML has tags that are nested but never overlapping.

e.g.

`<p>The cat <strong>sat</strong> on the mat.</p>` is well formed.

Whereas `<p>The cat <strong>sat</p> on the mat.</strong>` is not well formed as `p` closes before the `strong` inside it has been closed.

All comments and single tags (e.g. `img`, `br` etc) are removed from `dataStructureA`.  
All attributes are removed from the within the tags.

- (i) The contents of `dataStructureA` may look similar to below:

<code>&lt;html&gt;</code>	<code>&lt;head&gt;</code>	<code>&lt;title&gt;</code>	<code>&lt;/title&gt;</code>	<code>&lt;/head&gt;</code>	<code>&lt;body&gt;</code>	<code>&lt;h1&gt;</code>	<code>&lt;/h1&gt;</code>	<code>&lt;/body&gt;</code>	<code>&lt;/html&gt;</code>
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Tags are removed from `dataStructureA` in the same order they were added.

Identify what type of data structure `dataStructureA` is.

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----- **[1]**

`dataStructureB` is given a closing tag and gives the corresponding opening tag.

e.g.

`openingTag=dataStructureB.get("</head>")`

`openingTag` is "`<head>`" (courier font)

- (ii) Identify what type of data structure `dataStructureB` is.

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----- **[1]**

The following code is used to check if the tags are well formed.

```
function checkTags (dataStructureA)
{
    valid=true
    //loops while code is still valid
    //and dataStructureA has tags
    while valid==true and dataStructureA.isEmpty()==false
        tag=DataStructureA.remove()
        //Next, check if closing tag
        if tag.substring(1,1)=="/" then
            if dataStructureC.remove()!=dataStructureB.get(tag) then
                valid=false
            endif
        else
            dataStructureC.add(tag)
        endif
    endwhile
    return valid
}
```

(iii) Identify what type of data structure `dataStructureC` is.

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(iv) Explain why `dataStructureC` is suited to checking if HTML is well formed.

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----- [2]

**END OF QUESTION PAPER**

## Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
1		<ul style="list-style-type: none"> <li>• Appropriate tags to make Reasons to Choose Us subheading (e.g. h1, h2, h3). Accept b or strong if accompanied by attribute to make increase font size (1).</li> <li>• Laser Tag italicised (e.g. i or em) (1).</li> <li>• ul used for bulleted list (1).</li> <li>• li to mark out elements of list (1).</li> </ul>	4	<p>Up to 4 marks - 1 mark for each correct step in process.</p> <p>Example:</p> <pre>&lt;h2&gt;Reasons to Choose Us&lt;/h2&gt; Come play &lt;em&gt;Laser Tag&lt;/em&gt; with us for: &lt;ul&gt; &lt;li&gt;State of the art equipment&lt;/li&gt; &lt;li&gt;Friendly staff&lt;/li&gt; &lt;li&gt;Match recordings available to purchase&lt;/li&gt; &lt;li&gt;Buy two games get one free&lt;/li&gt; &lt;/ul&gt;</pre> <p>Accept answers where same effect is achieved using style attribute.</p>
		<b>Total</b>	<b>4</b>	
2		<ul style="list-style-type: none"> <li>• Content and formatting are kept separate (1). Changes can be made to the external style sheet and affect the whole site (1) saving time (1) and ensuring consistency (1). Stylesheets can be changed for different themes, or different devices (1).</li> </ul>	3	Up to 3 marks for a valid description.
		<b>Total</b>	<b>3</b>	
3	a	<pre>&lt;img src="UKstamps.jpg"&gt;</pre> <ul style="list-style-type: none"> <li>– One mark for img tag</li> <li>– One mark for correct src attribute</li> </ul> <p><b>(1 per –)</b></p>	2	<p>Accept self closing tag:</p> <pre>&lt;img src="UKstamps.jpg"/&gt;</pre>
	b	i	1	
		<ul style="list-style-type: none"> <li>– Formatting code has to be rewritten for every page</li> <li>– Changes have to be made to every page</li> <li>– It is a lot of work to keep the look of the site consistent.</li> </ul> <p>(1 per –, max 1)</p>		
		ii	1	
		<p>The site is slower to access (as the formatting information is reloaded for every page)</p> <p>Unlikely to have formatting specific to their device/needs.</p>		

## Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
	c	<ul style="list-style-type: none"><li>- Change the tag body ...</li><li>- So it includes the attribute style</li><li>- Which should have the value <code>background-color:lightGreen</code></li></ul> (1 per -)	3	Accept: <code>&lt;body bgcolor="lightGreen"&gt;</code> for full marks
		<b>Total</b>	<b>7</b>	

### Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
4	a	Code enclosed within #warning{...} (1) color: red; (1) font-family: monospace; (1)	3	#warning{ color: red; font-family: monospace; } Also accept hex color and RGB color notations. Don't penalise for missing semicolons.  <b>Accept a named suitable font like Courier New.</b>
	b	Creates a textbox (1) To hold the username/which is referred to as username (1)	2	
	c	<b>Mark Band 3–High Level (7–9 marks)</b>  The candidate demonstrates a thorough knowledge and understanding of client and server side processing. The material is generally accurate and detailed.	2  2  2	  <i>Answers may include, but are not limited to, some of the points below.</i>  <b>AO1: Knowledge and Understanding</b>

## Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
	<p>The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation.</p> <p>The candidate provides a thorough discussion which is well balanced. Evaluative comments are consistently relevant and well-considered.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p><b>Mark Band 2–Mid Level (4–6 marks)</b> The candidate demonstrates reasonable knowledge and understanding of client and server side processing; the material is generally accurate but at times underdeveloped.</p> <p>The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation.</p> <p>The candidate provides a sound discussion, the majority of which is focused. Evaluative comments are for the most part appropriate, although one or two opportunities for development are missed.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p><b>Mark Band 1-Low Level (1-3 marks)</b> The candidate demonstrates a basic knowledge of client and server side processing; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided.</p>	3	<p>Server side processing takes place on the webserver. Data is sent from the browser to the server, the server processes it and sends the output back to the browser. Client side processing takes place in the web browser.</p> <p><b>AO2.1: Application</b> Client side processing doesn't require data to be sent back and forth meaning code is much more responsive. Code is visible which means it can be copied. The browser may not run the code either because it doesn't have the capability or because the user has intentionally disabled client side code. Server side processing takes away the reliance of the browser having the correct interpreter. It hides the code from the user, protecting copyright and avoiding it being amended/circumvented. Server side processing puts extra load on the server. This is at the cost of the company hosting the website.</p> <p><b>AO3.3: Evaluation</b> Client side processing is best used when it's not critical code that runs. If it is critical then it should be carried out on the server. Client side processing is also best where a quick response is needed – an example being games. Server side processing is best used where it is integral that processing is carried out. It is often used for generating content. It can be used to access data including secure data. For this reason any data passed to it has to be checked carefully. With some things like validation good practice is to do both: First on the client for a quick response if there is an issue, then on the server in case the client side processing has been circumvented.</p>

### Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
			<p>The candidate provides a limited discussion which is narrow in focus. Judgments if made are weak and unsubstantiated. <i>The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.</i></p> <p><b>0 marks</b> No attempt to answer the question or response is not worthy of credit.</p>		
			<b>Total</b>	<b>14</b>	
5		i	Queue	1	
		ii	Hashtable	1	Accept Hashmap / Associative Array / Dictionary
		iii	Stack	1	
		iv	Stack uses a last in first out approach ... ... and the last HTML tag to be opened should be the first to be closed.	2	
			<b>Total</b>	<b>5</b>	