Credit value: 10

28 Website production

The Internet is perhaps the most important IT development in the last few decades; it has provided new ways to communicate and share information and, in doing so, has revolutionised the way people and businesses use IT.

In this unit you will learn how to design and create interactive websites. You will also discover the factors that can improve website performance and security issues affecting websites.

Being able to build websites is an important skill and one which is in high demand in the modern working world. Some organisations choose to employ a dedicated web designer in their company who works solely on their site; alternatively some organisations will hire an external web design company to create and manage their site. However, not all businesses can afford this and some, especially smaller companies, will be looking for a member of their staff who can maintain their website. Therefore there is a strong career route and high levels of opportunity for those who wish to study web design further. Conversely for those who do not wish to take this further, it is still a very useful skill to have and one which may elevate you above the competition when looking for employment.

Learning outcomes

After completing this unit, you should:

1. understand web architecture and components
2. understand the factors that influence website performance
3. be able to design websites
4. be able to create websites.

Assessment and grading criteria

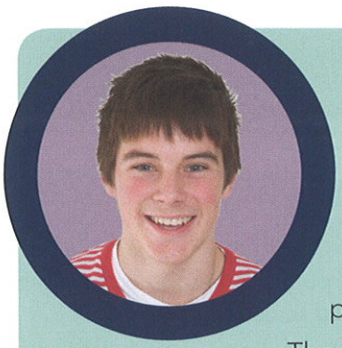
This table shows you what you must do in order to achieve a pass, merit or distinction grade, and where you can find activities in this book to help you.

To achieve a **pass** grade the evidence must show that you are able to:	To achieve a **merit** grade the evidence must show that, in addition to the pass criteria, you are able to:	To achieve a **distinction** grade the evidence must show that, in addition to the pass and merit criteria, you are able to:
P1 outline the web architecture and components which enable Internet and web functionality **See Assessment activity 28.1, page 161**	**M1** explain the role of web architecture in website communications **See Assessment activity 28.1, page 161**	**D1** explain the role of the TCP/IP protocol and how it links to application layer protocols **See Assessment activity 28.1, page 161**
P2 explain the user side and server side factors that influence the performance of a website **See Assessment activity 28.2, page 166**		
P3 explain the security risks and protection mechanisms involved in website performance **See Assessment activity 28.2, page 166**		
P4 using appropriate design tools, design an interactive website to meet a client need **See Assessment activity 28.3, page 174**	**M2** explain the tools and techniques used in the creation of an interactive website **See Assessment activity 28.3, page 174**	**D2** discuss the techniques that can be used on web pages to aid user access to information **See Assessment activity 28.3, page 174**
P5 create an interactive website to meet a client need **See Assessment activity 28.4, page 184**	**M3** improve the effectiveness of a website on the basis of a client review **See Assessment activity 28.4, page 184**	**D3** demonstrate that a created website meets the defined requirements and achieves the defined purpose **See Assessment activity 28.4, page 184**

How you will be assessed

For this unit you will complete four tasks:

- create a reference booklet explaining the hardware, software and other technology needed for a website
- write a short report on the user and server side features that affect website performance
- produce detailed designs for a website
- build and review the website you have designed.



William, BTEC National IT learner

I had always wondered exactly how websites worked and this unit gave me the answers. It was interesting in the first project to find out all the technology needed to create a website, then put it up on the Internet for people to see and use.

The second project looked at the performance on the website and all the different things that can affect it. I really enjoyed looking at the different file types and discovering that how you save your images will have an effect on your site. I was also interested in learning about the risks, such as hackers and viruses, and how you can protect your site against them.

The last two projects were really good, as I got to design and build my own website. When building it I had to be very careful to follow my design and make sure I met all of the user requirements, which helped me to achieve a distinction grade.

Throughout this unit I was fascinated by all the things we learned and was really happy with the website I made.

Over to you!

- **Which areas do you think you might find challenging about this unit?**
- **What might you do to prepare for this unit?**
- **Design and functionality of websites are important in this unit. Name five websites which you think are well designed and five websites which work well (eg are user-friendly, easy to navigate, etc).**

1 Understand web architecture and components

Start up

Perceptions of the Internet

The Internet has been around for only a relatively short time, coming into general use in the 1990s. There are differing opinions about it – some people think it is the best thing to have ever been invented, while others are still very wary of it.

- Create a set of questions to determine a user's perception of the World Wide Web.
- Ask these questions to as many people as possible, preferably from different age groups, and record their answers clearly.
- Analyse your findings and identify any patterns that emerge.

1.1 Web architecture

To allow a website to be seen across the Internet, it must be **uploaded** on to a **web server**.

The process of uploading involves a protocol called **FTP** (file transfer protocol). FTPing can be done straight through a browser or using a program such as CuteFTP.

It is not only the web pages that must be uploaded on to the web server, but all other associated files. This includes image, video and sound files. This is because these files are not embedded into web pages, but linked to them, remaining as separate entities.

Activity: Uploading to a web server

Research using the Internet to discover the difference between uploading through a browser and a program. Make notes for future use in your coursework.

A web server holds the live copy of the web page which can be seen by the public.

There are several web server software applications such as Internet Information Services (IIS), which comes bundled with modern versions of the Windows® operating system or Apache HTTP Server.

Key terms

Uploading – the process of putting a website on to a web server so it can be distributed across the Internet.

Web server – a server which distributes web pages on to the Internet.

FTP – stands for file transfer protocol. It is the protocol used to upload web pages on to a web server. Unusually, the term is used as both a noun and a verb.

IP address – a unique number which identifies a computer on a network, in the format of four numbers separated by full stops, eg 127.0.0.1

Hyperlinks – originally called hypertext, these are words that are interactive and, when clicked, open a web page or file.

Proxy server – a server that acts as a connector to other servers, either for security, speed or more dubious reasons, such as circumventing restrictions.

Router – a network device which can direct data traffic to the correct destination.

Internet service providers (ISPs)

An Internet Service Provider (ISP) supplies the connection with the rest of the world. They link a web server with the rest of the Internet. The ISP will usually determine what type of connection they have, for example if an ISP provides a maximum of only 1 Mb broadband, that is the fastest connection any user using that ISP can obtain. Most areas in the UK

are serviced by several ISPs, each providing different competitive features such as different speeds of connection, levels of capping (maximum amount of download or upload per month), prices and additional features such as free email, web space on their servers or support. More remote places in the UK, however, have fewer ISPs and therefore fewer features and less competitive rates to choose from, but nationally the level of Internet connection is increasing all the time.

Web hosting services

To be available on the Internet all websites must be hosted on a web server. A website owner can host a site themselves but they must have the equipment and Internet connection to cope with the number of users accessing the site. It is usually easier and more cost effective to pay for web hosting services. This is where the website owner pays for space on an existing web server. These hosts not only provide space but website management facilities can also be included in the fee such as maintaining uptime, providing traffic monitoring and technical support. Fees are usually calculated based on estimated number of users accessing it, features on the site (eg a site hosting an eCommerce site will take more of the host's bandwidth than a simple static site) and additional features required.

Domains

Each website is identified by the **IP address** of its web server. However, they are difficult to remember, are meaningless in terms of what the website contains and are easy to mistype. Therefore a website on the Internet needs to purchase a domain name, which can be linked to the IP address. A domain name is the characters that appear between the prefix (eg www.) and the suffix (eg .com), for example 'google'.

A domain name should be easy for the user to remember, simple to type and meaningful, reflecting the site's content. Usually short names are best, but iwantoneofthose.com and webuyanycar.com are examples where whole phrases have been used successfully. A useful thing to remember is that the existence of a site will only spread by word of mouth if it is easy to say, as well as type.

Also consider purchasing similar domain names to the one you have chosen, in case a user mistypes it or forgets a section. For example, www.edexcel.com also owns www.edexcel.co.uk, www.edexel.com and www.edecel.com.

World Wide Web

Although the terms Internet and World Wide Web are often used interchangeably, there is a subtle difference between them. Essentially the Internet is the collection of pages and the content of this huge network, whereas the World Wide Web is the technology that allows it to exist: the pages, the web servers, etc. Tim Berners-Lee was the inventor of hypertext, which we now call **hyperlinks**, the fundamental tool that underpins the World Wide Web and allows the content of the Internet to exist.

1.2 Components

There are many interrelated components on the Internet. They fall into the categories of hardware, software and networking.

The main hardware used for websites are servers such as web servers, email servers and **proxy servers**.

Routers are a key networking component in Internet networking and are usually used at the ISP level. They are the devices which can direct traffic to the right locations, whether going to a web server or back out to the user.

Did you know?

Data is transferred across the World Wide Web by bouncing data from node to node, to eventually reach the desired destination. A node may be a router or a web server or any piece of technology that can act as a conduit to pass the data package through. It is incredible to think that this transfer happens in less than a second!

The main programs used for the Internet are browser and email. A browser is used to view web pages. There are a variety available including Microsoft® Internet Explorer® (which comes standard with the Windows® operating system), Mozilla® Firefox® or Opera™ (free to download from the Internet) and Safari® (for the Apple® platform, including portable devices such as

the iPhone®). Different browsers provide different toolbars and functionality, and arguably speed of loading pages, although this is more dependent on the user's Internet connection.

Email can either be accessed through a program, such as Microsoft® Outlook®, or on the Web. Some ISPs offer a free email address as part of their deal. There are a variety of email services on the Internet, some free such as Gmail, and some for which you pay a fee such as www.fastmail.fm.

Protocols

Protocols are the agreed way that different systems can talk to each other, sometimes called a 'handshake'. They work a little like a translator does when two people who speak different languages are trying to communicate.

TCP/IP (transmission control protocol/Internet protocol) is responsible for transporting data and making sure it reaches the right address. It consists of four layers – link layer, Internet layer, transport layer and application layer – and is included in every data package that is sent across the Internet. Each of these layers deals with a different issue. The link layer is the lowest and deals with hardware, navigating through the myriad of routers, servers and other machinery to reach its destination. The Internet layer focuses on targeting the IP address. The transport layer establishes communications between hosts and moves the package towards its destination.

The application layer, the highest layer, contains other protocols including HTTP, HTTPS and SMTP. The hypertext transfer protocol (HTTP – an acronym you may have noticed at the beginning of each web address) sends out a request to the client to establish permission to transfer data. The client may be the final destination or just a node on the journey. In HTTPS, the S stands for Secure and does the same job but ensures a secure connection. This is used in eCommerce, banking websites and where private data is being transferred. Simple mail transfer protocol (SMTP) is the main protocol for the transfer of email. Other protocols which you may have heard about include POP (post office protocol) and IMAP (Internet message access protocol) which operate at the client-level to access mail servers.

1.3 Web functionality

As technology improves new functionality is being created. Internet connections become faster and more reliable, and it becomes more affordable.

Web 2.0

Web 2.0 refers to a new range of uses for the web which are focused on interactivity, user content and information sharing. It does not refer to a new version of the Internet, but instead the new way it is being used. Rather than accessing information on the Internet in a passive way, Web 2.0 allows the user to interact, add their knowledge and opinions, contribute, share and challenge. It includes:

- Wikis – a place where all users can contribute to information, the biggest example of which is Wikipedia, an encyclopedia website where anyone can contribute to any article or even create new ones
- Blogs – online journals; any person can become a blogger and create a blog which is usually public (although there are some private ones); tools are provided for readers to comment and contribute
- Social networking – sites such as Facebook, LinkedIn and Twitter, which allow people to communicate by signing up and creating a profile; they are then given tools with which to correspond, for example through chatting or playing games and are encouraged to make 'friends'; there are also similar sites such as Flickr, which allow users to share photographs
- Online applications – rather than purchasing a program and installing it to a local computer, online applications allow the user to use programs on the Internet; this means they are accessible anywhere and are often free or have a small subscription fee; Google™ Documents is a good example of this.

One of the results of Web 2.0 is the possibility of cloud computing, an exciting prospect which is beginning to be realised, although there are still a number of issues surrounding it. Cloud computing is where programs, files and data are not stored on the user's computer or on a server, but instead in 'the cloud', where shared resources are joined together in one mass of on-demand technology. This is a huge shift in the concept of networking. The advantages include being able to access your programs and files from

any computer which can connect to the Internet, and no longer having to worry about storage (hard drives, memory sticks, etc) as all files would be in the cloud. This would mean the nature of personal computers and laptops would change – true mobile working would be possible, from anywhere at any time.The disadvantages include a lack of trust that the cloud is reliable and that programs and data could be lost. Also, there may be concerns about the security of data, especially financial, personal or business data. As this is such a new and esoteric concept a large proportion of people are struggling to understand it and therefore mistrust it.

Did you know?

The term Web 3.0 is beginning to be used, although as it is so new there are disagreements as to its actual meaning and it will still be a little time until it is in common usage. Look up Web 3.0 and see for yourself what is being predicted for the future of the Internet.

Assessment activity 28.1

P1 M1 D1

BTEC

Fancy That! is a business selling fancy dress costumes. They want to create a website to advertise their business with a catalogue the customers can look through. They hope in the future to sell their products online.

1 Create a reference booklet for Fancy That! which will:

(a) outline the web architecture and components that will enable Internet and web functionality for them P1

(b) explain the role of web architecture in website communication M1

(c) explain the role of the TCP/IP protocol and how it links to application layer protocols. D1

Grading tips

- The outline could take the form of a short report or flow diagram that shows the different stages and the information which passes through them. P1
- When discussing website communications, describe in detail how information is moved around and shared. Make sure to refer to Web 2.0. M1
- When describing the layer protocols, ensure it relates to TCP/IP. D1

PLTS

Use your skills as an **independent enquirer** to carry out further research, and as a **reflective learner** to use the research to compile your booklet.

Functional skills

Bringing information together for your booklet could provide evidence for **ICT** skills when finding and selecting information and developing, presenting and communicating information.

2 Understand the factors that influence website performance

2.1 User side factors

The capabilities of the user's system must be taken into consideration because, if not, people who may become potential users could be prohibited from using the site.

Download speed

The speed of the user's Internet connection will determine how quickly the web page is downloaded.

- **Dial-up**: This is the traditional method of connection. It uses the existing analogue telephone lines and it has remained popular for many years. The earliest type had an average speed of 56 Kbps.
- **ISDN** (integrated services digital network): To achieve faster speeds, digital lines needed to be connected. ISDN could reach speeds of 128 Kbps.
- **DSL** (digital subscriber line): Using these digital lines, DSL was introduced. It is the basis for broadband. The most common in the UK is ADSL (asynchronous digital subscriber line) and it can currently reach speeds from 1 Mbps to 8 Mbps, although Cable is also gaining popularity with a current maximum speed of 6 Mbps.
- **Broadband**: This technology is constantly being developed and faster speeds are already conceivable in the near future, with even 100 Mbps being proposed in Japan.

You should ensure that your website will work satisfactorily on a 56K modem as well as the latest broadband speeds. This way you will not exclude any potential users from your site.

PC performance factors

As the connection speed will determine the rate of download, so the computer's components will affect the speed with which it is displayed and with which users interact with it.

You must take into consideration that a user's PC may not have a fast processor or large memory capacity and so you must decide between a high level of user specification requirements and a high number of visitors.

2.2 Server side factors

If a website is slow to download, it is likely that it will struggle to retain visitors. There are various methods which can be used in conjunction with each other to reduce download time and make the site more efficient.

Web server capacity

As well as the capabilities of the user's computer, the capacity of the web server must be taken into account. This is true whether the web server has been bought or rented.

Bandwidth determines how much traffic can be handled by the web server, specifically how much material is able to be downloaded at any one time. Bandwidth can be thought of as a pipe from the web server to the users. The bigger the pipe, the more that can be sent down it. The larger the web page and its associated files, the less users can download at any one time.

Server side scripting on a website will also take up bandwidth. The more that is to be performed before page load, the slower it will be to download on a user's computer. Client side scripting does not have the same issue as it is executed on the user's computer rather than the web server. As a general rule, server side scripting should be carried out only where absolutely necessary and as efficiently as possible.

Key terms

Bandwidth – the capacity a network connection can conduct at one time.

Compression – where a mathematical calculation is performed on a file in order to 'squash' it and make it smaller.

Bitmap – a map of bits; each pixel is saved in its location.

Vector – an image which is saved as a mathematical algorithm. Each line is saved as co-ordinates of each point and details of colour, width, etc.

File types

By using smaller file types which use **compression** methods, the website will have a faster download time. When deciding on which file types to use, a developer must make a judgement in order to balance quality and file size because the higher the quality, the larger the file size.

Activity: User and server side factors

1 Investigate the Internet service providers (ISPs) who currently provide broadband over ADSL. Create a table comparing the speeds and prices.

2 Find out the Internet connection method and speed at your school or college.

3 Find out the specification of the computers at your school or college.

4 Discuss the choice of connection and specification, explaining whether you would make any changes to it. Take financial factors into account.

Image files

There are two image file types available: **bitmap** and **vector** (see Figure 28.1), which are compared in Table 28.1.

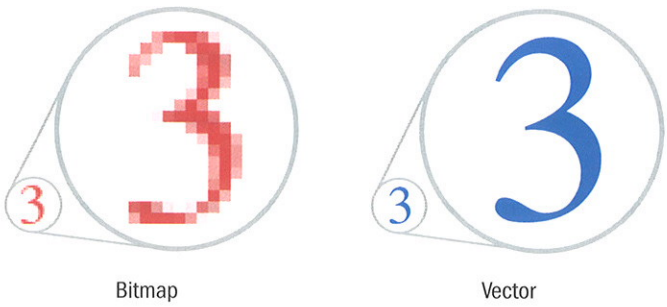


Figure 28.1: Bitmap and vector images

Bitmap file types include GIF and JPEG. A GIF has a maximum palette of 256 colours, therefore should be used for low colour images. A JPEG has a larger palette and is therefore better for higher colour images.

Bitmap	Vector
• Each pixel is saved individually with its location, colours and other details. • Generally has a large file size. • When resized, the image will become pixellated. • File formats include .bmp,.gif,.jpg. • Created by programs such as Microsoft® Paint and Adobe® Photoshop®. • Usually used in web pages as they are rendered by all graphical browsers.	• Co-ordinates of points and curves are saved as a mathematical equation. • Generally has a small file size. • When resized, image will retain clarity. • File formats include .pdf and .eps. • Created by programs such as Adobe® Illustrator® and CorelDRAW®. • Often used for graphics such as logos which need to be resized. • Shapes drawn in Adobe® Flash® are vectors.

Table 28.1: Comparison of bitmap and vector

Activity: Image file types

Look at an existing website, perhaps the one for your school or college. Open the code for that web page (in Internet Explorer® click View/ Source). What image file types have been used and why?

Sound files

Sound travels in waves. These are continuous and called analogue. Digital sound waves are sampled at regular intervals with gaps so small the human ear cannot perceive them (see Figure 28.2).

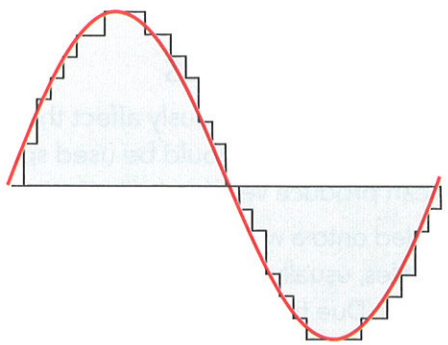


Figure 28.2: Close up of digital sound waves

Once these signals are combined the whole piece is a series of waves which denotes the characteristics of the sound (Figure 28.3). As a computer can only understand 0s and 1s, the value of each part of the wave is converted into a binary value, eg 0000, 0001, 0010, 0011, etc. These values are then translated by the computer into sound output.

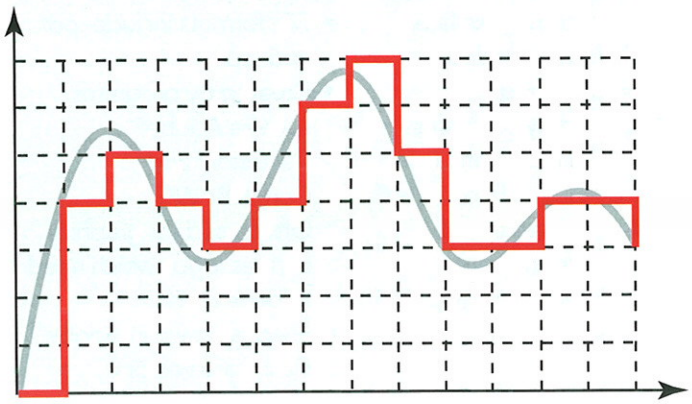


Figure 28.3: Full sound waves

There are several types of sound file type available, each with their own method of sampling and compression.

A .wav file has a high sample rate, which means the sound quality is closest to that produced by the actual instruments, but it is a relatively large file.

A .mp3 file has a low sample rate and therefore produces a smaller file size. This is how MP3 players manage to store such a high volume of music. However, there is a loss of quality, depending on the compression rate chosen. The higher the rate, the better quality but the larger the file size.

A consideration must also be made as to what types of music **plug-ins** a user is likely to have, as this may restrict the choice available.

Video and animation files

Video and animation can seriously affect the speed of a website and, in general, should be used sparingly. Both types can produce very large file sizes.

When uploaded onto a website, for a user to view video or animation files, usually they must click on them and download them. Due to the size of the files, this will often take a relatively long time and control a large proportion of bandwidth during the download, even with a high-quality Internet connection. A file such as this will also take a large proportion of web server space. The more video and animation files used, the more web server space used and the slower the website will be.

A possible solution to this problem could be to **stream** the video file instead of the user downloading it in one go (see Figure 28.4).

Key terms

Plug-in – software which will play specific types of files. For example, modern versions of browsers like Internet Explorer® come with Flash® Player which is a plug-in to allow the user to play Flash animation. Most browsers have a range of plug-ins automatically installed or available for download.

Streaming – feeding the video file to the user's computer in a continuous smaller volume of data, buffered by temporarily storing it and feeding to the player gradually so it is displayed steadily on the screen.

Trace – when the individual pixels of a bitmap are converted into the mathematical algorithm of a vector.

Firewall – a piece of software that protects the system from unauthorised access. This is especially important for web servers.

Public key encryption – a method of coding information so only the people with the right key at both ends of the communication can decode it.

Certificate-based authentication – a method of coding information so the people at either end are identified by a digital certificate, coupled with a digital signature. These can confirm the identity of the sender or recipient.

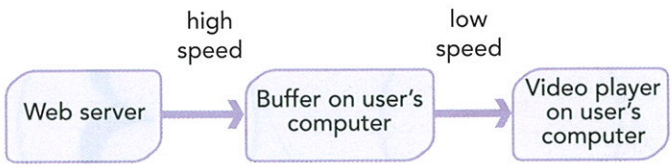


Figure 28.4: Video stream buffered to a user's computer

Conversion between formats

To convert a bitmap to a vector, the image has to be **traced**. This can be done in programs such as Adobe® Flash®, Adobe® Illustrator® and CorelDRAW®.

The conversion of a vector to a bitmap is a much simpler process, as it consists of opening the vector in a bitmap program and saving it. As the package's native file format is bitmap, anything saved in it will be saved as a bitmap. Programs such as Microsoft® Paint

and Adobe® Photoshop® will perform this process, which is called rasterisation.

Conversion between sound files involves using the compression algorithm, either to make into a smaller MP3 or to convert back to a file type such as .wav. CD creation programs such as Nero have the facilities to perform this conversion. It is very important to check that the conversion of the file and inclusion on the website will not break copyright law.

Activity: Image file conversion

1. Design a new logo for your school or college.
2. Create this logo in a vector program such as Adobe® Flash® or CorelDRAW®.
3. Convert the logo into a bitmap using a program such as Microsoft® Paint® or Adobe® Photoshop®.
4. In both programs, try increasing their size by 200 per cent. Make notes on the effects you observe.

2.3 Security

There are several risks to the security of a website, which is especially important for eCommerce sites where hackers and viruses can steal customers' details and use them for fraud, such as identity theft (see below).

Developers must build protection mechanisms into their websites in order for users to feel comfortable using them. This is especially important for eCommerce sites. For more information see Unit 8: ECommerce, in Student Book 1.

Risks

Hacking is when someone attempts to access a computer system or data to which they are not permitted. They may do this to try to steal the data, change it, destroy it or cause a nuisance. Often they will look for 'back doors', ports on web servers which have been left unsecured, which they can utilise to gain entry. Alternatively, they may seek to obtain a username and password of someone who is allowed access to the data.

Viruses are programs which are malicious and cause an unwanted result when run. They can be aimed at causing disruption or stealing data.

Identity theft is where a person's private details are stolen and used by someone else. By pretending to be the victim the thief can do things like apply for credit cards and make purchases in the victim's name, knowing that the bank will target the victim rather than the thief to pay the debt.

2.4 Security protection mechanisms

There are several security protection mechanisms available, such as anti-virus software. However, those which relate specifically to websites are discussed below.

Firewalls

A **firewall** builds a protective barrier around a computer or a network of computers so that only authorised programs can access the data.

The firewall sets up a gateway and only allows authorised traffic through the gateway. Incoming data is inspected and only allowed through if it is legitimate. This is done by the opening and closing of ports. Ports connect protocols and IP addresses together. Each computer has several ports for data to pass through. They are virtual so they cannot be seen. Ports are like doors: each has a number to identify it and can be open or closed. There are some default ports – for example, port 25 is usually for email and port 80 is usually for the Internet, although these can be changed. For a web server, it is good practice to close all ports that are not being used. Otherwise, hackers can take advantage of open ports to get into the system.

Secure socket layers (SSL)

SSL is a cryptographic protocol which provides secure communication on the Internet. It provides endpoint authentication – this means that both the server and the client need to be identified and confirm they are who they say they are. This is done by **public key encryption** and **certificate-based authentication**.

Adherence to standards

It is vital for all computer users to use strong passwords. This is especially important for web servers and other eCommerce systems.

A strong password involves:

- both letters and numbers
- both capitals and lowercase
- symbols such as * or #
- being over eight characters long.

Hackers can take advantage of weak passwords, especially those which are easy to guess. If a password is related to the user, for example a pet's name, it will not take too much effort for a hacker to guess it. There are software programs which can run through many possible combinations of characters and test whether that is the chosen password. The stronger the password, the longer this software will take to work it out, and the more likely a hacker will go on to try a different website. They are not likely to spend time working their way into a well-protected site.

Activity: Security

1 Research the threats to websites including hackers and viruses. Make notes for future reference in your coursework.

2 Research the methods to protect websites including firewalls. Make notes for future reference in your coursework.

Assessment activity 28.2

P2 P3 BTEC

As we have seen, Fancy That! is a business selling fancy dress costumes.

1 Prepare a report for Fancy That! to describe:
   (a) the user side factors that influence the performance of a website P2
   (b) the server side factors that influence the performance of a website. P2

2 Create a leaflet to explain the security risks and protection mechanisms involved in website performance. P3

Grading tips

- Make sure the report covers both user and server side factors and deals with each one in enough depth. Also consider the limitations such as client or customer hardware and software. P2
- As well as discussing risks generally, include laws and guidelines that rule website production and to which developers must adhere. P3

PLTS

Self-managers can carefully organise this task to make sure both parts have enough time and are equally done to the best of your ability.

Functional skills

Your **English** speaking skills can be evidenced by you presenting information in two different formats.

3 Be able to design interactive websites

Before a website can be created, it must be designed. If this stage if skipped, it can cause major problems when building the website or errors might not be found until it '**goes live**'.

3.1 Identification of need

By investigating the requirements of a project, a web designer can ensure they fully meet both the client's needs and those of the users.

Nature of interactivity

Most modern websites involve interactivity; **static websites** risk losing users.

It is important to decide how much interactivity will be in a **dynamic website**.

Too little interactivity and users may lose interest; too much and they may feel overwhelmed. It is important to get the balance right.

If a website is to be an eCommerce site, the designer also needs to decide how online transactions will be done. There are two parts to this issue:

1. How will the user browse the catalogue?
2. How will they make purchases?

Activity: Browsing and buying

1 Visit five websites which have e-commerce facilities. Note the URL and business name of each website you visit.

2 Make notes on the design decisions each have made.

3 Describe the interactivity possible on each website.

Client needs and user needs

Web designers must always have two sets of needs in mind: those of the client and those of the users. The client is the person who has commissioned the site to be made and usually they are also the person who holds the purse strings. If the client is not happy with the site, you may not get paid for your work.

The users are the visitors to the site. They need to be attracted to the site initially to make their first visit, and then encouraged to revisit. This may be for several reasons, for example, to make more purchases, to look at new content or take part in discussions on forums. One aim of websites is to persuade their users to bookmark the website, therefore increasing the probability of their returning on a regular basis.

Activity: Bookmarks

1 Think about websites you have bookmarked in the past. Why did you choose them? What persuaded you to become a potentially regular visitor?

2 If you haven't bookmarked a website before, why do you think that is? Would you like to bookmark any you use frequently?

A website must convey the correct image, especially if it is for a business. It should be professional and demonstrate that the organisation can be trusted. Image can be conveyed through a clear layout, choice of colours and pictures and the content of the text.

Key terms

'Go live' – describes the first time a website has been uploaded to a web server and made available to the public.

Static website – one with no interactivity and is usually just a presentation of information. Changes have to be hard-coded into the site.

Dynamic website – can involve any level of activity from a simple feedback form to a database that personalises the website for each individual visitor. Changes can be made on the fly.

Activity: Business image

Find three eCommerce websites: one for children, one for teenagers and one for adults. What meanings are the images trying to convey? What techniques have the designers used to suggest these meanings? Have they successfully portrayed appropriate images for each business?

A level of security must be decided upon as this will impact both the design of the website and its management. You will need to ask questions such as:

- Can anyone access the site, or will there be an account system with passwords, or a mixture of both?
- What protective methods will be used on the web server? (See Security, page 165.)

Development timescales must be agreed upon at the start of the project, preferably in a written form which both client and designer have signed. The schedule should be broken down into stages, with clear points of review where the client can check that the project is progressing to their satisfaction.

Support and maintenance contracts are important factors which need to be decided at the beginning of the project. The web developer might be contracted just for designing and building the website, or they might also be contracted to provide maintenance, updates and support when needed. The type of contract agreed on will naturally affect the cost of the project.

Pricing a website for a client is difficult. Items to consider when estimating costs include the size and content of the website, the timescale of the project and any aftercare requirements. Some developers charge by the hour for as long as the project takes. Others charge for each element in the website – the more that is in the website, the more expensive it will be. There might be very few overheads involved in website development (eg a freelance developer working from home), but on the other hand it is a very specialised area, so deciding on how much to charge can be difficult. A developer may select a price purely to undercut the competition.

Key terms

Search engine visibility – getting a website listed as highly as possible on a search engine. This will increase the number of visitors to a site.

Concept designing – outlining the overall design of the product. This gives the general feel of it and the effect it should have on the users.

Mood boards – a collage of images, textures and other items, aimed at providing an idea of the look and feel of a product. They are usually A3 size.

Storyboard – shows the sequence of a project. In web design, it shows how different pages will interrelate.

Other elements that a client may need include:

- logo design
- original images and photographs
- **search engine visibility**
- online advertising.

The user and client requirements are used as a benchmark of the success of a project. After testing, the website should be evaluated, including checking whether the requirements have been met. An explanation should be included for any requirements that have not been met (see Check against user requirements, page 184).

End user need

The other set of needs a web designer must consider are those of the users. This is difficult for sites intended for a large target market.

The website must be appropriate to the audience. The content must be suitable, which involves not using inappropriate language or technical jargon. The image should also be suitable for the wide range of people who may look at it. For example, the website for Disneyland Resort® Paris needs to be suitable for both children and adults and has to be careful to avoid excluding either of these target audiences. For children, there are colourful images and magical animations; for adults, there is information about the hotels, the parks and all the facilities available. The aim of the website is to encourage parents to book a holiday.

Considering the range of people who may use the site, the complexity of the site must be appropriate. This includes not just the content, but also the method of using it – for example, it must be possible to easily navigate round the site. Users with little Internet experience must also be taken into consideration.

One problematic area of web design is ensuring that client and user needs are compatible. For example, if the client wants to use a colour scheme of yellow and magenta but you know this would not be appropriate for the website's users, you will need to manage the situation and attempt to come to a compromise, such as using a header of yellow and magenta, but the rest of the website in more easily read colours.

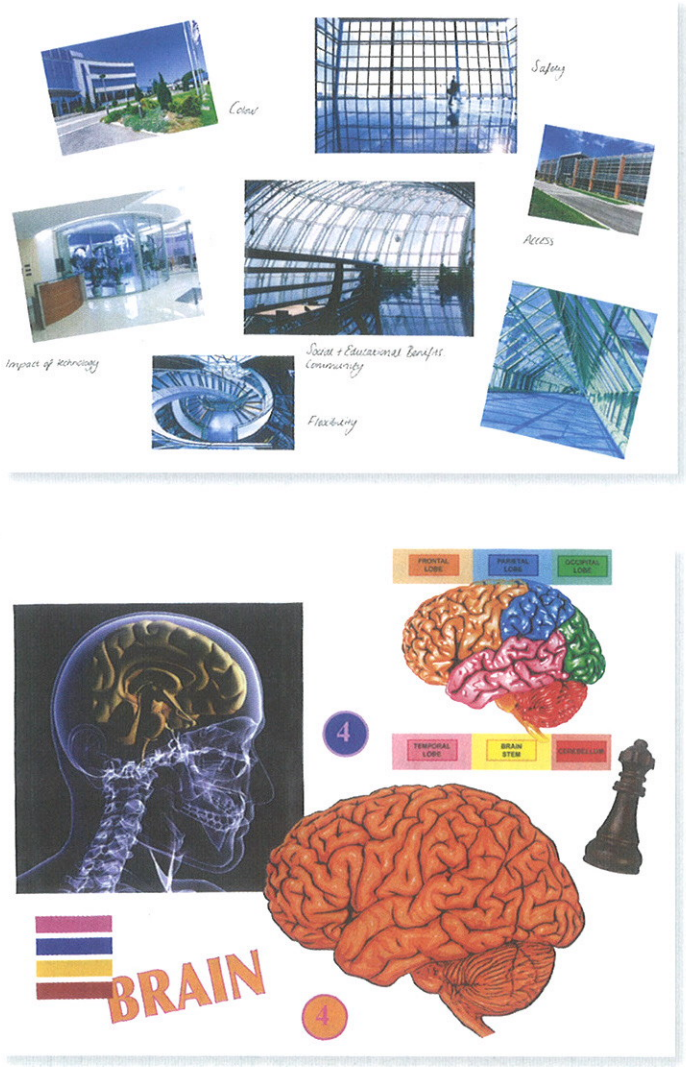


Figure 28.5: Examples of mood boards

3.2 Design tools

Several tools can be used to ensure that all areas are considered when designing websites. By producing a thorough design using the tools presented in this section and using this to communicate with your client, you can ensure that your client is happy with your plans before you build the site. This should reduce the problems you may encounter if there was a mismatch between client expectations and the actual outcomes.

Concept designing

To convey the concept of a site, you might use one or both of the following tools: **mood boards** and **storyboards**.

The aim of a moodboard (see Figure 28.5) is to produce something with the same feel as the website. They are useful way of focusing the design and demonstrating initial ideas to the client.

Storyboarding (see Figure 28.6) is key to structuring a website clearly and is a way of expressing a navigation design (see Navigation, page 175). It is not just used in web design; it is often used in the design of moving images such as animation or film.

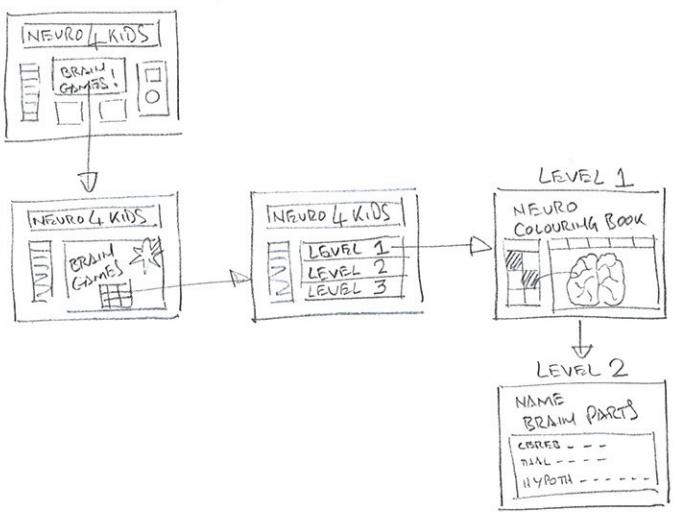


Figure 28.6: Example of a storyboard

Activity: Storyboarding

Think of a scene from your favourite cartoon or film. Create a storyboard to show what happens. Use a minimum of 10 boxes and a maximum of 20. Add any notes underneath each box to explain what is happening.

Layout techniques

As well as the structure of the overall site, the layout of the individual pages must be designed. There are several methods which can be used to arrange items on a web page, including **frames**, **tables**, **DIVs** and **SPANs**.

Key terms

Frame – a section of a web page which, when used with other frames, can make up a page of independently functioning sections.

Table – a collection of cells placed on a page, and data (text, images, etc) can each be placed in separate cells, which is a very good way of controlling layout.

DIV – a method of defining a style for a block of HTML (hypertext markup language). It includes an automatic paragraph break.

SPAN – a method of defining a style for a block of HTML (hypertext markup language).

The simplest method of layout is to use frames (see Figure 28.7) but this is considered 'old-fashioned' in the industry. Each part of the page is contained in its own file and there is a master page which pulls each part in like a jigsaw.

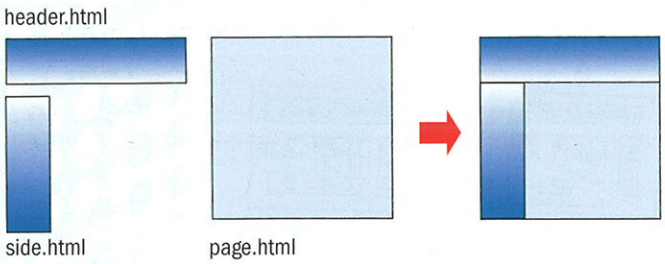


Figure 28.7: Example of frames

A table (see Figure 28.8) holds all the content on each page, with each cell having an individual part. It is a good method to ensure the layout is retained on the different browsers on which users may view the page. However, the more complicated the table, the longer it will take to load for the user. If a page takes too long, a visitor may lose patience and leave the site, perhaps never to return.

DIVs and SPANs are used to define styles within blocks of HTML; for example, `<span class="red small">some text</span>`.

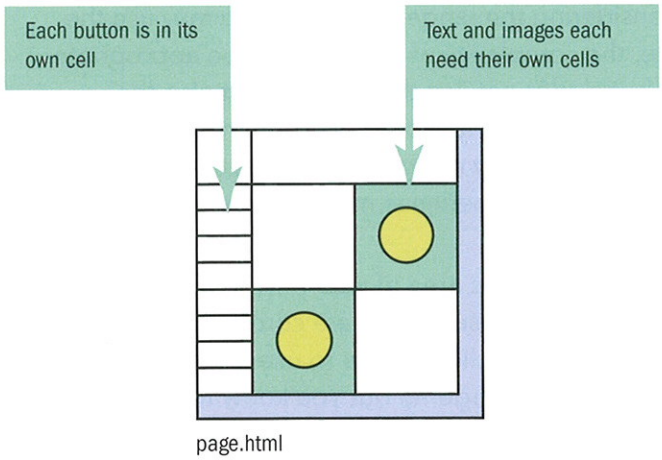


Figure 28.8: Example of a table

However, a more useful method is to combine them with CSS (cascading style sheets) formatting style. For example, in the code `<span class="warning">some text</span>` the "warning" style would be defined earlier in the CSS (see Cascading style sheets, page 182).

The main difference between DIVs and SPANs is that a DIV includes a paragraph return, whereas a SPAN does not. They are efficient methods of laying out and formatting a page, especially when used in conjunction with effective CSS.

Templates

Templates are used to make the process of adding content simpler, and are often used to provide an easy maintenance system for users with minimal web knowledge. A template keeps the design and content separate. Generally, a template will provide full design, connection to any other systems such as a database, and all interactive coding. The only thing that usually needs to be added is the actual content.

Templates can be quite expensive, depending on the level of design, especially if a company has asked for a unique creation. However, using templates can mean that a business that does not have someone with web skills within the organisation does not need to employ someone to create the website.

A recent development has been 'takeaway' websites. This is where all the parts of a website are provided and a user can add the content, mainly targeted at non-technical people who want to put their own personal website on the Internet. The result could be a high number of websites that look very similar and have low-quality content.

Colour schemes

The colours selected for a website can encourage or deter users, so the selection must be made with care. Several questions must be asked when deciding on a colour scheme.

- Do the colours combine well? Are they aesthetically pleasing?
- Are the colours appropriate for the target audience? For example, primary colours might be used for a children's website.
- Is the text readable? Black text on a purple background may give an atmospheric effect, but it is not easy to read.
- Does it fit with the business's house style?

Activity: House styles

1 Find three websites with distinctively different artistic styles. Describe the artistic style used on each website.

2 For each of your chosen websites, describe how a house style has or has not been carried through the website.

3 Explain why a house style has or has not been used for each website. In your opinion, is this effective for that website?

Screen designs

To visualise what the pages will look like before building them, designers create screen designs (see Figure 28.9). These are mock-ups of the actual page, concentrating on layout rather than content.

Activity: Screen designs

Choose an existing website and produce a screen design to show how the designer has created the layout (following the example shown in Figure 28.9). Label the colours, fonts and other specifications. Estimate sizes and give the images suitable labels.

Outline of content

As screen designs deal with the layout of the page, the content must also be considered. Generally, at this point, only headings will be defined.

Activity: Content design

1 Select two different websites about the same topic (eg computer). Compare the design of their content. Write a list of pros and cons of the quality of their content

2 Explain whether you think each website has fulfilled the users' needs in terms of content.

3.3 Software

It is only possible to choose the correct web development software once you know exactly what will be in your website. Otherwise, part of the way through a build, you may find you need another piece of software which will cost money and may take time to learn.

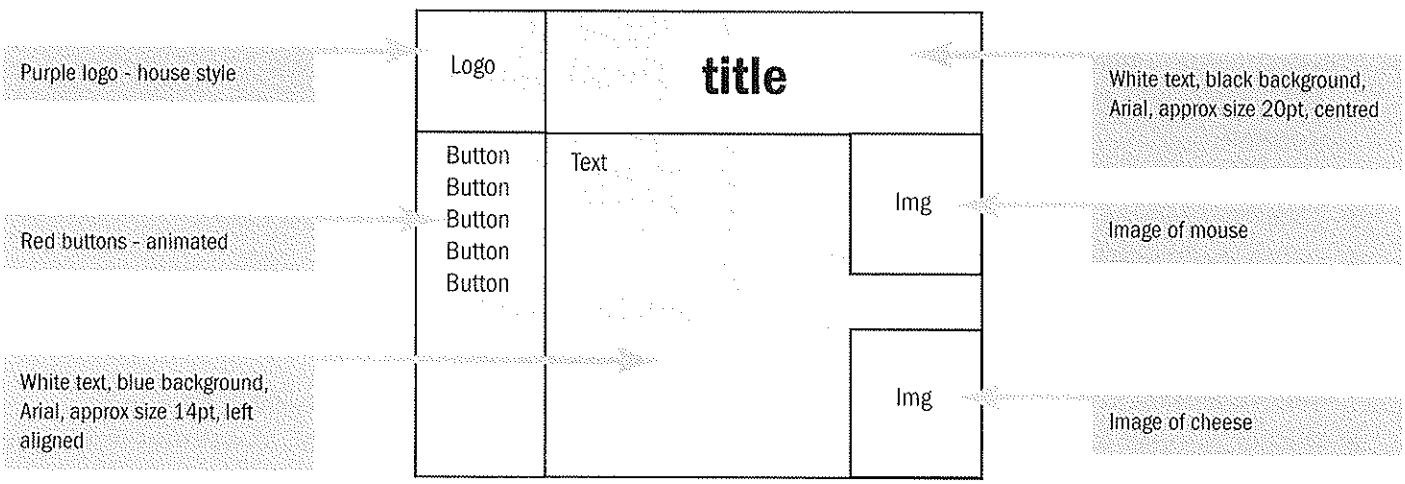


Figure 28.9: An example screen design

Markup languages

HTML (hypertext markup language) is the most commonly used markup language – so much so that all others are just about extinct. It forms the basis of all World Wide Web pages, even if other languages are used.

HTML uses a system of tags (indicated by angle brackets, < and >) which contain the instructions. Almost all tags come in a pair of open and close tags enclosing the content to be affected, eg `<font color="red">Some text</font>` would produce Some text. Note that American spelling is used in HTML.

HTML pages should start with `<html>` and end with `</html>` tags to declare the language being used. If other languages are used, they will need to be declared (see Client side scripting languages below).

Every web page is divided into a head and body section, each of which is defined by its tags. The head section is unseen by the user and can be thought of as the brains of the page. It contains all the information for the page to function correctly. The body is the part seen by the user and contains all the content of the page. A well-designed page should have reusable code in the head and minimal code in the body.

How to... Create a simple HTML web page

1 Open Notepad (or a similar text editor).

2 Enter this code:

```
<html>
<head>
<title>My First Web page</title>
<bgcolour="white">
</head>
<body>
<font color="blue"><b>Hello World!</b></font>
<font color=#000000><i>This is my first ever web page</i></font>
</body>
</html>
```

3 Click File / Save As.

4 Delete the Filename and type mywebpage.html, then click Save.

5 Navigate to where the file is saved using My Computer. Notice how the file icon is your Internet browser icon.

6 Double click your file. It should open in your browser.

Activity: Using HTML

Even though there are several web design environments available, it is still important to understand HTML. The best way to do this is to use Notepad (or a similar text editor) to create a web page using purely your own code.

1 In a browser, open a website with which you are familiar, such as your school or college website. View the HTML (eg in Internet Explorer® click View / Source or Tools / View Source). Examine the code and compare with the visual version in the browser.

2 Write down all the tags you recognise and what effect they have on the display of items on the web page. Try to find examples of all the tags listed in Table 28.2.

Client side scripting languages

Even though HTML is the basis of all web pages, as a language it is quite limited and so other languages need to be brought in to create more advanced features. A **client side scripting** language is code which is embedded into the HTML. When the web page is downloaded onto the user's browser, the script is run on the user's computer.

Key term

Client side scripting – when the script is executed on the user's computer. This is the opposite of server side scripting, which is executed on the web server. Server side scripting is used for more advanced interactive features such as connecting to a database and is not covered by this unit.

Features and advantages of software languages

There are several languages available for a web designer to use. At a basic level, all websites must have at least a foundation in HTML, even if that is just used to support the other languages.

Open tag	Close tag	Purpose	Example
`<font>`	`</font>`	Changes text. Open tag can have parameters such as colour, size, face.	`<font face="Arial" size="16">Text</font>`
`<b>` or `<strong>`	`</b>` or `</strong>`	Makes text bold	`<b>Text</b>`
`<i>` or `<em>`	`</i>` or `</em>`	Makes text italic	`<i>Text</i>`
` `	No close tag	Starts a new line. One of the rare tags that is not in a pair.	`Text` ` ` `Text`
`<li>`	`</li>`	Creates a list with bullet points	`<li>first item</li>` `<li>second item</li>`

`<table>`	`</table>`	Creates a table (`<tr>` creates rows and `<td>` creates columns)	`<table border=1>`
			`<tr>`
			`<td>top left</td>`
			`<td>top right</td>`
			`</tr>`
			`<td>bottom left</td>`
			`<td>bottom right</td>`
			`</tr>`
			`</table>`

`<img>`	No close tag	Inserts an image. One of the rare tags that is not in a pair.	`<img src="Images\logo.gif">`
`<a href>`	`</a>`	Creates a hyperlink. Can be used around text or an image.	`<a href="index.html">Go to home page</a>` `<a href="index.html"><img src="Images\logo.gif"></a>`

Table 28.2: Common HTML tags

CSS (cascading style sheets) is used to ensure standardised formatting across a website – this also makes the site easier to maintain. In order to make a formatting change to a website that is formatted in HTML, the designer would have to search through the whole code, finding every instance of the format that needed to be changed. There could be hundreds of entries so this is a very time-consuming method and it is likely to produce errors in consistency. By using CSS, on the other hand, only one formatting entry need be changed and it will be immediately applied throughout the whole site for every instance of the formatting style.

ASP (active server pages) and PHP (hypertext preprocessor) are server side web languages. This means that the code is executed using the web server's processing power. The result is that the code and the data are very secure and can be executed efficiently. Both these languages can create interaction on a website, particularly involving connecting to databases.

VBScript® and JavaScript® are client side web languages. This means that the code is executed using the user's computer and not the web server. This frees up the processing power which would otherwise have been used. Both languages can create interaction on a website, such as forms, searching and even games.

Software development environments

There are several software development environments available. Microsoft® FrontPage is the most popular web authoring application for beginners, as it uses a similar layout to the other Office® programs and is very user friendly. However, the functionality can be limited.

Adobe® Dreamweaver® is the current industry standard. Although more difficult to learn, it provides a wide range of tools to create a website and supports several client and server side scripting languages.

Using a development environment such as FrontPage or Dreamweaver® is not absolutely necessary – as you have seen from the previous examples, it is possible to write the code using a text editor. However, using a development environment can make coding quicker and formatting easier.

Activity: Web design software

1 Explain the advantages and disadvantages of using a text editor (eg Notepad) for creating a web page.

2 Explain the advantages and disadvantages of using web authoring software (eg FrontPage or Dreamweaver®) for creating a web page.

Assessment activity 28.3

P4 M2 D2 BTEC

Fancy That! want to create a website to advertise their fancy-dress business that includes a catalogue the customers can look through. They hope in the future to sell their products online. They want the website to have at least five pages and at least one interactive feature.

1 Using the appropriate design tools, design an interactive website to meet the requirements of Fancy That! P4

2 For each design tool used, add an explanation of the technique to describe it in general, how you have used it and how it will help you create the website. M2

3 Add a discussion of the techniques which can be used to aid user access to information in your design. D2

Grading tips

- The website that is designed must be a multi-page, two-way interactive site. P4
- Link the descriptions of tools to the site you are designing. M2
- Consider all elements of design and functionality that could improve accessibility. D2

PLTS

Creative thinkers can make inventive designs and **independent enquirers** might want to look at other existing websites for ideas.

Functional skills

Showing your designs are clearly designed and described could provide evidence of your **English** skills.

4 Be able to create websites

Once the design is entirely completed and the client is happy with it, the website can be built. Prototyping is often used in the first instance. This is where a test version of the website is built to ensure that the functionality is correct and the specifications are to the client's liking. By using a prototype the designer can save time and money.

The first element of the creation of a website is the structure. This will provide a solid basis for the content, which can then be easily inserted. Extra features, such as interactivity and audio-visual elements, can be added. At this point the website should be complete. All parts must then be tested to ensure they are functioning correctly. Once the developer is happy that there are no bugs in the site, it can be uploaded to a web server and go live on the Internet.

4.1 Structure

Before adding any content, the fundamental structure of the page should be put in place. Otherwise, you may have formatting problems later in the implementation.

Layout of pages

In your design, you will have decided whether you are going to use frames, tables or DIVs and SPANs. You should also have your layout exactly planned in your screen designs.

Navigation

The location of your buttons and hyperlinks should be in your screen designs. Your storyboard will show how the pages will link together. For example, in a matrix-style website all the pages will have buttons to all the other pages.

How to... Create tables in Adobe® Dreamweaver®

1. Open a web page in Dreamweaver®.
2. Select Insert / Table or click on the Table icon in the top toolbar (see Figure 28.10).
3. Enter the number of rows and columns required.
4. Select border thickness (0 is invisible, 1 and over are increasingly thick).
5. Test your page in the browser by pressing F12 or selecting File/ Preview in Browser.

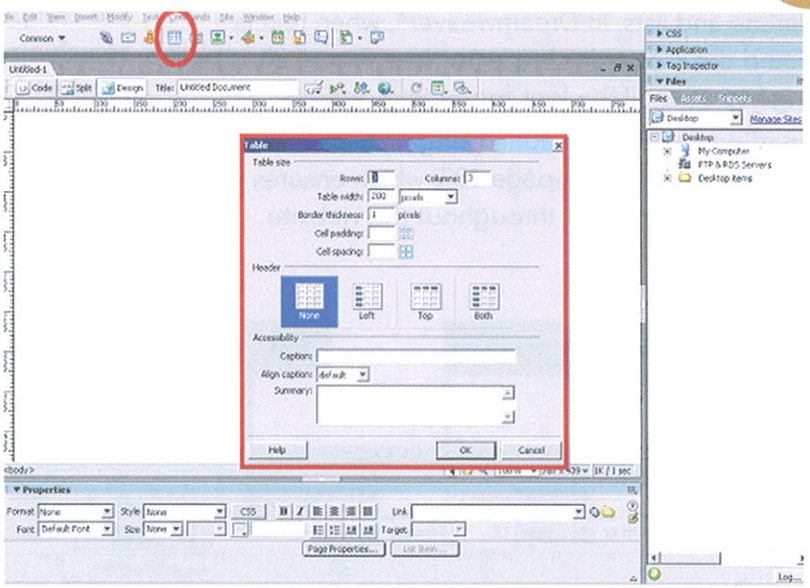


Figure 28.10: Dreamweaver® Table icon and Table Properties box

How to... Create Flash buttons in Adobe® Dreamweaver®

1. Open a web page in Dreamweaver®.
2. Select Insert / Media / Flash Button (see Figure 28.11).
3. Choose your settings: the style of the button, the text written on the button, font and font size, where the button should link to, and the 'save as' name – note that each Flash® button should be saved as a separate image.
4. Once you have selected the settings, click OK.
5. Test your page in the browser.

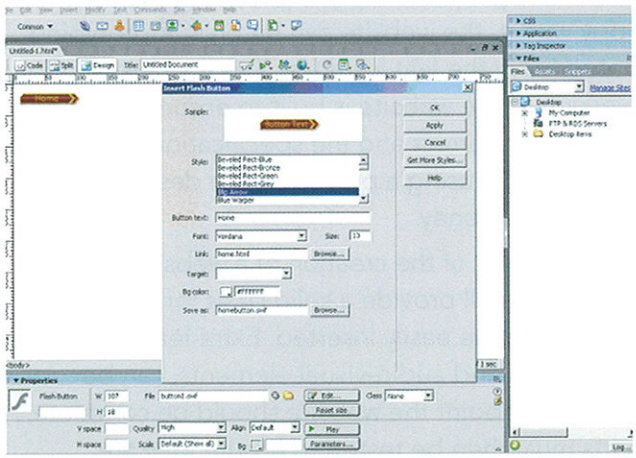


Figure 28.11: Dreamweaver® Flash® Buttons Properties box

Format of content and cascading style sheets (CSS)

There are several ways of formatting text on a web page, including font, size, emphasis (bold), italics, underline and lists. In Dreamweaver®, when text is selected the Properties Inspector (see Figure 28.12) will change to offer all the font formatting options.

Formatting can also be done using CSS (see Cascading style sheets, page 183) which ensures it is efficient and consistent throughout the website.

Interactive features

Interactivity involves two-way communication between the user and the computer. In other words, it requires input from the user which provokes a response from the computer. This could include giving feedback, searching a catalogue of products or purchasing a product from a website. To have a full catalogue of products would require a database and server side scripting, which are not covered in this unit. However, the functionality can be simulated using client side scripting.

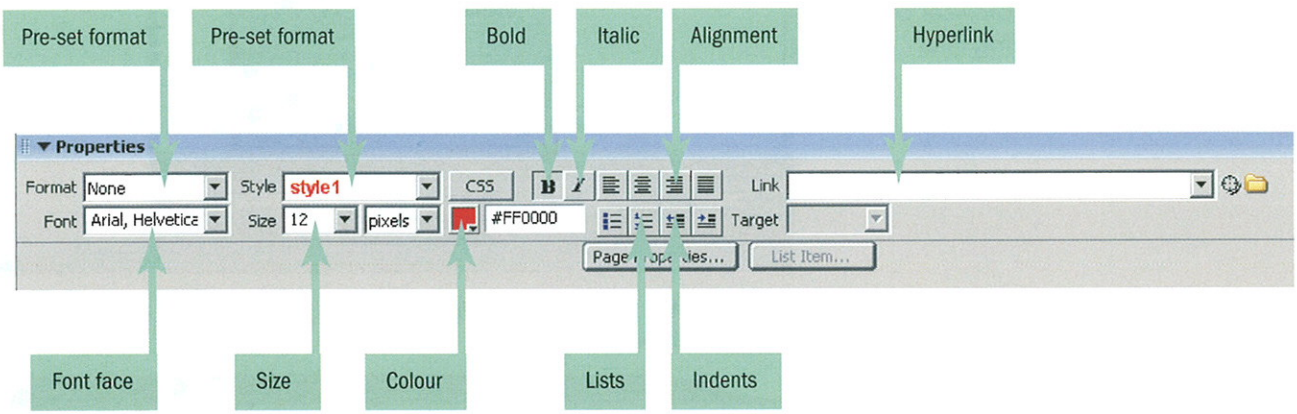


Figure 28.12: Font Properties Inspector

How to... Create a feedback form in Dreamweaver®

1 Open a web page in Dreamweaver® (either a blank one or one you have prepared for the form).

2 Change the toolbar drop-down to show the Forms toolbar (see Figure 28.13).

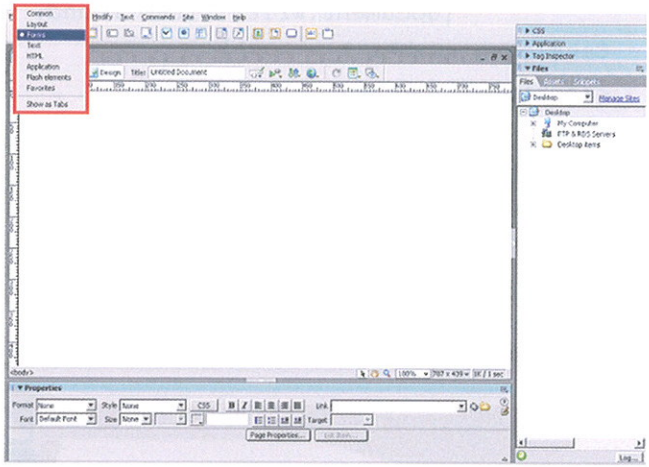


Figure 28.13: Dreamweaver® Forms toolbar

3 Place your cursor where you want the form to go and select the red dotted square (see Figure 28.14).

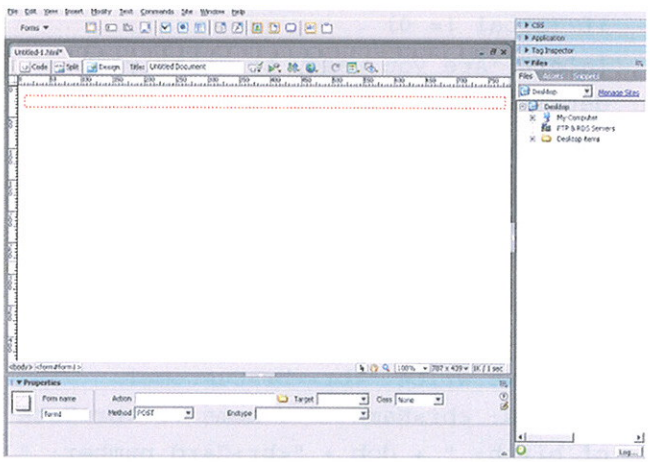


Figure 28.14: Dreamweaver® form outline

One will be automatically drawn on your web page. Everything within that red square will be part of the form.

4 Using the Forms toolbar, insert the fields you want, eg a textbox with the label Name.

5 When you have all your fields, insert two buttons at the bottom, still inside the red square, with no labels. They will automatically both be called Submit. Leave one as Submit and change the other to Reset using the Properties Inspector at the bottom of the screen.

6 Using the tag selector at the bottom left of the page (see Figure 28.15), select the Form tag. The Properties Inspector will show an action box. Into it, type mailto: followed by the email address to which you want to submit the form.

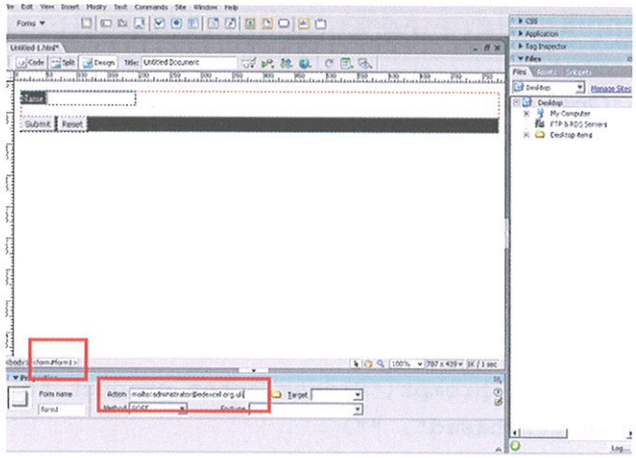


Figure 28.15: Dreamweaver® tag selector and completed action box

7 Test your page in the browser.

How to... Create a simple catalogue search using JavaScript

1 Create your catalogue web page with three products.

2 Above the </body> tag, enter this code:

```
<script>
necklace = 1
chocolates = 2
toy = 3
product=prompt("Please enter search
product", "")
if (product=="necklace")
      {document.write("Item found.
Catalogue number " + necklace)}
      else
            if (product=="chocolates")
                  {document.write("Item found.
Catalogue number " + chocolates)}
            else
            {document.write("Item found.
Catalogue number " + toy)}
</script>
```

3 Amend your code to match your three products (by changing the words in red).

4 Run the page in a browser to test if it works for all three products.

How to... Create a shopping cart system

1 Open a web page in Dreamweaver® (a blank or one you have prepared for the form).

2 Above the </body> tag, enter this code:

```
<script>
necklace = 25.99
chocolates = 5.95
toy = 4.51
product=prompt("Please enter product to
be purchased", "")
document.write("You have purchased ")
if (product=="necklace")
      {document.write("a fabulous
necklace: £" + necklace)
      total = necklace}
      else
      if (product=="chocolates")
            {document.write("a luxury box
of chocolates: £" + chocolates)
            total = chocolates}
      else
      if (product=="toy")
            {document.write("a cuddly toy:
£" + toy)
            total = toy}
            else
            {document.write("nothing")
                  total = 0}
document.write("<br>Total to pay is £"
+ total)
if (total != 0)
{alert("Are you ready to enter your
details?")
name=prompt("Please enter your
name:","")
dob=prompt("Please enter your date of
birth:","")
ccnum=prompt("Please enter your credit
card number:","")
document.write("<br><br>Customer
details: <br>Name: " + name + "<br>Date
of birth: " + dob + "<br>Card number: "
+ ccnum)
alert("Thank you for making your
purchase")
}
</script>
```

3 Amend your code to match your three products.

4 Run the page in a browser to test if it works for all three products.

***Note**: This unit will not show you how to process customer purchases, only how to collect their order and payment details.*

Activity: Using JavaScript®

1 Using your knowledge of JavaScript®, and referring to books and the Internet as necessary, amend the shopping cart code so it allows the user to purchase more than one item at a time.

2 Change one of the prices in the shopping cart exercise to £4.50. Notice how the zero is missed off when it is written to the web page. Research why that happens and how it might be fixed.

Images and animation

A web page should not be littered with images because they increase the download time of a site (see Image files, page 163) and can make the page look amateurish. Choose images and animations wisely so that they enhance the content on the website.

Similarly, animation can have a serious effect on the performance of a website and should, therefore, be limited to only where it is essential. There are several animation programs available, the most popular being Adobe® Flash®. When creating a Flash® animation, the working file is saved in the .fla format, but it is then converted to a movie file (.swf) so it can be added to a website. The user will need the plug-in Flash® Player® to be able to view the Flash® animation. However, most modern browsers already have the player built in. Animated GIFs can also be used as animations on a website. These provide a smaller file type but a lower image quality in playback and are therefore more suitable for small, simple animations. Animated GIFs can be made by several programs, including Adobe® Photoshop® and CorelDRAW®, and can be rendered on most browsers without the need for a plug-in.

4.2 Content

After the web page has been structured and all the coding features are finished, the content can be inserted. This includes text, more images and other features which are not part of the structure which give information to the user. It is pointless to have a website which looks stunning but which does not hold well-written, accurate, informative content.

The content of each page should be planned, remembering that generally users will not want to read an essay, but they must be able to obtain all the information they need. The use of language should be concise and precise.

Proofed, correct and appropriate

All text in a website should be proofed for both spelling and grammar mistakes. The website you are creating will be your client's presence on the web and as such it is an extension of them and their business. If it is an eCommerce site and there are mistakes in it, customers may not have confidence in the site and decide to shop somewhere else.

The content should be correct, accurate and up to date. If descriptions of products are incorrect then the client could be prosecuted under the Trades Description Act (1968). Prices must also be correct; if they are lower than they should be, your client may lose money.

Check also that there is no inappropriate content on the site. Not only could inappropriate content deter potential users, it might also contravene the Obscene Publications Act (1959), which can be applied to UK websites. In legal terms, the act says that 'an article shall be deemed to be obscene if its effect ... [is] such as to tend to deprave and corrupt persons who are likely, having regard to all relevant circumstances, to read, see or hear the matter contained or embodied in it.'

Reliability of information source

It is essential that the information given on a website is correct; otherwise, users may lose trust in the site and stop visiting. This is most important for an eCommerce site. When creating the content of the website, if a designer is taking information from other places, they must ensure that it is reliable. If the designer puts out incorrect information, even though it is from another source, they could be held responsible.

A legal disclaimer is usually included on the bottom of a website home page to ensure that the owners are not held responsible for incorrect or changing information. It can also include other legal information about viruses, data protection, copyright and trademarks.

Case study: Edexcel

Edexcel is the largest awarding body in the UK and offers a wide range of opportunities to help people achieve their full potential.

Their website provides information for tutors, learners and others involved in education.

1 Visit the Edexcel website www.edexcel.com and read the disclaimer.
2 Find two more websites with disclaimers
3 Compare the three disclaimers:
   (a) What elements do they have in common?
   (b) What dissimilar elements do they have?
4 Write a disclaimer for the website you are designing.

Structured for purpose

The content of a website should be structured so it is easy for the user to read. Lists should be put into bullet-point form and complex data should be put into tables. Prose should be ordered in a logical sequence.

Case Study: Nestlé

Nestlé is a multinational organisation with products including Nescafé® coffee, Kit Kat® chocolate bars and Ski® yoghurts. Their UK website is well-designed and rich with content.

The website uses several techniques to present the high volume of textual information effectively.

1 Go to www.nestle.co.uk and find examples of these formatting features:
   (a) bold text
   (b) uppercase
   (c) bulleted list
   (d) highlighting with colour.
2 How has the web designer ensured that the text is clear and readable? List a minimum of five methods.

4.3 Tools and techniques

There are several tools and techniques which can be used to create a website. It is only by combining these that an effective site can be produced.

Navigation diagram

There are three main methods of connecting web pages together in a **navigation diagram**: linear, hierarchy and matrix (see Figure 28.16).

Key term

Navigation diagram – a diagram that shows how the different parts of a project will combine. In web design, it shows how different pages will interrelate.

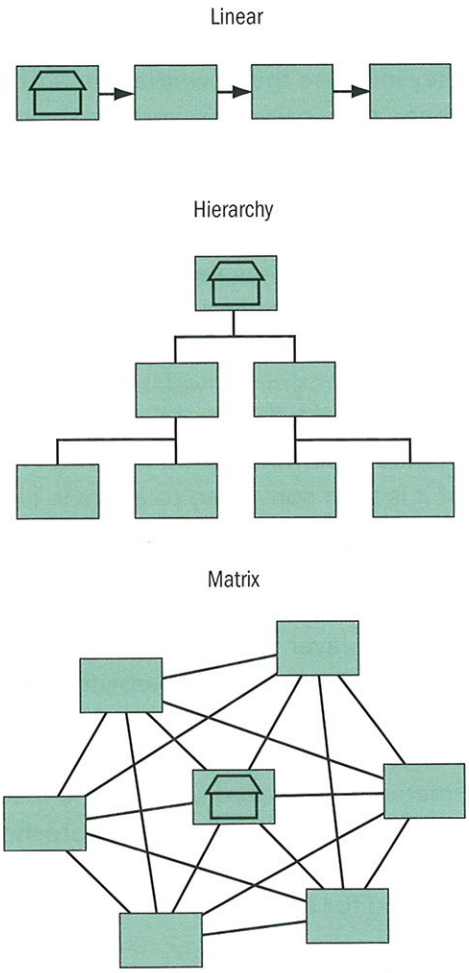


Figure 28.16: Website structures

Activity: Navigation structures

Analyse each type of structure. Name two positive points and two negative points about each one. Consider the needs of the designer, client and user.

Building interactivity tools

Client side scripting languages include JavaScript® and VBScript®. These can be used to create simple feedback forms which are emailed to an address when submitted or something as complex as arcade-style computer games. The essential purpose of the languages is to create two-way communication between the user and the website.

How to... Create a simple JavaScript® web page

1 Open Notepad (or a similar text editor).
2 Save the file as myjavascript.html.
3 Enter this code:

```
<html>
<head>
<title>My First JavaScript</title>
</head>
<body>
<script>
age=18;
document.write("My age is: ");
document.write(age);
</script>
</body>
</html>
```

4 Save the file.
5 Navigate to where the file is saved using My Computer.
6 Double click your file to open it in your browser.

Activity: Using JavaScript®

1 To receive input from the user, the following JavaScript® can be used:
`age=prompt("Please enter your age:","");`
Use this new code to alter myjavascript.html so the user can input their own age.
2 Add the ability for the user to input their name so it will be displayed on the web page.

Pseudo code is a method of designing code, forming an intermediary step between an explanation in English and the coding language – See Table 28.3.

Pseudocode	JavaScript
age = input from user	`age=prompt("Enter age","");`
if age >= 18 then	`if (age>=18)`
print onscreen "i am an adult"	`{document.write("I am an adult");}`
else	`else`
print onscreen "i am x years old"	`{document.write("I am " + age + " years old");}`

Table 28.3: Example of pseudo code used to plan JavaScript

By using pseudo code, a designer can plan what the code will do, without having to worry about ensuring the correct words and syntax are used. It is also easier to convert into the full programming language by using this transitional step.

Adding animation and audio/visual elements

It is good practice to save your images and animations in a folder called 'Images' and to store this folder in the same folder as your web pages. Keeping all your website files in one place means that when you come to upload them there is less chance you will miss any out. Also, it reduces the amount of code needed to link to an image or create a hyperlink.

How to... Insert an image in Adobe® Dreamweaver®

1 Open a web page in Dreamweaver®.
2 Select Insert / Image.
3 Browse to the image you want to insert and click OK.
4 Test your page in the browser.

How to... Insert a Flash® animation into Dreamweaver®

To use a Flash® animation in Dreamweaver®, it needs to be saved as a .swf file. This compiles it into a movie file that can then be linked to a web page.

1. Open a web page in Dreamweaver®.
2. Select Insert / Media / Flash.
3. Browse to the animation you want to insert and click OK.
4. Test your page in the browser.

How to... Insert sound into Adobe® Dreamweaver®

To insert sound as a link:

1. Open a web page in Dreamweaver®.
2. Highlight the text or image you want to link for the sound.
3. In the Link box in the Properties Inspector, type in or browse to the music file.
4. Test your page in the browser.

To embed as a background sound:

1. Open a web page in Dreamweaver®.
2. View the code by selecting View / Code or by clicking the Code button in the top left.
3. Between the <head> tag and the </head> tag, insert `<bgsound src="mysound.wav" loop=50>`. But instead of mysound.wav enter the file name of your sound and instead of 50 set the loop number to the amount of times it should play. (Note: loop can be set to infinite.)
4. Test your page in the browser.

Ensuring compliance with W3C

The W3C (World Wide Web Consortium) is a body which promotes the standardisation of web design, especially of HTML. This is to ensure universal **accessibility**, including the ability of websites to be displayed on a variety of browsers and resolutions and be used by users with special needs.

Key terms

Acessibility – the ease with which websites can be accessed by users, especially referring to those with particular technologies or special needs.

Spider – a type of bot (short for robot – a computer program that runs automatically) used by search engines to find websites for search engines.

Meta-tagging

Search engines do not literally search the whole Internet every time a search word is entered into a search engine. Instead, they use enormous databases to store information about all the websites of which they are already aware and it is these databases which are searched. Search engines use **spiders** to trawl the Internet for websites to include in their databases.

The spiders examine each web page encountered and send information back to be stored in the database. To ensure that the spiders list the web page correctly, the web developer can include meta-tags in the coding for the web page.

How to... Create meta-tags in HTML

1. Open your homepage.
2. Below the <head> tag, enter this code:

```
<meta name="description"
content="Cheeseworld - all you need
to know about cheese">

<meta name="keywords"
content="cheese, fromage, brie,
cheddar, dairy">
```

   Notice there are no spaces between the keyword and commas.
3. Change the description and keywords so they are relevant for your site.

   This code cannot be tested, but can be read by spiders to be listed in search engines.

Cascading style sheets

CSS (cascading style sheets) can be used to control the formatting of a website efficiently. They can appear in the head of a particular web page to which they are to be applied or in a separate file so that they can serve

How to... Create a simple CSS page

1 Open Notepad (or a similar text editor).
2 Save the file as myCSSweb page.html.
3 Enter this code:

```
<html>
<head>
<title>My First CSS</title>
<link rel="stylesheet" type="text/css"
href="myCSS.css">
</head>
<body>
Here is some normal text.
<br>
<h1>Here is the text with CSS tags.</h1>
</body>
</html>
```

4 Save the file.
5 Create another new file and save it as myCSS.css.
6 Enter the following code:

```
h1 {
font-family: Arial;
color: red;
font-size: 20pt;
}
```

7 Save the file.
8 Navigate to where the.html file is saved using My Computer.
9 Double click your html file to open in your browser.

***Note**: Make sure the.html and .css files are saved in the same folder.*

the whole site. CSS makes formatting easier. All the formatting is done in one place, meaning it is easier to preserve a house style. If alterations are required later on, only one change in the CSS needs to be made, rather than several in the HTML which may be hard to find.

Activity: Using CSS

1 In myCSS.css, change the font to Wingdings. Save the .css file and refresh the .html file in the browser.
2 In myCSS.css, change the colour to blue and the size to 100pt. Save the .css file and refresh the .html file in the browser.

4.4 Review

After the website is built, it is essential to test it to make sure all parts work correctly. This allows an opportunity for bugs to be removed and for the website to be perfected before it goes live.

Functionality testing

All the elements of the website should be tested. For example, when the page loads, the correct images should load in the right places. Also, each hyperlink should be tested to ensure it goes to the right page.

The user environment needs to be tested as well, to make sure it is in fact easy to use. This is often done using a usability group. This is a group of people who fit into the target market who will use the system. They provide feeback on the website when there is still time to make changes.

A test plan such as the one shown in Table 28.4 can be used.

Content

The content of the website must be proofread to check that there are no spelling and grammar errors and that the information is accurate and appropriate for the target audience.

Test number	Test element	On page	Test data	Expected result	Actual result	Success or failure	Screenshot reference
1	Home button	About.html	Left click	Load index.html	Load index.html	Success	S1
2	Logo.gif	Index.html	Load page	Appear in top left corner	Appear in centre of page	Failure	S2

Table 28.4: Example test plan

Check against user requirements

The final website should be compared with the user requirements which were defined in the design. The requirements that have been met should be assessed according to how well they have been met. If any requirements have not been met, this must be justified, giving valid reasons.

Activity: Meeting user requirements

1. Choose a website with which you are familiar. Identify the target audience and write a list of ten user requirements this site would need to meet.
2. For each user requirement, state how the web designers have or have not met it.
3. If any requirements have not been met, explain how the designers could improve the website to ensure that all requirements are met.

User acceptance

Once the website has been tested for functionality and been corrected, it is necessary to test if it is suitable for the designated audience. A focus group of people from the potential target market are selected to test the website and provide feedback. One very useful aspect of this will be to test whether the website is user friendly, as this is difficult to measure.

Audit trail of changes

An audit trail will track all the changes made to a web page. This can be used to trace all the developments made, especially useful when making changes due to testing.

In addition, tracking the changes made allows the possibility of reverting to a previous version if an amendment has caused a problem. For example, testing the JavaScript® might produce an incorrect result but when the code is changed it could stop asking the user for data to be inputted. If the developer has tracked the changes, instead of trying to repair this new error, they can easily change back to the original version and redo the repair of the script.

Assessment activity 28.4

P5 M3 D3 BTEC

1. Using your design from Assessment activity 28.3, build the website for Fancy That! This includes the HTML, CSS and server side scripting. A web authoring package should be used. P5
2. Improve your website based on a client review. M3
3. Demonstrate that your website meets the defined requirements of the client and achieves its desired purpose. D3

Grading tips

- Any method or software can be used to create the website, but it must be multi-page with two-way interaction as designed. P5
- The improvements should be measurable. Explain how they will make the website better in terms of design or functionality – for your client or the user. M3
- Meeting the requirements can be demonstrated with annotated screenshots. Make sure each original requirement is addressed. D3

PLTS

Self-managers should use their time management skills to make sure their project does not overrun and **creative thinkers** can use their originality to translate their designs into a real website. **Reflective learners** will test and find improvements.

Functional skills

This task allows you to use **ICT** to carry out complex and non-routine tasks.

WorkSpace

Jared

Web designer

There are two main areas of website production: designing and developing. Working as a web designer means that I concentrate on the artistic elements of the sites.

A large part of what I do is making sure the website's brand is used throughout the site and this is done by having a house style which defines the fonts, colours and other styles. These must be used consistently in all the site's pages.

Designing pages can involve working on large graphics for the whole layout, for example where the navigation will be on each page, or it could be small elements such as logos or individual buttons. Sometimes it can be more challenging working on the smaller parts, as you need to convey a company's logo and colour scheme in a very small space.

All the time I am working on a site, I have to remember two things:

- the client's needs – if the final product does not suit their requirements or does not fit the brief they have given me, then they might reject it
- the user's needs – the client needs a website which people will want to visit and be able to use easily.

Balancing these two sets of needs can be difficult, but when the final website is completed it is very rewarding.

Think about it!

Select three websites which you think are well designed and carry out the following tasks:

1. Write down five requirements that the client may have stated when requesting their website.
2. Write down five user needs for the website which will encourage them to keep visiting and using the site.
3. Compare these lists. Are any the same for client and user? Do any contradict each other?
4. You have identified these websites as being well designed. What specifically do you consider to be well designed on each site? What can you learn from them?

Just checking

1. Sketch a simple diagram to give an overview of how Internet technologies work together.
2. What are the four layers of TCP/IP and briefly what do they each do?
3. How does a firewall use ports to protect a web server?
4. What is the difference between static and dynamic websites?
5. How does bandwidth affect website performance?
6. What is compression and how does it aid website performance?
7. What is interactivity?
8. What are the advantages of using CSS?
9. How can meta-tags help a website move up the listings in a search engine?
10. What is house style and why is it used?

edexcel

Assignment tips

- Getting your head around Internet technologies can be a bit tricky because you need to imagine activities that are happening all over the world, numerous times every second. Try focusing on just one data package or one website and then expand it to consider what is happening across the whole of the Internet.
- When thinking about website performance, nanoseconds can make a big difference. Remember that it is important for websites to perform their actions as quickly as possible in as few clicks as possible.
- When designing your website, consider the time limit you are working to. Ambitious sites are impressive, but sites that are unfinished are not and could result in your achieving a lower grade. Strive for the best website you can make but be realistic about your deadline.