

GCE A2

**Applied Information and
Communication Technology**

January 2009

Mark Schemes

Issued: April 2009

**NORTHERN IRELAND GENERAL CERTIFICATE OF SECONDARY EDUCATION (GCSE)
AND NORTHERN IRELAND GENERAL CERTIFICATE OF EDUCATION (GCE)**

MARK SCHEMES (2009)

Foreword

Introduction

Mark Schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of 16- and 18-year-old students in schools and colleges. The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes therefore are regarded as a part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

The Council hopes that the mark schemes will be viewed and used in a constructive way as a further support to the teaching and learning processes.

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**Applied Information and
Communication Technology**

Assessment Unit A2 7

assessing

Unit 7: Investigating systems

[A6J11]

MONDAY 12 JANUARY, AFTERNOON

**MARK
SCHEME**

1

	Problem	Effect on the business
1	Staff are sometimes off sick.	<ul style="list-style-type: none"> • Appointments have to be rescheduled which causes extra work for the secretary in rescheduling and also for the other staff in handling the appointments. • Can also cause client dissatisfaction. • Costs the business money as next appointment is provided free of charge.
2	Lots of paperwork needs to be kept up to date.	<ul style="list-style-type: none"> • Time consuming. • When an appointment is made the secretary has to enter the details in the appropriate appointment book and also complete an appointment card. Staff details also have to be kept up to date on the notice board – several opportunities for error here as a lot of data to be recorded. • Too much reliance on paper based records – possible risk with fire, spillage etc.
3	The secretary must remember to allocate an extra 15 minutes for a new client.	<ul style="list-style-type: none"> • If the secretary forgets to do this there will be a knock-on effect on the schedule for the rest of the day – hence leading to dissatisfied clients and staff having to rush their work.
4	A product being out of stock is only identified when a customer asks for a particular item.	<ul style="list-style-type: none"> • Therapists may not be able to complete a treatment if stock is not available. • Clients may be dissatisfied and go elsewhere to buy products and so could in turn go there for future treatments. • Opportunity for a sale is wasted and so will have an impact on revenue.
5	The secretary finds the whole process very tedious and time consuming.	<ul style="list-style-type: none"> • A time consuming task may cause the secretary to leave out certain parts if she is very busy. • Boredom may lead to human error. • Staff turnover. • Could be doing other things.

1 mark for each effect from the above list or other suitable effect.

[5]

5

2 (a)

Situation	Technique being used
Talk to Janet Legg to get an overview of the whole business.	Interview
Spend some time sitting in the reception area.	Observation
Examine some of the client files.	Document research
Find out how all customers feel about TIP TOP TOES.	Questionnaire
Find out what therapists find difficult about the current procedures.	Interview
General chat about work with staff in the staff room.	Interview

1 mark for each correct technique as shown above. [6]

(b)

Interviews are the easiest method of fact finding as you don't have to plan anything beforehand.	FALSE
Questionnaires are useless as people never fill them in honestly.	FALSE
Document research is very useful as it provides you with reference material.	TRUE
With observation, you must ensure that the person understands why you are watching them.	TRUE
Fact finding is the least important part of the system development life cycle.	FALSE

1 mark for each correct answer as shown in the table above. [5]

11

3 (a)

Document	Sequence
System Specification	3
Feasibility Study	1
Project Plan	2
Technical Guide	5
Test Plan	4
User Guide	6

1 mark for each document correctly sequenced. [4]

(b) A feasibility study is written to:

- State the objectives of the project.
- State the scope of the project/project boundaries/terms of reference.
- Enable management to make a decision as to whether or not the project should proceed.
- Provide an overview of possible alternatives for the computerisation project.
- budget.

1 mark for any one of the above or suitable alternative. [1]

(c) A system specification is written to:

- Provide detailed information for the programmers or developers as to what the new system has to do.
- Provide instruction for the developers on hardware, software and data processing requirements.

1 mark for any one of the above or suitable alternative. [1]

(d)

Documents				
Section	System Specification	Feasibility Study	Technical Guide	Test Plan
Algorithms	✓			
Installing a new printer			✓	
User requirements		✓		
Cost benefit analysis		✓		
Proposed screen layouts	✓			
Data files				✓

1 mark for each correct answer.

[6]

12

4

	Categories			
	Input	Output	File	Process
Produce client invoice				✓
Therapist rota		✓		
Client name	✓			
Payments			✓	
Update client address				✓
Calculate weekly sales figures				✓
Stock			✓	
Appointment card		✓		

1 mark for each correct answer.

[8]

8

5 (a) Advantages of using a database:

- All data can be stored in one central location.
- Data will not need to be duplicated.
- Paperwork will be reduced.
- Reports can easily be produced to show important business data.
- Client/appointment and payment data will be more accurate.
- Availability to many users simultaneously.

1 mark for each of two reasons from the above list or other suitable alternative.

[2]

(b)

Description	✓
Staff ID	
Date	
Duration	✓
Room	
Cost	✓

1 mark for each correct tick.
(deduct 1 mark for each additional tick)

[3]

(c) Treatment ID/Treatment Code/Treatment Ref/Treatment No [1]

1 mark for any of the above or suitable alternative.

(d)

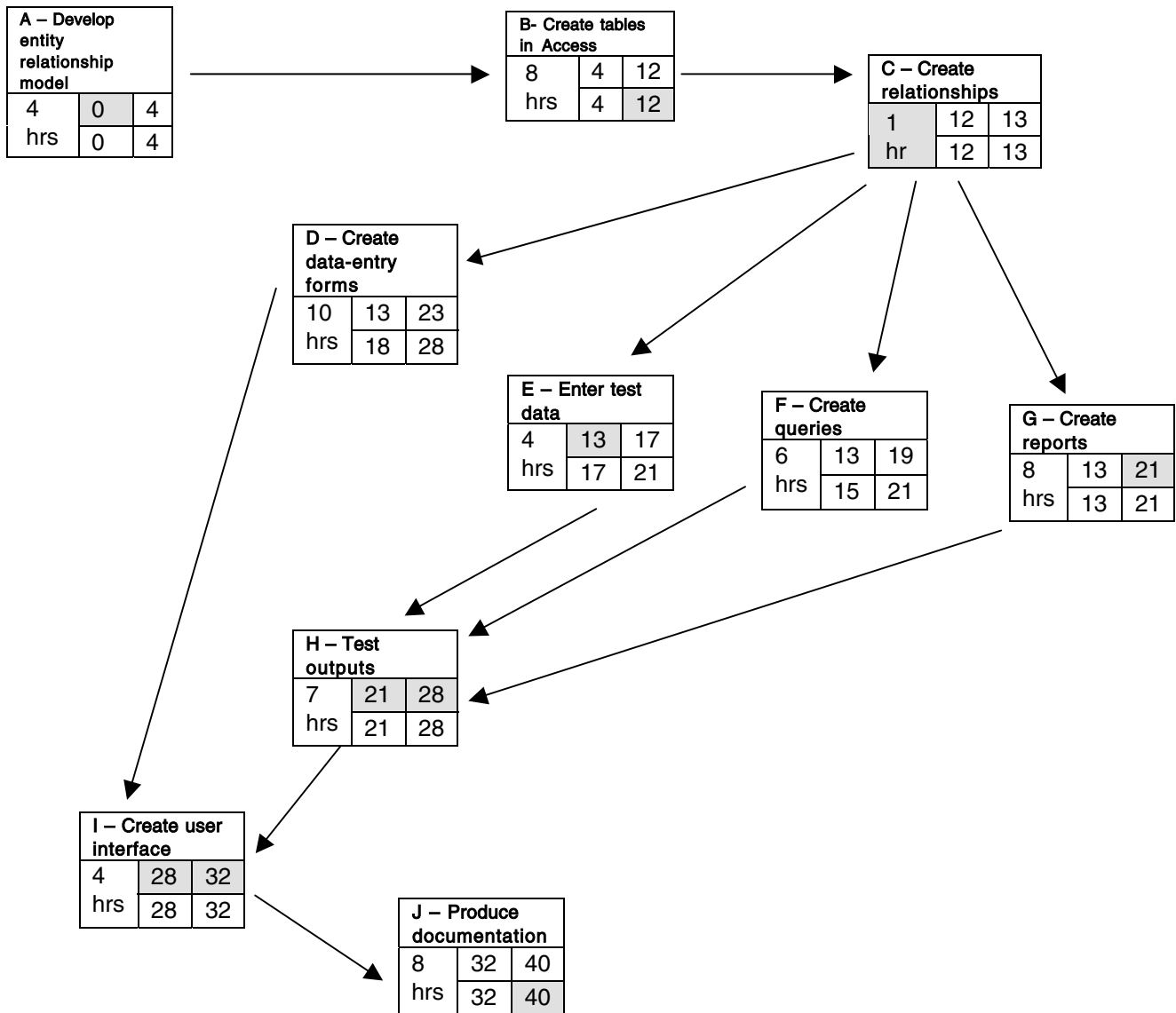
	Tables			
	Client	Appointment	Treatment	Staff
Client Name	✓			
Appt No		✓		
Date		✓		
Time		✓		
Treatment Type			✓	
Cost			✓	
Therapist Name				✓

1 mark for each correct answer as shown above. [7]

13

6 Chris has produced a plan to show how long the database development will take.

(a)



1 mark for each shaded cell correctly completed.

[10]

AVAILABLE MARKS

(b) 40 hours or 40 [1]

- (c) D – Create data-entry forms
- E – Enter test data
- F – Create queries

1 mark for any one of the above. [1]

- (d) A – Develop entity relationship model
- B – Create tables in Access
- C – Create relationships
- G – Create reports
- H – Test outputs
- I – Create user interface
- J – Produce documentation

2 marks for all correct. [2]

At least 5 activities listed – but D, E, F not included.

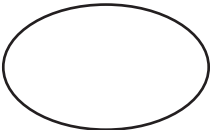
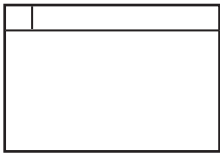

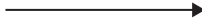
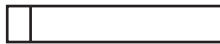
AVAILABLE
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- 7 (a) Context diagram
 Level 1 diagram – data flow diagram
 Level 2 diagram – entity rel model

1 mark for any two from the above list. [2]

- (b) Complete the following table to explain the notation used within data modelling:

Symbol	Description	Completed Example from within TIP TOP TOES	
	Entity	Possible entity from case study – client, staff Entity identifier must be included – a, b, c etc	[1] – for desc. [2] – for example
	Process	Possible process from case study. Must include a verb. Must include a process ID – numeric.	[1] – for desc. [2] – for example
	Data flow	appointment request 	[1] – for desc.
	File	Possible file from case study – client, stock, staff, appointments etc. Must include file ID – M1	[1] – for desc. [2] – for example

[10]

			AVAILABLE MARKS
(c)	(i)	Analyst or user	[1]
	(ii)	Important that user confirms all necessary inputs and outputs from the main process or other similar alternative.	[1]
8	(a)	(i) Program testing	
		<ul style="list-style-type: none"> – Checks that all the individual parts of the system work properly. – Concerning with testing the processing of individual programs to ensure that they perform correctly. – Program modules should be tested thoroughly to ensure their accuracy before integration into the main system. 	
		(1 mark for any of the above or suitable alternative)	[1]
	(ii)	Carried out by programmers or system developers	[1]
	(b)	(i) System testing	
		<ul style="list-style-type: none"> – Ensures that all parts of the new system work properly when combined. – Should test all interfaces, linkages, input, outputs and error handling. – whole system 	
		(1 mark for any of the above or suitable alternative)	[1]
	(ii)	Carried out by analyst	[1]
	(c)	(i) Acceptance testing	
		<ul style="list-style-type: none"> – Carried out to test whether system meets user requirements. – Makes sure that user can carry out all necessary functionality. – Ensures that all supporting documentation is correct. 	
		(1 mark for any of the above or suitable alternative)	[1]
	(ii)	Carried out by users	[1]
			14

(d)

Appt No	Date	Time	Client No	Attended?	Treatment Code	Paid?	Reason for rejection
10100	02/07/09	07:30	C009	Yes	BY1009	Yes	Appointment time too early.
10102	02/07/09	12:30	C029	No	CH0087	No	Client does not exist as all other fields are correct.
10200	06/07/09	10:45	C009	Yes			Treatment code not completed.

1 mark for each correct reason.

[3]

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MARKS

9

9

A Local Area Network within the business will mean that data can all be stored centrally.	TRUE
Clients will be able to view personal details of other clients.	FALSE
All appointment data and client data can now be viewed on screen.	TRUE
A separate printer will be needed in each treatment room which could be quite expensive.	FALSE
All therapists will have to be trained in the use of the new system.	TRUE
TIP TOP TOES will still need a secretary.	TRUE

[6]

6

10

Therapists should each have a unique logon code for the system.	✓
The backup file should be stored on CD in the filing cabinet in the reception area.	
TIP TOP TOES should register with the Data Protection Registrar.	✓
A full system backup should be carried out each night.	✓
Therapists should write their password in their appointment book.	
The secretary should always lock her computer if she is walking away from the main reception desk.	✓

[4]

4

- 11 (a)** – could use the web to promote their business-marketing tool
 – could provide a facility for on-line appointment booking
 – could sell products on-line

1 mark for each of two valid reasons. [2]

- (b)** Customers could use email to contact the business outside of normal business hours.
 Can be used to make appointment or reschedule appointments.
 Could use this as a means of communicating with suppliers.
 Can send a mail shot to customers regularly.

1 mark for any two from the above list or other suitable alternative. [2]

Total **100**

AVAILABLE MARKS	
Total	100



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**Applied Information and
Communication Technology**

Assessment Unit A2 13

assessing

Unit 13: Networking and Communications

[A6J71]

FRIDAY 16 JANUARY, MORNING

**MARK
SCHEME**

1	Device	Parallel	Serial
	Modem		✓
	Mouse		✓
	Printer	✓	✓
	Scanner	✓	✓

Each correct entry = [1]

[6]

6

- 2 (a) The sent byte will be transferred **to an asynchronous chip**.
- (b) The start bits will be **stripped off**.
- (c) The number of bits in the data byte plus **the parity bit** are **added together**.
- (d) If the totals match then the **stop bits are removed** and the byte is considered to have been sent (and received) properly.
- (e) If the totals do not match then it means that **the byte has been sent with an error**.
- (f) When this happens **a signal to this effect is sent to the sender and the sender must resend**.

(8 statements (or similar) × [1])

[8]

8

- 3 SOH – start of header – this is used to signify that a header is the next byte to follow
 STX – start of text – the next bytes to follow are the main body of the message
 BCC – block character check – a mechanism similar to parity checking which checks all the data bytes being sent

(3 × [1]) for definition PLUS (3 × [1]) for explanation.

[6]

6

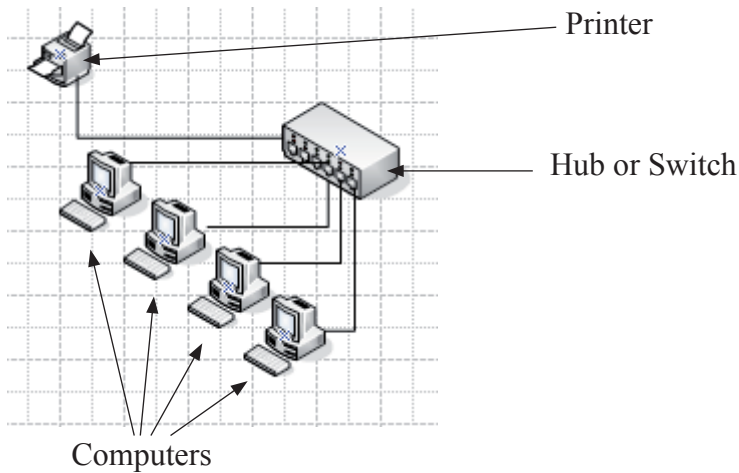
- 4 The card will be used in a star network (accept 10(0)(0)BASET) [1]
 The card is used in a star network because the port shown will accept a computer RJ45 connector.
 Use of CAT5, CAT5e or twisted wire cabling [1]

[1]

2

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- 5 (a) Labelled sketch showing four computers plus printer attached to HUB (or SWITCH) [2]
(lose [1] if sketch is not labelled)



- (b) A HUB (or SWITCH) is used to provide the connection. [1]
Simple description of HUB or SWITCH [1]

- (c) Software required is some form of NOS + explanation.
(Accept Windows or printer driver) [2]

[6]

6

6 Problems and solutions can include:

- System is slow if many multimedia users are sending files at one time
 - Solution to the problem may be to split the network into different sections with the high bandwidth users in one area and the lower bandwidth users on a separate part
 - Replace the bus with a switched star network
- Users find it slow to use the Internet
 - Either install broadband, ISDN or other such faster connection
- Bus based topology could be at fault with collisions frequent
 - Use star based network
 - Increase speed from say 10 BASE 2 to 100(0) BASE T with the use of switching
 - Move to client server topology
 - Set up a Proxy server to handle web requests
- Other suitable problem
 - Suitable solution

(2 × [2]) for each problem fully described

(2 × [2]) for each solution fully described

[8]

8

7 (a) A client server

A **client** is an individual user's computer or a user application that may do a certain amount of processing on its own (or in the case of a thin or lean client depends primarily on the central server for its processing activities). It also sends and receives requests to and from one or more servers for other processing and/or data.

A **server** consists of one or more computers that receive and process requests from one or more client machines. A server is typically designed with some redundancy in power, network, computing and file storage.

Definition of client [1]

Definition of server [1]

[2]

Business advantages of the Client/Server Environment

- Interoperability – key components (client/network/server) work together.
- Scalability – any of the key elements may be replaced when the need to either grow or reduce processing for that element dictates, without major impact on the other elements.
- Adaptability – new technology (i.e., multi-media, broad band networks, distributed database, pen computing, wireless) may be incorporated into the system.
- Affordability – cost effectiveness is ensured by using less expensive clients available on each platform.
- Data Integrity – entity, domain and referential integrity are maintained on the database server.
- Accessibility – data may be accessed from WANs and multiple client applications.
- Performance – performance may be optimised by hardware and process.
- Security – data security is centralised on the server.

Any one named business advantage [1]

Description of advantage [1]

[2]

(b) Switch

The switch is used in star based networks and picks up every transmission before it reaches another node.

The switch forwards the frame over the appropriate segment, just like a bridge, but since any segment contains only a single node, the frame only reaches the intended recipient.

This allows many transmissions to occur simultaneously on a switched network. Each machine has access to the full switch data transfer capability.

Switch can carry out multiple transfers at full speed.

Switch can connect devices at different speeds.

Description of purpose

[2]

			AVAILABLE MARKS
	<p>(c) Upgrading existing IT software</p> <p>Simple process to upgrade the software on the server No need to upgrade software on each client machine.</p> <p>Upgrade on server [1] No need to upgrade on client [1]</p>	[2]	
	<p>(d) Access to the Internet</p> <p>Gateway (or router) is necessary.</p> <p>Accept these optional components. Proxy server, firewall or other suitable hardware.</p> <p>Named component = (1 × [1]) Description of component = (1 × [2])</p>	[3]	
	<p>(e) Company intranet</p> <p>Items stored:</p> <p>Company documents, phone lists, employee contracts, company AUP, any other suitable document or resource</p> <p>Named component = (2 × [1]) Description of component = (2 × [1])</p>	[4]	15
8	<p>(a) Benefits of e-mail</p> <p>Customer e-mail addresses can be stored, attachments, instant messaging, read (receive) receipts, any other appropriate benefit.</p> <p>Three benefits</p> <p>Named component = (3 × [1]) Description of component = (3 × [1])</p>	[6]	
	<p>(b) Methods of virus prevention</p> <p>Don't allow mail to be opened or previewed automatically Use of firewall + description Use of virus prevention software + description Do not publish e-mail addresses on web-sites or bulletin boards Any suitable reason plus description</p>	[4]	10
9	<p>Ethernet follows a simple set of rules that governs its basic operation. It uses baseband transmission where the whole medium is used to transmit the signal i.e. the raw data is transmitted using the full bandwidth of the medium with no modulation.</p> <p>Each correct word (4 × [1])</p>	[4]	4

10

1.	A router	E
2.	DHCP	G
3.	CSMA/CD	C
4.	Wireless networking	B
5.	A proxy server	D
6.	A ring based network	F
7.	The WEP key	A

Each correct number (5 × [1])

[5]

5

11 A firewall

prevents most viruses from entering the company network.	✓
is a sprinkler system that stops fires from destroying the servers.	
can act as a proxy.	✓
controls traffic between networks.	✓
can prevent certain web pages from being viewed.	✓
contains the companies Acceptable Use Policy (AUP).	

Each correct tick (4 × [1])

[4]

4

12 A star topology

assigns IP addresses to computers in the star.	
stores network card serial numbers in a data file.	
uses an address resolution protocol (ARP) to look up web pages.	
can use a hub to transmit to all stations in a network.	✓
can be used in a peer to peer network.	✓
can be used in a client-server network.	✓

Each correct tick (3 × [1])

[3]

3

AVAILABLE MARKS

13 URL is the **text** name corresponding to the **numeric IP** address of a computer on the Internet. URL is the **address** of a resource on the Internet. URL must be **unique**. Internet users access your **website** using your URL. An example of a URL is **www.abc.com**.

Each correct entry (6 × [1]) [6]

6

14 Wireless networking

It uses infra red transmission media to save files.	
It uses Ethernet technology to transmit data.	
It can be subject to war driving.	✓
It uses CAT5 cabling.	
It can be used in home networking.	✓
It can use encryption to protect data transmission.	✓

Each correct tick (3 × [1]) [3]

3

15 Advantages of LAN

Shared resources, improved manageability, security controls, updating software made easy, any other advantage

Any **two** advantages × [1] [2]

Any **two** descriptions × [1] [2]

Disadvantage of LAN

Server crash would be critical, virus attack can be fatal, any other correct disadvantage

Any disadvantage [1]

Description [1]

6

16 Wireless networks are **slower** than those that are directly connected through an **Ethernet** cable. A serious problem for wireless networks is the speed of **video** downloads.

A wireless network is more **vulnerable** than a network using cable because anyone can try to break into a network which is broadcasting a signal. Wireless networks also use wireless traffic **encryption** for security. Many networks offer **WEP** because many wireless networks have been found to be susceptible to intrusion. Although this blocks some intruders, the security problems have caused some businesses to stick with wired networks until security can be improved. The use of a **firewall** will also help prevent security breaches.

Wireless networks may be available to the general public in areas called **hotspots**. The public can find these in areas such as airports, hotels and train stations. [8]

Total

**AVAILABLE
MARKS**

8

100

