

5. The Internet and Its Uses

5.3 Cyber security

1 Choose **six** correct terms from the following list to complete the spaces in the paragraphs below:

- encryption
- file name
- firewall
- HTML tags/text
- IP address
- protocol
- proxy server
- SSL certificate
- web server name

A user enters a URL. The web browser breaks up the URL into **three** components:

1

2

3

The web server returns the selected web page.

The web browser reads the from the selected page and shows the correctly formatted page on the user's screen.

A is used between the user's computer and the network to examine the data traffic to make sure it meets certain criteria.

To speed up the access to the web pages next time, a is used between the computer and web server; this device uses a cache to store the website home page after it has been accessed for the first time.

[6]

- 2 (a) Viruses, pharming and phishing are all examples of potential Internet security issues.

Explain what is meant by each of these **three** terms.

Virus

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Pharming

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Phishing

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[6]

- (b) An online bank requires a client to supply an 8-digit code each time they wish to access their account on the bank's website.

Rather than ask the client to use a keyboard, they are requested to use an on-screen keypad (shown on the right) to input the 8-digit code.

The position of the digits on the keypad can change each time the website is visited.

The client uses a mouse or touch screen to select each of the 8 digits.

2	5	1
6	8	3
9	0	4
	7	

- (i) Explain why the bank has chosen to use this method of entering the 8 digits.

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[2]

- (ii) Name and describe **another** measure that the bank could introduce to improve the security of their website.

Name

Description

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[2]

3 (a) Four statements about cookies are shown in the table below.

Study each statement.

Tick (✓) to show whether the statement is true or false.

Statement	True	False
they are a form of spyware		
they are used only in advertising		
they are used to track browser use		
they act in the same way as a virus		

[4]

(b) Five descriptions and five security issues are shown below.

Draw a line to connect each description to the correct security issue.

Description

malicious code installed on the hard drive of a user's computer or on the web server; this code will re-direct user to a fake web site without their consent

software that gathers information by monitoring key presses on a user's computer and relays the information back to the person who sent the software

program or code that replicates itself and is designed to amend, delete or copy data and files on a user's computer without their consent

the act of gaining illegal access to a computer system without the owner's consent

creator of code sends out a legitimate-looking email in the hope of gathering personal and financial data; it requires the recipient to follow a link in the email or open an attachment

Security issue

hacking

pharming

phishing

spyware

virus

[4]

4 (a) State what is meant by the term SSL.

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.....[1]

(b) The following stages take place when a user wishes to access a secure website.

Put each stage in sequence by writing the numbers 1 to 6 in the column on the right. The first one has been done for you.

Stage	Sequence number
the encrypted data is then shared securely between the web browser and the web server	
the web browser attempts to connect to a website which is secured by SSL	1
the web server sends the web browser a copy of its SSL certificate	
the web browser requests the web server to identify itself	
the web server will then send back some form of acknowledgement to allow the SSL encrypted session to begin	
the web browser checks whether the SSL certificate is trustworthy; if it is, then the web browser sends a message back to the web server	

[5]

5 Five computing terms are described below.

Write the name of the term being described.

Software that anyone can download for free from the Internet and then use without having to pay any fees. The usual copyright laws apply and a user license is important.

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Software that gives the user the chance to try it out free of charge before actually buying it. The software is subject to the usual copyright laws. As a rule, not all the features found in the full version are available at this stage.

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Software where users have freedom to run, copy, change and adapt it. This is an issue of liberty and not of price since the software guarantees freedom and the right to study and modify the software by having access to the actual source code.

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Set of principles that regulates the use of computers in everyday life. This covers intellectual property rights, privacy issues and the effects of computers on society in general.

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The taking of somebody's idea or software and claim that the idea or software code were created by the "taker".

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[5]

6 Identify which **five** computer terms are being described below.

- (a) A system designed to prevent unauthorised access to or from a private network or intranet; it examines all data traffic to and from the network and filters out anything that does not meet certain criteria.

..... [1]

- (b) Software that can be used on a trial basis before buying the full version; it often does not include all the features of the full version or has a time limit before it stops working.

.....[1]

- (c) A protocol for transmitting private documents via the Internet; it uses two keys to encrypt the data – a public key and a private key.

.....[1]

- (d) A standard adopted by the electronic music industry for controlling devices that produce music, such as synthesisers and sound cards.

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- (e) A device that allows audio signals to be converted into electrical signals which can be interpreted by a computer after being converted into digital signals.

.....[1]

7 There are a number of security risks associated with using the Internet.

Name **three** of these risks. For each, state why it is a risk and describe how the risk can be minimised.

Security risk 1

Why it is a risk

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How to minimise the risk

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Security risk 2

Why it is a risk

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How to minimise the risk

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Security risk 3

Why it is a risk

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How to minimise the risk

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8 (a) Computer ethics involves a number of different topics.

(i) A student made the following statement on an examination paper:

"It allows a user to have the freedom to run, copy, change and adapt the software and then pass it on to a colleague, friend or family member."

Identify which computer term the student was describing.

..... [1]

(ii) Explain what is meant by computer ethics.

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..... [3]

(b) The four statements below refer to firewalls and proxy servers.

Study each statement.

Tick (✓) the appropriate column(s) to indicate whether the statement refers to a firewall and/or a proxy server.

Statement	Firewall	Proxy server
Speeds up access of information from a web server by using a cache		
Filters all Internet traffic coming into and out from a user's computer, intranet or private network		
Helps to prevent malware, including viruses, from entering a user's computer		
Keeps a list of undesirable websites and IP addresses		

[4]

(c) Explain **three** ways of preventing **accidental** loss or corruption of data.

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9 Passengers fly into an airport from other countries. The airport has a security system that uses:

- computers
- scanners
- digital cameras

To gain entry to the country, each passenger must have a passport or identification (ID) card. This must contain a recent photograph and other personal data. The passenger must:

- place their passport or ID card on a scanner that reads machine-readable characters and scans the photograph
- look towards a camera that takes an image of the passenger's face

Describe how a computer checks whether the image just taken by the camera matches the scanned photograph.

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[2]

- 10** Some software can be described as free, freeware or shareware.

Tick (✓) the appropriate boxes in the table below to show which features apply to these three types of software.

Software feature	Free	Freeware	Shareware
Software source code can be freely accessed and modified as required			
All the features of the full version of the software are not made available; the full version needs to be purchased first			
The original software is subject to all copyright laws			
It is possible to distribute modified versions or copies of the software to friends and family			

[3]

- 11** Secure socket layer (SSL) is used in the security of information on Internet websites.

- (a) State how it is possible for a user to know that a website is secure by looking at the web address.

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[1]

- (b) Describe **three** of the stages a web browser goes through to detect whether a website is secure.

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[3]

12 Six security issues and six descriptions are shown below.

Draw a line to link each security issue to its correct description.

Security issue	Description
Pharming	illegal access to a computer system without the owner's consent or knowledge
Phishing	software that gathers information by monitoring key presses on a user's keyboard; the data is sent back to the originator of the software
Viruses	malicious code installed on the hard drive of a user's computer or on a web server; this code will re-direct the user to a fake website without the user's knowledge
Hacking	creator of code sends out a legitimate-looking email in the hope of gathering personal and financial information from the recipient; it requires the user to click on the link in the email or attachment
Spyware	a message given to a web browser by a web server; it is stored in a text file; the message is then sent back to the server each time the browser requests a page from the server
Cookies	program or code that replicates itself; designed to amend, delete or copy data or files on a user's computer; often causes the computer to crash or run slowly

- 13 (a) Five statements and three types of software are shown below.

Draw lines to connect each statement with the correct type of software.

Statement	Type of software
Users have the freedom to pass on the software to friends and family as they wish.	Free software
Users can download this software free of charge, but they cannot modify the source code in any way.	
Users are allowed to try out the software for a trial period only before being charged.	Freeware
Users can study the software source code and modify it, where necessary, to meet their own needs, without breaking copyright laws.	Shareware
Users can obtain a free trial version of the software, but this often does not contain all the features of the full version.	

(b) Describe **three** ethical issues that should be considered when using computers.

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[3]

(c) Security of data is very important.

Three security issues are viruses, pharming and spyware.

Explain what is meant by each issue.

Viruses:

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Pharming:

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Spyware:

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[6]

(d) Describe **three** tasks carried out by a firewall.

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[3]

14 A manager at a company is concerned about a brute-force attack on its employee user accounts.

(a) Describe how a brute-force attack can be used to gain access to the employee user accounts.

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(b) One possible aim for carrying out a brute-force attack is to install malware onto the company network.

(i) State **two** other aims for carrying out a brute-force attack to gain access to the employee user accounts.

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..... [2]

(ii) Identify **three** types of malware that could be installed.

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..... [3]

(c) Give **two** security solutions that could be used to help prevent a brute-force attack being successful.

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..... [2]

15 A student uses the internet for their schoolwork to research what is meant by pharming.

(a) State the aim of pharming.

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..... [1]

(b) Draw and annotate a diagram to represent the process of pharming.

[4]

- 16** A distributed denial of service attack (DDoS) is a cyber security threat.
- (a)** Draw and annotate a diagram to represent the process of a DDoS.

(b) State **two** aims of carrying out a DDoS attack.

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[2]

(c) Give **two** security solutions that can be used to help prevent a DDoS attack being successful.

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[2]

- 17** A student is writing a help guide about how to recognise and avoid the cyber-security threat of pharming.

(a) Give **three** appropriate solutions he could include.

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[3]

- (b)** The student also wants to include information in the help guide about the use of social engineering as a cyber-security threat.

Describe what is meant by social engineering.

Include **one** example of social engineering in your answer.

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[3]

- (c)** The student includes information about the security solution of access levels.

Describe what is meant by access levels.

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[3]

18 Complete the statements about a distributed denial of service (DDoS) attack.

Use the terms from the list.

Some of the terms in the list will **not** be used. You should only use a term once.

anti-virus	bot	botnet	hacker
internet	malware	secondary storage	
spyware	web browser	web server	website

The attacker encourages people to download onto their computer. This will turn each computer into a , creating a network called a

When the attacker wants the DDoS to take place, repeated requests are simultaneously sent from the computers to a This causes it to crash, meaning that users can no longer access the that is stored on this hardware.

[5]

19 Draw and annotate a diagram to demonstrate how a firewall works.

[4]

20 Malware can be used to corrupt data stored on a computer.

(a) Tick (✓) **one** box to show which cyber security threat is **not** a type of malware.

- | | |
|---------------------|--------------------------|
| A Phishing | <input type="checkbox"/> |
| B Ransomware | <input type="checkbox"/> |
| C Virus | <input type="checkbox"/> |
| D Worm | <input type="checkbox"/> |

[1]

(b) Identify **one** other example of malware than those given in **part 1(a)**.

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(c) Identify the type of software that is used to find and remove malware from a computer.

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- 21 (a)** Draw and annotate a diagram that demonstrates the cyber security threat of data interception.

[4]

- (b)** Identify **one** security solution that will help keep data safe from data interception and state why it will help keep the data safe.

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- (i) Explain how the firewall operates to help protect the network.

(ii) Give **two** examples of malware that the firewall can help protect the network from.

- 1
2 [2]

23 A company has a website that is suffering a distributed denial of service (DDoS) attack.

(a) Draw and annotate a diagram to show the process of the DDoS.

[5]

(b) Identify a solution that can be used to help prevent the DDoS attack being successful.

..... [1]

- 24 (d)** The company uses a proxy server to help protect the web server and the network from cyber security threats.

(i) Give **three** cyber security threats that the proxy server can help protect against.

1

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[3]

(ii) Identify **two** functions of the proxy server that can be used to help protect the web server and the network.

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[2]

(e) Customers access the company's web pages that are stored on the web server.

Describe how the web pages are located, retrieved and displayed on a customer's computer.

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[6]