



# **MARKSCHEME**

**November 2008**

## **INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY**

**Higher Level**

**Paper 2**

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Examiners should be aware that in some cases, candidates may take a different approach, which if appropriate should be rewarded. If in doubt check with your Team Leader.

In the case of an “identify” question read all answers and mark positively up to the maximum marks. Disregard incorrect answers. In the case of a “describe” question, which asks for a certain number of facts *e.g.* “describe two kinds”, mark the **first two** correct answers. This could include two descriptions, one description and one identification, or two identifications.

### Area of impact: Business and employment

1. (a) **Identify *two* ways that this e-mail could trick *Citibank* customers into providing sensitive information.** *[2 marks]*

Answers may include:

- presence of the citi logo
- link with https protocol suggests security
- other comment suggesting official look *e.g.* “A member of citigroup”, “Copyright @ 2004 Citicorp”
- threat of blocked account
- the bank's name is included in the sender's e-mail address
- reasons given sound plausible *i.e.* need to update software
- citbank.com appears in the reference link
- customers are tricked when they follow the link as they follow instructions to enter their account number and PIN
- customers are tricked as the link may download spyware which collects user information and sends it back to the criminal's server.

*[1 mark] each for any of the above points up to a maximum of [2 marks].*

- (b) **Describe the steps used by the bank's IT system to authorize a customer's access to their bank account when using a card at an ATM.** *[4 marks]*

- customer ID read from card/card is scanned/read
- the IT system checks that the card has not expired
- the IT system requires the PIN to be entered (or iris scan, voice recognition other characteristic)
- PIN is compared with PIN stored in database/account details (encrypted) are sent to bank's central computer/account details are matched in the customer database to check the account is valid
- if PIN matches the database then access is authenticated.

*[1 mark] each for any of the above points up to a maximum of [4 marks].*

(c) Explain *two* actions that could be taken by the bank to assist customers in identifying fraudulent e-mails. **[4 marks]**

- *Citibank* creates service to customers for reporting fraudulent e-mails – e.g. a special phone line to phone & check on specific email received
- availability of an online policy from *Citibank* – customers can immediately check on *Citibank* policies (e.g. *Citibank* will never send e-mails to customers requesting them to access a *Citibank* web site or input account details)
- *Citibank* posts warnings about fraudulent e-mails – notices/flyers posted in the bank
- *Citibank* posts warnings on its website
- the bank contacts customers - mailings by post/e-mail to customers explaining the problem and actions customers should take
- during ATM transactions screen displays include warning messages about fraudulent e-mails
- *Citibank* offers seminars regarding phishing – educates customers about how phishing occurs and what actions they should take
- the bank sends a letter to customers advising of the bank's e-mail address so they know this will be the only valid email address to receive valid email from the bank
- the bank provides a list of known phishing scams to help customers identify fraud
- the bank provides free anti-phishing software for customers to download from the bank's web page
- advice is given to customers face-to-face – e.g. from the teller when they visit the bank.

**[1 mark]**

*A limited response that indicates very little understanding of the topic.*

**[2-3 marks]**

*A reasonable explanation of actions that could be taken by the bank to assist customers in identifying fraudulent e-mails, although the answer may be unbalanced and lack appropriate reasoning at the bottom end of the band. Two actions identified/one action described [2 marks]. Two actions described [3 marks].*

**[4 marks]**

*A clear, detailed and balanced explanation of actions that could be taken by the bank to assist customers in identifying fraudulent e-mails.*

**(d) To what extent have ATMs *and* online banking changed the way that people manage their finances?** **[10 marks]**

- finance management is more efficient – done from home/less trips to bank/more convenient
- finances can be managed from anywhere in the world – convenient when travelling
- finances can be managed at any time of the day – ATMs and online banking are available 24/7
- bills may be paid on line – ease of transactions/convenience
- money can be transferred on line to other accounts
- statements can be printed online instead of received through the post
- less use of cash/cheques – bills are paid online and no need to pay with cash or use cheques
- better management of finances as statements can be accessed anytime
- choice of global/virtual banks (*e.g.* ING) which may offer higher interest rates
- customers can choose automatic payments – prevents charges due to late fees
- greater independence – customers can do their own handling of finances without needing to wait in the bank for a bank clerk who might be busy and may cause a delay in the transactions
- online banking allows transfers to systems such as PayPal – to allow customers to buy online goods from home
- managing finances using paper files is no longer necessary – online banking replaces the need to keep paper files/information can be accessed from anywhere and no need for storage cabinets
- people do not have to rely on credit cards for online transactions – when shopping online payments can be done online directly from their accounts.

Analysis could include arguments which explain the need to be aware of risks using online banking (*e.g.* hackers accessing credit card details) and ATMs (*e.g.* criminals can skim cards).

Do not award marks for discussions about the use of credit cards.

***Please see generic markband information sheet on page 16.***

**Area of impact: Arts, entertainment and leisure / Education**

2. (a) (i) **Identify *one* file format suitable for the storage of audio files.** **[1 mark]**

Answers may include:

- MP3/4 – MPEG-1 audio layer 3
- WAV – wave
- AIFF – audio interchange file format
- AU – audio file format (sun microsystems)
- WMA – windows media audio
- RAM – real audio media.

*[1 mark] for identifying one suitable file format for the storage of audio files.*

- (ii) **Identify *one* file format suitable for the storage of video files.** **[1 mark]**

Answers may include:

- AVI – audio video interleave
- MPEG-2 – moving pictures expert group
- MOV – movie (quick time)
- MP4 – MPEG-4
- real – name of the company
- wmv – Windows media video file
- FLV – Flash video.

*[1 mark] for identifying one suitable file format for the storage of video files.*

- (b) **Describe *two* concerns that schools may have about students being able to download and view videos on the school network.** **[4 marks]**

- bandwidth constraints – may take up more bandwidth than the school can tolerate/slow network down
- storage requirements – video files will take up a lot of storage space on school network server
- copyright issues – may be legal problems if unauthorized downloads
- students wasting time – students should be doing other things, viewing is time consuming
- suitability of content – video files may include content that is not suitable for school students
- risk of viruses – viruses may be downloaded with the video file and viruses could infect the school network.

*[1 mark] for each concern identified up to [2 marks], and an additional [1 mark] for each relevant description up to [2 marks].*

(c) **Explain why many news web sites use podcasts as a method for presenting news items.** **[4 marks]**

- users can access the material whenever they want – it is easy to catch up on missed TV/radio news programs
- users can take the material around with them *e.g.* listen to podcasts in the car/bus/gym
- reaches a younger audience who enjoy audio/video format
- devices to play podcasts are becoming more common
- easy to create/make available – reporters can easily submit podcasts from anywhere in the world
- no need to alter existing web sites
- provides a subscription service – users can easily subscribe and receive automatic updates
- provides anywhere/anytime access – increases the organisation's customer base
- appealing formats – captivate readers who prefer audio and video/gives more impact to news stories
- easily accessible by customers, standard format, relatively small file size (audio).

**[1 mark]**

*A limited response that indicates very little understanding of the topic.*

**[2-3 marks]**

*A reasonable description of why news web sites use podcasts as a method of presenting news items, although the answer may lack appropriate reasoning at the bottom end of the band.*

**[4 marks]**

*A clear and detailed explanation (with reasons) of why news web sites use podcasts as a method of presenting news items (must explicitly refer to news web sites).*

- (d) **With recent developments in technology, teachers are using a wider range of online learning resources. To what extent can these developments improve the study of news events by students?** *[10 marks]*

Answers may include:

**Advantages explicit to the study of news events**

- more material than in printed media
- more up to date news resources
- resources in a wide variety of formats – *e.g.* videos give news broadcasts more impact/appeal than plain text
- collaboration with others regarding global issues – students can post questions and seek opinions on world events
- many different points of view are available online (news sites/blogs) – students can compare different opinions/get a better perspective on world events
- many sites are free – this increases access to students whose families/schools may not be able to afford newspapers
- often provides links to similar news items/archives
- news censored in a student's country may be accessible *e.g.* via U-tube
- the use of RSS feeds will provide students with real time news that may reach students as the events happen
- the use of podcasts by news web sites makes it easy to download news articles to an MP3 player to be listened to anywhere/anytime.

**General advantages**

- improved understanding/motivation if presented attractively
- easy to copy and paste resources for assignments
- easy to acknowledge sources of news events
- available anywhere, anytime – useful for students who miss class and need to catch up at home
- features such as search, rewind, links to archived articles/similar articles, ability to share via e-mail.

**Considerations/analysis could include**

- vast amounts of information require students to learn smart search techniques
- authenticity of material may be questionable and must be checked
- links within news items may take students to unsuitable sites *e.g.* news videos depicting violence/culturally insensitive materials
- danger of plagiarism, copy and paste without reading
- broadband is necessary to show video clips (more readily available now with larger bandwidth at lower costs)
- problems if the teacher sets homework which requires online resources and the site is not available
- teachers need to be familiar with use of these sites to incorporate them in teaching.



**Do not accept**

- general distraction of the Internet
- use of tools *e.g.* VoIP/video conferencing – question asks about online learning resources.

***Please see generic markband information sheet on page 16.***

**Area of impact: Science and the environment**

3. (a) **Identify *two* ways that data collected in a weather station could be transferred to the weather database.** *[2 marks]*

- internet connection
- telephone/modem
- cellphone/modem
- radio signals
- wireless connection to computers
- via a PC and transferred to the database computer
- via memory card CD/DVD/USB memory device that is taken to the database computer
- cables connecting data loggers/sensors and database computer
- connection via LAN/WAN
- FTP
- Bluetooth
- satellite
- manual entry of data
- e-mail.

*[1 mark] each for any of the above points up to a maximum of [2 marks].*

(b) **Describe the differences between a computer model and a computer simulation.** *[4 marks]*

**Model:**

- model is a set of relationships
- representation/description of reality
- using a set of variables and relationships
- a physical representation of a system/process/entity
- abstraction/set of ideas to represent a system.

**Simulation:**

- simulation is a representation of reality/imitation of a real situation
- application/use of a model to determine the output
- pretending to have a real situation.

*[1 mark] each for defining the terms up to [2 marks], and an additional [1 mark] each for the relevant description up to [2 marks].*

(c) **Explain why the path of a hurricane may not match the prediction from the computer simulation.** **[4 marks]**

- inaccurate data has been collected and used to create the computer simulation
- practice of simplifying the parameters within the simulation which eliminates important aspects of the real situation (model may not consider enough variables)
- assumptions were made in generating the simulation that make the simulation inaccurate
- a programming error may have occurred which has not been detected (model is incorrect)
- the path and effect of the hurricane may be influenced by factors not considered in the model
- the simulation does not use continuous real time data, only some initial data, that does not correct the path as it goes along.

**[1 mark]**

*A limited response that indicates very little understanding of the topic.*

**[2-3 marks]**

*A reasonable description of how the path of the hurricane may not match the predictions from the computer simulation although the answer may lack appropriate reasoning at the bottom end of the band.*

**[4 marks]**

*A clear, detailed explanation (with reasons) of why the real path may not match the predicted path.*

**(d) Evaluate how the use of different IT systems could help a country prepare against natural disasters.** **[10 marks]**

- sensors/datalogging of weather/other forecasts – to forewarn population to allow for preparation
- database of resources – to assist citizens in an emergency
- database of specialist help – to assist citizens in an emergency
- Internet help site – to assist citizens in an emergency
- online backup of data – to prevent data loss in case equipment is destroyed
- satellites and remote sensing of weather – to provide information/warnings from wider areas
- multimedia tutorials for citizens/schools on the Internet/CD/e-mail – showing steps to follow in an evacuation
- GPS systems - to help evacuate vehicles/deliver emergency provisions
- Internet/SMS/networks (LAN/WAN) – to advertise warnings of closed routes/dangers
- the combination of weather forecasting techniques plus data from previous floods plus images from satellites, and models about river flows may allow the government to warn the population against possible floods
- deep underwater sensors to detect earthquakes and to confirm whether or not a tsunami has been generated
- map generation for different waves and inundations to warn different coastal towns
- sensors and data logging for continuous data collection – to create a database and identify patterns or use in a model to simulate a disaster (*e.g.* volcanic eruption)
- use of data bases previously collected to input into computer models to simulate different situations
- use of simulations on models of planned buildings to see if they would resist an earthquake.

**Evaluation could include:**

- warnings allow citizens to rescue valuables
- protective measures to buildings can be put into place
- associated costs of the IT systems
- reliability of warnings – if incorrect could lead to unnecessary panic/costs
- some countries may not have the infrastructure to connect the weather prediction equipment and the communication network
- evacuation is possible with forewarning
- possible privacy breaches if personal information from databases is used to find/contact people after a natural disaster.

***Please see generic markband information sheet on page 16.***

**Area of impact: Politics and government / Health**

**4. (a) Identify *two* input devices that could allow details of the soldier's medical condition to be determined and communicated electronically to the doctor. [2 marks]**

- camera(s) (to send images during the operation)
- temperature sensor
- blood pressure sensor
- sensor to measure pulse
- microphone (to allow soldier to communicate with doctor)
- thermometer (to take patient's temperature)
- heart rate monitor
- pressure band attached to soldiers arm linked to doctor
- motion sensor
- web cam
- vital signs monitor
- keyboard (to enter soldier's details/write emails).

*[1 mark] for any of the above points identified up to a maximum of [2 marks].  
Do not accept robot or unmanned aerial vehicle.*

**(b) Describe *two* factors that influence the reliability of sending information between the robot in the battlefield and the surgeon. [4 marks]**

- slow connection – slow speed of the connection from the robotic equipment in the medical vehicle to the satellite and to the doctor may cause data loss
- interruption of connection/lost connection – may cause data loss while being sent
- influence of ground level interference – may disturb the signal or cause a delay
- inaccuracies caused by transporting robotic equipment in a portable vehicle on the battlefield – physical equipment may be damaged by driving over the terrain
- battle damage may occur to the equipment
- failure of robot hardware *e.g.* sensors fail/reliability issues
- lack of uninterrupted power supply - temporary power out – resulting in data loss
- Radio Frequency Interference (RFI) caused by other equipment in the battlefield
- security of connection – if connection is open to hackers the enemy could gain access and render data unreliable
- adverse weather conditions can affect reliability of the signal
- battle wounds may prevent input devices working – *e.g.* damage to hands may prevent a pulse clip monitor being attached.

*[1 mark] for each factor identified up to [2 marks], an additional [1 mark] each for the relevant description up to [2 marks].*

(c) **Explain why governments may fund the development of remotely-controlled robots of this type for non-military purposes.** **[4 marks]**

- portable unmanned medical vehicles could be used in places surgeons cannot easily reach
- portable unmanned medical devices could be used in places where doctors do not exist
- patients requiring specialized operations would be able to be operated upon by a remote specialist
- de-centralization – people from towns will not need to travel to main hospitals
- less crowded hospitals will allow staff to better attend to patients
- lowers the risk of errors which could arise if patients are being treated by non specialists
- improves the quality of service in far away places
- families may not need to pay travel and accommodation costs if they can be operated on in their own home town
- overcomes lack of trained surgeons
- less time travelling means surgeons can see more patients
- emergency situation (plane crash/natural disaster) – overcomes lack of medical expertise
- allow doctors to conduct operations remotely when the patient is in a contaminated area.

**N.B.** Answers should relate to medical procedures involving remotely controlled robots.

**[1 mark]**

*A limited response that indicates very little understanding of the topic.*

**[2-3 marks]**

*A reasonable explanation of why the government may fund the development of remotely-controlled robots of this type for non-military purposes, although the answer may be unbalanced and lack appropriate reasoning at the bottom end of the band.*

**[4 marks]**

*A clear and detailed explanation of why the government may fund the development of remotely controlled robots of these types for non-military purposes with reference to the perceived advantages for a government or citizens.*

- (d) **A hospital is planning to implement remotely-controlled robots in local health clinics. Evaluate the issues involved in coming to this decision.** [10 marks]

**Advantages of remotely-controlled robots:**

- immediate medical attention can be provided – saves time for travelling (doctor or patient) in an emergency
- possible improvement of medical operation outcomes in places where specialists are not present
- some human errors may be prevented as specialists can be employed remotely
- provides treatment for patients who can't get to a hospital *e.g.* remote locations
- consultation between surgeons is easier *e.g.* robots collect patient medical data
- costs savings – savings on staff wages/travelling of specialist doctors to the clinic or of patients to the main hospital
- once set up overseas surgeons can be employed
- as patients are treated locally there is less pressure on hospitals.

**Concerns:**

- costs may be prohibitive – cost to purchase/maintain/upgrade
- staff may be difficult to obtain especially in some specialist jobs
- need to hire additional IT staff – new technologies in remote areas might need IT specialists nearby
- staff will need training – time consuming and expensive
- reliability of the robot – lives could be lost, who will be responsible if it fails
- patients' reactions to the robots – patients may not wish to be operated on by a machine
- may result in job loss for local doctors in clinics
- not face-to-face – general problem of diagnosing/working remotely
- privacy concerns – who is viewing the operation at the surgeon's end, does the patient know/approve?
- privacy concerns if sensitive patient data is hacked during transmission.

*Please see generic markband information sheet on page 16.*

Markband for all extended response questions

<p><b>4</b> <b>Opinion</b> <b>discuss,</b> <b>evaluate,</b> <b>justify,</b> <b>recommend</b> <b>and to what</b> <b>extent</b></p>	<b>0</b>	<i>No knowledge or understanding of IT issues and concepts or use of IT terms</i>
	<b>1-2 marks</b>	<i>A brief and generalized response with very little knowledge and understanding of IT issues and concepts with very little use of IT terms.</i>
	<b>3-5 marks</b>	<i>A response that may include opinions, conclusions and/or judgments that are no more than unsubstantiated statements. The response will largely take the form of a description with a limited use of IT terms and some knowledge and/or understanding of IT issues and/or concepts. If no reference is made to the information in the stimulus material, award up to [3 marks]. At the top end of this band the description is sustained. At the bottom of the band a tendency towards fragmentary, common sense points with very little use of IT terms.</i>
	<b>6-8 marks</b>	<i>A response that demonstrates opinions, conclusions and/or judgments that have limited support. The response is a competent analysis that uses IT terms appropriately. If there is no reference to IT terms the candidate cannot access this markband. There is evidence that the response is linked to the information in the stimulus material. At the top end of the band the response is balanced, the response is explicitly linked to the information in the stimulus material and there may be an attempt to evaluate it in the form of largely unsubstantiated comments. There is also evidence of clear and coherent connections between the IT issues. At the lower end of the band the response may lack depth, be unbalanced or tend to be descriptive. There may be also implicit links to the information in the stimulus.</i>
	<b>9-10 marks</b>	<i>A detailed and balanced (at least one argument in favour and one against) response that demonstrates opinions, conclusions and/or judgments that are well supported and a clear understanding of the way IT facts and ideas are related. Thorough knowledge and understanding of IT issues and concepts. Appropriate use of IT terms and application to specific situations throughout the response. <b>If there is no reference to IT terms candidates cannot access this markband.</b> The response is explicitly linked to the information in the stimulus material. At the bottom end of the band opinions, conclusions and/or judgment may be tentative.</i>