Diploma Programme
Programme du diplôme
Programa del Diploma

Markscheme

May 2016

Information technology in a global society

Standard level

Paper 1

21 pages

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 all other cases where a question asks for a certain number of facts *eg* "describe two kinds", mark the **first two** correct answers. This could include two descriptions, one description and one identification, or two identifications.

It should be recognized that, given time constraints, answers for part (c) questions are likely to include a much narrower range of issues and concepts than identified in the markband. There is no "correct" answer. Examiners must be prepared to award full marks to answers which synthesize and evaluate even if they do not examine all the stimulus material.

1. Public access to art museum databases

Note to examiners.
- *All part a questions are marked using ticks and annotations where appropriate*
- *Part b and part c are marked using markbands. Use annotations and text comments to provide a rationale behind the marks you awarded.* ***Do not use ticks.***

(a) (i) Identify **two** different types of field that can be included in a database. **[2]**

Answers may include:
- different data types *eg*
  - currency
  - date/time
  - text/short text
  - memo
  - varchar
  - Boolean (accept Yes/No)
  - hyperlinks
  - attachments to files (OLE object)
  - number
  - calculated (accept Computed)
  - lookup
  - object (accept Image)
  - dropdown.

- field names from the museum database (*eg* first name of artist, last name of artist, nationality, type of work, year of creation, dimensions of work *etc*).

Accept ***two*** *different data types,* ***two*** *different field names or* ***one*** *of each.*

Award ***[1]*** *for any of the types of field identified up to a maximum of* ***[2]****.*

(ii) Describe **two** characteristics of Creative Commons licensing. **[4]**

Answers may include:

- users can recognize that information is under Creative Commons licensing because it has the CC logo and there are several variations of the logo so users will immediately know what they are allowed to do with the information
- examples of CC logos: 
- offers the licenser multiples choices controlling what users can and cannot do with their work
- provides a "machine readable" version of the license
- licensers retain the copyright for their work
- it is automatic; this means that if a person wants to use digital content that is under the Creative Commons license they do not need to contact the person unless they want to give it a different use to what is allowed
- users can redistribute the digital content as long as they respect the Creative Commons conditions
- every Creative Commons license is valid around the world and lasts as long as applicable copyright lasts.
- the CC0 license allows creators to waive all rights and place a work in the public domain
- attribution / BY (must credit/acknowledge the original creator)
- shareAlike / SA (new creations based on the work must be licensed under identical terms)
- noDerivs / ND (creations must be passed along unchanged and in whole)
- nonCommercial / NC (creations can be built on but can only be used non-commercially).

Do not accept answers that refer to copyright in generic terms.
Must explicitly focus on Creative Commons licensing.

*Award **[1]** for each characteristics of Creative Commons licensing identified, and an additional **[1]** for an appropriate development of that characteristic.*
*Mark as **[2 + 2]**.*
*Award a maximum of **[4]** for the response.*

(b) Previously the information in the museum's database was only accessible to people working at the museum. Any changes will have implications for the museum's IT department.

Analyse the implications for a museum's IT department of allowing public access to selected information in the museum's database. **[6]**

Answers may include:

- provide support designed for the public
- increase security to protect the data
- create different levels of access / authorisation for groups of user (*eg* museum staff have edit capability, public users have view-only access *etc*)
- make sure that the infrastructure can handle many more users accessing the database
- hire new IT personal (*eg* for the helpdesk, installation of security software, increased need to maintain systems *etc*)
- more IT investment (*eg* upgraded servers to cope with increased traffic; scanning technology to digitise images, documents or artworks; increase in bandwidth from ISP; *etc*)
- design / construct / commission new web pages to allow public to search/query the database and view results.

[0]: *No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.*

[1–2]: *A limited response that indicates very little understanding of the topic or the reason is not clear. Uses little or no appropriate ITGS terminology. No reference is made to the museum's IT department. The response is theoretical.*

[3–4]: *A description or partial examination with some knowledge and understanding of the implications for museum's IT departments of allowing public access to information in the museums' databases. Some use of appropriate terminology relating to the topic. Some reference is made to the scenario in the stimulus material.*

[5–6]: *A thorough examination with a detailed knowledge and understanding of the implications for museum's IT departments of allowing public access to information in the museums' databases. An examination that uses appropriate ITGS terminology. Explicit and relevant references are made to the scenario in the stimulus material.*

(c) People who use the museum database are sharing the reports they create via blogs, social media and collaborative documents. For example, reports may show that the museum prefers artworks from artists of a specific gender, or show the differences in the frequency of loans of certain collections, or even the budget assigned for restoration and maintenance of certain museum pieces.

Discuss the advantages and disadvantages for the museums' managers of providing public access to the museum database. **[8]**

Answers may include:

Advantages for the museum of sharing the database

- people who analyze the data may come to conclusions that will make the museum investigate certain areas
- museums will show they have nothing to hide as they are not scared to show their data
- data sharing can disseminate information to a diverse range of users, increasing the museum's global appeal (*eg* artists may want their work to be included in the museum collection and in the database)
- increases awareness of / interest in the museums' collections
- public analysis of the data might result in new projects for the museum.

Disadvantages for the museum of sharing the database

- there may be mistakes in the database and the users may produce very critical reports in blogs, collaborate documents and on social media, creating a bad image for the museum
- museums need to be very careful not to disclose information that should not be available to the public for valid reasons (*eg* issues relating to copyright, security, privacy *etc*)
- museums will need to invest in IT resources (*eg* hardware, software and human resources) to create, maintain and share these databases.

Impacts that may be positive or negative

- availability of online information (either provided by the museum or via blogs and social networks) may impact the number of visitors to the physical museum.

Responses must relate to the museums / museums' managers.

In part (c) 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 21.

2. Online learning on your own device

Note to examiners.
- *All part a questions are marked using ticks and annotations where appropriate*
- *Part b and part c are marked using markbands. Use annotations and text comments to provide a rationale behind the marks you awarded.* ***Do not use ticks.***

(a) (i) The distance learning programme requires that each student spends three hours a week on online activities.

Identify **three** online activities that the university course could use as part of the distance learning programme. **[3]**

Answers may include:
- discussion forum
- online lectures / instructional videos / podcasts / presentations
- online evaluation/online quiz
- chat feature for communicating with other participants or faculty
- video conference
- online collaborative project *eg* glossary/database/wiki
- learning games
- interactive simulations / experiments.
- reading online versions of documents/ebooks/information specified by the university.

Do not accept "use VLE" as this is given in the question stem (eg Moodle, Google Classroom, Blackboard, Sakai etc).

Award ***[1]*** *for any of the online activities identified above up to a maximum of* ***[3]****.*

(ii) Students have to prepare work that will be assessed by the professors at the university. Much of this work will be done in groups, and group members may be located in different countries.

Identify **three** different IT tools that could be used by students to complete their group work. **[3]**

Answers may include:

- email
- collaborative online documents (Google docs)
- video conferencing tools (*eg* Skype, Google Hangouts *etc*)
- group text chat tools (*eg* Facebook chat)
- mind mapping tools
- group whiteboard or the equivalent
- collaborative online environment (wiki)
- collaborative file sharing tools (*eg* Dropbox, OneDrive, Google Drive, Box, Amazon Cloud Drive, *etc*)
- tools for reading online versions of documents/ebooks.

Do not accept reference to hardware alone without reference to a software tool / app.

*Award **[1]** for any of the different online tools identified above up to a maximum of **[3]**.*

(b) On the final degree certificate, Mountains University is required to state whether the course was either:
- an online course
- a course completed by attending class at the university.

Analyse the impact of this statement for the student when using the degree certificate to apply for a job. **[6]**

Answers may include:

Positive considerations of an online course
- the student is a person who is able to manage time and work independently
- the student has been working and studying juggling time and commitments
- the student is interested in moving forward and learning new things even while having other commitments
- the student may have had different experiences by collaborating with students in different parts of the UK and the world
- the student will have developed more skills in using online tools for collaborating with others which may be a consideration for the future employer.

Negative considerations of an online course
- employer might feel that the course may not have the rigour of when a student attends a course at the university
- employers unfamiliar with online degrees often have negative perceptions of the quality of the degree
- employer might doubt the validity of the work done by the student to get the diploma
- countries where the employer is based might not grant work permits/visas as online degrees are not endorsed/accepted.

Positive considerations of an attended course
- employers are familiar with university degree programs and have a better understanding of the student's degree
- employers will recognize that students will have more face-to-face interactions with other students and the faculty in their courses than in online programmes.

Negative considerations of an attended course
- the student may have attended a local university where most of the students come from a small geographical region. They may not have had the opportunity to interact with students from other parts of the world.

[0]: *No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.*

[1–2]: *A limited response that indicates very little understanding of the topic or the reason is not clear. Uses little or no appropriate ITGS terminology. No reference is made to Mountains University. The response is theoretical.*

[3–4]: *A description or partial analysis with limited knowledge and/or understanding of the implications for students who have completed online courses. Some use of appropriate terminology relating to the topic. Some reference is made to the scenario in the stimulus material.*

[5–6]: *A thorough examination with a detailed knowledge and understanding of the implications for students who have completed online courses. An analysis that uses appropriate ITGS terminology. Explicit and relevant references are made to the scenario in the stimulus material.*

(c) Some professors at Mountains University have been working with schools in the area as consultants on the use of online activities for education. Some of the local schools have a number of mobile equipment carts that may be pushed to the different classrooms when needed. However the number of devices available is not enough for the number of students in the school. Mountains University is recommending that, instead of purchasing more devices, schools should ask students to bring their own mobile devices or laptops to school as part of a Bring Your Own Device (BYOD) scheme.

Discuss the implications for a school of implementing a BYOD scheme. **[8]**

Answers may include:

- school may be able to save on file storage space as students will be able to save their work on their own devices and continue to work outside school
- school may need to train IT support staff to know about the different types of devices available and their compatibility with the school infrastructure
- school will not need to spend money on buying, setting-up and maintaining student devices
- school would have to improve security/firewalls
- school would have to have clear policies for the use of student devices (*ie* antivirus software, use of the school network, required applications *etc*)
- school may be held responsible for damages / losses / theft *etc* of students' devices
- school may need to install more electricity sockets in classrooms to allow students to charge devices during lessons
- school may need to be improve bandwidth and Wi-Fi access to allow for a large number of devices to connect to the school network
- school may need to provide helpdesk support to solve students' IT issues (*ie* some activities may not run due to hardware or software limitations, not all students may have the same applications)
- school will have no control over applications and content on students' devices
- school will need to use software to control the access of the school network and internet from student devices (*eg* tracks which sites are accessed by specific devices, certain websites are blocked for student access)
- school will need to provide information to the teachers, students and parents about the implementation of the BYOD programme
- the school may need to provide training for the teachers so that students can effectively use their BYOD devices in lessons
- school will need to make provision (*eg* supply/maintain hardware) for those students who are unable to provide their own BYOD
- teachers at the school might incorporate e-learning more frequently in their classes as devices will always be available (*eg* no need to book a cart for a lesson; may improve the quality of teaching).

In part (c) 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 21.

3. Our interconnected world

Note to examiners.
- *Part a and part b questions are marked using ticks and annotations where appropriate*
- *Part c are marked using markbands. Use annotations and text comments to provide a rationale behind the marks you awarded.* ***Do not use ticks.***

(a) (i) Outline the difference between the internet and the World Wide Web. **[2]**

Answers may include:
- the internet is a global network of interconnected computers / a network of networks. The World Wide Web is software / a service that runs on the hardware of the internet and provides access to content / a collection of pages that can be accessed through hyperlinks / a way of accessing and sharing the information that is held on the Internet in webpages
- the World Wide Web uses the http protocol. This is only one of the many protocols used by the internet.

The response must make reference to both the internet and the World Wide Web. Do not award marks if only one is mentioned.

Award ***[1]*** *for identifying* ***one*** *characteristics of the internet and* ***[1]*** *for identifying* ***one*** *characteristic of the World Wide Web up to a maximum of* ***[2]****.*

(ii) Identify **two** characteristics of a router. **[2]**

Answers may include:
- a router is a device that forwards data packets along networks
- a router is connected to at least two networks, commonly two LANs or WANs or a LAN and its ISP's network
- routers are located at gateways, the places where two or more networks connect
- determine the best path for forwarding the packets (using headers and forwarding tables)
- routers use protocols such as ICMP to communicate with each other and configure the best route between any two hosts
- provide network access through WIFI or ethernet cable (do not accept internet access as this is given in the stem)
- provide network security (*eg* password for WiFi access)
- assign IP addresses to the devices connected to it (via a built-in Dynamic Host Configuration Protocol (DHCP) server).

Award ***[1]*** *for any of the characteristics of a router identified above up to a maximum of* ***[2]****.*

(iii) Identify **two** pieces of information that the URL below provides about the site it connects to: https://www.khanacademy.org/math **[2]**

Answers may include:

- it uses secure hypertext transmission
- https is the protocol (hypertext transfer protocol secure)
- www.khanacademy.org is the domain name (do not accept "Khan Academy")
- org means non-profit organization (accept "organization")
- math is the name of the file / folder / directory / path / resource.

*Award **[1]** for any **two** pieces of information that the URL below provides about the site it connects to: up to a maximum of **[2]**.*

(b) A group of university students has rented a house near a free hotspot that can be used from inside the house. Some of the students want to sign a contract with a local ISP so that they can have their own Wi-Fi in the house, while others want to continue using the free hotspot.

Analyse the advantages and disadvantages of home internet connections and hotspots. **[6]**

Answers may include:

Private home internet connection

- secure with password
- may not be seen outside the house if the antenna is not radiating to the street/or if configured to be invisible
- connected directly to your ISP
- only used by the few users inside the house who know the password
- requires a monthly payment to the ISP / possible installation costs
- the public hotspot will still be available even if the home internet connection is down
- can get support from ISP.

Public hotspot

- no password, or public password is used
- may not be secure – information could be hacked / intercepted
- many simultaneous users, therefore speed/use of bandwidth could be an issue
- may have restrictions (*eg* connection time, downloading videos may be blocked, some services may not work such as VoIP).

Do not accept "free" as this is in the question stem.

***[0]:** No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.*

***[1–2]:** A limited response that indicates very little understanding of the topic or the reason is not clear. Uses little or no appropriate ITGS terminology. No reference is made to the relative advantages and disadvantages of home internet connections and hotspots. The response is theoretical.*

***[3–4]:** A description or partial analysis with limited knowledge and/or understanding of the relative advantages and disadvantages of home internet connections and hotspots. Some use of appropriate terminology relating to the topic. Some reference is made to the scenario in the stimulus material.*

***[5–6]:** A thorough examination with a detailed knowledge and understanding of the relative advantages and disadvantages of home internet connections and hotspots. An analysis that uses appropriate ITGS terminology. Explicit and relevant references are made to the scenario in the stimulus material.*

(c) Tim Berners-Lee, creator of the World Wide Web, believes that the ability to access and use the World Wide Web is necessary for the benefit of everyone across the world.

To what extent do you agree with this statement? **[8]**

Answers may include:
Possible points in support of statement:
- access provides economic opportunities (*eg* providing access to information, connecting people to businesses in other geographical locations, and opening up new markets for products and produce, learning from profitable business practices and models used in other locations, *etc*)
- access can provide educational opportunities that may not be available otherwise (*eg* access to affordable online university courses, collaboration between students located in different geographical regions, access to information world wide on any topic *etc*)
- telemedicine can help provide healthcare in underserved areas
- may save lives, *eg* access to information about weather, flood warnings *etc*
- access to social networks (Facebook, Instagram, *etc*) to connect with friends family, job opportunities.

Possible points against statement:
- access is not enough for people who lack the education or skills to make use of the web
- not a 'priority' for people who lack basic food/water. Providing access may divert funds *etc* away from more pressing needs
- may expose people to security/privacy risks that otherwise they would not be vulnerable to (*eg* cybercrime)
- access to the internet varies due to costs and quality of infrastructure
- access to the internet may be affected by non-technical tasks such as censorship
- access raises issues of cyberbullying/harassment?
- has the use of the web led to an improvement in human well-being?
- having access may lead to spending too much time on the WWW, which may cause concerns
- greater access to electronic information could lead to events such as copyright infringement and plagiarism
- in practice not everyone has access to the internet which may tend to increase rather than reduce inequality of benefit.

In part (c) 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 21.

4. Is that the original photograph?

Note to examiners.
- *All part a and part b questions are marked using ticks and annotations where appropriate*
- *Part c is marked using markbands. Use annotations and text comments to provide a rationale behind the marks you awarded.* ***Do not use ticks.***

(a) (i) Identify **two** sensors that the trail camera might have. **[2]**

Answers may include:
- light detection sensor
- microphone / sound sensor
- infrared for night vision
- heat detection
- motion detection (PIR passive infrared).

*Award **[1]** for each sensor identified above up to a maximum of **[2]**.*

(ii) The images taken by the trail camera need to be transferred to a computer to create the video. These are high resolution images, so they will need to be compressed using lossy or lossless compression before being sent over the internet.

Outline the difference between lossy and lossless compression. **[2]**

Answers may include:
Difference in the reconstruction of original data
- lossless data compression uses algorithms that allow the exact original data to be reconstructed from the compressed data
- lossy data compression does not allow the exact original data to be reconstructed from the compressed data as some data is removed during the compression.

Difference in the loss of data
- in lossless data compression no information is lost, it is only changed so that the file size is reduced
- in lossy data compression some information is taken from the file that will change the final image and will make the file smaller.

Difference in loss in quality
- in lossless data compression no information is lost and therefore no loss in quality
- in lossy data compression some information is taken from the file that will result in some loss in quality which normally goes unnoticed.

*Award **[1]** for each valid element of answer, up to a maximum of **[2]**.*

(iii) Identify **two** techniques that can be used to digitally manipulate a photograph. **[2]**

Answers may include:

- cropping (photographs can be cut to leave out areas near the borders that are not relevant)
- changing brightness
- change contrast
- change hue
- change colour saturation
- change resolution
- remove part of an image and replace it with something else (cloning tool)
- selective colour change (selecting an object and changing the colour)
- combining multiple images
- changing backgrounds
- using filters
- retouching (making skin tones more even, removing blemishes)
- alter size of the image.

*Award **[1]** for each technique identified above up to a maximum of **[2]**.*
Do not accept "photoshopping".

(b) Explain the importance of the requirements specification, project schedule and product design to the success of the video. **[6]**

Answers may include:

- requirements specification – provides the details of the hardware and software needed to create the video based on the needs of the fashion company
- requirements specification - provides specific performance criteria to measures if the final video is effective and the content is appropriate
- requirements specification - indicates what system interactions and the processes that are required in order for the video to function properly
- schedule – can serve as the plan for completing the video, sets up regular meetings with the fashion company to be sure the video meets their requirements
- schedule - the plan ensures that all the stages of development are followed in the development of the video including analysis (*eg* feasibility), planning, development, testing/final editing
- schedule - sets deadlines for completion of the stages of the project
- schedule - sets the correct order for the processes involved in the development of the project
- design – provides the fashion company with a detailed plan for developing the video (*eg* the design, resources required, techniques that will be used, testing), essential for insuring that the client's needs are met in the final product
- design - provides the overall structure of the video (*eg* sequence, order of major sections of the video) and the internal structure (*eg* sequence/ storyboard, cropping, transitions, titles and credits, sound, script *etc*) so that the plan for final video can be communicated to the client before the product is begun.

*Award **[1]** for the identification of a reason up to a maximum of **[2]**.*
*Award an additional **[1]** for the development of the reason up to a maximum of **[2]***
*Mark as **[2 + 2 + 2]** Maximum of **[6]** for the question.*

(c) After the success of the video of a caterpillar turning into a butterfly, Juliana and Teresa were hired by a fashion company to create a brochure showing fashion models wearing the latest clothing designs. Juliana and Teresa were asked to consider manipulating some of the images to enhance the products or to make the models look more attractive.

Discuss the social and ethical implications of the fashion company using manipulated images. **[8]**

Answers may include:

- manipulated images in the fashion brochure may not be advertised as having been manipulated – therefore creating a false image to be believed by others
- customers lack of satisfaction – the products may not create for a customer the same effect shown on the picture in the fashion brochure
- characteristics of the products on offer may differ from the real ones (colour, style)
- manipulated images create unattainable standards of beauty
- can create damaging psychological responses for some customers (*ie* body dissatisfaction, loss of self-esteem, and possible eating disorders in an attempt to achieve the same figure as the models in the photos)
- ethically the images should only be manipulated to the extent that they are still realistic
- fashion company should take the responsibility to indicate that the images in the brochure are manipulated
- manipulated images might make the products more successful / increase sales and profit for the fashion company
- the fashion company needs to determine what ethical guidelines must be adheres to in retouching images for their publications (*eg* policy).

In part (c) 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 21.

SL and HL paper 1 part (c) and HL paper 3 question 3 markband

Marks	***Level descriptor***
No marks	• *A response with no knowledge or understanding of the relevant ITGS issues and concepts.* • *A response that includes no appropriate ITGS terminology.*
Basic ***1–2 marks***	• *A response with minimal knowledge and understanding of the relevant ITGS issues and concepts.* • *A response that includes minimal use of appropriate ITGS terminology.* • *A response that has no evidence of judgments and/or conclusions.* • *No reference is made to the scenario in the stimulus material in the response.* • *The response may be no more than a list.*
Adequate ***3–4 marks***	• *A descriptive response with limited knowledge and/or understanding of the relevant ITGS issues and/or concepts.* • *A response that includes limited use of appropriate ITGS terminology.* • *A response that has evidence of conclusions and/or judgments that are no more than unsubstantiated statements. The analysis underpinning them may also be partial or unbalanced.* • *Implicit references are made to the scenario in the stimulus material in the response.*
Competent ***5–6 marks***	• *A response with knowledge and understanding of the relevant ITGS issues and/or concepts.* • *A response that uses ITGS terminology appropriately in places.* • *A response that includes conclusions and/or judgments that have limited support and are underpinned by a balanced analysis.* • *Explicit references to the scenario in the stimulus material are made at places in the response.*
Proficient ***7–8 marks***	• *A response with a detailed knowledge and understanding of the relevant ITGS issues and/or concepts.* • *A response that uses ITGS terminology appropriately throughout.* • *A response that includes conclusions and/or judgments that are well supported and underpinned by a balanced analysis.* • *Explicit references are made appropriately to the scenario in the stimulus material throughout the response.*