



MARKSCHEME

May 2010

INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY

Higher Level

Paper 2

18 pages

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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* output devices on an ATM.

[2 marks]

- speaker
- screen / monitor
- printer (for receipt)
- headphone jack and customer plugs in headphones
- cash dispenser / slot to dispense cash / tray to dispense money (*N.B.* where the cash comes out is not enough).

Award [1 mark] for identifying each output device up to a maximum of [2 marks].

(b) Describe *one* example of fraud involving an ATM card and *one* possible solution to this crime. [4 marks]

- fraud – a card skimmer, hidden on the ATM machine, reads the ATM card number and a camera captures the PIN when typed on the keypad (*need both for 2 marks*).
solution – biometrics is used to identify the customer / embedded security microchip makes card harder to copy / banks educate customers to look for unusual devices / to shield their hands when inputting PIN / banks check ATMs regularly for scam devices / ATMs sound an alarm if tampered with to alert police / ATM is set up inside a store where it is in view of employees who can report any suspicious behaviour.
- fraud – criminals access PIN numbers and encryption codes stored on databases and create counterfeit cards.
solution – safer encryption methods that store encryption codes separate from PINs.
- fraud – criminals divert the ATM card when it is inserted, steal it, then shoulder surf to see the PIN.
solution – customer education to be aware of criminals near the machines / immediate notification of card loss / banks make areas around ATMs private so onlookers can't look over customer's shoulder.
- fraud – phishing scams collect ATM card numbers and PINs through e-mail responses.
solution – banks educate customers and publicize that they never send e-mails / make phone calls requesting this data / a password in addition to a PIN is required for online transactions.
- fraud – new cards and PIN are stolen when sent through the mail to customers.
solution – activation only occurs when customer contacts bank and provides personal information if telephoning.
- fraud – ATM card and PIN stolen. Thief attacks user, steals card, requests PIN.
solution – biometrics is used to identify customer / install web cam to film ATM, video feed sent to bank or security firm / notify bank of theft and cancel card.
- fraud – criminals get card details and PIN – by installing malware on ATM which records the data on the magnetic stripe plus the PIN.
solution – regularly scan ATMs to check for malware / install ATM inside a store so employees can see any suspicious activity.

- fraud – a false ATM can collect the card and record the PIN number that the user typed in (the card is then taken from the dummy machine by the criminals and used in a real machine to withdraw cash).
solution – biometrics as identification of the card holder.

- fraud – a card skimmer is installed in the ATM machine and will go unnoticed by the bank customer and with a camera will record the details of the card and PIN.
solution – “banks such as AVB and NBC have provided a green-lit slot protector fitted to the slot that reveals any third party reader that was placed in there”.

Award [1 mark] for identifying a fraud and [1 mark] for identifying a solution up to a maximum of [2 marks]. Award [1 mark] for each relevant description up to a maximum of [2 marks].

(c) Explain *two* validation processes that take place when you use the ATM to withdraw money from your bank account. **[4 marks]**

- ATM reads expiry date from the ATM card and the expiry date is checked against the current date – to verify the ATM card is valid
- account details are sent to the bank’s central computer where they are matched in the customer database – to verify the account is valid
- the PIN/password is entered – and sent to the bank’s central computer to verify it is valid for that account number
- the withdrawal amount is sent to the bank’s central computer and the amount is compared with the balance – to ensure there are sufficient funds
- the withdrawal amount is checked – to ensure it does not exceed a preset limit
- the daily number of transactions is checked – to ensure it has not reached a preset limit
- the number of PIN attempts is checked – to ensure it has not reached a preset limit
- ATM checks correct cash is available – checks against list of accepted denominations – most ATMs only dispense \$50 or \$20 notes so a request for \$105 would not be valid
- account type is validated – *e.g.* user can choose Savings or Cheque and this must correspond to the user’s account at the bank
- ATM checks that card is valid – card type is checked against a database of approved bank cards to be used in that ATM machine
- ATM checks 16 digit serial number and description.

[1 mark]

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

[2 marks]

Two processes identified or one process described.

[3 marks]

Two processes described with reasoning.

[4 marks]

A clear, detailed explanation giving reasons.

Answers must relate to validation.

- (d) **To what extent does the improved customer service offered by online banking outweigh the possible disadvantages for customers?** *[10 marks]*

Improved customer service

- more convenient – customers can access banking details from any place they can use the Internet
- time is saved – there is no need to travel to a bank/ATM or queue for bank teller
- easy access – unlike a bank, access is available 24/7
- cost saving – travel costs / fees are often cheaper than dealing with a bank teller
- Internet banking offers more services than an ATM – *e.g.* bill payment/viewing statements online
- customers may select language / several languages available – when going to a bank language will be limited to what the bank teller knows
- online banking is more anonymous/private – customers do not need to discuss/disclose financial details to teller.

Disadvantages for customers

- sensitive information is being sent over the Internet / stored on bank server and could be accessed by hackers
- if the web site is down accounts are not accessible
- customers may not have Internet access or the IT skills to use Internet banking
- customers are not able to make cash deposits/withdrawals
- customers need to keep access codes safe and accessible
- customers need to remain alert to potential scams – *e.g.* fake web sites posing as their bank / phishing scams asking for logons and passwords
- may not get an immediate response to queries – may have to wait for an e-mail reply
- less human interaction – some customers prefer talking to a bank teller
- there may be a difficulty correcting errors in online transactions.

In part (d) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband information sheet on page 18.

Area of impact: Politics and government / Arts, entertainment and leisure

2. (a) For the URL <http://www.barackobama.com/newsroom/index.php>,

(i) identify the protocol *[1 mark]*

- http / hypertext transfer protocol

(ii) identify the domain name. *[1 mark]*

- www.barackobama.com or barackobama.com

Award [1 mark] for identifying the protocol.

Award [1 mark] for identifying the domain name.

(b) Describe *two* ways in which information can be sent to you on a regular basis from a political party using the Internet. *[4 marks]*

- newsletter via e-mail – voters can subscribe to a party’s newsletters / join their listserv and the latest newsletter will be sent to their inbox
- news feeds/RSS – voters can subscribe to a news feed and receive automatic updates in a news reader
- e-mail notification from wikis – voters can join a candidate’s wiki and request e-mail notification when pages are updated
- e-mail notification of new posts on blogs – voters can join a candidate’s blog and receive e-mail notification of new posts
- receive regular e-mail updates – voters subscribe for e-mail updates on web site
- join the party’s social networking site / become a “friend” – voters receive updates in their inbox of the social networking site
- join the party's social networking site and receive messages – party can send out mass messages to the group
- subscribe to the party's podcasts – these can be downloaded automatically when you access *iTunes*
- follow a candidate on *Twitter* – receive regular “tweets” with party information
- register to be on a party's email list – receive regular emails *e.g.* details of party events
- political party purchases email addresses / gets email addresses from government database – voters receive regular emails *e.g.* details of party events
- subscribe to services on a candidate’s web site that sends text messages to the user's cell (mobile) phone.

Note the key word is “sent”, it does not assume you log on and check the site each day.

Award [1 mark] for identifying a way up to a maximum of [2 marks].

Award [1 mark] for each relevant description up to a maximum of [2 marks].

(c) Explain *two* reasons why party documents are stored on web sites in PDF format rather than as word processed documents. **[4 marks]**

- PDF files are smaller and faster for users to download – word processed files may become very large, especially if graphics are included in the file
- PDF files are platform independent – word processed files may not open on different hardware platforms
- fonts are embedded in PDF files – fonts may change when opened in the word processor if those fonts are not installed on the user’s computer
- software to read PDF files is free – word processed files may not open if the user does not have the software or has an earlier version
- the original format is retained for viewing and printing – formatting may be lost when files are opened in the word processor
- PDF files cannot be edited so are more secure from tampering than word processed files
- PDF files allow the addition of multimedia files *e.g.* video promoting the party – word processors are limited to graphics
- PDF files are much easier to navigate than a word document. They often have tables of contents with hyperlinks leading to other parts of the document. Word processors are limited to searching for words in documents.

[1 mark]

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

[2–3 marks]

[2 marks] for two reasons identified or one reason described. [3 marks] for two reasons described. The response may lack a comparison with word processed files at the bottom end of the band. Top end of the band may only have implicit comparison with word processed documents.

[4 marks]

A clear, detailed explanation justifying two reasons why the PDF format is preferred over the word processed format.

- (d) **Evaluate the increasing use of the Internet in political campaigning by candidates.** [10 marks]

Advantages for candidates

- e-mail is a cheap and efficient way to run a campaign
- the Internet reaches a global audience
- access to party information is available 24/7
- web pages can incorporate images and multimedia which enhance the campaign and make it more personalized
- blogs provide a medium for a more casual approach that may appeal to younger voters
- forums provide candidates with an opportunity to respond directly to voters' questions
- provide regular update of the campaign trail – uploaded to web pages / through RSS feeds / sent to smart phone
- candidates can collect voter details through forms on their web page / subscriptions to newsletters *etc.*
- web pages allow voters to donate online
- *YouTube* provides a cheap and accessible way to provide promotional videos to a global audience without the expense of TV ads
- social networking sites are free and appeal to the younger voters who may be able to leave comments
- voters feel a more personal connection with the candidate – *e.g.* RSS feeds come to voter's inbox
- candidates have control over the information that relates to their campaign
- social networking sites are simple to use – do not need to be an expert to manage the site
- use of the Internet gives the candidate an edge over competitors who do not use the Internet
- Internet tools make it easy to produce dynamic marketing campaigns which can be targeted to specific groups.

Considerations

- some of their potential voters may not have Internet access and IT skills
- hackers can deface/change web pages negatively affecting a campaign
- authenticity is a consideration – people can pretend to be the candidate and publish material on the Internet
- it is easier for the community to react negatively *e.g.* posting comments on blog pages
- costs for hosting/developing/updating Internet sites
- web sites need to be kept up-to-date – voters will get a poor impression of outdated web pages
- candidates must be cautious of what is written on their web sites as once data gets on the Internet it is easily shared and its effect can be irreversible.

Advantages for voters

- access to more information – via web site, blogs, wiki, *etc.* – is this too much information?
- can express opinions / join debates by leaving comments on the web site
- convenience – accessible anytime, videos can be replayed
- voting preferences are private and the Internet allows voters to be more anonymous (*e.g.* compared with going to a rally)
- voters out of the country can access documents and speeches, they have access to candidates' views
- easy to pass on information to others – *e.g.* can quickly forward links/emails to friends.

Considerations for voters

- may be exposed to misinformation
- assumes voters have Internet access.

In part (d) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband information sheet on page 18.

Area of impact: Science and the environment / Education

3. (a) From the simulation shown in the Diagram on the previous page,

(i) identify *one* input

[1 mark]

- season
- location
- structure
- glazing
- ventilation
- evaporative cooling
- heating
- plants
- set points.

Only accept items in this list.

(ii) identify *one* output.

[1 mark]

- solar radiation / air temperature / relative humidity / humidity ratio
(*need to mention one of these four graphs, not just the word graphs*)
- picture or animation of the actual greenhouse / plant growth
- time counter in days.

Only accept items in this list.

Award [1 mark] for identifying any one input.

Award [1 mark] for identifying any one output.

(b) Describe *two* tasks which must be performed in the development of simulation software like that used in the Diagram on the previous page.

[4 marks]

- gather a database of data – *e.g.* items in part (a) (i) such as types of glazing, ventilation / by researching and documenting real life processes
- develop formulae / rules and relationships to calculate the expected output given different inputs (*student may discuss programming the simulation and give details of formulae*)
- test the results / test for programming bugs by checking the results conform with real life information
- design the user interface (*e.g.* layout, choice boxes/lists, buttons) to allow the user to choose different inputs and see the results
- identify the output needed *e.g.* types of graphs, statistics, animation
- design of the “Help” feature *e.g.* word processed document, video tutorial.

Award [1 mark] each for identifying a task up to a maximum of [2 marks].

Award [1 mark] for each relevant description up to a maximum of [2 marks].

(c) Explain *two* benefits of using this simulation in the agricultural science classroom. **[4 marks]**

- schools save money – simulation software is cheaper than setting up and maintaining a greenhouse/travelling to visit a greenhouse
- schools save money as teaching costs can be reduced – simulation software allows larger class sizes – practical classes usually have upper limits
- classes can have access from any network point and do not have to be scheduled for practical lessons – software can be distributed across the network and made available from any networked computer
- students can easily revise a difficult concept – the simulation software allows them to repeat the experiment at any time
- students can easily catch up on missed work – they are able to access the software from home
- increased safety – no possibility of an accident involving broken glass
- no risk of damaging plants/equipment in a real greenhouse
- a wider range of results would be observed – not limited to scheduled class lessons
- various inputs can be tested – this may not be possible with class time restraints
- no need to wait for results – immediate feedback on input
- a hands-on experience is more interesting/valuable than reading a text book – students are able to choose different inputs and check the results.

Answers should relate to features of a simulation.

Answers should relate to the classroom.

Award [1 mark] for each benefit identified. Award an additional [1 mark] for the explanation of that benefit up to a maximum of [2 marks]. Mark the first two correct benefits identified.

(d) To what extent should a commercial farmer rely upon a computer simulation such as this when planning to build a greenhouse? [10 marks]

- a simulation is a simplification of reality – a limited number of parameters (e.g. glazing / ventilation) and choices within a parameter (e.g. types of glazing) mean the results will only be an approximation of real life
- reliability is an issue – if the database of “facts” is incorrect then results will be unreliable / if formulae are incorrect then calculations will be wrong
- simulations need to be tested carefully before implementation – software is prone to bugs which can give incorrect results
- simulations should be used in conjunction with expert advice – there is a tendency for people not to question results that are computer generated
- data may become outdated – weather patterns are constantly changing
- simulations do not take into account unexpected events – when a user makes a choice of parameters (e.g. season and location) the simulation retrieves data from the database. This data may not include unexpected events e.g. heat waves, floods
- integrity of data could be an issue if data has been changed/alterd from the original by another user.

In part (d) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband information sheet on page 18.

Area of impact: Health

4. (a) Define the term *key field*. [2 marks]

- it is unique
- it identifies one record in the database / one person in the Icelandic database
- an example *e.g.* ID number of the person
- it is used to link tables in a relational database.

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

(b) Describe the process used to create a query which would produce an alphabetical list of all the citizens who have suffered from diabetes, were born after 1990 and do not smoke. [4 marks]

- disease = diabetes / diabetes = yes / filter on field disease and type in “diabetes”
- year of birth > 1990
- smoker = no / filter on field smoker and type in “no”
- sort by surname/name or select surname or name and choose A–Z.

Award [1 mark] for each aspect of the query up to a maximum of [4 marks].

Answers can be in sentence format.

- search the field disease/sickness/suffering for the word diabetes
- search the field year of birth for year greater than 1990
- search the field smoker for values yes/true
- list citizens that in field smoker have yes or true
- sort the results by surname/name.

- (c) **Explain the difference between data matching and data mining with reference to the Icelandic database.** **[4 marks]**

Data matching

- compares records in different databases to find individuals who appear in more than one database *e.g.* a person in the genetic profile database may also appear in a database of diseases
- may link databases on key fields *e.g.* ID to build up information about a person
- ID in the genetic database could be linked to other databases to identify the citizens.

Data mining

- looks for hidden relationships/patterns in data *e.g.* between genetic profile and various diseases
- does not generally identify individuals rather identifies patterns in the data *i.e.* uses ID instead of citizen's name
- researchers are looking for relationships between genes and diseases.

[1 mark]

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

[2–3 marks]

A reasonable description of data matching and data mining, although the answer may be unbalanced and may not relate to the Icelandic database at the bottom end of the band.

[4 marks]

A clear, detailed and balanced explanation of the difference between data matching and data mining with reference to the Icelandic database.

- (d) **To what extent do the advantages to medical research outweigh the concerns of some Icelandic citizens about storage of their genetic data?** [10 marks]

Advantages to medical research

- genes can be linked to diseases / predict health problems
- drug companies can design drugs more effectively.

Concerns of Icelandic citizens

- genetic information about citizens could be given to drug companies – however participation in drug trials could be beneficial
- people who are not ill but carry the genes may be discriminated against socially/ in the workplace/when purchasing life insurance
- data may not be reliable at the level of genetic testing or data entry
- some citizens may not wish to know if they have a gene that could result in a disease later in life
- DNA is a unique identifier and, once shared, it cannot be retrieved
- in a small community it may be difficult to mask individual identity in the database
- security of the data – how is it secured against unauthorized access? / could lead to identity theft
- genetic information could result in unexpected revelations *e.g.* paternity.

In part (d) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband information sheet on page 18.

Markband for all extended response questions.

<p>Opinion discuss, evaluate, justify, recommend and to what extent</p>	0	<i>No knowledge or understanding of IT issues and concepts or use of ITGS terminology.</i>
	1–2 marks	<i>A brief and generalized response with very little knowledge and understanding of IT issues and concepts with very little use of ITGS terminology.</i>
	3–5 marks	<p><i>A response that may include opinions, conclusions and/or judgments that are no more than unsubstantiated statements.</i></p> <p><i>The response will largely take the form of a description with a limited use of ITGS terminology and some knowledge and/or understanding of IT issues and/or concepts.</i></p> <p><i>If no reference is made to the information in the stimulus material, award up to [3 marks].</i></p> <p style="padding-left: 40px;"><i>At the top end of this band the description is sustained.</i></p> <p style="padding-left: 40px;"><i>At the lower end of the band a tendency towards fragmentary, common sense points with very little use of ITGS terminology.</i></p>
	6–8 marks	<p><i>A response that demonstrates opinions, conclusions and/or judgments that have limited support.</i></p> <p><i>The response is a competent analysis that uses ITGS terminology appropriately. If there is no reference to ITGS terminology the candidate cannot access this markband.</i></p> <p><i>There is evidence that the response is linked to the information in the stimulus material.</i></p> <p style="padding-left: 40px;"><i>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.</i></p> <p style="padding-left: 40px;"><i>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></p>
	9–10 marks	<p><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.</i></p> <p><i>Thorough knowledge and understanding of IT issues and concepts.</i></p> <p><i>Appropriate use of ITGS terminology and application to specific situations throughout the response. If there is no reference to ITGS terminology candidates cannot access this markband.</i></p> <p><i>The response is explicitly linked to the information in the stimulus material.</i></p> <p style="padding-left: 40px;"><i>At the lower end of the band opinions, conclusions and/or judgment may be tentative.</i></p>

“ITGS terminology refers to both the IT technical terminology and to the terminology related to social and ethical impacts.”