



Cambridge International AS & A Level

CANDIDATE
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INFORMATION TECHNOLOGY

9626/12

Paper 1 Theory

October/November 2023

1 hour 45 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.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [].

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

1 A company secretary is creating a new database of workers to record:

- their six digit ID number
- the date they joined the company
- their rate of pay per hour up to a maximum rate of \$50 per hour.

She has entered data from a source document into the database. There was an error in record 3 and an error in record 4 in the source document. The secretary also made an error when copying record 1.

Source document

Record	ID number	Date joined	Rate of pay
1	147563	13/06/2019	35
2	163459	09/10/2019	28
3	1827697	15/08/2020	31
4	221524	23/12/2020	56
5	256817	27/07/2021	15

Database

ID_number	Date_joined	Rate_of_pay
147563	13/06/2020	35
163459	09/10/2019	28
1827697	15/08/2020	31
221524	23/12/2020	56
256817	27/07/2021	15

Using this data, explain, in detail, the need for verification and validation when entering data into a database.

- Verification only checks the data is copied correctly
- Validation checks that the data entered is reasonable
- The original data may have errors although copied correctly which could be picked up using validation checks
- The copied data may have been copied incorrectly which would have been picked up by using verification
- Both checks are needed to cover mistakes that the other would not identify
- In record 4 a range check (validation) on the rate of pay would have accepted only values between 15 and 50

Others

- Format Check (Validation) can be used on Date_joined field to check that it is dd/mm/yyyy

[6]

2 Mainframe computers are used in banking. Supercomputers are used in climate research.

(a) Explain what is meant by a mainframe computer and by a supercomputer with reference to the types of processing and the processors they each use.

- A mainframe Computer can have hundreds of processor (cores)
- A Super Computer can have more than hundred thousands (processing) cores
- For mainframe Computer all cores share one operating system
- others - For Super Computer the cores has their own operating system
- Mainframe Computers use parallel processing
- Super Computers use massively parallel processing

[3]

(b) Explain how supercomputers are used in climate research.

- many variables are collected
- Complex calculations carried out
- Show the historical of different variables over several decades
- Mathematical formulae are used to describe how the different parts of a climate system interact
- Computer models are used to describe how the climate will change

[4]

3 Give brief descriptions of the following types of user interface.

(a) command line interface

- User types in instructions
- prompt appears in Screens
- Requires fewer resources than GUIs
- Requires the following devices; Keyboard and Monitor Screen

[2]

(b) gesture based interface

- user moves part of the body to communicate with the Computer
- Requires a Camera, Sensor to detect movement
- Computer matches body movements it has stored in the database
- Examples of the body movement; finger pointing, hand waving, head nodding

[2]

(c) dialogue interface

- user uses their voice to communicate with the Computer
- Speech recognition software is used to recognize speech
- Computer matches speech it has stored in the database
- Speech is converted into commands
- Requires a microphone

[2]

- 4 (a) Describe how touch sensors are used as part of a control system in nuclear power plants.

- Touch Sensor is used for measuring fluid levels such as the cooling water level of the reactor

- A Capacitive touch sensor measures the capacitance between two conductors separated by an insulating plate

Others - Detects when the fluid is touching the conductor

[2]

- (b) Describe how infrared sensors are used in burglar alarm systems.

- used to detect presence of humans

- Human bodies emit thermal energy

- By detecting heat radiation

[2]

Chapter 1 : Data and Information (Direct and Indirect Data)

- 5 Maria wants to use information about the families in her town for a study. She will get the information from an indirect data source, the town's electoral register. This is kept at the local council office. She has decided **not** to use a questionnaire, which is a direct data source, to gather the information she needs.

Describe the suitability of using the electoral register rather than a questionnaire.

- The electoral register is a single document already gathered

- Electoral register data is already collated

- Data from questionnaire may take time to collate

- May take long to distribute questionnaire

- Maria will only need to make one trip to the Council office

Others

- Electoral register only list family members older than voting age, however these does not include children

- Questionnaire would gather information about the whole family including younger children

- Electoral register only holds limited information such as name, address, age, gender

[5]

6 Chapter 6 - Digital Divide

- 6 There can be a digital divide between people who live in rural areas and people who live in urban areas. The divide can be caused by the lack of fast broadband in rural areas, resulting in limited access to the web.

(a) Explain the effects on people who live in rural areas of having limited access to the web.

- Inability to find information due to inability to access

Search engines

- Tasks takes longer to complete which time wastage

Areas including Education

- Unable to do wider research, so will lead to lack of understanding of the topic

- Cannot access online learning resources, so quality of education is lower

Areas including remote job

- unable to have face to face communication over the web [4]

(b) Describe ways to reduce this digital divide.

- Deliver access using Satellite technology

- Create Cyber cafes in rural areas

- Improve access to the Internet in rural areas

Others

- Government investigates alternative means of distribution

[3]

- 7 Louisa, a teacher with limited IT knowledge, has created a simple database of her students. The database contains the names of her students and the results of their latest test.

She prints out the names of the students who have passed the latest test by gaining a mark of 40 or more.

When she created the database, she considered creating a dynamic parameter query to produce her printout. However, she decided to create a static parameter query.

Explain why this was a good decision.

- Louisa doesn't have to spend time responding to the typing in the pass mark
- Louisa would have been more likely to have made mistakes setting up a dynamic parameter query
- There is an increased chance of entering the wrong number as the pass mark as she must enter it every time
- The pass mark is always the same, so there is no need for a dynamic parameter query
- Louisa would need greater technical knowledge to set up a dynamic parameter query

[5]

A dynamic query is automatically refreshed each time it is used. When you use a dynamic query, the program searches the database for any new records meeting the criteria you specify and adds them to the results.

A static query is like taking a snapshot of your database at the time the query is created. Only the records selected when the query is first created will be included when the query is used in the programme.

- 8 Students often transfer files between different word processing and database packages.

Justify the need for generic file formats for the transfer of files between different packages.

- Files created in one software package are sometimes difficult to use/open in other software, particularly if the packages are incompatible
- Generic file formats are compatible with different software packages
- Since generic file formats are needed to enable different operating systems to read the file because the particular file format will not operate on that operating system

Examples

- Database files should be exported as a .csv, .rtf
- Word processing files should be saved as a .txt, .rtf
- So that word processing software can understand it

[8]

- 9 Sukhjinder, a mathematics student, has defined a procedure using pseudocode. It calculates the area of a parallelogram by multiplying the base by the height. All parallelograms will have an area of less than 1000.

The procedure Sukhjinder has written is:

```
PROCEDURE parallelogram(base,height)
area ← base*height
ENDPROCEDURE
```

He has also begun writing an algorithm which calls the procedure and then passes back the area.

The main algorithm accepts inputs of the base and the height of 10 parallelograms, one at a time. It will output the areas of the largest and smallest parallelograms.

Complete the algorithm for Sukhjinder by filling in the missing lines.

```
count ← 0
smallest ← 1000
```

```
largest ← 0
```

```
WHILE count < 10
```

```
    INPUT base, height
```

```
    CALL parallelogram (base, height)
```

```
    IF area < smallest
```

```
        THEN
```

```
            smallest ← area
```

```
        ELSE
```

```
            IF area > largest
```

```
                THEN
```

```
                    largest ← area
```

```
            END IF
```

```
        END IF
```

```
        count ← count + 1
```

```
    END WHILE
```

```
    PRINT smallest largest
```

[8]

10 Explain why the following techniques could be needed when making videos.

(a) trimming a video clip

- To remove unwanted / unnecessary parts at start / end to make it less boring
- To shorten the length because it is too long or to reduce file size
- To make it more exciting
- To bring video and audio into sync

others

[2]

(b) adding subtitles to a video

- People watching the video might speak a different language so subtitles in other languages can be provided
- Viewers of a video may have hearing difficulties so subtitles help them understand what is being said
- What has been said is shown on the screen so that nothing is missed

[2]

(c) adding sound to a video

- To add a clear soundtrack without background noise
- To add sound effect which can heighten the impact of explosions
- To add authenticity
- To grab audience attention
- By making the video more interesting
- To increase engagement

[2]

11 When data is sent across the internet, it is usually encrypted.

Discuss the benefits and drawbacks of encrypting data which is transmitted over the internet.

Benefits

- keeps personal data secure
- Enables IT departments to comply with data protection regulations
- For third parties who don't have a decryption key so is of no use
- Examples of items of data that could be protected; DNA, banking information

Drawbacks

- It takes longer to decrypt data
- It takes longer to transmit encrypted data
- It uses extra storage space for the client
- If the decryption is lost, it is extremely difficult to recover the data
- Data can be recovered by reissuing of the digital certificates but takes time
- Makes it difficult for authorities to monitor criminal activities

[8]

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