



Cambridge IGCSE™

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INFORMATION AND COMMUNICATION TECHNOLOGY

0417/12

Paper 1 Theory

May/June 2023

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use an HB pencil for any diagrams, graphs or rough working.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].
- No marks will be awarded for using brand names of software packages or hardware.

This document has 12 pages. Any blank pages are indicated.



- 1 A book contains a bar code whose number is 503619309903

Tick (✓) the most appropriate validation check to test the validity of the bar code.

- | | | |
|----------------|-------------------------------------|--|
| A check digit | ☒ | - extra digit added to a number which has been calculated from the other digits. |
| B format check | ☐ | - checks if the data input is in the correct format |
| C range check | ☐ | - checks if data input lies between acceptable upper and lower values/bounds. |
| D spell check | ☐ | - test carried out by software, often a word processor on text |

[1]

- 2 Identify the most appropriate hardware from the descriptions given:

- (a) non-volatile internal memory used to store the start-up instructions

..... Read Only Memory (ROM) [1]

- (b) an internal component that provides the input and output of audio signals

..... Sound card [1]

- (c) an internal component that is composed of the main memory, the control unit and the arithmetic logic unit.

..... Processor / CPU [1]

- 3 A headteacher is producing a web page about the history of her school. She has been given some old hard-copy photographs which she will include on the web page. She has a digital camera and a scanner to use to convert the hard-copy photographs into a digital format.

Compare the use of a digital camera with a scanner in this scenario. Your answer must include similarities and differences.

Digital Camera - images are stored on a memory card can be transferred to a computer
Scanner - used to enter information on a hard copy into a computer.

- Similarities
- Both capture images
 - Both store digital data
 - Both create digital images

- Differences
- Digital Camera is more portable than a scanner
 - Digital Camera has faster data capture than a scanner
 - Scanner captures the image in more detail than a digital camera
 - Scanners have no key stone effects
 - Digital cameras may capture glare/shadow off the image

[4]

4 A company uses an extranet.

(a) Explain what is meant by an extranet.

An extranet is part of a company's intranet. The company gives permission for customers and suppliers to access it. It enables businesses to exchange information over the internet in a secure way. It requires credentials/username and password to access it. [2]

(b) Describe the differences between the internet and an extranet.

- The internet allows public access to info whereas extranet allows limited access.
 - Extranet is more secure than the internet due to the smaller exposure of surface of attacks.
 - The internet is not owned by anyone whereas the extranet is owned by a company/organisation.
 - The internet comprises of more information than an extranet.
- [2]

5 State which health issue is most likely to occur from each description shown. Your answer must be different in each case.

(a) typing on a keyboard for long periods of time

Carpal Syndrome / Repetitive Strain Injury (RSI) [1]

(b) looking at a computer screen for a long time

Eye Strain [1]

(c) sitting with poor posture

Neck ache / Back ache [1]

- 6 A company requires its employees to regularly change their login passwords for the company's computer systems. Passwords must be strong and cannot be reused.

(a) Explain three problems that may occur when the employees change their passwords regularly.

- 1 Passwords could become similar hence weakening the security of the system.
 - It may be difficult to find a different password hence interfering with the user experience.
- 2 Users could easily forget the current password leading to a system lock out.
 - Users may mistype the current password correctly as it may be like previous ones hence leading to system lock out.
- 3 Users may have to write the passwords down so they do not forget. May lead to others seeing the users password, a breach of privacy and security.

[6]

(b) The company has a website which uses a digital certificate.

A digital certificate is a pair of files stored on a users computer used to ensure the security of data sent over the internet.

- Explain the purpose of the digital certificate.
- It ensures a website is trusted/genuine.
 - It is used to share a public key for encryption when communicating with the website.
 - It verifies if the company owns the website.

[1]

(c) A digital certificate is attached to an email.

State three items contained in a digital certificate.

- 1 Company/owner's name
 - 2 Owner's/Company's public key
 - 3 Date issued
- Expiry date
Serial Number
Issuer's/Sender's Name
Company digital signature

[3]

- 7 A student is creating a spreadsheet that includes a formula to check a number entered in a cell is between two values.

- The number is entered in cell A10 as an integer.
- If the number is between the two values then a message 'OK' is displayed, otherwise 'error' is displayed.

The formula the student has created is:

=IF(AND(A10>1,A10<32),"OK","error")

Data will be used to test the formula.

*Normal - data which is acceptable/valid and has an expected/known outcome
 *Extreme - data at the limits of acceptability/validity
 *Abnormal - data outside the limits of acceptability/validity and should be rejected or cause an error message

- (a) Identify **two** items of extreme test data the student should use and give the reason why this data was chosen.

Extreme test data 1 2

Extreme test data 2 31

Reason To test the boundaries of the formula
 To test the comparisons are correct

[3]

- (b) The student has entered an item of abnormal test data.

Explain why abnormal test data is used.

- To test that data outside the range is not acceptable
- To test that the correct data type is entered.
- To test that the error message works.
- To test that the errors are trapped correctly

[3]

- 8 A teacher provides revision lessons during the holidays. The teacher plans to use web-conferencing for the lessons.

(a) Explain what is meant by web-conferencing.

Is a form of real time / live / online communication that multiple users / devices connect using the internet. All users see the same screen. Communication is using videos, video camera and microphones.

[3]

(b) Evaluate the use of web-conferencing in this scenario.

- Positives
- Students save time as they don't need to travel to school.
 - Students save on cost of travelling to school.
 - Students and teachers can work from anywhere / remotely.
 - Can be recorded for students who miss the lesson.

- Negative
- Hardware and software could be expensive.
 - Requires a good / reliable internet connection.
 - There could be issues with child protection.
 - More difficult to concentrate for students.
 - Only students with the correct specialist device will be able to access.
 - If hardware breaks / loss of connection / lack of hardware then the student cannot participate.

[6]

- 9 (a) The products in a warehouse contain either a bar code or a Radio Frequency Identification (RFID) tag.

The data about each product is read electronically.

Compare bar code readers and RFID readers. Your answer must include similarities and differences.

Barcode readers are used to read information in the form of a bar code
RFID use radio waves to read and capture information stored on a tag.

Similarities

- Both readers scan for the product code
- Both use direct data entry
- Both readers allow tracking of products
- Both readers are contactless

Differences

- Barcode readers require a direct-line of sight with the code whereas RFID use near-field technology.
- Barcode readers only scan one bar code at a time whereas RFID readers read multiple tags at the same time
- Barcode readers emit/use light whereas RFID readers use electromagnetic/radio waves
- Barcode readers might have read errors if the barcode is scratched/damaged whereas RFID can read data as long as chip/tag is not severely damaged
- Barcode readers needs to be in the correct position for the reader to be able to read
- Barcode readers need to be close to the barcode

[6]

- (b) Identify two other uses of RFID.

- 1 Library Book tracking
- 2 Livestock tracking
- Passports/ID cards
- Race horse tracking
- Event Attendee tracking

[2]

10 Metatags can be used in a web page.

A metatag is a tag that holds metadata - data about other data.

(a) A metatag can be used to define the viewport settings.

Identify **three** other items that can be defined in metatags.

- 1 Name attribute - specifies other elements required
- 2 Content attribute - used with the name attribute and contains value assigned to the name
- 3 Character set / charset - specifies the type of characters displayed on a page.

[3]

(b) Metatags are used in the HTML of web pages.

State the section of the HTML which contains the metatags.

head section <head> </head> [1]

11 Some gaming systems use gesture based user interfaces to operate a game.

(a) Describe what is meant by a gesture based user interface.

Gesture based interfaces rely on human interaction by the move of hands, hand or even feet. Gesture recognition allows humans to interact with a computer without need for any mechanical devices.

- In gesture based systems, the human body interacts with the device.

The human gives the commands/instructions without the use of mouses, keyboards/pointing devices. [2]

(b) Describe the drawbacks of using gesture based user interfaces in this way.

- Only works fairly near to the camera/sensor hence not as accurate as other UIs
- May only accept a limited number of movements
- Users can unintentionally activate the device, by moving their arms/fingers
- Users have to learn what the gestures do / have to remember gestures.
- Users with physical disabilities may not be able to make the gestures.
- Prone to fatigue/gorilla arm due to movement
- Could cause damage if in a restricted space.

[4]

12 Movies can be stored on Blu-ray discs or an internal hard disk.

(a) Describe why Blu-ray discs are preferred to an internal hard disk for storing movies.

- Blu-ray disc is a type of optical storage media that reads from and writes to the disc using a Blu-ray optical device.
 Hard disks use magnetic storage of data on its platters that rotate.
- Data cannot be erased/edited on the Blu-ray compared to the hard disk
 - Blu-ray discs are more portable than hard disks.
 - Blu-ray discs can be easily stacked for more storage compared to hard disk
 - Blu-rays are external storage devices hence do not take up internal storage. Hard disks are fixed in the computer.
 - have less flexibile

[4]

(b) Hard disks and Blu-ray discs are examples of backing storage.

Backing storage is main internal storage where application software, disk operating system and files are stored

(i) State two characteristics of backing storage.

- 1 - Is non-volatile
- stores data permanently
- 2 - Slower to access than internal memory

[2]

(ii) Identify two other types of backing storage.

- 1 SSD
- 2 CD
- DVD
- cloud storage
- Magnetic tape
- Memory cards

[2]

13 Weather forecasters use computer modelling.

- (a) Explain why computer modelling is used to forecast the weather.

Computer modelling is a field that deals with the study of and creation of simulations, models of real systems to study the system behaviour.

- It can predict long range weather trends.
- It produces more accurate results.
- It can deal with more complex calculations quicker.
- It is a faster way of analysing weather patterns than using a human.
- Large number of variables make it more difficult for a human to forecast correctly/accurately.

[4]

- (b) Data is collected by different types of sensor and then input to the computer model to be processed.

Identify **two** sensors that could be used to collect weather data.

1 Temperature

2 Moisture/Humidity
Wind speed
Pressure

[2]

- (c) The processed data is then output.

Identify **two** output devices that could be used.

1 Monitor

2 Printer

Plotter - print on paper using a pen/pencil/marker pen to draw multiple continuous lines.

[2]

14 ePublishing software is used to create an ePublication to display a school's yearly magazine.

(a) Describe the characteristics of an ePublication.

Epublication is an electronic format of material published on paper.
Characteristics

- Can be used by many users simultaneously
- Readers can interact with the ePublication
- Allows auto change of pages.
- Allows multimedia to be embedded in the pages
- It is digital so can be used in other documents
- Sections can be linked internally/externally
- More up to date than physical magazines

[4]

(b) The ePublishing software is subject to software copyright legislation.

Give two methods that could be used to prevent software copyright legislation being broken.

- 1 - Getting permission from the owner
 - Use of license agreements
- 2 - Users install a unique license key/serial number/authorization key
 - Users install DRM (parts of the code which stop people from copying it)

[2]