1(a) A company wants more customers to be able to find their website on the internet.

The company would like to start selling their products on their website. They will use both client side and server side processing to do this.

Tick (✓) **one** box on each row to identify whether each task would be best performed on the client side or the server side.

Task	Client Side	Server Side
Loading the website HTML code		
Applying CSS styles to a website		
Running JavaScript code to check that the customer surname has been entered on the order form		
Running queries on the database to check if an item is available in stock		

[4]

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(b) Discuss why search engine indexing and page ranking will be important in achieving this.

You should include the following in your answer:

- what search engine indexing means and what information is collected
- what PageRank means and possible factors that can affect a PageRank score of a website
- possible ways for the company to improve the PageRank score of pages on its website.

```
</p>
```

The `<label>` tag will instruct the user what information they need to enter. The code `onchange` will run a function called `errorCheck` automatically after a password has been entered. The function `errorCheck` will check that the password is a suitable length.

Write JavaScript code for the function `errorCheck` which:

- checks the length of the password is between 8 and 12 characters (including 8 and 12)
- displays the message "Password Length Error" in the HTML `label` tag identified by the id `errorText` if the length is not between 8 and 12 characters.

---

[5]

3(a) A team of programmers create a robot that will be used in a factory. The robot will be able to do the work of multiple humans.

The programmers discuss whether to write the instructions for the robot in assembly language or a high-level language.

The robot provides a web-based interface for users. The home screen webpage for this interface is shown in **Fig. 4**.

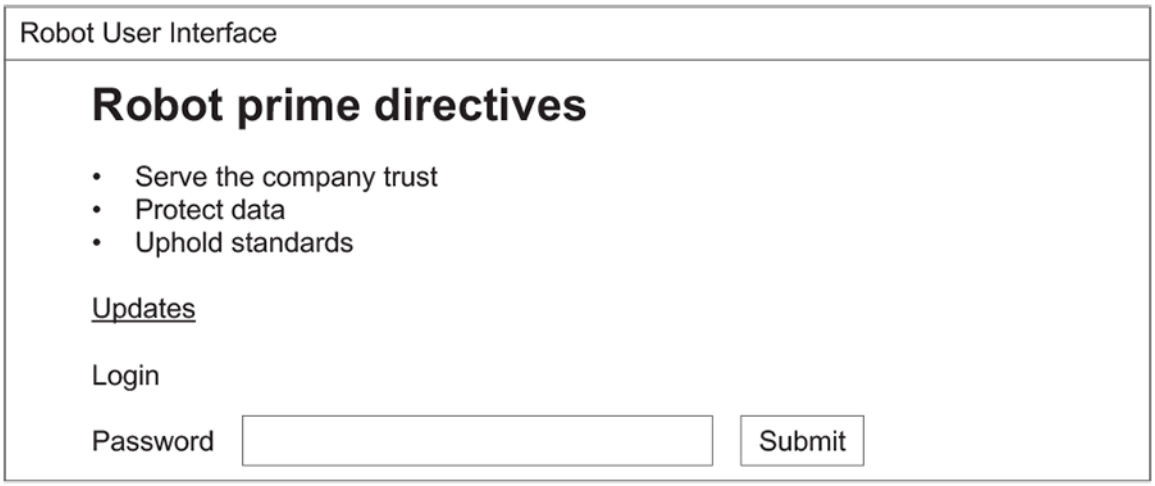


Fig. 4

i. Complete this HTML code that will display the webpage shown in **Fig. 4**.

```
<html>
    <head>
        <title>Robot User Interface</title>
    </head>
    <body>
        <h1>Robot prime directives</h1>
        ……
            <li>Serve the company trust</li>
            <li>Protect data</li>
            <li>Uphold standards</li>
        ……
    <a …… = "updates.html">Updates</a>
    <p>……</p>
    <form action="dologin.php">
        Password
        <input type = "……" name="pw">
        <input type = "……">
    </form>
    </body>
```

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```
</html>
```

[5]

ii. Write CSS code that could be used in an external stylesheet to format all text using the <h1> tag as white with a red background.

---

[3]

(b) The robot's web interface uses images that show the robot in action. These photographs have been taken using a digital camera.

The programmers do not want other people to download and use these images.

i. State the name of **one** relevant piece of legislation and describe how this would protect these images.

Legislation _____

_____

Description _____

_____

_____

_____ **[3]**

ii. For other areas of the web interface, the programmers need to use images that they have not created themselves.

Give **two** ways that they could make sure these images are used legally.

1 _____

_____

2 _____

_____ **[2]**

4 The following JavaScript has been found to crash certain web browsers.

```
Line    Code
1       var total = "";
2       for(var j = 0; j < 200000; j++)
3       {
4         total = total + j.toString();
5         history.pushState(0,0, total);
6       }
```

`j.toString()` converts `j` to a string. It is the JavaScript equivalent to `str(j)`.

Complete the table below.

Line	Effect of Code
1	
2	
3	
4	
5	Pushes `total` onto a stack that holds the browser's history.
6	

[2]

[1]

[1]

5(a) One page in the website contains a hyperlink on an image. When the image stored as "ticket.png" is clicked, the user is hyperlinked to the page stored as "booking.htm".

Write the HTML code to implement this hyperlink.

[3]

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(b) Users are able to search for and find the ticket website using a search engine. Search engines can use indexing and ranking.

i. Describe how a website is indexed by a search engine.

[4]

ii. A search engine can use the PageRank algorithm to determine a website's ranking. The PageRank algorithm utilises a damping factor.

State what is meant by the term 'damping factor'.

[1]

iii. Give **two** other factors that affect the output value given by the PageRank algorithm for a website.

1

2

[2]

(c) A website sells tickets for sporting events. The website uses HTML, CSS and JavaScript.

Describe the purpose of HTML and CSS within the code of the website.

HTML ---

CSS ---

---

[4]

6 Shreya is a web developer who creates webpages for a variety of different companies.

Shreya has received a webpage written in HTML shown in **Fig. 2.1**.

```
<html>
      <head>
            <title>BBC Computer</title>
            <link rel="stylesheet" type="text/css" href="BBC.css">

      </head>
      <body>
            <h1 id="Beeb">History of the BBC Micro Computer</h1>

            <h2>BBC Micro Models</h2>
            <ul>
                  <li class="model">Model A</li>
                  <li class="model">Model B</li>
            </ul>

      </body>
</html>
```

Fig. 2.1

Some of the formatting requirements for this webpage are shown in **Fig. 2.2**.

		Formatting Requirements

Class/ID	Text	font-family	colour
Beeb	History of the BBC Micro Computer	times	green
model	Model A Model B	arial	red

Fig. 2.2

Write the CSS Shreya needs to display the webpage so that it meets the formatting requirements stated in Fig 2.2.

[6]

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7 A web development company makes its money building websites for other companies.

* The web development company is looking to recruit a programmer to build websites.

Discuss the technologies the programmer would need to know and use and the importance of each one.

[9]

8 RestaurantReview is a website that allows users to leave reviews and ratings for different restaurants.

The website uses a database with the following structure.



The database management system ensures referential integrity is maintained.

Each review includes a score out of 5. When the score is entered on the website it is checked in the browser to ensure a number no higher than 5 has been entered. It is then checked again on the server.

i. State what is meant by the term 'server'.

---

[1]

ii. Explain why it is important that the review score that the user entered is also checked server-side.

---

[2]

END OF QUESTION PAPER

<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td>a</td><td></td><td>1 mark for each correct row.

<table>
<tr><th>Task</th><th>Client Side</th><th>Server Side</th></tr>
<tr><td>Loading the website HTML code</td><td>✓</td><td></td></tr>
<tr><td>Applying CSS styles to a website</td><td>✓</td><td></td></tr>
<tr><td>Running JavaScript code to check that the customer surname has been entered on the order form</td><td>✓</td><td></td></tr>
<tr><td>Running queries on the database to check if an item is available in stock</td><td></td><td>✓</td></tr>
</table></td><td>4</td><td>Accept alternatives to ticks in the boxes so long as it is clear which side is marked.

<u>Examiner's Comments</u>

Most candidates were able to gain 2 or 3 marks on this question with many gaining all 4 marks. The most common error was ticking server side for Running JavaScript to check the surname.</td></tr>
</table>

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Question			Answer/Indicative content	Marks	Guidance

	b		**Mark Band 3-High Level (9-12 marks)**
			The candidate demonstrates a thorough knowledge and understanding of search indexing and page rank. The material is generally accurate and detailed.
			
			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.
			
			The candidate is able to assess the extent to which page rank and search engine optimization is important to online visibility.
			
			There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.
			
			A mark band 3 answer will explain in detail how search indexing happens and the factors affecting PageRank scores. There will be clear evaluative points that identify how to improve PageRank score.
			
			Mark Band 2-Mid Level (5-8 marks) The candidate demonstrates reasonable knowledge and understanding of search indexing and page rank; the material is generally accurate but at times underdeveloped.
			
			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.
			
			The candidate makes a reasonable attempt to come to a conclusion as to why page rank and search engine optimisation are important to online visibility.
			
			There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.
			
			A mark band 2 answer will cover both search indexing and page ranking and will expand the points, explaining what
				12	Points may include but aren't limited to:
					
					AO1 Knowledge and Understanding
					Search engine indexing:
					
					• Search engine indexing is where a database of key words is kept with links to relevant pages stored with the keyword
					• Words are stored along with their position on a page
					• Bots (spider/crawlers) will "crawl" the web finding web pages and looking for key words on them
					• The will navigate from page to page following hyperlinks
					• They are then sent back to the search engine's database
					• When you search for a website, you are not searching on the web, you are searching in the search providers database
					
					PageRank:
					
					• Used to find and rank website pages and then list the results in a search engine. If a website has a higher score, it will appear higher in the list of search results.
					• More links from more important pages, ranks a page higher
					• Stored as a weighted, directed graph
					  ◦ Pages are nodes
					  ◦ Hyperlinks are edges in one direction
					  ◦ Weightings are calculated by page rank
					
					AO2 Application
					To get more of presence they will need to...
					
					• Make effective use of meta tags that effectively describe the contents of the website.
					• Make effective use of H1 tags using suitable headings that describes the content of the website
					• Increase the number of quality of incoming links from other websites, ideally those with a high PageRank score themselves
					• Increase the number of outgoing links
					• Key words can be stored in meta tags,

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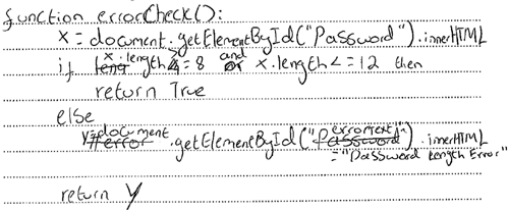
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Question			Answer/Indicative content	Marks	Guidance
			information is collected during indexing and factors that affect PageRank scores although these may not be balanced. There should be some attempt to identify how to improve PageRank score. Mark Band 1-Low Level (1-4 marks) The candidate demonstrates a basic knowledge of search indexing or page rank; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than an unsupported assertion. 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. *A mark band 1 answer will contain some basic, relevant facts about what search indexing is and/or what PageRank means. They may not discuss how the company can improve PageRank.* 0 mark No attempt to answer the question or response is not worthy of credit.		title tags or header tags (h1, h2 etc) • Damping factor is used to quash a PageRank based on the idea that a user will only click through a certain number of links AO3 Evaluation • PageRank algorithm is only one algorithm that is used to Rank websites. • To get a better presence on the internet, the company will need to consider who links to their page, the more popular the better • They could potentially work with other companies who have established websites and get incoming links from those sites • It's important that a company ensures their site is malware free/secure as this can impact on their PageRank score <u>Examiner's Comments</u> Many candidates were able to discuss some factors that affect PageRank and how the website could improve it. Far less were able to discuss search engine indexing correctly. Some were able to apply their knowledge to the scenario. More successful candidates were able to give a good description of both search engine indexing and PageRank as well as relevant suggestions for how the website could improve their PageRank.
			Total	16	

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Question			Answer/Indicative content	Marks	Guidance

2			• Correctly declared **function errorCheck ()** (CAO)
			• Use **`getElementById`** and assign to a variable
			• Use `if` statement to check if password length < 8 // password length > 12 ...
			• ... `if` statement checks both password length < 8 and password length > 12
			• Inside if statement set `innerHTML` of `errorText` to “Password Length Error” (CAO)
			
			POSSIBLE SOLUTION:
			`function errorCheck() {`
			
			`var pass = document.getElementById("Password").value;`
			
			`if (pass.length > 12 || pass.length < 8)`
			`{`
			
			`  document.getElementById("errorText").innerHTML = "Password Length Error";`
			`}`
			`}`
				AO3.2 (5)	Award 0 marks if it is clear JavaScript has not been used
					
					Allow nested if statements
					
					Examiner’s Comments
					
					Although candidates were required to write this response in JavaScript, marks were still given if the syntax was close, and the logic was generally correct. A number of candidates didn’t use JavaScript and gave responses in alternative scripts or Python. The question states that JavaScript code must be written, therefore any other code received no marks.
					
					Exemplar 3
					
					
					
					This candidate response was given full marks. The second part of the ‘if’ statement is not entirely correct, but the overall code provided is very close to each mark scheme point and was therefore given full marks.
					
					Assessment for learning
					
					Appendices 5d in the specification gives guidance on what students are expected to know regarding JavaScript with examples.

			Total	5	

Question			Answer/Indicative content	Marks	Guidance
3	a	i	• and • href • Login • text/password • submit	5	<html> <head> <title>Robot User Interface</title> </head> <body> Robot directives - Serve the company trust - Protect data - Uphold standards Updates Login <form action="dologin.php"> Password <input type = "text" name="pw"> <input type = "submit"> </form> </body> </html> HTML tags are not case sensitive Correct answer only <u>Examiner's Comments</u> Generally well answered and many candidates gained full marks with most being able to gain at least two.

		ii	• h1 and other code contained in { }
			• color :white;
			• background-color : red;
			//background: red;
				3	Ignore presence or lack of <style> tags.
					Ignore lack of semicolons
					
					Penalise misspelling of "color" once and then FT
					
					h1 {
					color:white;
					background-color: red;
					}
					
					White can be #FFFFFF or #FFF
					Red can be #FF0000 or #F00
					
					<u>Examiner's Comments</u>
					
					Many candidates were able to gain full marks. The most common reasons candidates lost marks was through the use of quotes around the colour equals instead of colons and for misspelling colour

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Question			Answer/Indicative content	Marks	Guidance
	b	i	• Copyright Designs and Patents Act Any two from: • Gives the author (the programmers)ownership/copyright of the photographs • …no need to apply // this is automatic • Others cannot use/distribute // can beprosecuted/fined for using/distributing… • …without permission • Permission can be granted / bought / licenced	3	Must be full name of Act for MP1 FT for versions of Copyright or nothing for MP2-6 Examiner's Comments Many candidates were able to gain 2 marks but many did not give the full name of the legislation.
		ii	• Ask permission of **author / photographer /owner** • Use images marked as copyright free (e.g.Creative Commons Licence) • Purchase (licence to use) image	2	Do not accept just "ask permission" Examiner's Comments Many candidates were able to gain 2 marks. It was surprising to see how many believed that you could use copyright images for your business just by crediting the artist. Candidates should be made aware that although crediting the artist may help avoid plagiarism it does not allow you free use of a copyright image.
			Total	13	
4			1. Creates / declares / defines a variable (called total) (1) and assigns it an empty / blank (string). (1) 2. A loop that iterates 200,000 times. (1) 3. - 4. Concatenates (the string version of) j to total. (1)	4 AO3.3	For point 1 accept 'blank value' for empty string For point 4 accept *add* instead of *concatenates* only if it is clear it is building a string and not adding a numeric value. Accept 'append'. Examiner's Comments In general, candidates did not use technical terminology when describing the effect of the code e.g. declaring a variable, assigning an empty string, concatenating strings. Centres should encourage candidates to use these and similar terms in response to questions where they are required to describe code.
			Total	4	

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Question			Answer/Indicative content	Marks	Guidance
5	a		• Correct <a> with close • href property to correct page • correct <img> tag with src property to correct file	3 AO3.2	<img src=”ticket.png”>
	b	i	• Web crawler /spider visits site • Either be selecting it from an existing list or following a link. • Records information • …such as text / metatags / etc • Records the position of each word within the page • Storing them in an index • Follows links to other sites • Robots.txt file can be used to instruct web crawlers	4 AO1.1	
		ii	• A value between 0 and 1 • Probability that a user will not follow a link	1 AO1.1	
		iii	• Number of links to target site • PageRank score of those sites (linking inwards)	2 AO1.1	
	c		• HTML defines the structure of a web page • HTML defines the content of a web page • Using tags (enclosed in <>) • CSS defines the style / appearance • Using selectors such as classes / IDs / etc • Can be placed within HTML or externally in a file • Multiple pieces of CSS can be combined (the more local instances overriding)	4 AO1.1	Do not accept layout/format for HTML as this is too vague and can be used to describe CSS
			Total	14	

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Mark Scheme

Question			Answer/Indicative content	Marks	Guidance

6			1 mark per bullet up to a maximum of 6 marks:
			
			• Correct syntax for css class for “model”(including opening and closing curly brackets)
			• Correct syntax for css id for “beeb” (including opening and closing curly brackets)
			• Correct syntax for setting the font family to arial for class “model”
			• Correct syntax for setting the font colour to red on class “model”
			• Correct syntax for setting colour to green for id “beeb”
			• Correct syntax for setting font family to times for id “beeb”
				6
				AO3.1
				(6)
					Example:
					`li.model {`
					`color: red;`
					`font-family: arial;`
					`}`
					`#Beeb {`
					`color: green;`
					`font-family: times;`
					`}`
					
					Ignore if `li` is not put in front of `.model`
					Reject if any other tag is put in front of `.model`
					
					Responses written in HTML mark as NAQ

			Total	6	

Question	Answer/Indicative content	Marks	Guidance
7	**Mark Band 3–High Level (7-9 marks)** The candidate demonstrates a thorough knowledge and understanding of the technologies required for web development. The material is generally accurate and detailed. 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. The candidate provides a thorough discussion which is well balanced. Evaluative comments are consistently relevant and well-considered. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Mark Band 2-Mid Level (4-6 marks)** The candidate demonstrates reasonable knowledge and understanding of the technologies required for web development; the material is generally accurate but at times underdeveloped. 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. 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. There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence. **Mark Band 1-Low Level (1-3 marks)** The candidate demonstrates a basic knowledge of the technologies required for web development; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply	9 AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	HTML… ..they understand how to write (i.e. define the structure of) web pages. CSS.. … they understand how to define the formatting of websites. JavaScript... ..they understand how to write client side code …allowing them to add interactivity to the website Understanding of HTML/CSS and JavaScript is essential for the role. Without knowing HTML it is impossible to handcode webpages. Whilst WYSIWYG tools exist these often produce inefficient code and at any rate it will be necessary at some point to hand tweak the code. *(As the role is 'programmer' it is reasonable to expect that the site will be coded.)* CSS is nearly as essential. Whilst HTML can be used for a lot of the formatting, this is considered bad practice. CSS will allow them to make consistent looking sites. JavaScript is also essential as most websites have an interactive element (e.g. validation of forms) Knowledge of Server-side processing / PHP/ASP etc… …allowing them to write dynamic websites. This is important if the company wants to produce websites with content that changes Databases… …allowing them to allow websites to store and retrieve data. Some knowledge of databases will be useful if writing dynamic sites. This will largely be focussed around SQL. Photo editing… …allowing them to prepare images for the website. This is less essential as in many cases the

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Question			Answer/Indicative content	Marks	Guidance
			acquired knowledge and understanding to the context provided. The candidate provides a limited discussion, which is narrow in focus. Judgments if made are weak and unsubstantiated. 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. 0 marks No attempt to answer the question or response is not worthy of credit.		assets will be pre-prepared. A basic knowledge (e.g. resizing would be expected). Knowledge of software engineering practices… …allowing them to work as part of a team when building the website. The importance of this will depend on the size of the team working on the site. May mention more advanced technologies e.g. AJAX, SOAP, JSON etc. <u>Examiner's Comments</u> Candidates were assessed on the quality of their extended response in this question. Most candidates correctly cited HTML, CSS and JavaScript as the basic technological requirements. The level of discussion varied with many extending their response to include other appropriate technologies. This question was generally well answered by most candidates.
			Total	9	

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Question			Answer/Indicative content	Marks	Guidance
8		i	– A device which provides a central point of control / access	1 AO1.1	Examiner's Comments Many candidates did not clearly define the term. Candidates should be reminded that they must clearly express fundamental definitions at this level of study.
		ii	– Client side processing can be modified – And can sometimes be disabled on the browser – To prevent malicious code (such as an SQL injection / XSS) – To prevent a non-validated review (one with a score of over 5) being sent to the server (1 mark per -, max 2)	2 AO2.1 (1) AO2.2 (1)	Examiner's Comments Again, many candidates did not clearly explain the importance of a server-side check in this scenario.
			Total	3	

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