

Briefing Session on 2021 HKDSE ICT Exam



Enquiry

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Special Arrangement for **2022 Exam**

- Same as the special arrangement for 2021 Exam
- SBA – CANCELLED
- Paper 1: 55% → **70%**
- Paper 2: 25% → **30%**
 - Choose **3** out of 4 questions
 - Each question carries 15 marks
 - No change in exam time (i.e. 1.5 hrs)



Breakdown of Elective Part


	Number Sat	%
All	5,355	0.5
2A	710	-0.7
2B	78	5.1
2C	3151	-2.7
2D	1429	12.2

Results of ICT (all candidates)

Level	2017	2018	2019	2020	2021
5**	0.9	0.8	0.9	0.9	1.1
5*+	3.6	3.2	3.8	3.5	4.1
5+	8.9	8.1	9.7	8.7	10.0
4+	27.2	27.3	30.1	28.0	30.0
3+	52.2	53.3	54.7	52.9	54.1
2+	80.3	81.9	82.7	80.6	81.1
1+	94.1	95.0	94.8	94.2	93.8

Note: L5** Around Top 10% of L5
L5*+ Around Top 40% of L5 (L5* = next 30%)

Marking (1)

- Quality control: standardisation, checkmarking, control scripts, etc.
- Marking
 - accept common abbreviations (e.g. terms in C&A Guide and the Glossary), e.g. Paper 1B,
 - Q1(a)(i): **AP** 
 - answers not written in the language medium entered would not be marked

Marking (2)

- Marking schemes
 - Marking guidelines agreed after standardisation (after checking 100-300 scripts)
 - may not exhaust all possible answers
 - professional discretion and judgment in accepting alternative answers (correct and well-reasoned)

Marking (3)

- Bad languages used in exam
 - Standing Committee to scrutinise exam irregularities
 - Possible consequences: mark deduction

2021 ICT Samples of Candidates' Performance

- Paper 1B: 2 samples (1 with annotated note) @ Level @ language version
- Paper 2 –samples from different elective papers available
- Uploaded to www.hkeaa.edu.hk

Performance – Compulsory Part

- Average no. of MC items correct = 25
- High correlation with Paper 2s

Performance – Elective Part

- Equating – performance of candidates (Elective Part) can be reflected on the same scale (Equipercentile method \boxplus)
- Performance of students (Paper 1):
 $2D \gg 2A > 2B \gg 2C$

\boxplus Refer to *Grading Procedures & standards-referenced Reporting in the HKDSE Exam (HKEAA)*

Paper 1A



1. In Question 1 and Question 6, Just below half of the candidates demonstrated a comprehensive understanding of word processing. They understood how to create formatted documents effectively and suitably for specific tasks.

Q.1 → Which of the following can effectively format a document in word processing software?

- (1) → Setting the default font as the most frequently-used font type and font size
- (2) → Using pre-set styles for headings
- (3) → Enabling the auto-correction function

- * → A. → (1) and (2) only → (40%)
- B. → (1) and (3) only → (11%)
- C. → (2) and (3) only → (7%)
- D. → (1), (2) and (3) → (42%)

Q.6 → Tim uses the 'table of contents' feature in word processing software, as shown below. When inserting a new chapter, _____.

Table of Contents	
Chairman's message.....	→ 1
Introduction.....	→ 5
Background.....	→ 12

- A. → Tim has to input a formula for calculating the page numbers → (2%)
- B. → Tim has to input the chapter name in the table of contents → (27%)
- * → C. → the page numbers can be updated accordingly → (50%)
- D. → the new chapter will be inserted as the last chapter → (21%)

2. Question 3 tests the understanding of ASCII codes and binary numbers, which are the fundamental knowledge of ICT. Only about half of the candidates answered correctly. Candidates were weak in data representation, which is essential for understanding the mechanism of the data operations in a computer.

Q.3 → The ASCII codes for the characters 'X' and 'Z' in hexadecimal are _____ and 5A respectively.

- | | | |
|-------------|---|-------|
| → A. → 3A | → | (25%) |
| → B. → 3C | → | (14%) |
| * → C. → 58 | → | (51%) |
| → D. → 59 | → | (10%) |

3. Question 11 tests candidates' knowledge of database software. About half of the candidates thought that option (2) or (3) was correct. It seems that weaker candidates probably lacked practical experience in using database software and did not understand the basic use of a data entry form.

Q.11 → What is/are the major advantage(s) of using a form for data entry in database software?

- (1) → It reduces input errors.
- (2) → It shortens the execution time of SQL statements.
- (3) → It requires less storage space.

- | | | |
|-------------------------|---|-------|
| * → A. → (1) only | → | (52%) |
| → B. → (2) only | → | (24%) |
| → C. → (1) and (3) only | → | (12%) |
| → D. → (2) and (3) only | → | (12%) |

4. Question 14 tests candidates' knowledge and understanding of scanners. Although almost all candidates identified the colour depth which is the common specification of a scanner, only a third of the candidates answered correctly. Not only should candidates be able to use scanners for scanning documents and photos, but they also should be able to understand all the specifications of a scanner and their effects on the scanning operation.

Q.14 → Which of the following can be the specifications of a scanner for scanning documents and photos?

- (1) → 802.11n supported
- (2) → 24-bit colour depth
- (3) → Built-in 64 MB RAM

- | | | |
|---------------------------|---|-------|
| → A. → (1) and (2) only | → | (26%) |
| → B. → (1) and (3) only | → | (6%) |
| → C. → (2) and (3) only | → | (32%) |
| * → D. → (1), (2) and (3) | → | (36%) |

5. Question 25 tests candidates' ability to integrate the knowledge of LAN and WAN. From the response figures, the majority of the candidates thought that a Wi-Fi network was unrelated to a LAN. Broadly speaking, a Wi-Fi network is a wireless LAN based on the IEEE 802.11 family of standards and they are closely related. Candidates should strengthen their understanding of different types of networks and connecting devices involved.

Q.25 → Mary can use her mobile phone in her office to control the appliances connecting to a Wi-Fi network at home. Which of the following are involved?

- (1) → LAN
- (2) → Internet
- (3) → Access Point

- | | | |
|---------------------------|---|-------|
| → A. → (1) and (2) only | → | (7%) |
| → B. → (1) and (3) only | → | (13%) |
| → C. → (2) and (3) only | → | (45%) |
| * → D. → (1), (2) and (3) | → | (35%) |

SBA Arrangement

- 2021 Exam – CANCELLED
- 2022 Exam – CANCELLED
- 2023 Exam – Teachers should still put the SBA tasks in their yearly teaching plan



HKDSE ICT 2021

Exam paper marking review
(Paper 1B Q1)



Marking guideline

- Fairness
 - Marker not do GUESS of student answer
- Professional
 - As students are studying ICT,
 - Answer should be more technical / professional
- Others
 - Not accept too general answer
 - Not accept answer seems direct copy from qu



Function of marking review

Know the
**suggested
answer**

Know the
**marking
flexibility**

Know
**candidate
performance**


Enhance
**teaching
strategies**



Enhance teaching strategies

大綱 投影片

1 ☆



2 ☆

HKDSE ICT 應試技巧

黃維宏老師

3 ☆

應試技巧

- 黃維宏老師
- HKDSE 應試技巧之介紹
- 應試技巧之重要性
- 應試技巧之分類
- 應試技巧之應用
- 應試技巧之總結

4 ☆


應試技巧

- 應試技巧之分類
- 應試技巧之分類
- 應試技巧之分類
- 應試技巧之分類

5 ☆

應試技巧 (續)

- 應試技巧之分類
- 應試技巧之分類



HKDSE ICT 應試技巧

圖片來源：<http://www.suitqaisdiaries.com/wp-content/uploads/2012/08/170810-012.jpg>



Paper 1B

2021-DSE
ICT

PAPER 1
(SECT B)

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2021

INFORMATION AND COMMUNICATION TECHNOLOGY

PAPER 1

SECTION B: Question-Answer Book

This paper must be answered in English

INSTRUCTIONS

- (1) After the announcement of the start of the examination, you should first write your Candidate Number in the

Please stick the barcode label here.

Candidate Number

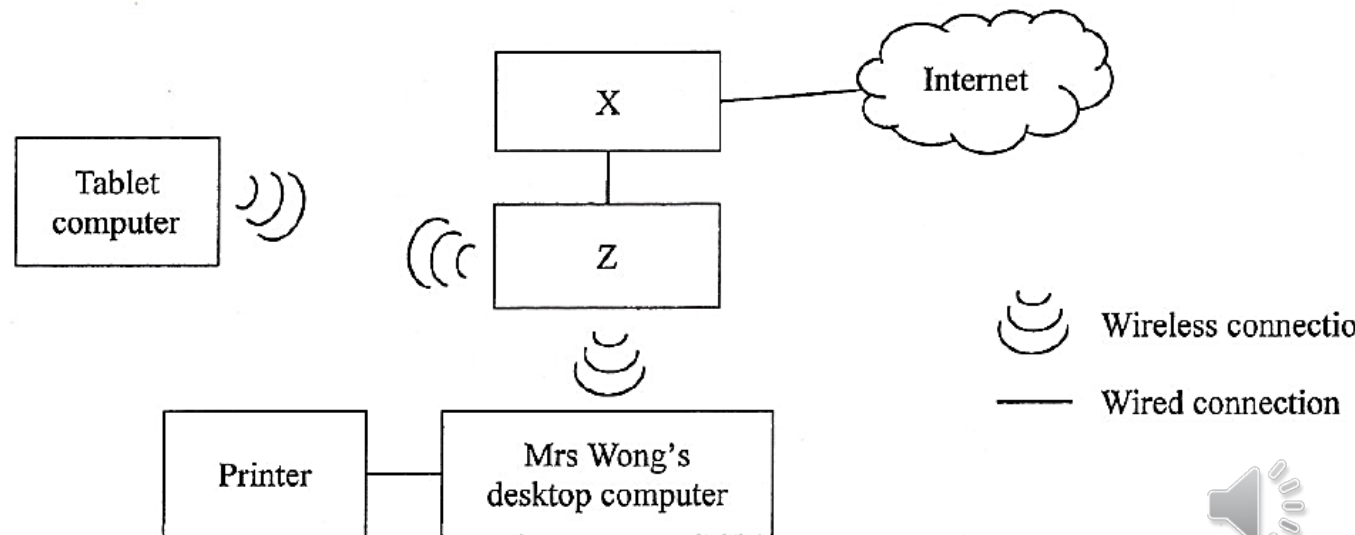
--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



Paper 1B

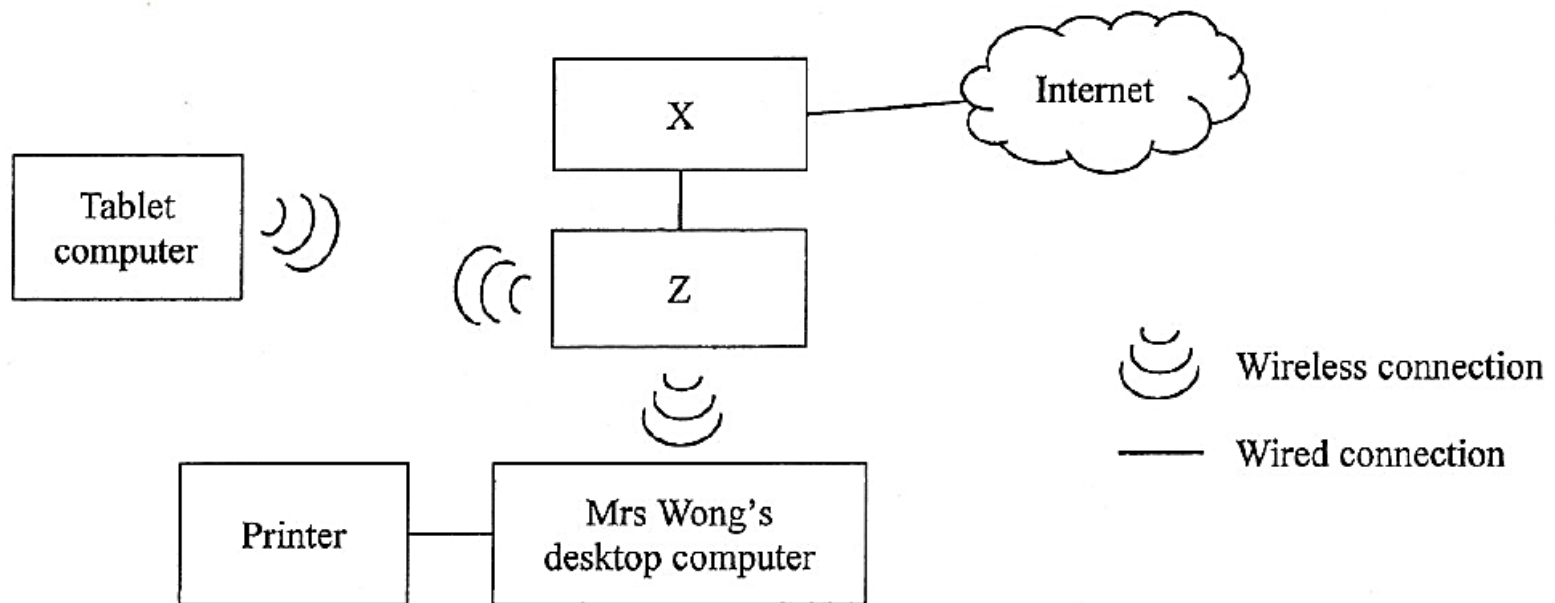
Q1

Mrs Wong builds a wireless network at home such that her son, John, can use a tablet computer to access the Internet. The network is shown below:



1B Qu 1 – Networking

- Mrs Wong builds a wireless network at home such that her son, John, can use a tablet computer to access the Internet. The network is shown below:



1B Qu 1a (i) – Network devices

(a) X and Z are network devices. The tablet computer is connected to Z for Internet access.

(i) What are X and Z?



1B Qu 1a (i) – Network devices

Know the suggested answer

- X : modem / router
- Z : Access Point / AP / 無線網絡接達點



1B Qu 1a (i) – Network devices

Know the marking flexibility


- Z :
 - Accept “wireless router”
 - But not accept simply “router”
 - Accept “網絡接達點”
 - Not accept “WiFi 熱點”




1B Qu 1a (i) – Network devices

Know the marking flexibility


(i) X 和 Z 是什麼？


X: 路由器 

Z: 無線網絡接達點 
(2 分)

(a) X and Z are network devices. The tablet computer is connected to Z for Internet access.


(i) What are X and Z?

X: modem 

Z: router 
(2 marks)

(a) X 和 Z 均為網絡設備。平板電腦連接到 Z 以接達互聯網。

(i) X 和 Z 是什麼？

X: 交換器 

Z: 路由器 
(2 分)



1B Qu 1a (i) – Network devices

Know candidate performance

- Good in X but not good in Z
 - Most candidates can clearly identify which device is X and but only some for Z
 - For Z :
 - A few will not be aware that home use router (they simply called router) in fact is a mix of devices (router + switch + AP)



1B Qu 1a (i) – Network devices

Enhance teaching strategies

- Need to let students know home use devices are somehow designed/made to fit sales' need but not 100% fit with what we learnt / taught academically.



1B Qu 1a (ii) – Uses of Network

- (a) X and Z are network devices. The tablet computer is connected to Z for Internet access.
- (ii) Refer to the above diagram, give two uses of the network for John, other than Internet access.



1B Qu 1a (ii) – Uses of Network

Know the **suggested answer**

- hardware sharing (but need elaboration)
 - Like “Share printer” / “Share storage space”
- File Sharing
 - Exchange data (file sharing)



1B Qu 1a (ii) – Uses of Network

Know the **marking flexibility**

- Accept “remote control the computer”
- Not accept
 - Simply “Communication”
 - “Software sharing” as the case haven’t mentioned that



1B Qu 1a (ii) – Uses of Network

Know the marking flexibility

(ii) Refer to the above diagram, give two uses of the network for John, other than Internet access.

John can access files stored in Mr. Wong's desktop computer by file sharing services, and he can also print documents from the printer wirelessly using his tablet computer.

(2 marks)

(ii) Refer to the above diagram, give two uses of the network for John, other than Internet access.

John can also use for hardware sharing and software sharing.



1B Qu 1a (ii) – Uses of Network

Know candidate performance

- Good
 - Most of the candidates know the use of network in resources sharing
 - Some candidates wrote “Internet access” which is already mentioned in the question
 - Some candidates wrote network access which is too generic



1B Qu 1a (ii) – Uses of Network

Enhance teaching strategies

- Remind students to do answer that echo the scenario set by the question, and aware of “answer” that already mentioned in the question



1B Qu 1b (i) – Health Issues

- (b) Mrs Wong uses her desktop computer for more than 6 hours a day.
 - (i) State the health hazard due to the use of a mouse.



1B Qu 1b (i) – Health Issues

Know the **suggested answer**

- Repetitive use of wrist / finger / muscle / tendons of arm for data entry
- 手腕 / 手指 / 手部肌肉關節勞損 / RSI 重複性勞損



1B Qu 1b (i) – Health Issues

Know the marking flexibility

- Accept answers with similar meaning like “重複動作造成的損傷”
- Not accept
 - 手部受傷
 - Or simply “Tired”



1B Qu 1b (i) – Health Issues

Know the marking flexibility

(i) State the health hazard due to the use of a mouse.

Due to Mrs Wong overly using her desktop computer, she might feel pain in her wrists and forearms.

(1 mark)



(i) 舉出因使用滑鼠可能對健康造成的傷害。

滑鼠長使用可能對手部造成勞損，肌肉酸痛。

(1 分)



1B Qu 1b (i) – Health Issues

Know candidate performance

- Satisfactory
 - Most candidates know the problem of prolonged use of mouse.
 - Some lost mark because of cannot express clearly the health hazard related



1B Qu 1b (i) – Health Issues

Enhance **teaching strategies**

- Students need to know how to express the health hazard caused by improper use of Computer / Tablet
 - Instead of simply “eye” or “muscle” problem



1B Qu 1b (ii) – Health Issues

- (b) Mrs Wong uses her desktop computer for more than 6 hours a day.
 - (ii) Suggest a product for reducing this health hazard.



1B Qu 1b (ii) – Health Issues

Know the **suggested answer**

- wrist rest / mouse with the ergonomic design



1B Qu 1b (ii) – Health Issues

Know the marking flexibility

- Accept
 - Chair with arm rest
- Not accept
 - 人體公學
 - Cushion
 - “Mouse pad” only



1B Qu 1b (ii) – Health Issues

Know the marking flexibility

(ii) Suggest a product for reducing this health hazard.

Use an ergonomic mouse with a wrist pad to
prevent the injuries caused by a long
time mouse usage

(1 mark)

(ii) 建議一項產品，以減少此傷害。

使用滑鼠墊，能讓手腕托在上方。



1B Qu 1b (ii) – Health Issues

Know candidate performance

- Good
 - A number of candidates cannot spell “ergonomic” correctly, or cannot write it correctly in Chinese.
 - Some candidates give “mouse pad” as answer which is too generic and cannot be regarded as correct answer



1B Qu 1b (ii) – Health Issues

Enhance teaching strategies

- Even though “ergonomic” can be replaced by descriptive sentence, but sometimes, students answers are not “descriptive enough” to get mark(s).
- Remind students to give more specific answer rather than providing generic answers.



1B Qu 1c – Health Issues

(c) John uses his tablet computer 4 hours a day. Give two good practices for John to reduce the health hazard of this.



1B Qu 1c – Health Issues

Know the **suggested answer**

- Take short breaks periodically during the use. /
- Maintain a good posture. /
- Use an anti-glare screen cover. /
- Turn on the night shift mode to filter blue light. /
- Look at distant objects. /
- Use ergonomic keyboard / mouse.



1B Qu 1c – Health Issues

Know the marking flexibility

- simply 'look at green objects' cannot get marks, unless the answer includes distant objects like trees

(c) 志偉每天使用平板電腦 4 個小時。為志偉提供兩種良好做法，以減少對健康造成的傷害。

① 定時休息，例如使用平板電腦一小時休息十分鐘



② 使用人體工學設備，例如可調校的坐椅。



(2 分)



Know candidate performance

- Very Good
 - Most candidates know ways to reduce the problem caused by prolonged use of computer / tablet.



1B Qu 1c – Health Issues

Enhance teaching strategies

- Answer scope of this question is very broad, but be prepared to questions in the future may have limitation in answer scope.



1B Qu 1d (i) – CyberSecurity

- (d) Mrs Wong buys food on a supermarket's web site. The web site uses a firewall and SSL technology to secure the online service.
- (i) How can the firewall support a secured online service?



1B Qu 1d (i) – CyberSecurity

Know the **suggested answer**

- It can filter network traffic / block unauthorized access → ①
- to the server → ①



Know the marking flexibility

- If can mention
 - 保障網站 / company → can be regarded as protect server → can give mark
- Not accept
 - 保障用戶資料 → not equivalent to protect server
 - Hacker attack → not equivalent to protect server



1B Qu 1d (i) – CyberSecurity

Know the marking flexibility

(i) How can the firewall support a secured online service?

It can detect documents that potentially contain malware or computer virus, and notify the server hoster so the hoster can make a decision to allow the file or not, or block the file entirely

(2 marks)



(i) 防火牆如何能支援保障



務安全？



在有不明來歷的IP或惡意程式打算入侵電腦時，防火牆會進行攔截。



1B Qu 1d (i) – CyberSecurity

Know candidate performance

- Poor
 - Most candidate only mentioned firewall protect from hacker attack but not aware the answer may not clearly describe the question has client side and server side. Simply “Hacker attack” not means protect the server.



Know candidate performance

- Quite Poor
 - Some candidate even mixed up firewall is to protect server / network from computer virus.



Enhance **teaching strategies**

- Remind students to include

action + recipient

in the answer, so as to get full mark



1B Qu 1d (ii) – CyberSecurity

- (d) Mrs Wong buys food on a supermarket's web site. The web site uses a firewall and SSL technology to secure the online service.
- (ii) How can the SSL technology support a secure online service?



1B Qu 1d (ii) – CyberSecurity

Know the **suggested answer**

- SSL encrypts information / sensitive data such as usernames and passwords, and credit card information → ①
- transmitted between Mrs Wong (customers) and the web site → ①



Know the marking flexibility

- Not accept
 - Digital Cert / Server identity
 - Authenticate the identity
 - As not equal to encrypt



1B Qu 1d (ii) – CyberSecurity

Know the marking flexibility

(ii) How can the SSL technology support secured online service?

SSL technology will encrypt the data transmitted decrease the chance of hackers and unauthorised people interpret the information even they are able to have the signals collected.

(ii) SSL 技術如何能支援保障網上服務安全？

網站受「HTTPS」協定保護。



Know candidate performance

- Poor
 - Some candidates wrongly think SSL can help prevent hacker attack or computer virus infection
 - Some candidates cannot get the 2nd mark which related to what data is being encrypted.



Enhance teaching strategies

- To get the first mark (encrypt) is easy, but to get the second mark need deep understanding of the scenario and describe the case in detail.
- More practice is needed.



Summary of teaching strategies

- Answer
 - show to fit knowledge to question scenario
 - should echoing the scenario of the qu
- Need to get more experience in everyday practice
- Know answer priorities
- Grouping answers in categories and @
Cat. give 1 answer (for qu need >1 ans)



HKDSE ICT 2021 Exam Paper Marking Review

(Paper 1B Q2, Q3, Q4)



Key

**Know the
suggested
answer**

**Know the
marking
flexibility**

**Know
candidate
performance**

**Enhance
teaching
strategy**



1B Q2

Topics / Marks distribution

- (a) The Networking and Internet Basics (2 marks)
- (b) Basic Machine Organisation (2 marks)
- (c) Basic Machine Organisation (2 marks)
- (d) Basic Machine Organisation (2 marks)
- (e) Computer Systems (2 marks)
- (f) The Networking and Internet Basics (2 marks)

Scenario

- *A school library has a wireless network*



1B Q2a

Suggested Answer

Users can access network services without the limitation of cable connection.

The number of network connections can be flexible.

✓ allows Wi-fi only device to access network services

✗ coverage

✗ less cabling

✗ (higher) speed

Marking Flexibility

Candidate Performance

Poor

The importance in flexibility in physical layout should be emphasized

Teaching Strategy



(a) Give two benefits of using a wireless network instead of a wired network in the library.

The coverage is larger.

It is more portable.

✗

✗

(a) 舉出在此圖書館使用無線網絡而非有線網絡的兩個好處。

使用者能夠不受線的限制使用網絡

無線網絡的安裝較有線網絡低

✓

✗

(a) 舉出在此圖書館使用無線網絡而非有線網絡的兩個好處。

電子產品使用位置不受線網絡有所規限。

可同時供多個電子產品使用 例如多部電腦、電話、平板電腦

✓

✓

(2 分)

(a) Give two benefits of using a wireless network instead of a wired network in the library.

wireless network coverage is larger than wired

network and the setup is more simpler.

(of wireless network)

✗

✗

(2 marks)



1B Q2b

Suggested Answer

RAM: volatile, higher data transfer rate, primary storage
(SSD: non-volatile, lower data transfer rate, secondary storage)

Candidate Performance

Satisfactory

✓ RAM: holds program/data currently being executed by the CPU vs SSD: holds program/data for long-term storage

- ✗ RAM (physical) size
- ✗ different size / speed
- ✗ direct access (without mentioning “by the CPU”)

Marking Flexibility

Be cautious on the spelling of the words like “volatile”, “temporary”, “permanent”

Need to point out the characteristics of primary vs secondary storage

Teaching Strategy



(b) 描述 RAM 和 SSD 之間於特性上的兩個差異。

RAM 是易失，SSD 非易失

RAM 所儲存的東西和 SSD 的不同

(b) Describe two differences in characteristics between RAM and SSD.

RAM is volatile, the data will disappear instantly after the power off. SSD is for storing data and files, the ^{storage} capacity is larger.

(2 marks)

(b) 描述 RAM 和 SSD 之間於特性上的兩個差異。

1. RAM 是易失性的記憶體，而 SSD 是非易失性。

2. RAM 的存儲空間比 SSD 小。

(2 分)

1B Q2c

Suggested Answer

5 GHz: the clock rate of CPU
(時鐘頻率)

10 cores: 10 processing units
(處理單元) within a CPU

- ✗ instructions per second
- ✗ speed / rate / frequency
- ✗ sampling rate

- ✗ process 10 tasks at the same time
- ✗ 10 CPU

Marking Flexibility

Candidate Performance

Poor

Teaching Strategy



(c) P 的 CPU 規格是 5 GHz 和 10 核心。描述它們分別代表什麼。

5GHz 是 CPU 的時鐘頻率或速度

10 核心 是 CPU 的單元

(2 分)

(c) The CPU specifications of P are 5 GHz and 10 cores. Describe what they represent respectively.

5GHz represent the clock rate

10 cores represent How many task the cpu can handle at the same time.

(2 marks)

(c) The CPU specifications of P are 5 GHz and 10 cores. Describe what they represent respectively.

5GHz represent the clock rate of the CPU and 10 cores means the number of processing units.

(c) P 的 CPU 規格是 5 GHz 和 10 核心。描述它們分別代表什麼。

5GHz 代表 CPU 運行時的時鐘頻率，即每秒進行「輸入、處理-輸出，周期的頻率。

10 核心則是 CPU 的 處理器，能同時處理的處理器件數量。

(2 分)

1B Q2d

Suggested Answer

Virtual keyboard, speech recognition, handwriting

- ✓ on-screen keyboard
- ✓ voice recognition (語音輸入)
- ✓ speech-to-text
- ✗ OCR / touch display
- ✗ mic + software
- ✗ sound / audio translation / conversion

Marking Flexibility

Candidate Performance

Good

Familiarise the technical terms and concepts related to mobile devices

Teaching Strategy



(d) 建議用戶在沒有額外裝置情況下，於 Q 上輸入文本的兩種方式。

觸控屏幕及語言輸入

✗

✗

(d) Without additional devices, suggest two ways that users input text in Q.

Voice recognition and virtual keyboard.

✗

✗

(d) Without additional devices, suggest two ways that users input text in Q.

Type on the touch screen

✗

Speak to the Microphone.

✗

(d) Without additional devices, suggest two ways that users input text in Q.

Using voice to input text with voice recognition software and microphone

✓

Use touch screen to input text with virtual keyboard.

✓

(2 marks)

(d) 建議用戶在沒有額外裝置情況下，於 Q 上輸入文本的兩種方式。

使用觸控屏幕 使用平板電腦上的觸式鍵盤輸入文本

✓

使用麥克風的語言輸入，輸入文本

✓



(2 分)

1B Q2e

Suggested Answer

allow Internet access via SIM card when WiFi is not available
lighter in weight to increase portability

- ✓ cellular network / mobile data (as an alternative to via SIM card)
- ✓ smaller in size (as an alternative to lighter in weight)
- ✗ lower power consumption

Marking Flexibility

Candidate Performance

Good

Teaching Strategy



(c) 學生選用 Q 而不是 P 於街上進行調查。舉出兩個理由以支持他們的選擇。

可存大量的調查結果，有足夠的容量。

有實體鍵盤方便入資料及調查結果。

(2 分)

(c) 學生選用 Q 而不是 P 於街上進行調查。舉出兩個理由以支持他們的選擇。

因為 Q 的手機電腦較 P 的手機電腦為輕。

手機電腦 Q 擁有流動網絡，若街上沒有 Wi-Fi 可連接，便可使用流動網絡。

(2 分)

(c) Students choose Q instead of P to conduct a survey on the street. Give two reasons to support their choice.

And lighter in weight

It is because Q is smaller in size, so that it is more convenient

for them to bring to school. Moreover, Q supports cellular, such that

they could still access to the Internet when Wi-Fi is unavailable, so that

they could use it everywhere.

(2 marks)

1B Q2f

Suggested Answer

When the operating systems of all the devices use the same network protocol for data communication, files can be transferred successfully.

Marking Flexibility

✓ FTP or TCP/IP (*as a specific example of same communication protocol*)

Candidate Performance

Very Poor

Teaching Strategy

Students should understand the need of communication protocols.



- (f) School file servers, P and Q are installed with different operating systems, but files can be transferred between the devices through the network. Why?

Because the files are in ~~cross-systems~~ formats
can be transferred through different OS as
long as they are computers.

✗

(2 marks)

- (f) 學校的檔案伺服器，P 和 Q 安裝了不同的操作系統，但檔案卻可在各裝置之間透過此網絡互相傳遞。為什麼？

因為 P 和 Q 雖然安裝了不同的操作系統，但在
透過連接網絡互相傳遞時，操作系統的不同並不
會存在影響。

✗

- (f) 學校的檔案伺服器，P 和 Q 安裝了不同的操作系統，但檔案卻可在各裝置之間透過此網絡互相傳遞。為什麼？

因為學校的檔案伺服器，P 和 Q 均使用 LMAP 和 POP3 或 SMTP

✗

- (f) School file servers, P and Q are installed with different operating systems, but files can be transferred between the devices through the network. Why?

There is same file transfer protocol
that can work on both ~~OS~~
~~operat~~ ~~oper~~ operating system.



(2 marks)

1B Q3

Topics / Marks distribution

- (a) Algorithm Testing & Design (6 marks)
- (b) Algorithm Testing (3 marks)
- (c) Social Implications (2 marks)

Scenario

- *Peter designs an algorithm to encrypt an array of binary digits, A , ...*



1B Q3a

Suggested Answer

- (i) 0100
- (ii) 1001
- (iii) or $I = 1$

Marking Flexibility

(partial mark allowed)

✓ (iii) $I \leq 1$ is accepted

Candidate Performance

- (i) Good
- (ii) Satisfactory
- (iii) Fair

Teaching Strategy

*Students are good in code tracing and understanding of the requirement of scenario.
More practice can be made to the modification of algorithm.*



(a) (i) 假設 A 的初始內容是：

A[1]	A[2]	A[3]	A[4]
0	0	1	1

執行此算法後 A 的內容是什麼？

A[1]	A[2]	A[3]	A[4]
0	1	0	0



(2 分)

(ii) 假設執行此算法後 A 的內容是：

A[1]	A[2]	A[3]	A[4]
1	0	1	0

A 的初始內容是什麼？

A[1]	A[2]	A[3]	A[4]
0	1	0	1



(2 分)

(iii) 如果 A 的初始內容中的所有數值均為 1，則該算法無法正常終止。修改該算法，使其可以正常終止。

$I \leftarrow 5$
重複

$I \leftarrow I - 1$
 $A[I] \leftarrow 1 - A[I]$

直至 $(A[I] = 1)$

或

$(A[I] = 0)$



(2 分)

(i) Suppose that the initial content of A is:

A[1]	A[2]	A[3]	A[4]
0	0	1	1

What is the content of A after executing the algorithm?

A[1]	A[2]	A[3]	A[4]
0	1	0	0



(2 marks)

(ii) Suppose that the content of A after executing the algorithm is:

A[1]	A[2]	A[3]	A[4]
1	0	1	0

What is the initial content of A?

A[1]	A[2]	A[3]	A[4]
1	0	0	1



(2 marks)

(iii) The algorithm cannot terminate properly if all entries in the initial contents of A are 1. Revise the algorithm such that it can terminate properly.

$I \leftarrow 5$
repeat

$I \leftarrow I - 1$
 $A[I] \leftarrow 1 - A[I]$

until $(A[I] = 1)$

OR

$I = 0$



(2 marks)

1B Q3b

Suggested Answer

4
1
1

Marking Flexibility

1 mark per box

Candidate Performance

Satisfactory

Teaching Strategy

More practice can be made to the modification of algorithm.



(b) 志明重寫 (a)(iii) 內的算法為另一個可行算法。完成以下算法。

Flag \leftarrow 1

設 I 由 遞減至 1 執行 ✓

如果 Flag = 則 ✓
A[I] \leftarrow 1 - A[I]

如果 A[I] = 則 ✓
Flag \leftarrow 0

(3 分)

(b) Peter rewrites the algorithm in (a)(iii) as an alternative algorithm. Complete the algorithm below.

Flag \leftarrow 1

for I from down to 1 do ✗

if Flag = then ✓
A[I] \leftarrow 1 - A[I]

if A[I] = then ✓
Flag \leftarrow 0

(3 marks)



1B Q3c

Suggested Answer

People may not be easily to access the Internet. (Internet access)

People may find difficulty in operating electronic devices to learn the online materials. (Digital divide)

Candidate Performance

Fair

✓ Internet access / hardware / software / handicapped

✓ Knowledge / literacy

Marking Flexibility

Teaching Strategy

Students should try giving answers of different categories.



- (c) 志明計劃在網站上載電腦學習材料，讓社區人士自學。舉出在社會上此電子學習活動的兩個限制。

並不是每個人都有合適的裝置在網上學習。

不是每個人都有互聯網可以隨時使用。

(2 分)

- (c) Peter plans to post computer learning materials on a web site for the community to learn by themselves. Give two limitations of this e-learning activity in society.

~~The digital divide cause some disable or people from low-income family do not know how to use computer properly since they do not have enough money for buying the electronic devices.~~

~~Hard to attract disable people since the learning materials may not be suitable for them.~~ (2 marks)

- (c) 志明計劃在網站上載電腦學習材料，讓社區人士自學。舉出在社會上此電子學習活動的兩個限制。

① 貧窮的社區人士無法負擔起電腦費用以自學電腦學習材料

② 視障人士無法瀏覽電腦學習材料

康

(2 分)



1B Q4

Topics / Marks distribution

- (a) Algorithm Design (2 marks)
- (b) Data Organisation and Data Control (3 marks)
- The use of Office Automation Software
- (c) Database (3 marks)
- (c) Spreadsheets (5 marks)

Scenario

- *Ms Li has the following designs for searching for examination marks of students on a web page.*



1B Q4a

Suggested Answer

Design 1: Marks other than multiples of 10 can be entered.

One subject must be selected.

The subjects to be chosen could be added easily without changing the layout.

Design 2: It ensures that numeric data is entered in the Mark.

One or more subjects can be entered.

All options can be viewed at a glance.

Candidate Performance

Fair

Marking Flexibility

- ✗ Reduce input error
- ✗ Increase input speed / efficiency
- ✗ User friendly

Teaching Strategy

Justification should be based on the distinctive difference of the two designs.



(a) Which design is better? Give two reasons to support your answer.

Design 2 is better. It can reduce typing error. It provides more user-friendly interface. It reduce the typing time.

(2 marks)

(a) Which design is better? Give two reasons to support your answer.

Design 1. The search area of mark can be narrowed as it does not restricted by the marks provided by scroll bar.

Second, the interface is more clearly as the subject column designed as scroll bar.

(2 marks)

(a) 哪個設計較佳？舉出兩個理由以支持你的答案。

設計2較佳，設計2在分數上使用下拉式選單，能夠減少用戶輸入錯誤的可能，而在科目上則能夠讓用戶一眼看清所有選擇，節省搜尋的時間。

(2 分)



1B Q4b

Suggested Answer

(i) 10409

(ii) Double entry / print out for checking

Marking Flexibility

✓ Enter the number by 2 different persons

Candidate Performance

(i) Excellent

(ii) Satisfactory

Teaching Strategy

Students should know the difference between validation (有效性檢驗) and verification (校驗；驗證)

闡述運用有效性檢驗及奇偶檢測來偵測誤差，並運用驗證及有效性檢驗來防止出現誤差

validation
variable
verification

有效性檢驗
變量
校驗；驗證

(b) (i) 數字 46300、10409 或 10205，哪一個在 IDNO 是有效的？ 10409 ✓
(1 分)

(ii) 在 IDNO 中，數字 22012 被錯誤地輸入為 22102。建議一項對 IDNO 驗證檢查。

數據欄位檢測

✗

(1 分)

(b) (i) 數字 46300、10409 或 10205，哪一個在 IDNO 是有效的？ 10409 ✓
(1 分)

(ii) 在 IDNO 中，數字 22012 被錯誤地輸入為 22102。建議一項對 IDNO 驗證檢查。

雙重輸入，把數據輸入兩次。

✓

(1 分)

(b) (i) Which number, 46300, 10409 or 10205, is valid in IDNO? 10409 ✓
(1 mark)

(ii) The number 22012 is wrongly entered as 22102 in IDNO. Suggest a verification check for IDNO.

Double data entry.

✓

(1 mark)



1B Q4c

Suggested Answer

(i) IDNO + SUBJECT

(ii)

Chinese	70
English	88
Mathematics	90

Candidate Performance

(i) Poor

(ii) Very Good

(ii)

Group by (3 rows with correct subjects)

Average (correct calculation) + others (column order, no extra fields/symbols, correctly match)

*row order is not significant.

Marking Flexibility

Teaching Strategy

More practice on how to identify key fields under different scenarios



(c) 參考 SCORE 內已知的六筆記錄。

(i) 舉出 SCORE 的主關鍵碼。 IDNO + SUBJECT ✓ (1 分)

(ii) 執行以下 SQL 語句後的輸出是什麼？

SELECT SUBJECT, AVG(MARK) FROM SCORE GROUP BY SUBJECT

中文 70
英文 88
數學 90

(c) 參考 SCORE 內已知的六筆記錄。

(i) 舉出 SCORE 的主關鍵碼。 IDNO + SUBJECT + MARK ✗ (1 分)

(ii) 執行以下 SQL 語句後的輸出是什麼？

SELECT SUBJECT, AVG(MARK) FROM SCORE GROUP BY SUBJECT

中文 70
英文 88
數學 90

(c) Refer to the six given records in SCORE.

(i) State the primary key for SCORE. IDNO ✗

(ii) What is the output after executing the following SQL statement?

SELECT SUBJECT, AVG(MARK) FROM SCORE GROUP BY SUBJECT

Chinese 70
English 88
Mathematics 75

(2 marks)



1B Q4d

Suggested Answer

Formula :

=COUNTIF (D\$2 : D4 , D4)

Value displayed :

3

Marking Flexibility

Formula – 1 mark

Value displayed – 1 mark

Candidate Performance

Satisfactory

Teaching Strategy



- (d) 李小姐在 F2 輸入公式 =COUNTIF(D\$2:D2,D2) , 並複製到 F3:F91 。寫出在 F4 的公式和顯示值。

公式： =COUNTIF(D\$4:D4,D4) ✗

顯示值： 3 ✓

(2 分)

- (d) Ms Li enters the formula =COUNTIF(D\$2:D2,D2) in F2 and then copies it to F3:F91. Write down the formula and the displayed value in F4

Formula: =COUNTIF(D\$2:D4,D4) ✓

Displayed value: 3 ✓

(2 marks)



1B Q4e

Suggested Answer

(i) 2

(ii) It ensures that students with the same marks are of the same rank.

(ii)

Only mention 'same marks' but not mention 'with the same rank' ①

Marking Flexibility

Candidate Performance

(i) Satisfactory

(ii) Satisfactory

Teaching Strategy



(e) Ms Li enters the value 1 in G2. She enters the formula =IF(E2=E3,G2,F3) in G3 and then copies it to G4 : G91.

(i) Write down the displayed value in G4. 3 ✗
(1 mark)

(ii) Describe the purpose of the formulae in column G.

Show the number of student who get same-mark
in the same subject.

(2 marks)

(e) 李小姐在 G2 中輸入數值 1。她在 G3 輸入公式 =IF(E2=E3,G2,F3)，並複製到 G4:G91。

(i) 寫出在 G4 的顯示值。 2 ✓
(1 分)

(ii) 描述欄 G 內的公式的目的。

~~根據 RANK 中的~~ 比較科目的分數，從而進行排名 ✗

(2 分)



DSE ICT 2021 BRIEFING SESSION

Paper 1B (Q 5)



►Candidates
Performance (5 Levels)

- Excellent (優)
- Very Good (良)
- Good (常)
- Satisfactory (可)
- Poor (劣)



ICT C&A Guide

The recommended number of hours for each module and option are noted below:

Module / Option		No. of hours allocated
The Compulsory Part		145
A.	Information Processing	54
	<i>a. Introduction to Information Processing</i>	5
	<i>b. Data Organisation and Data Control</i>	4
	<i>c. Data Representation</i> ←	10
	<i>d. The Use of Office Automation Software</i>	30
	<i>e. Presentation of Information</i>	5
B.	Computer System Fundamentals	25
	<i>a. Basic Machine Organisation</i> ←	15
	<i>b. System Software</i>	4
	<i>c. Computer Systems</i>	6
C.	Internet and its Applications	24
	<i>a. The Networking and Internet Basics</i>	9
	<i>b. Internet Services and Applications</i>	7
	<i>c. Elementary Web Authoring</i>	8
D.	Basic Programming Concepts	20
	<i>a. Problem-Solving Procedures</i>	4
	<i>b. Algorithm Design</i>	13
	<i>c. Algorithm Testing</i>	3
E.	Social Implications	22
	<i>a. Equity of Access</i>	2
	<i>b. Work and Health Issues</i>	2
	<i>c. Intellectual Property</i>	6
	<i>d. Threats and Security on the Internet</i>	12



Answers written in the margins will not be marked.

	Column						
	1	2	3	4	5	6	7
Row 1							
2							
3							
4							
5							
:							
200							

	Column						
	1	2	3	4	5	6	7
Pixels to be displayed:	■	■	□	■	□	□	■
Bit pattern:	1	1	0	1	0	0	1

```
11010011  10000011  10000011  10000011  01111101
```



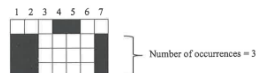
Answers written in the margins will not be marked.

2020-DSE-ICT 1B-11

11

Go on to the next page 

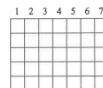
For example, 00011001 00000110 11000011 represent



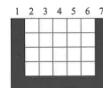
```

11111111  00000110  11010011  11111111

```



(ii) Write down the three bit patterns for representing the following display:



(iii) What is the maximum number of rows of pixels represented by two bit patterns?

(2 marks)

Answers written in the margins will not be marked.

2020-DSE-ICT 1B-12

12

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

(1 mark)

(2 marks)

(iii) In general, which method, Method 1 or Method 2, needs fewer computer resources? Explain briefly.

(2 marks)

2020-DSE-ICT 1B-13

13



Q5

5. A display consists of 15×15 pixels, as shown below:

		Column															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1																	
2																	
3																	
⋮																	
⋮																	
15																	

Each pixel displays a colour represented by a 2-bit code, as shown below:

Colour	Short form	2-bit code
Red	R	00
Green	G	01
Blue	B	10
Yellow	Y	11

- (a) How many bits are required for representing the pixels on the display? Show your calculation.

$$15 \times 15 \times 2 \text{ bits} = 450 \text{ bits}$$

① for expression ① for correct answer

(2 marks)

Candidates Performance : Satisfactory



Q5

Q5(a) Sample Scripts

number of bits = $2 \times 15 \times 15 = 450$ bits

2

$$\frac{15 \times 16}{2 \times 4} = 450 \text{ (像素)}$$

1

$15 \times 15 = 225$ 像素
 $\log_2 225 \approx 7.81$ bits
 \therefore 需要 8 位元

0

$15 \times 15 = 225 = 11011001$
 11011001 have 8 bits add 3 bits for color
so it's 11 bits

0



Q5

A computer applies an encoding scheme that each row on the display is represented by one or more bit patterns. Each bit pattern consists of 6 bits. The first 2 bits represent a colour, and the remaining 4 bits represent the number of consecutive pixels (in binary notation) of the colour.

For example, the bit pattern 110100 represents 4 consecutive yellow pixels:

$\frac{11}{Y} \quad \frac{0100}{4}$

(b) Write down the pixels that the bit pattern 100001 represents.

Colour: ① Blue/B Number of pixels: ① 1 (2 marks)

Colour	Short form	2-bit code
Red	R	00
Green	G	01
Blue	B	10
Yellow	Y	11

Q5(b) Sample Scripts

顏色：藍色 像素數目：1

2

Colour: Blue Number of pixels: 1

2

Colour: blue Number of pixels: one

2

Candidates Performance : Excellent



Q5

For example, the two bit patterns 110100 and 001011 represent a row of 15 pixels:

Y	Y	Y	Y	R	R	R	R	R	R	R	R	R	R	R
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

(c) (i) Write down the pixels represented by the following three bit patterns.

010100 100001 111010

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

G	G	G	G	B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

(2 marks)

Any one code ①

01 → G
0100₍₂₎ → 4₍₁₀₎

10 → B
0001₍₂₎ → 1₍₁₀₎

11 → Y
1010₍₂₎ → 10₍₁₀₎

Colour	Short form	2-bit code
Red	R	00
Green	G	01
Blue	B	10
Yellow	Y	11

11 → Y
0100₍₂₎ → 4₍₁₀₎
00 → R
1011₍₂₎ → 11₍₁₀₎

Q5(c)(i) Sample Scripts

G	G	G	G	B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

2

G	G	G	G	G	B	B	Y	Y	Y	Y	Y	Y	Y	Y
--------------	--------------	--------------	--------------	--------------	---	---	---	---	---	---	---	---	---	---

1

Candidates Performance : Excellent

Q5

(ii) Write down the bit patterns for representing the following pixels in a row.

[illegible]

100010 110001 101100 Any one ①

(2 marks)

Colour	Short form	2-bit code
Red	R	00
Green	G	01
Blue	B	10
Yellow	Y	11

B (2)	10	0010
Y (1)	11	0001
B (12)	10	1100

Q5(c)(ii) Sample Scripts

100010 110001 101100

2

~~000~~ | ~~000~~ * 1000 = 1000

1

Candidates Performance : Very Good



Q5

(iii) With the encoding scheme, how many bits are required for representing a row of 15 pixels in each of the following cases?

(1) All pixels are red.

6

bit pattern: 001111

(1 mark)

(2) No two adjacent pixels are of the same colour.

$15 \times 6 = 90$

- only expression ①
- only answer ②

bit pattern:

000001 100001 000001 100001
000001 100001 000001 100001
000001 100001 000001 100001
000001 100001 000001

(2 marks)

Candidates Performance : Satisfactory



Q5

Q5(c)(iii) Sample Scripts

(1) 所有像素均是紅色。

6 位元

1

(2) 沒有兩個相鄰像素是相同顏色。

90 位元

2

(1) 所有像素均是紅色。

001111

0

(2) 沒有兩個相鄰像素是相同顏色。

10000 | 11000 | 10000 | 11000 | 10000 | 11000 |
10000 | 11000 | 10000 | 11000 | 10000 | 11000 |
10000 | 11000 | 10000 |

1

(1) All pixels are red.

001111 required 6 bits

1

(2) No two adjacent pixels are of the same colour.

6 bits $\times 15 = 90$ bits

2



Q5

(iv) What computer resource should be considered for implementing the encoding scheme, other than the storage size? Explain briefly.

The computation power (CPU) should be considered because the encoding scheme involves extra computation for representation.

Other accepted answer:
CPU word length/clock rate/core/register/ RAM/
display card

(2 marks)

Candidates Performance : Satisfactory



Q5

Q5(c)(iv) Sample Scripts

需利用寄存器，将4种颜色所对应的2位元代码储存，以便电脑进行翻译以及解码。

2

(iv) 除儲存大小外，還需考慮使用什麼電腦資源來實施該編碼方案？簡略說明。

電腦的 ~~CPU~~ 需要能夠快速處理在該系統板的不同頁面不斷改變的位元，確保不會有卡頓。

2

(iv) 除儲存大小外，還需考慮使用什麼電腦資源來實施該編碼方案？簡略說明。

系統能否支援 ~~搜尋~~ 封裝該編碼方案

0



Briefing Session on DSE ICT Paper 2A 2021



Question Number	Popularity
1	93%
2	74%
3	88%
4	45%



1. An organisation holds an inter-school programming competition annually. It uses database tables SCHOOL, PSTUD and MARK to store information on schools, participating students and marks of students respectively.

The competition has two groups, the Junior group and Senior group. Participating students will be awarded a mark. There will be no record in MARK for a student who is absent from the competition.

SCHOOL

Field name	Type	Description	Example
SID	Character	School code	S0013
SNAME	Character	Name of school	ABC Government Secondary School

PSTUD

Field name	Type	Description	Example
SID	Character	School code	S0013
PID	Character	Identity code of student	P2020023
PNAME	Character	Name of student	Chan Siu Man
FIRST	Boolean	The student enrolls in the competition for the first time	TRUE
GP	Character	Junior group (J) or Senior group (S)	J

MARK

Field name	Type	Description	Example
PID	Character	Identity code of student	P2020023
SMARK	Integer	Mark awarded in the competition	74

Write SQL statements to complete the following tasks from (a) to (c) below.

- (a) List the names of the students who come from the school with the school code 'S0013'.

(a)

```
SELECT PNAME FROM PSTUD
WHERE SID = 'S0013'
```

①

① all correct

2

(a) Very good. A very high proportion of the candidates provided the correct SQL statement.

(2 marks)



An organisation holds an inter-school programming competition annually. It uses database tables SCHOOL, PSTUD and MARK to store information on schools, participating students and marks of students respectively.

The competition has two groups, the Junior group and Senior group. Participating students will be awarded a mark. There will be no record in MARK for a student who is absent from the competition.

SCHOOL

Field name	Type	Description	Example
SID	Character	School code	S0013
SNAME	Character	Name of school	ABC Government Secondary School

PSTUD

Field name	Type	Description	Example
SID	Character	School code	S0013
PID	Character	Identity code of student	P2020023
PNAME	Character	Name of student	Chan Siu Man
FIRST	Boolean	The student enrolls in the competition for the first time	TRUE
GP	Character	Junior group (J) or Senior group (S)	J

MARK

Field name	Type	Description	Example
PID	Character	Identity code of student	P2020023
SMARK	Integer	Mark awarded in the competition	74

Write SQL statements to complete the following tasks from (a) to (c) below.

- (a) List the names of the students who come from the school with the school code 'S0013'.

```
SELECT PID, SID FROM PSTUD
WHERE SID = S0013
```

(2 marks)



An organisation holds an inter-school programming competition annually. It uses database tables SCHOOL, PSTUD and MARK to store information on schools, participating students and marks of students respectively.

The competition has two groups, the Junior group and Senior group. Participating students will be awarded a mark. There will be no record in MARK for a student who is absent from the competition.

SCHOOL

Field name	Type	Description	Example
SID	Character	School code	S0013
SNAME	Character	Name of school	ABC Government Secondary School

PSTUD

Field name	Type	Description	Example
SID	Character	School code	S0013
PID	Character	Identity code of student	P2020023
PNAME	Character	Name of student	Chan Siu Man
FIRST	Boolean	The student enrolls in the competition for the first time	TRUE
GP	Character	Junior group (J) or Senior group (S)	J

MARK

Field name	Type	Description	Example
PID	Character	Identity code of student	P2020023
SMARK	Integer	Mark awarded in the competition	74

Write SQL statements to complete the following tasks from (a) to (c) below.

- (a) List the ^①(names of the students) who come from the school with the school code 'S0013'.

```
SELECT PNAME FROM PSTUD
WHERE SID = "%S0013%";
```



(b) Find the total number of students who come from the schools with names including 'Government'.

(3 marks)

(c) List the names of students in the Junior group who get a mark greater than or equal to 60.

(3 marks)

(d) What is the purpose of the following SQL statement?

```
SELECT PID, PNAME FROM PSTUD
WHERE GP = 'S' AND FIRST
AND PID NOT IN (SELECT PID FROM MARK)
```

(2 marks)

(b) `SELECT COUNT(PID)` ① or `COUNT(*)`
`FROM SCHOOL, PSTUD`
`WHERE SCHOOL.SID = PSTUD.SID AND SNAME LIKE '%GOVERNMENT%'`
① ①

Alternative:

```
SELECT COUNT(*) FROM PSTUD
WHERE SID IN (SELECT SID FROM SCHOOL
              WHERE SNAME LIKE '%GOVERNMENT%')
```

(c) `SELECT PNAME FROM`
`PSTUD P, MARK M` ①
`WHERE P.PID = M.PID AND GP='J'` ①
`AND SMARK >= 60` ①

(d) Find the first-time participating students of the Senior group who are absent from the competition (or no marks).

① ① ① (2 out of 3)



(b)

Good. Weaker candidates did not use the `COUNT` function in their answers.

(c)

Very good.

(d)

Excellent. Nearly all candidates were able to interpret the SQL statement and give the purpose.



(b) 找出來自學校名稱包含「官立」的學生總人數。

```
SELECT SNAME, COUNT(PID)
FROM SCHOOL.S INNER JOIN PSTUD.P
ON S.SID = P.SID
GROUP BY PID
HAVING SNAME LIKE "%官立%";
```

(3 分)

(c) 列出初級組獲得分數 60 分或以上的學生姓名。

```
SELECT PNAME, MARK
FROM PSTUD.P INNER JOIN MARK.M
ON P.PID = M.PID
WHERE GP = "J" AND MARK >= 60;
```

(3 分)

(d) 以下 SQL 語句的目的是什麼？

```
SELECT PID, PNAME FROM PSTUD
WHERE GP = 'S' AND FIRST
AND PID NOT IN (SELECT PID FROM MARK)
```

列出學生識別碼和學校編碼，當該學生在高中組不是第一次比賽。

(2 分)



- (b) Find the total number of students who come from the schools with names including 'Government'.

```
SELECT SID, SNAME FROM SCHOOL
WHERE SNAME = 'Government'
AND AND SUM SID
```

(3 marks)

- (c) List the names of students in the Junior group who get a mark greater than or equal to 60.

```
SELECT SNAME, FROM PID FROM MARK,
GP FROM PSTUD.
WHERE GP = J
WHERE SNAME >= 60
```

(3 marks)

- (d) What is the purpose of the following SQL statement?

```
SELECT PID, PNAME FROM PSTUD
WHERE GP = 'S' AND FIRST
AND PID NOT IN (SELECT PID FROM MARK)
```

Listing the students who are seniors and
do not have record in PSTUD.

(2 marks)



(e) Complete the following SQL statement for finding the sum of the marks of the students in each school.

```
SELECT S.SID, _____ AS TOTAL
FROM SCHOOL S, PSTUD P, MARK M
WHERE _____
_____
GROUP BY _____
```

(3 marks)

Database table TM stores the results of the SQL statement in (e).

TM

Field name	Type	Description
SID	Character	School code
TOTAL	Integer	The sum of the marks of students

(f) A school will be awarded a certificate if the sum of the marks of its students is the highest among the schools. Write a SQL statement with TM to find the name(s) of school(s) that will be awarded a certificate.

(e)

Good.

(f)

Satisfactory. Weaker candidates did not provide sub-queries and the MAX function in their answers.

(2 marks)

(e) SUM(SMARK)
S.SID = P.SID and P.PID = M.PID
S.SID

(f) SELECT SNAME FROM TM, SCHOOL S
WHERE TM.SID = S.SID AND
TOTAL IN (SELECT MAX(TOTAL) FROM TM)
↑
=

Alternative:

SELECT SNAME FROM SCHOOL
WHERE SID IN (SELECT SID FROM TM
WHERE TOTAL IN (SELECT MAX(TOTAL) FROM TM))

- ① a proper table join
 - ① correct use of IN
 - ① SELECT statement
- (2 out of 3)



(e) 完成以下 SQL 語句，以列出每所學校的學生分數總和。

```
SELECT S.SID, _____ SMARK _____ AS TOTAL
FROM SCHOOL S, PSTUD P, MARK M
WHERE _____ S.SID = P.SID _____
          _____ P.PID = M.PID _____
GROUP BY _____ SID _____
```

(3 分)

數據庫表 TM 儲存 (e) 內 SQL 語句的結果。

TM

欄名	類型	描述
SID	字符	學校編碼
TOTAL	整數	學生分數總和

(f) 若學校的學生分數總和為所有學校中最高者，將會獲得證書一張。寫出包含 TM 的 SQL 語句以找出獲得證書的學校名稱。

```
SELECT SNAME, SUM(MARK)
FROM SCHOOL S, PSTUD P, MARK M
WHERE S.SID = P.SID
      P.PID = M.PID
GROUP BY SNAME
HAVING MAX(MARK) >
```

(2 分)



- (e) Complete the following SQL statement for finding the sum of the marks of the students in each school.

SELECT S.SID, P.PID, Sum(M.MARK) AS TOTAL

FROM SCHOOL S, PSTUD P, MARK M

WHERE M.PID = PSTUD.PID and PSTUD.SID = S.SID

GROUP BY SID

(3 marks)

Database table TM stores the results of the SQL statement in (e).

TM

Field name	Type	Description
SID	Character	School code
TOTAL	Integer	The sum of the marks of students

- (f) A school will be awarded a certificate if the sum of the marks of its students is the highest among the schools. Write a SQL statement with TM to find the name(s) of school(s) that will be awarded a certificate.

Select SNAME from SCHOOL where SID IN
(Select ~~SID~~ max(Total) SID from TM group
by SID having max(Total))

(2 marks)



2. A library uses database tables READER, BOOK, CIR and BKCOPY to store information on readers, books, circulation and copies of books respectively.

READER

Field name	Description	Example
RID	Identity code of reader	R0132
NAME	Name	Chan Tai Man

BOOK

Field name	Description	Example
BID	Identity code of book	B102
TITLE	Title	A Brief History of Time
CAT	Category	Science
AUTHOR	Author	Stephen Hawking

- (a) ITEMNO + DOB
ITEMNO + DOR

CIR

Field name	Description	Example
ITEMNO	Item number	B102C1
RID	Identity code of reader	R0132
DOB	Timestamp of borrowing	1/12/2020 10:20
DOR	Timestamp of return	20/12/2020 15:30
FINE	Overdue fine (\$5 per day)	25

- (b) (i) FINE is the derived attribute of CIR. FINE can be calculated by DOB and DOR.

BKCOPY

Field name	Description	Example
ITEMNO	Item number	B102C1
BID	Identity code of book	B102
DOP	Date of purchase	15/10/1990

Books in the library can be borrowed for a period of 14 days. There may be several copies of certain books and each copy has a unique item number ITEMNO stored in BKCOPY.

- (a) Identify two candidate keys of CIR.

(1) _____

(2) _____

- (a) Poor. Only a small number of the candidates were able to identify the candidate keys of compound attributes. Some candidates wrongly thought that RID was sufficient to act as a candidate key.

- (b) Satisfactory.

(4 marks)

- (b) (i) Which field can be regarded as a derived attribute? Explain briefly.

(2 marks)

1
1

1 × 2



某圖書館使用數據庫表 READER、BOOK、CIR 和 BKCOPY 來分別儲存讀者、書籍、書籍借閱和書籍冊數的資料。

READER

欄名	描述	例子
RID	讀者識別碼	R0132
NAME	姓名	陳大文

BOOK

欄名	描述	例子
BID	書籍識別碼	B102
TITLE	標題	時間簡史
CAT	類別	科學
AUTHOR	作者	史提芬霍金

CIR

欄名	描述	例子
ITEMNO	編號	B102C1
RID	讀者識別碼	R0132
DOB	借書之時間戳記	1/12/2020 10:20
DOR	還書之時間戳記	20/12/2020 15:30
FINE	逾期罰款(每天\$5)	25

BKCOPY

欄名	描述	例子
ITEMNO	編號	B102C1
BID	書籍識別碼	B102
DOP	購買日期	15/10/1990

圖書館的書籍借閱期為 14 天，部分書籍可能有多冊，而每一冊均有一個獨一無二的編號 ITEMNO 儲存在 BKCOPY 內。

(a) 舉出 CIR 的兩個候選鍵碼。

(1) ITEMNO

(2) RID

(2 分)

(b) (i) 哪個欄位可被視為衍生屬性？簡略說明。

DOR 和 FINE，因為還書之時間過期時也能得知罰款。
逾期

(2 分)



A library uses database tables READER, BOOK, CIR and BKCOPY to store information on readers, books, circulation and copies of books respectively.

READER

Field name	Description	Example
RID	Identity code of reader	R0132
NAME	Name	Chan Tai Man

BOOK

Field name	Description	Example
BID	Identity code of book	B102
TITLE	Title	A Brief History of Time
CAT	Category	Science
AUTHOR	Author	Stephen Hawking

CIR

Field name	Description	Example
ITEMNO	Item number	B102C1
RID	Identity code of reader	R0132
DOB	Timestamp of borrowing	1/12/2020 10:20
DOR	Timestamp of return	20/12/2020 15:30
FINE	Overdue fine (\$5 per day)	25

BKCOPY

Field name	Description	Example
ITEMNO	Item number	B102C1
BID	Identity code of book	B102
DOP	Date of purchase	15/10/1990

Books in the library can be borrowed for a period of 14 days. There may be several copies of certain books and each copy has a unique item number ITEMNO stored in BKCOPY.

(a) Identify two candidate keys of CIR.

(1) ITEMNO + RID + DOB

(2) ITEMNO + RID + DOR

(2 marks)

(b) (i) Which field can be regarded as a derived attribute? Explain briefly.

Fine, the overdue fine is \$5 per day, depending on the relationship between DOB and DOR, if the period between DOB and DOR exceeds 14 days, each extra day will cost \$5 and sum up in fine

(2 marks)



(ii) State a reason for having a derived attribute in a database.

(1 mark)

(c) The requirements of the database are described below:

Each reader may borrow a maximum of 5 books. Some readers may not have borrowed any books from the library. Some books may never be borrowed. There is more than one copy of some books.

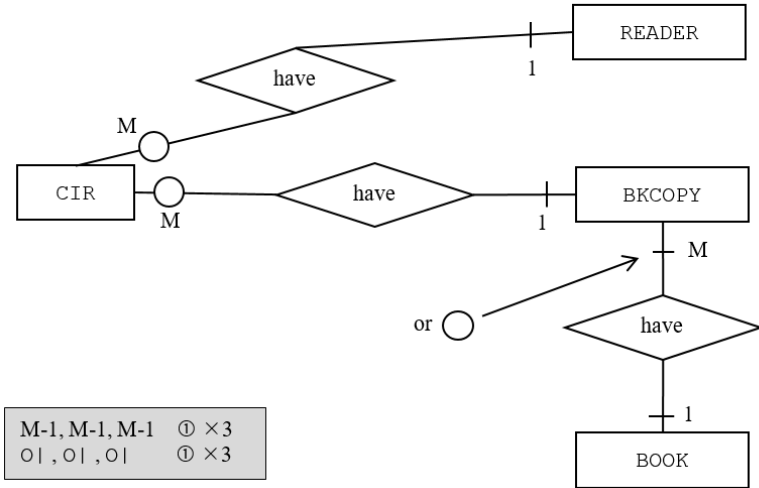
Complete the ER diagram below for this database. It is not necessary to draw attributes.



(6 marks)

(ii) It can increase query efficiency because there is no need to calculate the value FINE every time when running a query.

(c)



M-1, M-1, M-1 ① × 3
01, 01, 01 ① × 3

(c)

Satisfactory.

1

6



(ii) 寫出一個支持在數據庫內設有衍生屬性的理由。

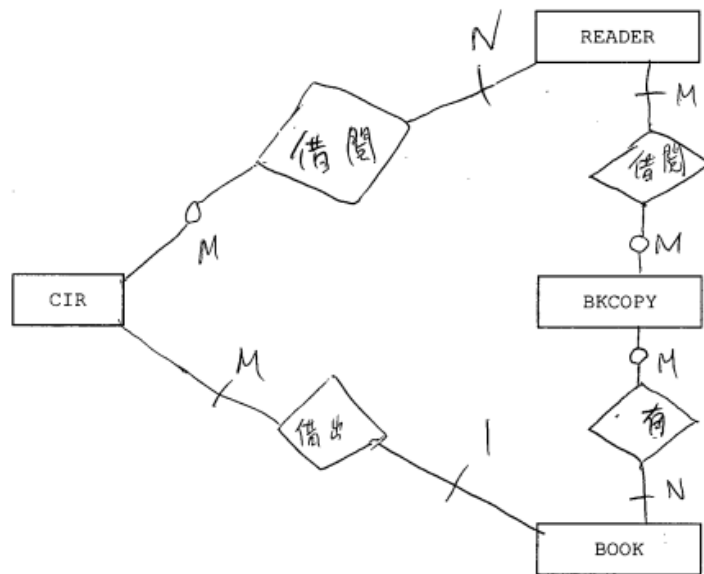
能深入了解欄位的目的。

(1 分)

(c) 此數據庫的要求如下所述：

每位讀者最多可以借閱 5 本書籍。有些讀者從來沒有在圖書館借閱書籍。
有些書籍可能從來沒有被借出。有些書籍有多於一冊。

完成以下此數據庫的實體關係圖。圖內不用畫上屬性。



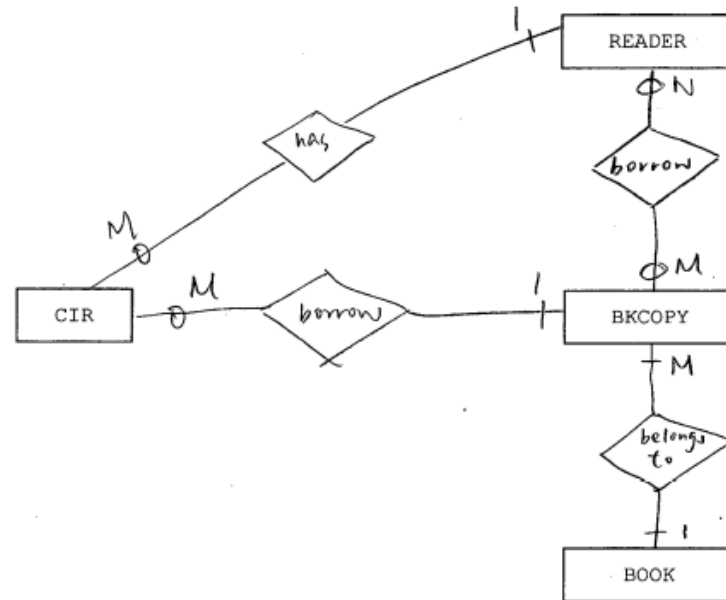
(ii) State a reason for having a derived attribute in a database.

Easier for view, no need to spend extra time
and effort to calculate the result, it can be compared
and seen or adjusted based on the
derived attribute easily. (1 mark)

(c) The requirements of the database are described below:

Each reader may borrow a maximum of 5 books. Some readers may not have borrowed any books from the library. Some books may never be borrowed. There is more than one copy of some books.

Complete the ER diagram below for this database. It is not necessary to draw attributes.



Part of the records in the database are as follows:

READER

RID	NAME
R0132	Chan Tai Man
R0124	Lee Ka Ka
R0155	Lee Ka Ka

Primary key: RID

CIR

ITEMNO	RID	DOB	DOR	FINE
B102C1	R0132	1/12/2020	20/12/2020	25
B134C1	R0132	20/12/2020		
B134C2	R0124	11/12/2020	18/12/2020	0

(d) Explain the integrity problem in the database for each of the following cases.

(i) RID in CIR is replaced by NAME.

(d) (i) It is because NAME is not unique, two students may have the same name,
① unique ① elaboration
(① only state 'entity integrity')

2

(ii) R0132 in CIR cannot be identified.

① concept of referential integrity ① elaboration

2

(2 marks)

(ii) The record of the reader 'Chan Tai Man' in READER is deleted.

(d)

Satisfactory. In general, candidates identified and explained the entity integrity problem properly. Weaker candidates were not able to explain the referential integrity problem clearly.

(2 marks)



數據庫內部分記錄如下：

READER

RID	NAME
R0132	陳大文
R0124	李嘉嘉
R0155	李嘉嘉

主關鍵碼：RID

CIR

ITEMNO	RID	DOB	DOR	FINE
B102C1	R0132	1/12/2020	20/12/2020	25
B134C1	R0132	20/12/2020		
B134C2	R0124	11/12/2020	18/12/2020	0

(d) 在以下各情況下，解釋數據庫內的完整性問題。

(i) 在 CIR 中 RID 被 NAME 取代。

NAME 不是獨一無二，因此會有數據不一致的問題。

(2 分)

(ii) 在 READER 中讀者「陳大文」的記錄被刪除。

在 READER 中讀者「陳大文」的記錄被刪除，但 CIR 仍未被刪除，因此造成更新異常的問題。

(2 分)



Part of the records in the database are as follows:

READER

RID	NAME
R0132	Chan Tai Man
R0124	Lee Ka Ka
R0155	Lee Ka Ka

Primary key: RID

CIR

ITEMNO	RID	DOB	DOR	FINE
B102C1	R0132	1/12/2020	20/12/2020	25
B134C1	R0132	20/12/2020		
B134C2	R0124	11/12/2020	18/12/2020	0

(d) Explain the integrity problem in the database for each of the following cases.

(i) RID in CIR is replaced by NAME.

When RID in CIR is replaced by NAME, the records in table CIR will mix up. For example, in table READER, R0124 and R0155 have the same name Lee Ka Ka.

(2 marks)

(ii) The record of the reader 'Chan Tai Man' in READER is deleted.

If record of the reader 'Chan Tai Man' in READER is deleted, deletion anomaly occurred. For example, we can't find the name of people with RID R0132 in table CIR.

(2 marks)



3. John and Mary organise a singing contest in a school. Students join the contest in teams. The database tables SONG and TEAM are used to store information on songs and teams respectively.

SONG

Field name	Description	Example
SID	Identity code of song	0117
TITLE	Song title	Happy birthday
DS	Duration of song	6:15

Primary key: SID

TEAM

Field name	Description	Example
TID	Identity code of team	024
TNAME	Team name	Rainbow
SEQ	Order of performance	8
TMARK	Mark awarded in the contest	78

Primary key: TID

- (a) (i) Complete the following SQL statement for preventing the same order of performance from entering in SEQ.

```
CREATE TABLE TEAM (TID char(3) primary key,  
                    TNAME char(30),  
                    SEQ int _____,  
                    TMARK int NOT NULL)
```

(1 mark)

- (ii) What is the pros and cons of using NOT NULL constraint on TMARK in the SQL statement above?

(a)

Satisfactory. Candidates were able to provide the pros and cons of the 'NOT NULL' constraint properly. Weaker candidates did not use UNIQUE in answering the constraint.

(2 marks)



志偉和莉莉在校內籌備一個歌唱比賽，同學組成隊伍參加比賽。數據庫表 SONG 和 TEAM 分別儲存歌曲和隊伍的資料。

SONG

欄名	描述	例子
SID	歌曲識別碼	0117
TITLE	曲目	生日快樂
DS	歌曲時間長度	6:15

主關鍵碼：SID

TEAM

欄名	描述	例子
TID	隊伍識別碼	024
TNAME	隊伍名稱	彩虹
SEQ	表演次序	8
TMARK	比賽得分	78

主關鍵碼：TID

(a) (i) 完成以下 SQL 語句以防止在 SEQ 中輸入相同的表演次序。

```
CREATE TABLE TEAM (TID char(3) primary key,  
                    TNAME char(30),  
                    SEQ int NOT NULL,  
                    TMARK int NOT NULL)
```

(1 分)

(ii) 在以上 SQL 語句內的 TMARK 使用 NOT NULL 限制的優點和缺點是什麼？

優點：容易計算比賽的排名。

缺點：如有些隊伍沒有參加就不能計算，
但 NOT NULL 必須顯示比賽得分，此會有數據不一致的問題。

(2 分)



John and Mary organise a singing contest in a school. Students join the contest in teams. The database tables SONG and TEAM are used to store information on songs and teams respectively.

SONG

Field name	Description	Example
SID	Identity code of song	0117
TITLE	Song title	Happy birthday
DS	Duration of song	6:15

Primary key: SID

TEAM

Field name	Description	Example
TID	Identity code of team	024
TNAME	Team name	Rainbow
SEQ	Order of performance	8
TMARK	Mark awarded in the contest	78

Primary key: TID

- (a) (i) Complete the following SQL statement for preventing the same order of performance from entering in SEQ.

```
CREATE TABLE TEAM (TID char(3) primary key,  
                    TNAME char(30),  
                    SEQ int NOT NULL,  
                    TMARK int NOT NULL)
```

(1 mark)

- (ii) What are the pros and cons of using NOT NULL constraint on TMARK in the SQL statement above?

In benefit, TMARK must be filled in and no records are null : to make sure the editor don't miss it. On the other hand, there may not marks can be given when the students join the contest for the first time.

(2 marks)



- (b) SONG and TEAM contain some records. John and Mary propose two methods that both use SID to link the two database tables together.

Method 1: Dropping TEAM and then re-creating this table with SID.

Method 2: Changing the structure of TEAM with SQL statements.

- (i) What are the consequences of using Method 1? (b) (i) Data loss (all data entered will be dropped)
Re-enter or insert data.
Need to set indexes when re-creating the table.
referential integrity issue

1 × 2

- (ii) FOREIGN REFERENCES

1, 1

(2 marks)

- (ii) Complete the following SQL statements for Method 2.

ALTER TABLE TEAM
ADD column SID char(4)

- (b) Satisfactory. A quarter of the candidates completed the SQL statement with FOREIGN and REFERENCES correctly.

ALTER TABLE TEAM
ADD _____ key (SID) _____ SONG(SID)

(2 marks)



- (b) SONG 和 TEAM 已載有一些記錄，志偉和莉莉建議兩個方法，均利用 SID 把這兩個數據庫表連結起來。

方法 1：把 TEAM 刪除，然後再重新建構此數據庫表，並加入 SID。

方法 2：使用 SQL 語句來修改 TEAM 的結構。

- (i) 使用方法 1 的後果是什麼？

需要完成的工作量比方法 2 多，甚至遺失數據（例如沒有事先記錄的數據刪除 TEAM）
TEAM 內

(2 分)

- (ii) 完成以下方法 2 的 SQL 語句。

ALTER TABLE TEAM

ADD column SID char(4)

ALTER TABLE TEAM

ADD Foreign key (SID) 70 SONG(SID)

(2 分)



- (b) SONG and TEAM contain some records. John and Mary propose two methods that both use SID to link the two database tables together.

Method 1: Dropping TEAM and then re-creating this table with SID.

Method 2: Changing the structure of TEAM with SQL statements.

- (i) What are the consequences of using Method 1?

If dropping TEAM, people can't recognise the TID represent to which team name.

(2 marks)

- (ii) Complete the following SQL statements for Method 2.

ALTER TABLE TEAM

ADD column SID char(4)

ALTER TABLE TEAM

ADD foreign key (SID) references SONG (SID)

(2 marks)



STUDENT is a database table that stores the information on students.

STUDENT

Field name	Description	Example
STUDID	Identity code of student	2018103
NAME	Student name	Chan Ka Yan
TEL	Phone number	34567890

Primary key: STUDID

Students join the contest in teams of two to four members. There is only one team leader in each team. John and Mary propose two different methods to store the information on team leaders and team members.

(c) Mary proposes additional fields in TEAM, as shown below:

Field name	Description	Example
TID	Identity code of team	024
TNAME	Team name	Rainbow
SEQ	Order of performance	8
SID	Identity code of song	0117
TMARK	Mark awarded in the contest	78
LEADER	Identity code of student who is the team leader	2018103
MEM1	Identity code of student who is team member 1	2018112
MEM2	Identity code of student who is team member 2	2018120
MEM3	Identity code of student who is team member 3	

(i) To store team information, John proposes a new database table consisting of TID, an existing field and a new Boolean field. Complete the following design of the table proposed by John.

Field name	Description
TID	Identity code of team

(2 marks)

(ii) Give one advantage of John's proposal over Mary's proposal.

(1 mark)

(iii) Give one advantage of Mary's proposal over John's proposal.

(1 mark)

- (c) (i)

STUDID Identity code of student
ROLE Role in the team (True for leader, False for member)
(reasonable description)

1
1
- (ii)

No repeated fields / No fields without values / No (reduce) data redundancy

1
- (iii)

Fewer tables / SQL operations are needed and it is more efficient to manipulate the tables.

1

Satisfactory. Weaker candidates did not give the advantages of the designs properly and wrote some brief and general descriptions about the proposals. Candidates should answer (ii) and (iii) from a technical point of view.



STUDENT 是儲存學生資料的數據庫表。

STUDENT

欄名	描述	例子
STUDID	學生識別碼	2018103
NAME	學生姓名	陳嘉恩
TEL	電話號碼	34567890

主關鍵碼：STUDID

學生以二至四人為一隊參加歌唱比賽，每隊只有一位隊長。志偉和莉莉提出兩個不同的方法儲存隊長和隊員的資料。

(c) 莉莉建議在 TEAM 增加欄位，如下所示：

欄名	描述	例子
TID	隊伍識別碼	024
TNAME	隊伍名稱	彩虹
SEQ	表演次序	8
SID	歌曲識別碼	0117
TMARK	比賽得分	78
LEADER	隊長的學生識別碼	2018103
MEM1	隊員 1 的學生識別碼	2018112
MEM2	隊員 2 的學生識別碼	2018120
MEM3	隊員 3 的學生識別碼	

(i) 志偉建議以一個新數據庫表來儲存隊伍的資料，表內包含 TID、一個現存的欄和一個新的布爾類型的欄。完成以下由志偉建議的數據庫表的設計。

欄名	描述
TID	隊伍識別碼
STUDID	學生識別碼
BOOLEAN	分辨隊長和隊員識別碼

(2 分)

(ii) 舉出志偉的建議勝於莉莉的建議的一個優點。

容易理解，亦沒有重複群組。

(1 分)

(iii) 舉出莉莉的建議勝於志偉的建議的一個優點。

容易分辨隊長和隊員的資料，然後儲存。
各個

(1 分)



STUDENT is a database table that stores the information on students.

STUDENT

Field name	Description	Example
STUDID	Identity code of student	2018103
NAME	Student name	Chan Ka Yan
TEL	Phone number	34567890

Primary key: STUDID

Students join the contest in teams of two to four members. There is only one team leader in each team. John and Mary propose two different methods to store the information on team leaders and team members.

(c) Mary proposes additional fields in TEAM, as shown below:

Field name	Description	Example
TID	Identity code of team	024
TNAME	Team name	Rainbow
SEQ	Order of performance	8
SID	Identity code of song	0117
TMARK	Mark awarded in the contest	78
LEADER	Identity code of student who is the team leader	2018103
MEM1	Identity code of student who is team member 1	2018112
MEM2	Identity code of student who is team member 2	2018120
MEM3	Identity code of student who is team member 3	

- (i) To store team information, John proposes a new database table consisting of TID, an existing field and a new Boolean field. Complete the following design of the table proposed by John.

Field name	Description
TID	Identity code of team
LEADER	Identity code of team leader
MEM	Identity code of team members

(2 marks)

- (ii) Give one advantage of John's proposal over Mary's proposal.

Reduce data redundancy.

(1 mark)

- (iii) Give one advantage of Mary's proposal over John's proposal.

More details show in the database table.

(1 mark)



John wants to post a report about the results of the competition online for the public, as shown below:

Results of the competition

Order of Performance	Team	Song Identity Code	Song title	Student Identity Code	Student Name	Phone	Mark
1	Rainbow	0117	Happy birthday	2018103	Chan Ka Yan	34567890	78
1	Rainbow	0117	Happy birthday	2018112	Wong Ka Ming	23456789	78
1	Rainbow	0117	Happy birthday	2018120	Li Lai Kit	98765432	78
2	Thunder	0115	One day	2017138	Cheung Hoi Yan	22334455	80

⋮

Mary improves the report to meet the following requirements:

- To maintain data privacy
- To show the champion, first runners-up and second runners-up only
- To reduce redundant information
- To make the layout more readable

(d) Re-design the report and annotate your design, where appropriate.

- (d)
- Create an appropriate layout
 - Reduce unwanted columns
 - Show the champion, first runners-up, and second runners-up only (single row for each entry with/without student names)
 - Describe the design accordingly (private information / redundant data)

1 × 4

(d) Good. Candidates in general were able to provide an improved design that met the requirements. Weaker candidates did not write the proper annotation of their designs.



X 比賽結果 X X X X							
表演次序	隊伍	歌曲識別碼	曲目	學生識別碼	學生姓名	電話	分數
1	彩虹	0117	生日快樂	2018103	陳嘉恩	34567890	78
1	彩虹	0117	生日快樂	2018112	王嘉銘	23456789	78
1	彩虹	0117	生日快樂	2018120	李麗潔	98765432	78
2	閃電	0115	一天	2017138	張凱恩	22334455	80

莉莉改良這份報告，以符合以下要求：

- 維護數據私隱
- 只顯示冠、亞、季軍
- 減少多餘的資料
- 使版面更易讀

(d) 重新設計這份報告，並在你的設計上加上適當的註解。

校內歌唱比賽結果

冠軍	隊伍名稱	曲目
亞軍	隊伍名稱	曲目
季軍	隊伍名稱	曲目

刪減歌曲識別碼、學生識別碼，因為這些對公眾來說是無用數據，刪減學生姓名及電話為保障學生私隱和版面更易讀，公眾只需知道冠亞季軍所以不顯示分數。



John wants to post a report about the results of the competition online for the public, as shown below:

Results of the competition							
Order of Performance	Team	Song Identity Code	Song title	Student Identity Code	Student Name	Phone	Mark
1	Rainbow	0117	Happy birthday	2018103	Chan Ka Yan	34567890	78
1	Rainbow	0117	Happy birthday	2018112	Wong Ka Ming	23456789	78
1	Rainbow	0117	Happy birthday	2018120	Li Lai Kit	98765432	78
2	Thunder	0115	One day	2017138	Cheung Hoi Yan	22334455	80

Mary improves the report to meet the following requirements:

- To maintain data privacy
- To show the champion, first runners-up and second runners-up only
- To reduce redundant information
- To make the layout more readable

(d) Re-design the report and annotate your design, where appropriate.

Order of Performance	Team	Song	Mark	Member
First runners up	Thunder	Happy birthday	80	Cheung Hoi Yan
Second runners up	Rainbow	One day	78	Chan Ka Yan Wong Ka Ming Li Lai Kit

It decrease the data redundant information of Song title, Team Name. Also it do not show the private information such as phone number and student ID. However, it clearly show the performance of conteste without the unnecessary information such as Song ID.



4.

P and Q are two large chain stores. Recently P acquired Q. Their membership databases will be merged in one of the stages of the database application development lifecycle.

(a) Tim is responsible for most of the work in the requirements collection and analysis stage.

(i) What database personnel should Tim be? _____
(1 mark)

(ii) Describe **two** deliverables for this stage.

(2 marks)

MEMP and MEMQ are database tables with the same field names that store information on members of P and Q respectively.

MEMP

Field name	Description	Example
MID	Identity code of member	K123456789
NAME	Member name	Wong Siu Mei
TEL	Phone number	98761234
GENDER	F = Female, M = Male	F

MEMQ

Field name	Description	Example
MID	Identity code of member	QQ456
NAME	Member name	Wong Siu Mei
TEL	Phone number	98761234
GENDER	0 = Female, 1 = Male	0

(a) (i) Database/Data developer/specialist/analyst

1

(ii) Schema analysis, ER diagram, DFD (data flow diagram), user requirement specification (or examples of relevant deliverables)

1 × 2

(b) Same field with different data format (MID)

1 × 3

Same field with different data length (MID)

Same field with different data type (GENDER)

Duplicated member in the two data tables (i.e. same person in the two original tables)

(b) According to MEMP and MEMQ, give **three** examples to explain why data conversion is necessary.

(a)

Poor. Only a quarter of the candidates answered correctly. Candidates gave some deliverables irrelevant to the context or something that were not deliverables at all.

(b)

Fair. Weaker candidates provided answers which were not related to data conversion.

(3 marks)



P 和 Q 是兩間大型連鎖店，最近 P 收購了 Q。它們的會員數據庫將於數據庫應用系統發展周期的其中一個階段內合併。

(a) 子添負責大部分要求收集及分析階段的工作。

(i) 子添應該是什麼數據庫的工作人員？

數據庫人員

(1 分)

(ii) 描述此階段的兩項交付成果。

收集員工資料和店址業績

將兩間連鎖店的職員資料和業績合併形成新的數據庫

(2 分)

MEMP 和 MEMQ 擁有相同欄名的數據庫表，它們分別儲存 P 和 Q 的會員資料。

MEMP

欄名	描述	例子
MID	會員識別碼	K123456789
NAME	會員姓名	王小美
TEL	電話號碼	98761234
GENDER	F = 女, M = 男	F

MEMQ

欄名	描述	例子
MID	會員識別碼	QQ456
NAME	會員姓名	王小美
TEL	電話號碼	98761234
GENDER	0 = 女, 1 = 男	0

(b) 根據 MEMP 和 MEMQ，舉出三個例子以解釋為何需要數據轉換。

轉換 MID 以將兩間連鎖店的會員識別碼合併，避免出現數據不一致（同一會員有兩個識別碼）。

轉換 GENDER 以將兩間連鎖店的會員性別的貯存標記統一，避免出現不一致（有些會員以 0/1 表示性別，有些會員以 F/M 表示）。

會員姓名和電話號碼刪減至剩 1 個，避免重複欄位。



P and Q are two chain stores. Recently P acquired Q. Their membership databases will be merged in one of the stages of the database application development lifecycle.

(a) Tim is responsible for most of the work in the requirements collection and analysis stage.

(i) What database personnel should Tim be? System Developer (1 mark)

(ii) Describe two deliverables for this stage.

The amount of membership data that has to be merged together and the storage needed for the data
Not building database (2 marks)

MEMP and MEMQ are database tables with the same field names that store information on members of P and Q respectively.

MEMP

Field name	Description	Example
MID	Identity code of member	K123456789
NAME	Member name	Wong Siu Mei
TEL	Phone number	98761234
GENDER	F = Female, M = Male	F

MEMQ

Field name	Description	Example
MID	Identity code of member	QQ456
NAME	Member name	Wong Siu Mei
TEL	Phone number	98761234
GENDER	0 = Female, 1 = Male	0

(b) According to MEMP and MEMQ, give three examples to explain why data conversion is necessary.

Firstly, the gender attribute's example use different data in both tables. The boolean in MEMP ~~is~~ use F/M for gender while MEMQ used 0/1. This will result in different type of data indicating the same gender.
Secondly, Both tables use different ~~length~~ length for its MID. The length of the identity codes are different for both tables. Thus needing data conversion. Thirdly, the format of the MID is also different. MEMP has only one alphabet while MEMQ allows two alphabets. Data conversion is necessary to define its method. (3 marks)



(c) Tim considers the following two methods to merge two database tables.

Method 1: Use SQL statements to do the merging.

Method 2: Using a general programming language to write a program to do the merging.

(i) Give an advantage of Method 1 over Method 2.

(c) (i) It can be simple and easy to implement when the table structures are simple. (less time for development)

1

(ii) Data conflict or membership redundancy can be easily handled. (coding flexibility)

1

(ii) Give an advantage of Method 2 over Method 1.

(d) Prepare/Clean data.
Conduct analysis or estimation using the data.
Utilise a sales strategy for improving the business.

1

1

1

(1 mark)

(d) Describe how data mining can be used to determine sales strategies.

(c)

Poor. Candidates were weak in understanding the database application development lifecycle.

(d)

Fair. Weaker candidates attempted to describe sales strategies using data mining techniques but did not involve the data in the chain stores properly.

(3 marks)



(c) 子添考慮運用以下兩個方法，將兩個數據庫表合併。

方法 1：利用 SQL 語句來進行合併。

方法 2：以一般程式編寫語言編寫一個程式，來進行合併。

(i) 舉出方法 1 勝於方法 2 的一個優點。

無需使用額外程式，減省貯存空間

(1 分)

(ii) 舉出方法 2 勝於方法 1 的一個優點。

以一般程式進行合併，其效率更高

(1 分)

(d) 描述如何使用數據庫來制定行銷策略。

分析 售出數量得知哪款產品更暢，從而
為生產此產品供公眾人士購買。

分析 產品數量得知哪款產品即將缺貨，從而
進行補貨

分析 產品保鮮期以盡快吸引客人購買該產品。
附上優惠

(3 分)



(c) Tim considers the following two methods to merge two database tables.

Method 1: Use SQL statements to do the merging.

Method 2: Using a general programming language to write a program to do the merging.

(i) Give an advantage of Method 1 over Method 2.

SQL statements do not need to be updated regularly.

(1 mark)

(ii) Give an advantage of Method 2 over Method 1.

Less chance of having errors.

(1 mark)

(d) Describe how data mining can be used to determine sales strategies.

With data mining you can collect big data and analyse sales. And then you can know which aspect you have to improve on and what market or issue is the most discussed. Thus, you can adjust your sales strategies to those markets or issues.

(3 marks)



(e) Members' phone numbers are stored in the merged database.

(i) Phone number in the database is a candidate key instead of a primary key. Why?

(2 marks)

(ii) Give two potential benefits of having several candidate keys such as phone number in the database.

(e) (i) Phone number is a natural key that has contextual meaning. It may need to be changed and cannot stand the test of time. A surrogate key such as the identity code of a member should be more appropriate for being a primary key in the context.

/ Phone numbers may be changed. / No phone numbers can be given.

(2 reasons or 1 reason + elaboration)

(ii) It can be used for data recovery if there is data corruption.
More indexes can be set to improve the query performance.
The data/record can be better validated.

2

1×2

(e)

Poor. A high proportion of the candidates had difficulty in describing the advantages of having candidate keys in database tables.



(e) 會員的電話號碼在已合併的數據庫中儲存。

(i) 數據庫內的電話號碼是一個候選鍵碼而非主關鍵碼。為什麼？

因為會員識別碼是主要分析會員的數據，因為客戶有可能轉電話號碼，但會員識別碼只得一個，不可轉換。

(2 分)

(ii) 舉出在數據庫中，擁有如電話號碼的多個候選鍵碼的兩個潛在好處。

更容易分析會員的確實身份，增加一個驗證身份的資訊。

(2 分)



(e) Members' phone numbers are stored in the merged database.

(i) Phone number in the database is a candidate key instead of a primary key. Why?

That is because member will call the store more than one time so the numbers will be repeated if the member calls more than one time. It is a candidate key because it rely on the MID and MNAME.

(2 marks)

(ii) Give two potential benefits of having several candidate keys such as phone number in the database.

① It will be more efficient to find the data information of a person / file / doc / ~~document~~ person / store / etc.

② ~~Extra information~~ can have more accurate database if there are candidate keys in it.

(2 marks)



DSE ICT 2021 BRIEFING SESSION

Paper 2B (Q 1, 2)



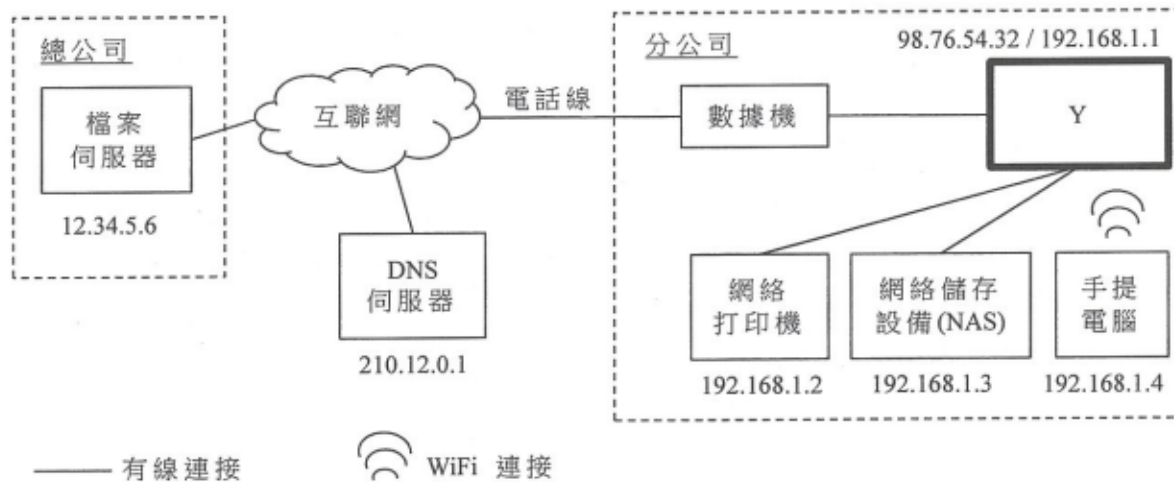
► Candidates
Performance (5 Levels)

- Excellent (優)
- Very Good (良)
- Good (常)
- Satisfactory (可)
- Poor (劣)



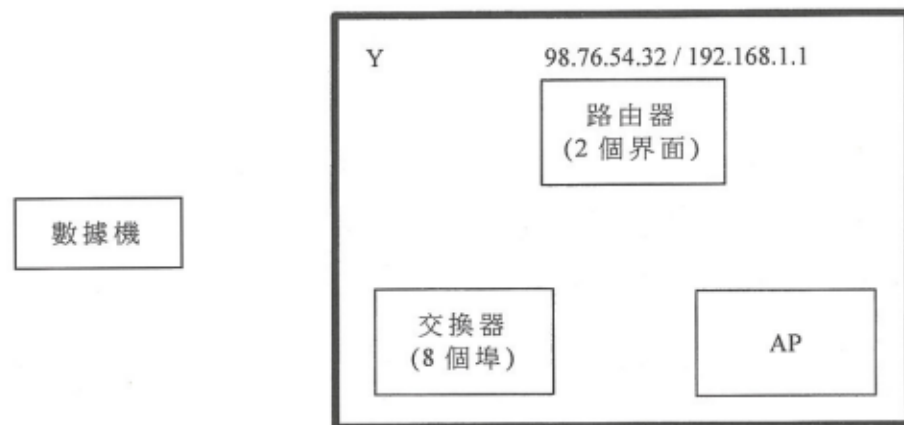
Q1

1. 張小姐建立其分公司的電腦網絡，並手動設定此網絡，如下所示：



- (a) Y 是由交換器、路由器和無線網絡接達點 (AP) 組成。

- (i) 在下圖繪畫網絡連接，以展示 Y 內的三個設備與數據機是如何連接。

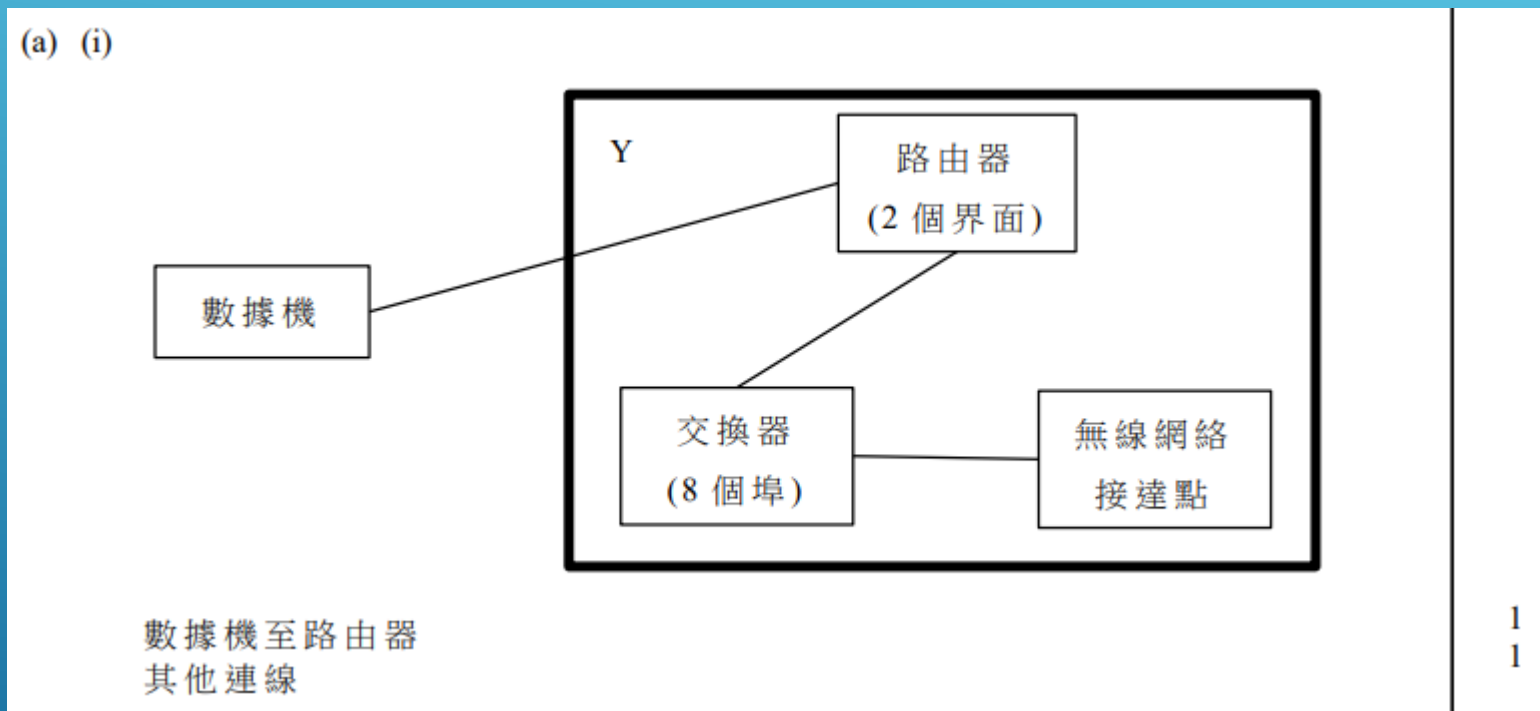


(2 分)



Q1

Q1(a)(i) Suggest Answer

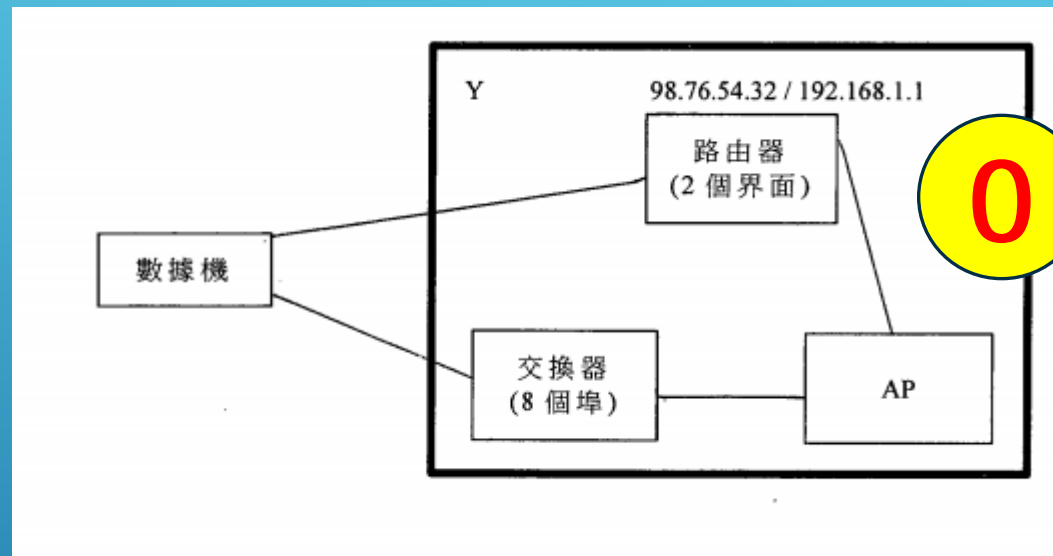
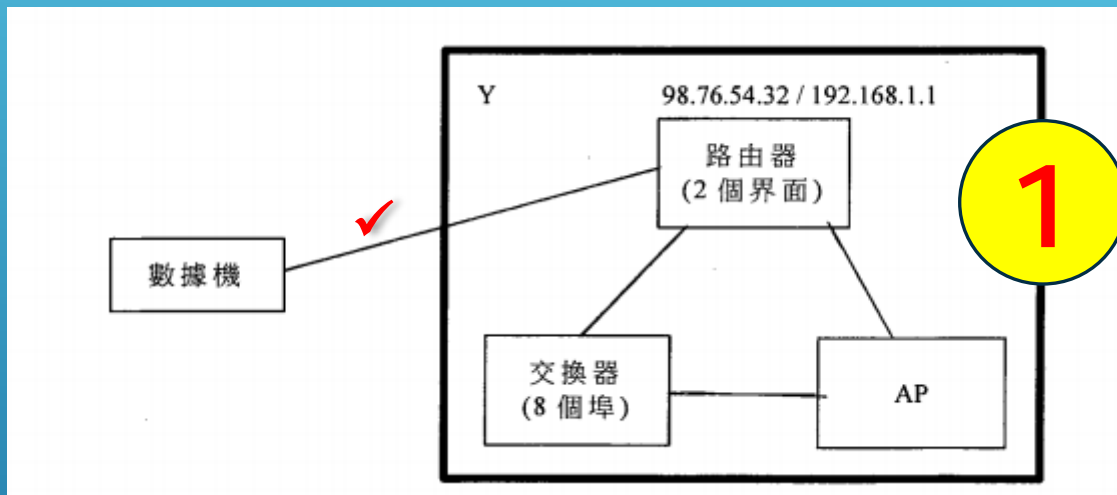


Candidates Performance : Very Good

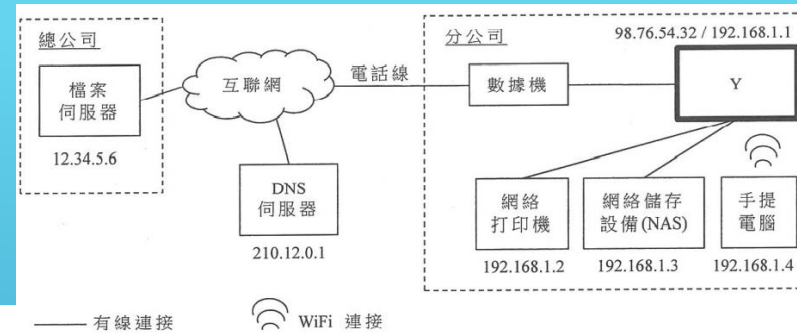


Q1

Q1(a)(i) Sample Scripts



Q1



(ii) 手提電腦正傳送一個封包至總公司內的檔案伺服器。完成以下封包資料。

手提電腦傳送此封包至 Y：

IP 封包表頭			有效載荷
來源 IP 位址	目標 IP 位址	
192.168.1.4	12.34.5.6	

Y 轉送此封包至總公司內的檔案伺服器：

IP 封包表頭			有效載荷
來源 IP 位址	目標 IP 位址	
98.76.54.32	12.34.5.6	

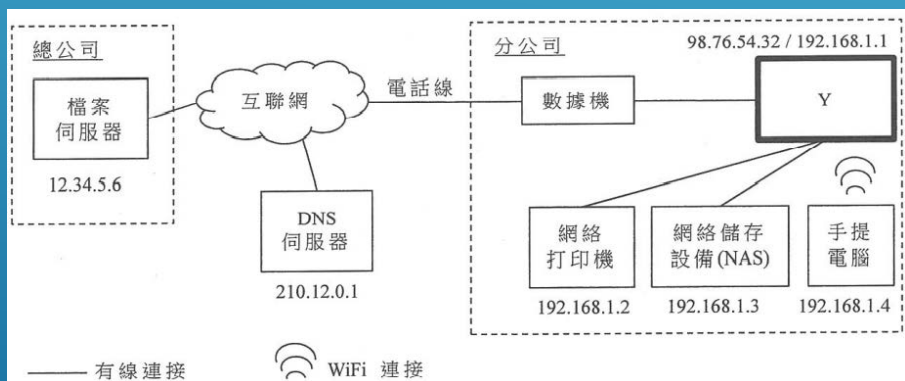
(2 分)

Candidates Performance : Good



Q1

Q1(a)(ii) Sample Scripts



手提電腦傳送此封包至 Y：

IP 封包表頭		有效載荷
來源 IP 位址	目標 IP 位址	
192.168.1.4	192.168.1.1

Y 轉送此封包至總公司內的檔案伺服器：

IP 封包表頭		有效載荷
來源 IP 位址	目標 IP 位址	
98.76.54.32	12.34.5.6

手提電腦傳送此封包至 Y：

IP 封包表頭		有效載荷
來源 IP 位址	目標 IP 位址	
192.168.1.4	98.76.54.32

Y 轉送此封包至總公司內的檔案伺服器：

IP 封包表頭		有效載荷
來源 IP 位址	目標 IP 位址	
192.168.1.1	12.34.5.6

1

0



Q1

(b) 張小姐打算為分公司的網絡採用 DHCP。

(i) 舉出使用 DHCP 的**兩個**好處。

減少 IP 衝突
減輕手動 IP 設定的工作量

Candidates Performance : Good

(2 分)

(ii) 舉出此路由器支援 DHCP 的**兩項**網絡設定屬性。

預設閘道 / 子網絡遮罩 / DNS伺服器 / IP

Candidates Performance : Satisfactory

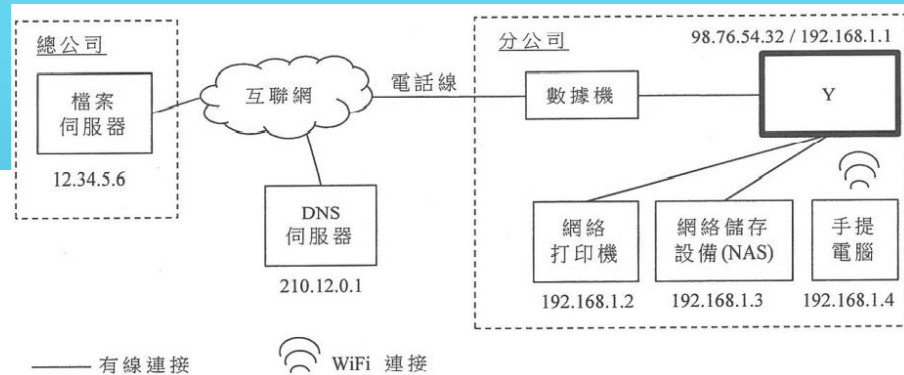
(2 分)

(iii) 指出分公司內一個**不應**採用 DHCP 的設備，簡略說明你的答案。

路由器/預設閘道，因為必須透過它才能接達互聯網 /
網絡打印機，因為若經常改變 IP 位址，其他電腦便難以連接使用 /
NAS，因為若經常改變 IP 位址，其他電腦便難以連接使用
交換器：方便管理及進行交換器設定修改
無線網絡接達點：方便管理及進行交換器設定修改

Candidates Performance : Good

(2 分)



Q1

(c) 建議及描述**兩項**網絡保安措施，讓張小姐以手提電腦連接至總公司。

採用WPA2 / 採用MAC位址過濾 / 採用VPN / 隱藏 SSID/
使用防火牆

✕防毒軟件

(2 分)

Candidates Performance : Very Good



Q1

(d) 張小姐發現她的手提電腦未能連線總公司內的檔案伺服器。為偵測問題所在，她利用 ping 指令檢查網絡的連通性。

(i) 她執行了

```
ping 127.0.0.1
```

以上指令的目的是什麼？

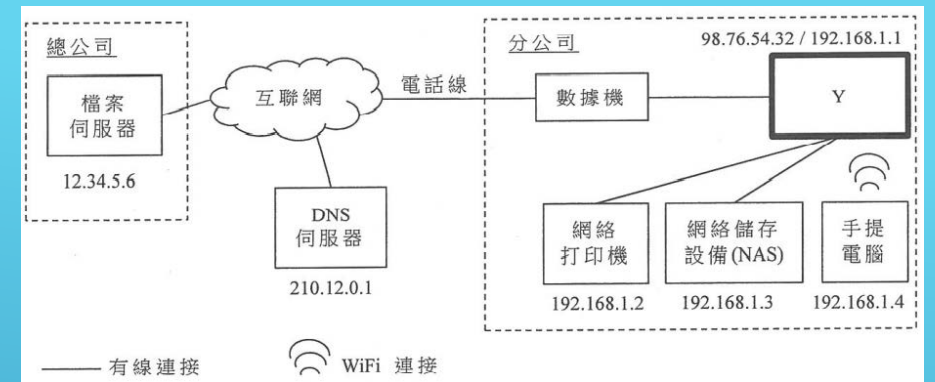
測試電腦網絡界面咭是否運作正常 /
檢查本機網絡是否運作正常

(1 分)

Candidates Performance : Satisfactory



Q1



(ii) 建議另外**兩個**使用 ping 的測試指令，並描述這些指令的目的。

ping 192.168.1.1以檢查分公司網絡是否正常 /
ping 210.12.0.1以測試分公司是否能正常連接到互聯網 /
ping 12.34.5.6以測試總公司的伺服器是否服務正常

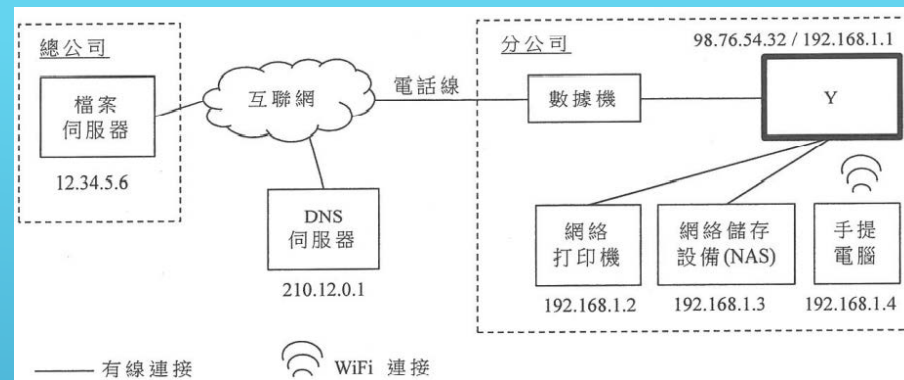
(2 分)

Candidates Performance : Satisfactory



Q1

Q1(d) Sample Scripts



(i) 她執行了

ping 127.0.0.1

以上指令的目的是什麼？

測試網絡穩定性。

x

0

(1 分)

(ii) 建議另外兩個使用 ping 的測試指令，並描述這些指令的目的。

執行 ping 210.12.0.1

x

0

執行 ping 192.168.0.1



Q2

2. 某卡拉 OK 餐廳提供房間供顧客消遣。房間內提供平板電腦讓顧客選擇音樂視頻 (MV) 和查看已選定的播放列表。

(a) 房間內使用紅外線麥克風連接至卡拉 OK 系統。舉出採用紅外線勝於無線射頻 (RF) 作連線方法的**兩個**優點。

設定簡單 / 不會受其他房間訊號干擾

(2 分)

Candidates Performance : Satisfactory



Q2

Q2(a)(i) Sample Scripts

紅外線較無線射頻穩定。✗
紅外線可以覆蓋更多範圍。✗

0

1. 紅外線較無線射頻難受外在環境干擾 ✓
2. 紅外線在接收信號時較無線射頻穩定 ✗

1



Q2

(b) 這些平板電腦以 WiFi 連線。舉出採用 WiFi 勝於藍牙作連線方法的**兩個**優點。

—— 傳送數據量較高 / 連線距離較長 / 保安程度較高 ——

(2 分)

Candidates Performance : Very Good



Q2

(c) 房間內同時有採用單向和雙向的通訊模式。描述在房間內使用每種通訊模式的一個應用。

單向通訊模式：

麥克風把聲音數據單方向傳送到接收器 / 揚聲器

雙向通訊模式：

平板電腦除了傳送點曲指令外，亦會接收歌曲清單

(2 分)

*其他合理設備（如遙控）及有合理理由亦可給分

Candidates Performance : Good



Q2

該餐廳採用雲端技術儲存 MV。當顧客點選 MV 時，MV 透過串流技術播放。該餐廳的連線如下：

- 下載速度：1 Gbps
- 上載速度：400 Mbps

(d) 假設在網絡傳輸時沒有額外消耗。

(i) 估算職員上載一個 500 MB 的 MV 檔案至雲端儲存的所需時間。

$$500 \times 1024 \times 1024 \times 8 / 400 \times 1000 \times 1000 = 10.49s$$

① Expression only

(2 分)

(ii) 已知串流 MV 的位元率為 5 Mbps，估算最多可同時播放 MV 的數目。

$$1 \times 1000 \times 1000 \times 1000 / 5 \times 1000 \times 1000 = 200 \text{ 個}$$

Or directly

$$1000 / 5 = 200 \text{ 個}$$

(2 分)

Candidates Performance : Good



Q2

Q2(d) Sample Scripts

(i) 估算職員上載一個 500 MB 的 MV 檔案至雲端儲存的所需時間。

$$\begin{aligned} & 500 \text{ MB} \div 400 \text{ Mbps} \\ & = 1.25 \text{ s} \end{aligned}$$

✗

0

(ii) 已知串流 MV 的位元率為 5 Mbps，估算最多可同時播放 MV 的數目

$$\begin{aligned} & 1000 \div 5 \text{ Mb} \\ & = 200 \end{aligned}$$

✓

∴ 最多可同時播放 MV 的數目是 200。

2



Q2

該餐廳計劃為顧客提供訪客 WiFi 服務。下列為一些常用的 WiFi 規格：

頻率	穿透能力	傳送速度	訊號覆蓋範圍
2.4 GHz	較高	較低	較廣
5 GHz	較低	較高	較窄

(e) 就以下每個網絡活動，應採用哪個頻率？簡略說明你的答案。

在房間內觀看直播足球賽事：

在房間內觀看直播足球賽事：5GHz；
串流MV需要較高數據傳送速度

在餐廳內不同位置使用即時通訊軟件：

在場所不同位置使用即時通訊軟件：若採用2.4 GHz，能有較佳訊號
穿透能力，顧客短暫離開房間亦不會影響連線

- ① 能分別給出正確的頻率選擇
- ① 在觀看直播足球賽事 - 選擇5GHz的理由
- ① 在場所不同位置使用即時通訊軟件 - 選擇2.4 GHz的理由

(3 分)

Candidates Performance : Excellent



Q2

Q2(e) Sample Scripts

(e) 就以下每個網絡活動，應採用哪個頻率？簡略說明你的答案。

在房間內觀看直播足球賽事：5GHz。因該頻率能減少直播中的足球賽事的延遲。 ✓ ✓

在餐廳內不同位置使用即時通訊軟件：2.4GHz。因該頻率的穿透能力及訊號覆蓋範圍能控制及處理在不同位置使用即時通訊軟件的指令及要求。 ✓

(3 分)

3



Q2

(f) 訪客 WiFi 服務啟用後，一些顧客投訴用來點選 MV 的系統運作不暢順。舉出一個可能的原因，並簡略說明。

- 訪客 Wi-Fi 與點曲的系統均採用相同頻率 (frequency) / 相同通道 (channel)
- 顧客的流動裝置為點曲的網絡造成干擾

(2 分)

Candidates Performance : Poor

Q2

Q2(f) Sample Scripts

網絡傳輸速度變慢。因同時段內有過多顧客使用該網絡，令該網絡不能及時處理過多要求及指令，因此導致此問題發生。

(2 分)

0

傳輸速度較弱。因為該寫 WiFi 服務啟用以致太多人使用無：線網絡服務。

0



HKDSE ICT 2021

Exam paper marking review
(Paper 2B Q3 & Q4)



Marking guideline

- Fairness
 - Marker not do GUESS of student answer
- Professional
 - As students are studying ICT,
 - Answer should be more technical / professional
- Others
 - Not accept too general answer
 - Not accept answer seems direct copy from qu



Function of marking review

Know the
**suggested
answer**

Know the
**marking
flexibility**

Know
**candidate
performance**

Enhance
**teaching
strategies**



Paper 2B

**2021-DSE
ICT
PAPER 2B**

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2021

**INFORMATION AND COMMUNICATION TECHNOLOGY
PAPER 2B**

**Data Communications and Networking
Question-Answer Book**

11:15 am – 12:45 pm (1 hour 30 minutes)
This paper must be answered in English

INSTRUCTIONS

Please stick the barcode label here.

Candidate Number

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



Paper 2B

Q3

3. Mr Chan works in a school installed with a class C net

Room	Number of computers
Staff room	80
Computer room	46
Classroom	28
Server room	10

- (a) Mr Chan plans to use four subnets for the above using subnets.



2B Qu 3 – IP & Folder rights

- Mr Chan works in a school installed with a class C network. It has computers as shown below:

Room	Number of computers
Staff room	80
Computer room	46
Classroom	28
Server room	10



2B Qu 3a – Subnet

- (a) Mr Chan plans to use four subnets for the above four types of rooms. Give two technical reasons for using subnets.



2B Qu 3a – Subnet

Know the **suggested answer**

- reduces congestion / network's load
- Limit data flow and thus enhance data security




Know the marking flexibility


- Not accept
 - Increase network speed
- Better have reason for why congestion can be reduce / data flow can be limited but that's not a must



2B Qu 3a – Subnet

Know the marking flexibility

- (a) Mr Chan plans to use  ts for the above four types of rooms. Give two technical reasons for using subnets.

Higher network security since subnets cannot access each other.
Higher transmission speed by reducing traffic between subnets. 

- (a) 陳先生計劃為以上四類房間採用四個子網絡。舉出採用子網絡的兩個技術原因。

方便管理 ^{不同區域的} 網絡設定，以不同子網絡區
分不同房間使資料傳輸時以子網絡位
分辨接收者，更為清晰，高效率。



Know candidate performance

- Fair
 - Some candidates simply mentioned easy management but seems that's not “technical” enough



Enhance teaching strategies

- Remind students what type(s) of answer are “technical” and what are not



2B Qu 3b – IP Address

(b) Mr Chan plans to use the network 192.168.10.0 for assigning IP addresses in the school. Complete the table below.

Room	Usable IP range	Subnet mask
Staff room	192.168.10.1 to _____	255.255.255.128
Computer room	192.168.10.129 to 192.168.10.191	_____
Classroom	192.168.10.193 to _____	255.255.255.224
Server room	_____ to 192.168.10.254	255.255.255.224



2B Qu 3b – IP Address

Know the suggested answer

- Staff Room : 192.168.10.126
- Computer Room : 255.255.255.192
- Classroom : 192.168.10.222
- Server Room : 192.168.10.225



Know the marking flexibility

- Exact value, no flexibility



Know candidate performance

- Fair
 - Some candidates still, cannot do accurate calculation of subnet range



Enhance teaching strategies

- Need to let students know the calculation logic behind and not solely rely on subnet calculator



2B Qu 3c – Network Services

(c) Mr Chan sets up a domain controller in the school. State two functions of the domain controller.



2B Qu 3c – Network Services

Know the suggested answer

- 帳戶認證 Login authentication /
- 權限管理 User rights control /
- 執行保安政策 enforce security policy




Know the marking flexibility


- Accept
 - Login control
 - User rights setting





2B Qu 3c – Network Services

Know the marking flexibility

(c) Mr Chan sets up a domain controller in the school  vo functions of the domain controller.

Control the ~~permission~~ right to access files of ~~the~~ the
classroom computers, manage different accounts, ^{and permissions}
such as classroom and staff accounts ^{login} 

(c) 陳先生在學校設  域控制器。寫出此網域控制器的兩項功能。

控制網域的資料，例如修改名稱
加密，為網域加密 



Know candidate performance

- Fair
 - Some candidates wrongly think domain controller is responsible for encrypting data



Enhance teaching strategies

- Functions of Domain controller seems “asked” for some years already, but still some students’ performance is not good.
- Suggest to do live demo of settings that can be done through domain controller, or even set VM for students to experience

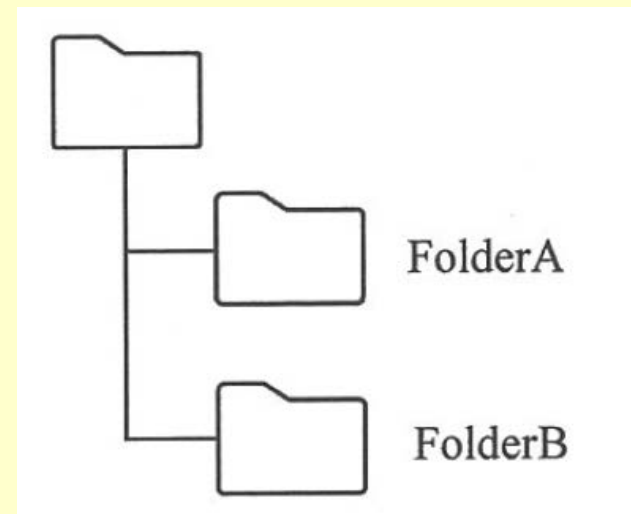


2B Qu 3 – IP & Folder rights

A file server is setup in the school. Mr Chan plans to let teachers and students access the following folders through the network:

Mr Chan sets the following requirements:

- Teachers can read and store teaching materials in FolderA
- Students can read files in FolderA but they cannot modify them
- Students can store their assignment files in FolderB but they cannot read the files in FolderB
- Teachers can read assignment files stored in FolderB and add comments in those files



2B Qu 3d (i) – Folder rights

(d) (i) Complete the permission settings in the table below. Use '✓' and '✗' to represent 'Yes' and 'No' respectively.

Folder	Teacher group permission		Student group permission	
	Read	Write	Read	Write
FolderA				
FolderB				



2B Qu 3d (i) – Folder rights

Know the **suggested answer**

資料夾	老師群組檔案權限		學生群組檔案權限	
	讀取	寫入	讀取	寫入
FolderA	✓	✓	✓	✗
FolderB	✓	✓	✗	✓

- All correct → 2 marks
- Either 1 row or 1 column correct
 - → 1 marks



2B Qu 3d (i) – Folder rights

Know the **marking flexibility**

- Exact value, no flexibility



Know candidate performance

- Excellent
 - Candidates seems can understand the situation described in the questions and translate to the related folders access / user rights



Enhance teaching strategies

- Give students' hands on experience in setting different access rights for folders, so that they can have better understanding and experience.



2B Qu 3d (ii) – Folder rights

(d) (ii) Other than a read and write permission, state another permission that can be set.



2B Qu 3d (ii) – Folder rights

Know the suggested answer

- 執行權限 Execute
- 完全控制 Full control



2B Qu 3d (ii) – Folder rights

Know the marking flexibility

- Will give mark if cannot wrote out exact wordings but can provide similar description

(ii) Other than a read and write permission, state another permission that can be set.

Administrator permission. 

(ii) 除了讀取和寫入權限外，寫出另外一個可以設定的權限。

編輯權 



2B Qu 3d (ii) – Folder rights

Know candidate performance

- Poor
 - Most candidates cannot provide “Execute” or “Full Control” as answer. Implied that they do not have (enough) experience in setting folder rights



2B Qu 3d (ii) – Folder rights

Enhance teaching strategies

- More hands on practice is suggested to let students have more experience and deeper memory on folder rights setting.



2B Qu 3d (iii) – Network Redundancy

(d) (iii) Mr Chan considers using RAID-0 or RAID-5 in the file server. Describe each option and state its benefit.

RAID-0

RAID-5



2B Qu 3d (iii) – Network Redundancy

Know the **suggested answer**

- RAID 0
 - Describe :
 - Save data evenly across two or more disks
 - Benefit :
 - Faster data read / write speed



2B Qu 3d (iii) – Network Redundancy

Know the **suggested answer**

- RAID 5
 - Describe :
 - Use three or more hard disks, and save the parity data to one of the hard disks. The parity data is generate from the data in the other harddisk
 - Benefit :
 - Data can recovered even one of the harddisk has problem



2B Qu 3d (iii) – Network Redundancy

Know the **marking flexibility**

- Accept equivalent description of functions and benefits



2B Qu 3d (iii) – Network Redundancy

Know the marking flexibility

(iii) Mr Chan considers using RAID-0 or RAID-5 in the file server. Describe each option and state its benefit.

RAID-0: RAID-0 has the highest speed among the RAID in the file server. RAID-0 is placing data in order and only one disk is needed for RAID-0.



RAID-5: RAID-5 is ^{the most} commonly used RAID in the file server. It need at least three disk to operate. And it has ~~the~~ higher security than RAID-0 because the orders of data is more complicated than RAID-0. And also, it is more stable than RAID-0.



(4 marks)



2B Qu 3d (iii) – Network Redundancy

Know the marking flexibility

RAID-0: 把檔案分成至少兩個部分，並利用

RAID-0 同時輸入檔案的不同部分，其好處是能以極快的速度存取檔案。



RAID-5: 把檔案分成至少三個部分，並利用

RAID-5 的兩個部分輸入檔案，剩餘的一部分則是經由運算儲存數據，在其中一部分損壞時，可以以運算部分修補完整資料，其好處是檔案的安全性會更高，因有相應的修補方案。

(4 分)



Know candidate performance

- Fair
 - Most candidates know the benefits of RAID 0 and RAID 5
 - But cannot clearly describe how they (RAID 0 and RAID 5) work



2B Qu 3d (iii) – Network Redundancy

Enhance teaching strategies

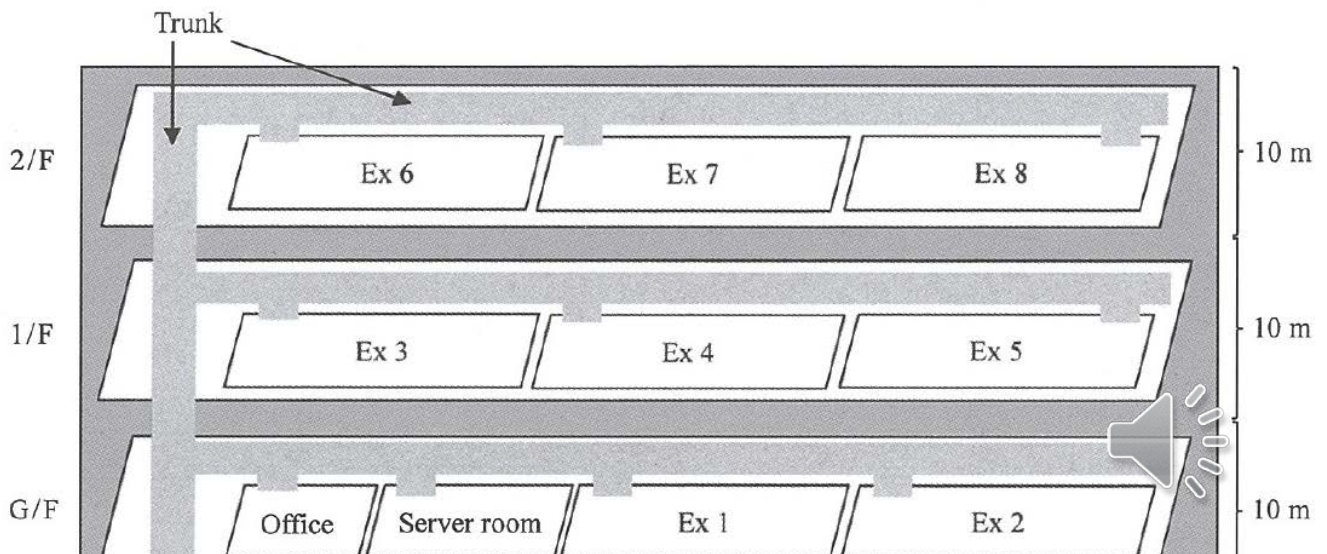
- More exercises re describing the mechanism behind is suggested for students.



Paper 2B

Q4

4. An exhibition centre has three floors. Each floor is 10 m tall. There are 8 exhibition rooms (Ex1, Ex2, ..., Ex8) in the centre, 40 m × 40 m each. The server room is located on G/F. There is an Access Point (AP) in each exhibition room while a wired network is used in the office.

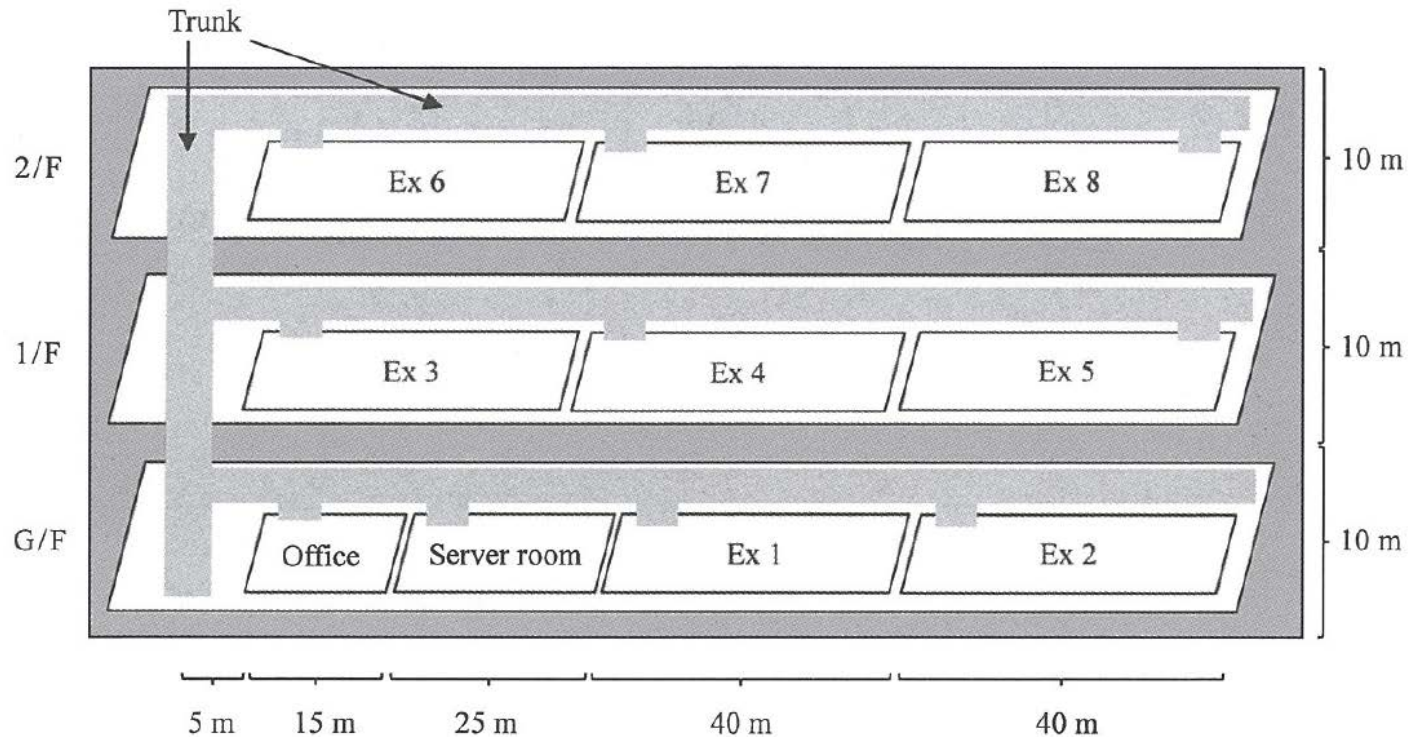


2B Qu 4 – Network Design

- An exhibition centre has three floors. Each floor is 10m tall. There are 8 exhibition rooms (Ex1, Ex2, ..., Ex8) in the centre, 40m x 40m each. The server room is located on G/F. There is an Access Point (AP) in each exhibition room while a wired network is used in the office.



2B Qu 4 – Network Design



- Mr Li designs the network and adopts a star topology. He uses UTP cables to connect each AP directly to a switch in the server room through the trunks.



2B Qu 4a – Topology

(a) Give one advantage and one disadvantage of using the star topology.



Know the **suggested answer**

- Adv :
 - Network can still normally run even when a AP is down
- Disadv :
 - Single point of failure
 - Higher cost because of the need of more cables



Know the marking flexibility

- Adv :
 - Other advantages of Star topology also accept
- Disadv :
 - Simply “Higher Cost” → no mark
 - Need elaboration (reason for higher cost)



2B Qu 4a – Topology

Know the marking flexibility

(a) 舉出採用此星形布局的一個優點和一個缺點。

優：當其中有一個節點損壞也不會影響到
其他節點。



缺：成本相對比其他布局高。



(2 分)

(a) Give one advantage and one disadvantage of using the star topology.

Advantage: Cost is low



Disadvantage: the switch may become the point of failure.



(2 marks)



Know candidate performance

- Good
 - Candidates know the pros and cons of using Star topology when compare with Bus and Ring topology



Enhance teaching strategies

- Remind students not simply giving generic answer like lower / higher cost. Need more elaboration for this type of answer.



2B Qu 4b – Network Connection

(b) Mr Li finds that the network connections to Ex 5 and Ex 8 are not stable. However, he finds no problem in other exhibition rooms. Give two reasons for this situation.



2B Qu 4b – Network Connection

Know the **suggested answer**

- Distance between end point to networking connecting device over the cable transmission limit
- Too many visitors
- Interference exist



Know the marking flexibility

- Not accept
 - Bad signal received
 - As cannot explain why has such bad signal



2B Qu 4b – Network Connection

Know the marking flexibility

- (b) Mr Li finds that the network connections to Ex 5 and Ex 8 are not stable. However, he finds no problem in other exhibition rooms. Give two reasons for this situation.

✓ The access point in Ex 5 and Ex 8 are not in a suitable location, compared to Ex 1, Ex 2, Ex 3, Ex 4, Ex 6, Ex 7 the access point in Ex 5 and Ex 8 are much farther away from the main trunk. The bandwidth is not enough to cover for Ex 8 and Ex 5.

(2 marks)

- (b) 李先生發現 Ex 5 及 Ex 8 的網絡連接不穩定，但其他展覽室沒有問題。舉出此情況出現的兩個原因。

Ex 5 及 Ex 8 皆位於樓層的末端，訊號可能因而接收不良。



Know candidate performance

- Good
 - Most candidates know there has limitation in transmission length



Enhance teaching strategies

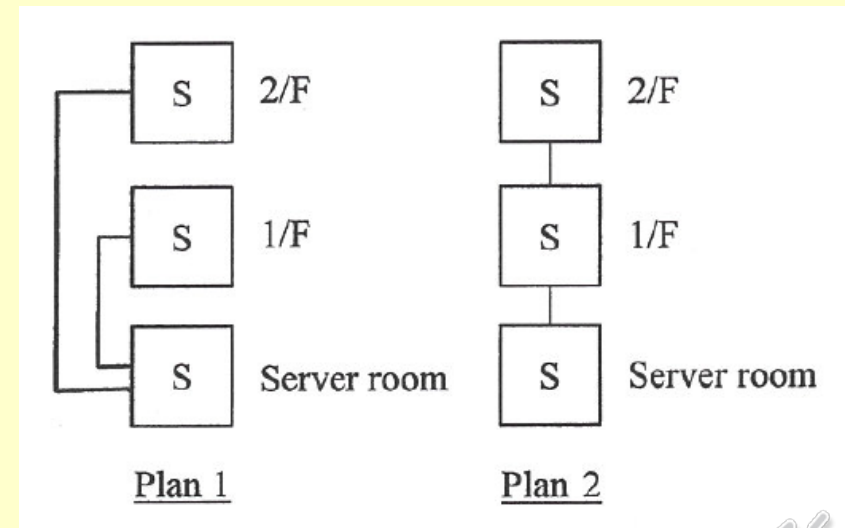
- Let students know explanation (reason)
need to be specific, cannot be too
generic



2B Qu 4c – Network Design

(c) In order to improve the overall network performance, Mr Li suggests adding a switch S on 1/F and 2/F to connect to APs on their corresponding floors. He has two plans below:

State one advantage of Plan 1 and one advantage of Plan 2.



Know the **suggested answer**

- Plan 1 :
 - Bandwidth from Server room to both floors are the same
- Plan 2 :
 - Less cables are required



Know the marking flexibility

- Accept
 - Plan 1 :
 - Problem in 1/F switch will not affect 2/F



2B Qu 4c – Network Design

Know the marking flexibility

舉出方案 1 及方案 2 的優點各一。

方案 1: 因減輕了一樓的交換器的負擔, 可以減少
網絡擠塞的情況, 網絡更流暢




方案 2: 節省佈線的工序
因不需從地下鋪設至二樓, 而




2B Qu 4c – Network Design

Know the marking flexibility

State one advantage of Plan 1 and one advantage of Plan 2.

Plan 1: The connections are independent of each other.
Even if one connection is down, the other remains
unaffected. 

Plan 2: Less wiring is required when compared with
plan 1 



Know candidate performance

- Good
 - Most candidates know the advantage of both Plan 1 and Plan 2



Enhance teaching strategies

- Need to let students know every connections has its advantage(s) and disadvantage(s). Which plan best fits the need depends on exact situation.



2B Qu 4d (i) – Network Design

(d) The centre supports WiFi roaming so that visitors can connect to the WiFi network without interruption. Give two network settings that Mr Li needs to set.



2B Qu 4d (i) – Network Design

Know the suggested answer

- Same SSID
- Same encryption setting



Know the marking flexibility

- Accept
 - Enable roaming function of AP
- Not accept
 - Same network setting
 - (too general)



2B Qu 4d (i) – Network Design

Know the marking flexibility

- (d) 展覽館支援 WiFi 漫遊 客能不間斷地連接 WiFi 網絡。舉出李先生需要設置的**兩個**網絡設定。



李先生應設置多個 SSID，當訪客由第一個 AP 走到第二個時需要
連接到相應的 SSID。另外他需要把 SSID 設置為相
同的名字才能無感連接。





2B Qu 4d (i) – Network Design

Know the marking flexibility

(2 marks)

- (d) The centre supports WiFi roaming so that visitors can connect to the WiFi network without interruption. Give two network settings that Mr Li needs to set.

The SSID of every access point must be identical 
Also, the throughput of the network must be adequate
which allow numerous of devices to connect with at 
the same time

(2 marks)



Know candidate performance

- Good
 - Most students know the need to have roaming



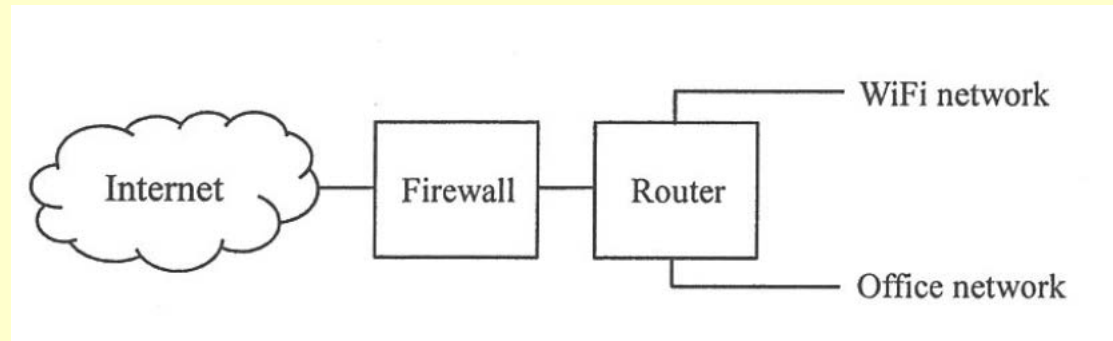
Enhance teaching strategies

- As most school WiFi has roaming function, teachers should make use of this good environment to let students know what's the meaning of roaming and how it works.



2B Qu 4e (i) – Network Security

(e) In the server room, Mr Li installs a firewall and a router for connecting to the wired network in the office and the WiFi network in the exhibition rooms, as the configuration below:



(i) From a security point of view, state one advantage and one disadvantage of the configuration above.



Know the **suggested answer**

- Adv :
 - Can protect both office network and WiFi network from external attack
- Disadv :
 - Attack from WiFi network to Office network cannot be defended by Firewall




Know the marking flexibility


- For Disadv
 - If mentioned cannot protect WiFi network from attack that come from Office network, even though not common, but also accept



2B Qu 4e (i) – Network Security

Know the marking flexibility

Advantage: The firewall can block unauthorised access
from the internet, more secure 

Disadvantage: ~~There may some website blocked by~~
~~the firewall, and the setup of firewall is com~~ 
The network speed will be slower because the firena
firewall will filter, before entering the website. (2 marks)
first



Know the marking flexibility

(i) 從保安角度考慮，舉出以上配置的一個優點和一個缺點。

優點： 所有由互聯網所發放到路由器內的數據也得到防火牆掃描，使安全性較高



缺點： 內部的數據中，黑客能透過 WiFi 網絡，避開防火牆入侵辦公室網絡。



(2 分)



Know candidate performance

- Good
 - Most candidates know the placing of firewall in network can help defend of hacking from external
 - Some cannot aware there also exist internal attack from neighbour network



Enhance teaching strategies

- More emphasis on nowadays, network attack from internal is common

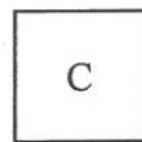


2B Qu 4e (ii) – Network Design

(e) (ii) Complete the logical network design in the following diagram. The following items should be added to the diagram:

- three computers in the office
- a domain controller, a firewall, a router and a switch
- all necessary network connections

Use the following symbols to represent the relevant network components:



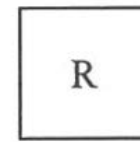
Computer



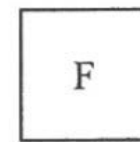
Domain controller



Switch



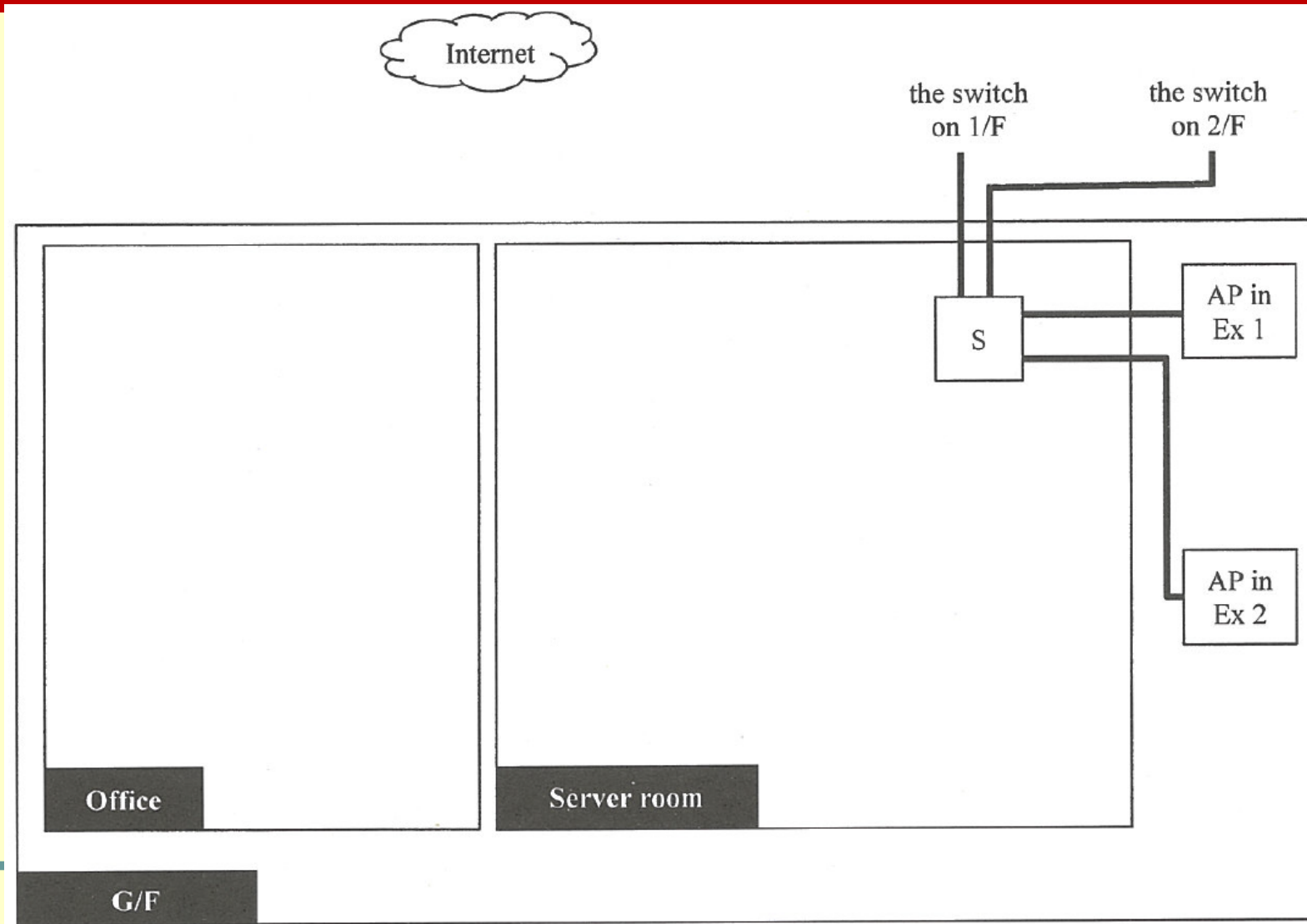
Router



Firewall

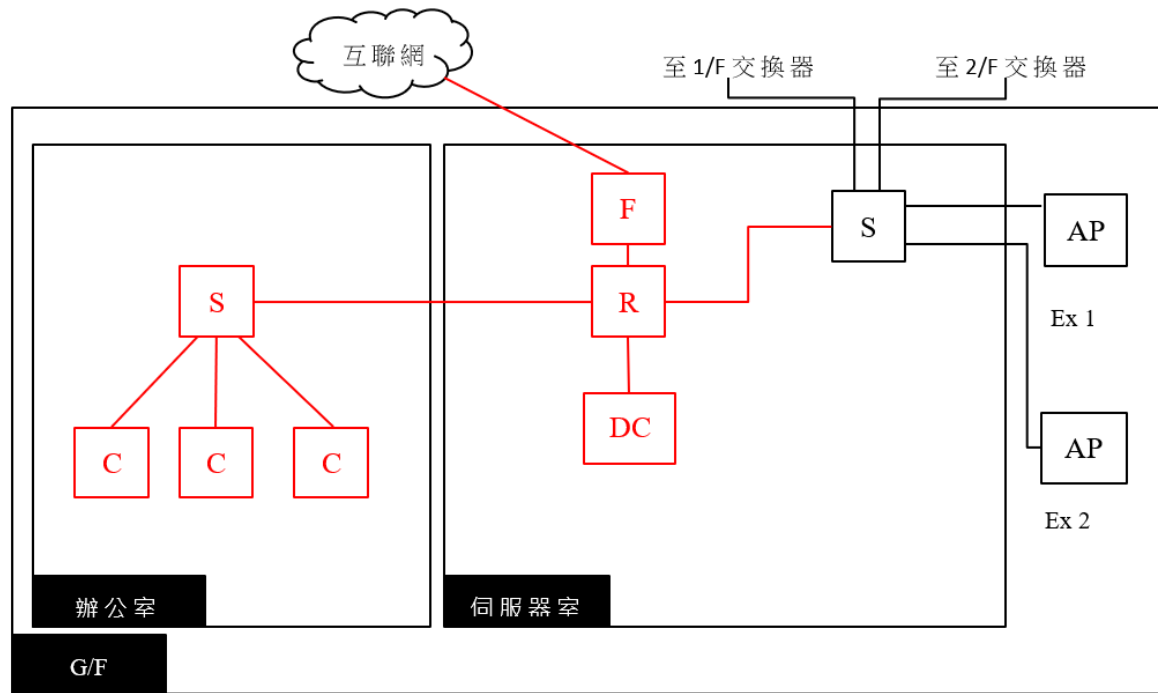


2B Qu 4e (ii) – Network Design



2B Qu 4e (ii) – Network Design

Know the suggested answer



- Firewall and router
 - Location and connection are correct
- Router separate WiFi and office network
- 3 PC of office connect to switch
- DC is connected to internal network



Know the **marking flexibility**

- DC can connect to Router or to any Switch, and is located inside server room
- Both switches can be located inside server room



Know candidate performance

- Good
 - Most students can connect devices correctly



Enhance teaching strategies

- Remind students that some of the devices should be located in server room
 - For example :
 - Firewall
 - Router
 - Servers



2B Qu 4e (iii) – Network Services

(e) (iii) Give a reason for connecting the domain controller to the device in your design.



2B Qu 4e (iii) – Network Services

Know the **suggested answer**

- Connect to Router
 - Higher security as can set ACL to limit access of DC from which network
- Connect to switch of office network
 - Higher security as connection from WiFi network is disabled
- Connect to switch of WiFi network
 - DC can keep in server room and less cable is needed



2B Qu 4e (iii) – Network Services

Know the **marking flexibility**

- Other acceptable reason for connection



Know candidate performance

- Poor
 - Student do not know difference for connecting server to different network connecting devices



Enhance teaching strategies

- More similar scenario discussion are suggested with open discussion on pros and cons of the connection.



Summary of teaching strategies

- Answer
 - show to fit knowledge to question scenario
 - should echoing the scenario of the qu
- Need to get more experience in everyday practice
- Know answer priorities
- Grouping answers in categories and @ Cat. give 1 answer (for qu need >1 ans)



Thank you

Exam paper marking review
(Paper 2B Q3 & Q4)



2021 ICT 2C Q1



2C Q1a

Mr Wong uses a web camera to record his lessons and posts the videos on the Internet for students to study.

- (a) There are two options in the video recording settings, as shown below. Give two differences between the two options in terms of video quality.

Option	Resolution	Frames per second
A	720p	15 fps
B	4K	30 fps



Suggested Answer

Option B:

Resolution:

- The video shows **more details / clearer**

Frame per second:

- The video playback is **smoother / more fluent**



Marking Flexibility

B的幀速率比A快15fps，使B的畫面比A更流暢
B的解像度比A高，令B的畫面比A更清晰。

選項B在視像質素會較佳，因為其解像度以及幀速率都較高。



Marking Flexibility

~~第一~~ 第一，分辨率不同，分辨率愈高視像的質量
也愈好，所以 B 比 A 的視像質量更好
第二，幀速率不同，幀速率愈高視像愈流暢，所以
B 的視像流暢度更好



Candidate Performance

- Good
- Common mistakes:
 - Not read the questions carefully, e.g. video quality
 - Not related to video quality, e.g. File size
 - 與影片播放速度相關, e.g. B速度較慢
 - Too general, e.g. Video quality is better



Teaching Strategies

- Provide opportunity for students to compare videos of different attributes



2C Q1b

Not more than 500 MB

- (b) Mr Wong records a 40-minute video. He wants to limit the file size of the video to not more than 500MB. Estimate the highest bit rate (in kbps) of the video that can be adopted. Show your calculation.



Suggested Answer

$$\begin{aligned} & 500\text{MB} / 40\text{mins} \\ &= 500 \times 1024^2 \times 8 \div (40 \times 60) \div 1000 \\ &= 1747 \text{ kbps or } 1747.6 \text{ kbps } (\leq 1747.62666\dots \text{ kbps}) \end{aligned}$$

$\times 1748 \text{ kbps}$ (file size $\sim 500.1\text{MB}$) or 1747.63 kbps

① file size \div time

① Correct kbps answer

(the highest bit rate not to make the file more than 500MB)



Marking Flexibility

$$\frac{500 \times 1024 \times 1024 \times 8}{40 \times 60 \times 1000} = 1747.6 \text{ kbps}$$



Marking Flexibility

設最高位元率為 x bps

$$\frac{x(40 \times 60)}{8 \times 1024 \times 1024} = 500 \text{ MB}$$

$$\frac{2400x}{8 \times 1024 \times 1024} = 500 \text{ MB}$$

$$x = 1747626.667$$

∴ 最高位元率是 1748 kbps ..

~~$$500 \times 1024$$~~
$$500 \times 1024^2$$

$$= 524288000$$

$$\text{位元率} (40 \times 60) = 524288000$$

~~可擁有的位元率~~



Candidate Performance

- Fair
- Common mistakes:
 - Not read the question requirements “Not more than 500 MB”
 - Poor unit conversion



Teaching Strategies

- Emphasize the difference between
 - Bit
 - Byte (e.g. KB, MB and so on)
 - bps (e.g. kbps, Mbps)



2C Q1c (i)

- (c) Even though Mr Wong hosts a web server at home, he decides to publish his videos on a video sharing platform.
- (i) Give two reasons to support his decision.



Suggested Answer

- It reduces storage space / workload on his server
- It reduces network traffic of his home network. (bandwidth)
- It reduces the Mr. Wong's workload on providing streaming services
- Video sharing platform provides technical support



Marking Flexibility

No reason!

在影片平台上分享，能讓更多人瀏覽他的視頻。

在影片 分享平台上發佈能減少了網頁伺服器負擔。

· 分享在平台上可支援流式串流技術

· 學生若在網頁伺服器中獲得視像可能仍要下載影片播放器才能觀看，而在平台上則不用，較為方便

No extra maintainence is needed for the server.

Video sharing platform is more accessible for students.

No reason!



Candidate Performance

- Fair
- Common mistakes:
 - Not realize the target user is Mr. Wong's students
 - Mr. Wong can earn money from the video sharing platform
 - Too general answers



Teaching Strategies

- Provide opportunity for students to set up web server



2C Q1c (ii)

- (ii) When a student plays the videos, the sharing platform automatically chooses the lowest resolution. Suggest two possible reasons for this.

< Resolution >	
	1080p
	720p
✓	360p



Suggested Answer

- Network aspects:
the transmission rate / bandwidth of internet connection is low /
the network connection is poor.
- Device aspects:
screen resolution of user device is low /
processing power of user device is low.
- Platform can support more concurrent users (in busy hours)
- It reduces the initial playback delay.
- Platform use user previous setting/preferences



Marking Flexibility

Because it can reduce the time to load the videos files by having a lower resolution, so the videos can be played more smoothly. And watching with the highest resolution may need extra payments.

(2 marks)



Marking Flexibility

1. 可能他的信號不太好, 只有使用最低解像度才可流暢播放。
2 reasons are related to network aspects

2. 可能該平台為了幫助那些使用流動數據的人不必使用
不必要浪費的數據

2. 同學以往的習慣都是以最低解像度觀看影片, 因此分享平台自動選擇其解像度, 以減少用戶再次選擇該解像度的時間。 (2分)



Candidate Performance

- Good
- Students have relevant experience such that they can answer the questions.



2C Q1c (iii)

(iii) Mr Wong wants to share a video on his web page. He gets an embedded code from the sharing platform.

 **Share video**

< Embedded Code >

What kind of code does Mr Wong get? How can he share the video using this embedded code?



Suggested Answer

|
HTML code / iframe / XML
Insert the code into his web page. / 插入在他的網頁內



Marking Flexibility

HTML code. He can put the HTML code into the HTML file of his web page so that the video appears on the web page.

他獲取了嵌入式代碼，他可以直接複製此代碼
~~然後放入該網頁的HTML中。~~



Marking Flexibility

He gets the hyperlink of the video. He can just copy the hyperlink and share with others

URL. 他按下分享視像後，會出現一條該視像的路徑，只要他將此嵌入式代碼複製，其他人則可以透過點擊代碼而直接去到該視像的網頁位置，從而觀看視像。



Candidate Performance

- Poor
- Common mistakes:
 - URL
 - Hyperlink



Teaching Strategies

- Provide opportunities for students to insert streaming videos into their websites



2C Q1d

(d) Mr Wong develops an online quiz with multiple-choice questions, as shown below:

Online Quiz	
Question	Answer
1. $3+4=?$ A. 5 B. 6 C. 7 D. 8	<input type="text" value="A"/>
⋮	
20. $5-2=?$ A. 1 B. 2 C. 3 D. 4	<input type="text" value="C"/>
<input type="button" value="Submit"/>	

Describe a potential problem of the input design above. Suggest two different designs to address this problem.



Suggested Answer

- Invalid input can be entered in the textbox / example of unreasonable input
- Use radio buttons /
- drop-down lists /
- Use button to show options /
- Use validation check /
- Use scripts/codes such that user can click the option directly.



Marking Flexibility

以上輸入設計容易發生輸入錯誤的問題。我建議的第一個設計是^{使用}下拉式選單，下拉式選單只能選取一個答案，而且可以選取不用輸入，大大減低了輸入錯誤的機會。第二個建議是使用多選按鈕，多選按鈕可以列出多個答案而且不用輸入，選擇對的答案就可以，亦是避免輸入錯誤的其一方法。



Marking Flexibility

此設計可能會因為打答案時多加了一個空格或誤打了
使有提判定為錯誤。第一個建議是~~可~~把A,B,C,D轉成
按鈕，回答時只需按去想答的答案便可以了。

第二個建議，把轉入答案的形式換成選擇A,B,C,D，
這樣的話可以不會再發生輸入錯誤的問題



Marking Flexibility

Wasting a lot of space of whole page.

It can design into a 'next page' button in order to jump to next question, this can help save up a lot of space. Moreover, it can also just let the user click on the choices instead of typing the answers in the box - and circle it

(3 marks)



Candidate Performance

- Fair
- Common mistakes:
 - Not read the questions carefully, e.g. input design
 - Give answers related to layout problems



Teaching Strategies

- Provide opportunities for students to implement data validation in web design



2C Q1e

(e) Mr Wong decides to use CSS to build his web site. Give two reasons to support his decision.



Suggested Answer

- Responsive web design:
Change the layout of website to suit difference devices / browsers / operating systems.
- Provide consistent layout/format/style/design of web pages /
It is easier to maintain the layout/design/format/style/design of web pages in the website.
- Provide enriched formats / examples



Marking Flexibility

- 1) CSS provide a better platform format than HTML.
- 2) CSS have more different function which can provide a well-function website like image filtering.

2 reasons are related to enriched formats



Marking Flexibility

使用 CSS 的第一個理由是，他可以自己編修網站的指令，建出他喜歡的網站。第二個理由是 CSS 的使用操作較為簡單。

第一，CSS 建構網站較容易，第二大部份網站皆支援 CSS。



Candidate Performance

- Poor
- Students could not show they know the function of CSS.
- The answers were too general.



Teaching Strategies

- Provide opportunities for students to apply CSS in web design




2021 ICT 2C Q4



2C Q4 a(i)

Amy designs a toy store web site so that visitors can order toys online.

- (a) (i) Amy considers using the following web design features, D1 to D5, to filter toys for children with different requirements:

D1: Checkbox	D2: Textbox	D3: Range sliders
<input type="checkbox"/> Item 1 <input checked="" type="checkbox"/> Item 2 ⋮	<input type="text"/>	<div>1025</div> 
D4: Radio buttons	D5: Drop-down menu	
<input type="radio"/> Item 1 <input checked="" type="radio"/> Item 2 ⋮	<div>Option▼ Item 1 Item 2 Item 2</div>	



2C Q4 a(i)

Choose a suitable web design feature for each input in the following table. Each feature (D1 to D5) can only be used once.

Input	Example of input data	Web design feature
Price	\$101 – \$200	
Suitable age	‘4 or above’	
Multiple brand names of toys	‘Wonder toy’, ‘Joyful kid’	
Gender	Male	
Keyword	bicycle	



Suggested Answer

(a) (i) D3
D5
D1
D4
D2

1 correct answer → 1 ;

2 correct answers → 2 ;

3 correct answers → 3 ;

5 correct answers → 4 ;

remark: ignore repeating answers



Marking Flexibility

Input	Example of input data	Web design feature
Price	\$101 – \$200	D3
Suitable age	'4 or above'	D5
Multiple brand names of toys	'Wonder toy', 'Joyful kid'	D1
Gender	Male	D4
Keyword	bicycle	D2

(4 n



Candidate Performance

- Good
- Common mistakes:
 - Some students use full name (e.g. checkbox) to answer the questions



2C Q4 a(ii)

- (ii) Amy thinks that it is not suitable to use textboxes for entering the delivery date and time. Draft a suitable design for Amy and describe it briefly.



Suggested Answer

- (ii) KEY feature: by selection ← Q: draft a suitable design
Verbal description ← Q: describe it briefly



Marking Flexibility

May 2020

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Date: 7/5/2020

Time: 12:30, 12:45, 12:50, 12:55

Choose the Year, then find the correct month and
click the date.

Date box, This design can 100% to visitors choose the
correct time.

(2 marks)

An



Marking Flexibility

送貨日期: -

* DD-MM

時間: ☒ AM 上午 ☐ PM 下午

9:00-10:00	<input type="checkbox"/>
10:00-11:00	<input type="checkbox"/>
...	...

在送貨日期用星號表示 DD-MM 代表格式而日期旁邊有日曆表讓用戶清晰地選擇。而運用了下拉式選擇。時間運用了單選按鈕選擇上午或下午然後伺服器根據用戶選擇而在下面用下拉式選擇時間

(2 分)



Marking Flexibility

Delivery date = Jan 2021

Mon	Tue	Wed	Thurs	Fri	Sat	Sun
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20

Selected date = 12 / 1 - 2021

Delivery time

Input time

Pull-down menu

am.
p.m.

calendar

A calendar is shown to let visitors to select the delivery date. And the selected date would be shown below the calendar. And customers can enter the delivery time in the boxes provided and select whether is am or p.m.

(2 marks)



Candidate Performance

- Good

- 要求是日期和時間皆不用文字輸入欄，所以必需完成**2**個項目，缺一不可。有個別考生只處理**1**個，就算正確也不獲得評分，可惜是太大意了。



Teaching Strategies

- Understand the suitable applications of different input design
- Provide poor / bad examples of input design for discussion



2C Q4 a(iii)

(iii) Amy creates the following window to deliver a message to first-time visitors.

Message
<p>Our web site uses <u>cookies</u> to ensure your <u>best browsing experience</u>. By clicking the 'I agree' button, you will confirm your consent.</p> <p>I agree</p>

Give two examples of the browsing experience that the above message refers to.



Suggested Answer

- (iii) It stores visitors' identity and so it **can speed up** the toy ordering.
It stores the previous selected options (toys) so as **to suggest** other relevant toys for visitors.
It stores Session information **to authenticate** visitors.



Marking Flexibility

Cookies can store the personal information and remain the login of the members.

Cookies can store the "shopping bag" of the users in the website.

(2 marks)



Marking Flexibility

能全面接收網站內的所有資訊，包括圖片等。

能呈現更多符合瀏覽者的產品或資訊，

個人資料會收到保密。

不會收到廣告干擾。



Candidate Performance

- Fair



Teaching Strategies

- Compare the differences after disabling cookie functions



2C Q4 b(i)

(b) Amy plans to write an online number guessing game.

(i) NUM is an integer array. To generate a random answer, she writes a client-side script MySwap(pos1, pos2) to swap the values in NUM[pos1] and NUM[pos2].

temp is a temporary variable. Complete the pseudocode for MySwap below.

MySwap(pos1, pos2)

temp \leftarrow NUM[pos1]

NUM[pos1] \leftarrow

NUM[pos2] \leftarrow



Suggested Answer

(b) (i) NUM[pos2]
temp

remark: exact spelling of variable names



Marking Flexibility

```
MySwap(pos1, pos2)
```

```
temp ← NUM[pos1]
```

```
NUM[pos1] ← NUM[pos2]
```

```
NUM[pos2] ← temp
```



Marking Flexibility

MySwap(pos1, pos2).

temp \leftarrow NUM[pos1]

NUM[pos1] \leftarrow NUM[pos2]

NUM[pos2] \leftarrow NUM[pos1]

MySwap(pos1, pos2)

temp \leftarrow NUM[pos1]

NUM[pos1] \leftarrow pos 2

NUM[pos2] \leftarrow pos 1



Candidate Performance

- Good



Teaching Strategies

- Array element vs Index of Array



2C Q4 b(ii)

- (ii) In the game, players guess 4 numbers in the correct order to win. Amy uses the following variables to develop the game:

Variable	Description
ANSWER	An array to store the answer
GUESS	An array to store the numbers that a player guesses

Suppose that ANSWER and GUESS have already stored some values. Amy plans to write a client-side script CHECKANS to check if the player has guessed the answer correctly.



2C Q4 b(ii)

Example 1: CHECKANS returns TRUE for the following values.

i	1	2	3	4
ANSWER[i]	15	18	16	17

i	1	2	3	4
GUESS[i]	15	18	16	17

Example 2: CHECKANS returns FALSE for the following values.

i	1	2	3	4
ANSWER[i]	15	18	16	17

i	1	2	3	4
GUESS[i]	15	18	17	16



2C Q4 b(ii)

ALLCORRECT is a Boolean variable. Complete the pseudocode for CHECKANS below.

CHECKANS

ALLCORRECT ←

for i from 1 to

do

if GUESS[i]

ANSWER[i] then

return ALLCORRECT



Suggested Answer

(ii) TRUE

4

<> / != / ≠

ALLCORRECT ← FALSE

("return FALSE" scores 1 mark)



Marking Flexibility

CHECKANS

```
ALLCORRECT ← TRUE
for i from 1 to 4 do
  if GUESS[i] <> ANSWER[i] then
    return FALSE
return ALLCORRECT
```



Marking Flexibility

CHECKANS

ALLCORRECT \leftarrow TRUE

設 i 由 1 至 4 執行

如果 GUESS[i] \neq ANSWER[i] 則

FALSE, $i \leftarrow i + 1$

傳回 ALLCORRECT



Marking Flexibility

CHECKANS

ALLCORRECT ←

· for i from 1 to do

if GUESS[i] ANSWER[i] then

return ALLCORRECT



Candidate Performance

- Overall: Fair
 - TRUE : Fair
 - 4 : Good
 - <> : Fair
 - ALLCORRECT = FALSE : Poor
- Not understand the use of “Return ALLCORRECT”



Teaching Strategies

- Understand the Return value of user-defined function



香港中學文憑試 2021
資訊及通訊科技科
卷 2C 第二題



(a) 莉莉決定建構一個網站而非流動應用程式，讓學生取得這些學習資源。

(i) 舉出**兩個**理由以支持她的決定。

- It has a higher compatibility for different platforms / cross platform
- No installation is needed.
- Save the storage / web site can store more materials than mobile application
- The content can be updated/maintained easily. **(1) X 2**

1. 網站可儲存的學習資源較

流動應用程式多

2. 網站於任意的操作系統，或流

動裝置都能使用。



(2 分)

而且網站不需要 ~~太高~~ 太高昂的經費
且每部電話及電腦便能夠使用，適合大
部分機體

2 能夠讓所有學生使用，因為並非所有學生都擁有
流動電話

2. 建構網站比較起建構應用程式會更容易



(ii) 此網站應支援不同的常用瀏覽器。舉出建構網頁時，莉莉應考慮的兩個技術因素。

- Test HTML codes whether supported by different popular browser
- Test plug-in whether supported by different popular browser
- Add a program to determine execute which part of program statements by testing which browser is used. (1) X 2

X
莉莉應用統一碼以便顯示不同語言的文字。
莉莉應考慮以 HTML 5 去建構網頁，因為 HTML 5 能支援多媒體，且無須外掛程式，因此便能避免因部份瀏覽器因不支援外掛程式而無法查閱網站的所有內容。 (2 分) ✓



1. 網站能否在不同操作系統中使用。✗

2. 網站能否支援不同人士使用，如
殘障人士 ✗



(iii) 建議並描述一個客戶端網頁設計功能，以提醒學生瀏覽網站一小時後休息。

- Use client script to record the time of computer. (1)
- Create a pop-up alerting message after a period of time. (1)

設計一個彈出式視窗，在一小時後彈出，並提醒學生休息。

客戶端手稿程式會利用學生的裝置的內置時鐘計時。若學生使用網站多於一小時，則會彈出視窗，提醒休息。



网页内置^x时钟，网页打开后一小时后，
检测到

即了羊出提醒^x。



(b) 莉莉設計網頁時包含以下一幅解像度為 7000×4000 的圖像。

- (i) 莉莉修改 HTML 編碼中有關高度和寬度的圖像屬性，使此圖像以 700×400 顯示。這個圖像的檔案大小會有什麼變化？簡略說明。

The file size of the image will remain **unchanged** because the HTML code does not affect the original file. (Correct answer without or with wrong explanation.)

No / 沒有 (1)



由 7000×4000 變成 700×400 ，圖像大小會
縮小，而檔案大小也會變小。✗



(ii) 除高度和寬度外，舉出一個可以在 HTML 編碼中修改的圖像屬性。

- alternative text, title (1)

- border ~~x~~ 水平~~x~~ 垂直 翻轉~~x~~
色深~~x~~



(iii) 建議並描述一個互動的網頁設計，讓莉莉可以使用以上圖像去教授家具名稱（例如餐枱和沙發）。

- Create an image map for the objects. (1)
- Click/mouse over to pop up a (overlay) window to show the vocabularies. (1)

Image map.

Mary can create areas wrapping the furniture in the image, then assign different links to the areas corresponding to the furniture.

Therefore when the user clicks a piece of furniture on the image, he/she will be directed to a webpage teaching the name of the corresponding furniture.



(2 marks)

Mary should add audio and text into the web page:
When the user press on a furniture, the web browser
would detect and play the required audio specifying
the name of the furniture. Also, the name of the
furniture in text form should appear on the page to
show up to users. X

在圖片上插入文字欄並
輸入家具的名稱。 X



(c) 分別舉出使用客戶端手稿程式和伺服器端手稿程式以產生串字核對結果的優點。

(1)

客戶端手稿程式：It has less loading on the server / quick response.

客戶端手稿程式：檢查用戶的串字是否完整，可以
減少伺服器端的工作 ✓

點。

客戶端手稿程式：核對答案的時間較快 ✓



伺服器端手稿程式： _____

Student performance can be immediately stored in a database. /

Prevent student can get answer from client side scripts. (1)

伺服器端手稿程式： 可以隨時更改錯誤的字，以及增加新的字。

(2 分)

伺服器端手稿程式： 伺服器端手稿程式能更有效地減低核對結果的出錯機會。



(d) 莉莉嘗試註冊域名 *hkhappysch.edu*，但是該域名已被註冊。建議另一個包含 *hkhappysch* 的二級域名。

hkhappysch.edu.hk (1)

hkhappysch.com

hkhappysch001.edu

001hkhappysch.edu

hkhappysch.org

:

:



- (e) 莉莉打算將某網頁的 URL 展示在宣傳海報上，讓家長瀏覽此網頁，但此 URL 太長了。建議莉莉**兩個**不同方法以解決這個問題。

Create a QR code with the URL. (1)

Apply URL shortening to create a shorter URL. (1)

製成 二維碼 ✓ 讓家長只需掃描
二維碼便能瀏覽 和使用 DNS 將網址名稱
轉換成 IP 地址，但家長只需輸入 IP 便能瀏覽
網頁。 (2 分)

1. 把 URL 改名稱，把 URL 改一個較短的名稱。



香港中學文憑試 2021
資訊及通訊科技科
卷 2C 第三題



志明喜歡唱歌及使用電子鋼琴演奏音樂。

(a) 志明使用電子鋼琴演奏和錄製一些音樂於一個檔案，然後以小提琴音色播放此檔案。

(i) 這檔案是什麼格式？ MIDI / RIFF (1)
(1 分)



(ii) 除檔案大小外，舉出一個 (a)(i) 的檔案格式的優點。

It can be edited easily. /

(1)

It can be played in an instrument other than the piano.

它是用模擬聲音作為收錄聲音，如利用
電子鋼琴錄製，所以音頻的聲音較真實。

演奏和

(1 分)



- (b) (i) 志明合併琴音和歌聲的音頻聲道而建構了一個音頻。舉出當合併音頻聲道時，他可調節的兩個音頻屬性。

Amplitude/loudness/volume , Phase (pitch/frequency),
tempo/speed, no of channel. **(1) X 2**

× sampling rate / sampling size, panning / fade in fade out / length

聲量✓和速度✓。

取樣頻率, 樣本大小。



(ii) 志明考慮「有損」壓縮和「無損」壓縮的音頻檔案格式。舉出各種壓縮的優點。

「有損」壓縮： smaller in file size (1)

「無損」壓縮： better audio quality / can convert back to the original file (1)

「有損」壓縮： 檔案大小較小✓

「無損」壓縮： 音質較佳，因為沒有音訊失真✓



(c) 志明錄製了一首歌曲為兩個不同的 MP3 檔案 P 和 Q：

規格	P	Q
取樣頻率 (kHz)	22.05	44.1
取樣大小 (位元)	16	8
聲道數目	單聲道	雙聲道

(i) 假設此歌曲的時間長度為 3 分鐘，而壓縮比例為 1:5。估算 P 的檔案大小，並以 KB 表示。展示你的計算。

$$\frac{(22.05 \times 1000) \times 16 \times (3 \times 60)}{5 / 1024 / 8} \quad (1)$$

$$= 1550 \text{KB} \quad (1)$$

$$\text{Or } (22.05 \times 1000) \times 16 \times (3 \times 60) / 5 / 1000 / 8 = 1588 \text{KB}$$

$$\begin{aligned} & \frac{((22.05 \times 1000) \times (16) \times (3 \times 60))}{5} \div 8 \\ &= 12700800 \div 8 \div 1024 \\ &= 1550.39 \text{ KB} \end{aligned}$$



(ii) 最後志明選用 Q 而並不是 P。舉出兩個原因以支持他的選擇。

Two channels can be used and the song plays lively. /

Better sound quality with explanation / surrounding sound (身歷聲) /
more realistic / Richer listening experience / (1)

× more channels

The sound frequency range is broader and music tones can be
represented more precisely. /

Better sound quality with explanation / more detailed / closer to the
original audio (1)

× clear voice / can convert to the original voice / smoother

因為 Q 是雙聲道，因此聆聽時能有立體聲，播
於比 P 更為佳。

Q 的雙聲道比 P 的單聲道更清晰 ×

Q 檔案的取樣頻率較 P 高，流暢度較高 ×

(d) 志明建立一個視像廣播網站，讓瀏覽者觀看他的現場表演。

(i) 以下是視像廣播的詳細資料：

視像廣播的位元率	8500 kbps
串流伺服器的網絡頻寬	1 Gbps
一般瀏覽者的網絡頻寬	300 Mbps

每一位瀏覽者應該能夠順暢地觀看表演。建議最多可容許同一時間觀看的瀏覽者人數。展示你的計算。

$$\frac{1 \text{ Gbps}}{8500 \text{ kbps}} \quad (1)$$

$$= 117.65 = \underline{117} \quad (1)$$

$$\begin{aligned} & \frac{(1 \times 1024 \times 1024 \times 8500)}{(300 \times 1024)} \\ & = 29013.3 \\ & \approx 29013 \text{ 人} \end{aligned} \quad \text{X}$$



(ii) 志明考慮兩個不同進程來編輯所錄製的視像：

進程 1：倍增視像的幀速率，但沒有改變視像數據。

進程 2：在視像中，每兩幀中刪除一幀。

簡略描述各進程可能對視像的時間長度及檔案大小的改變。

進程 1： The file size in remains unchanged.

The duration will be halved / shorter. (1)

進程 1： 由於倍增視像的幀速率，所以會
使視像變得更流暢，但相對上便會令檔
案大小變大~~X~~，但對影片長度不變。~~X~~

進程 1： 視像長度不變，但檔案大小增加~~X~~
時間~~X~~



進程 2: The file size in is smaller / halved. (1)

The duration will be halved / shorter. (1)

進程 2: 由於幀被減少，因此等於會少了一些畫面，因此會令影片時間長度變短，且檔案的大小也會變小。

進程 2: 視像的時間長度下降，檔案大小減少。



2021 HKDSE ICT-D sharing workshop

(popularity of the Elective Part : 26.6 %, 1427 candidates)

2021 September

Candidates
Performance

Range	Star
Poor	*
Satisfactory	**
Good	***
Very Good	****
Excellent	*****



Q1 (a)

Answer **THREE** questions only.

1. In a train station, the departure times of trains in one day are stored in an array P of size n ordered by time. Peter writes a program $F1(s, t)$ to find the number of trains departed from time s to time t inclusive. He assumes that there are always trains departed at time s and time t . For example, according to the content of P below, $F1(12:20, 18:00)$ returns 3.

i	1	2	3	4	5	6	7
$P[i]$	06:05	07:10	11:25	12:20	14:25	18:00	19:30

(a) (i) According to the content of P above, find the return values of the following:

(1) $F1(07:10, 14:25)$ **4** **①** _____ (1 mark)

(2) $F1(11:25, 11:25)$ **1** **①** _____ (1 mark)

(ii) Complete the following pseudocode for $F1$.

```
F1(s, t)
  count  $\leftarrow$  0
  for i from 1 to n do ①
    if  $s \leq P[i]$  AND  $P[i] \leq t$  then ①
      count  $\leftarrow$  count + 1
  return count ①
```

(3 marks)



Q1 (b)

Peter writes a subprogram BS using binary search to find the index of the train departed at time t :

```
BS(t)
  s ← 1
  e ← n
  while s ≤ e do
    m ← (s+e)/2
    if P[m] = t then
      exit subprogram and return m
    else
      if t > P[m] then
        s ← m + 1
      else
        e ← m - 1
  return m
```

(b) Refer to the content of P above.

(i) What is the return value of BS(14:25)?

5

① ****

(1 mark)

(ii) How many times will the 5th line in BS ' $m \leftarrow (s+e)/2$ ' be executed when calling BS(19:30)?

3

① *** 

(1 mark)

Q1 (c)

- (iii) Peter rewrites F1 as F2. F2 uses binary search to find the index of the train departed at time s . Then it sequentially searches the number of trains departed on or before time t . Complete the pseudocode for F2 below.

```
F2(s, t)
  count  $\leftarrow$  0
  for i from BS( S ) to n do
    if P[i]  $\leq$  t or i  $\leq$  BS(t) then ***
      count  $\leftarrow$  count + 1
  return count
```

(3 marks)

- (iv) Peter rewrites F1 as F3. F3 uses binary search twice to find the number of trains departed from time s to time t inclusive. Complete the pseudocode for F3 below.

```
F3(s, t)
  a  $\leftarrow$  BS(s)
  b  $\leftarrow$  BS(t)
  count  $\leftarrow$  b - a + 1
  return count
```

(2 marks)



Q1 (d)

- (c) Peter writes $F4$ for cases that there may not be a train departed at time s or time t . For example, according to the content of P above, $F4(12:00, 18:30)$ returns 3. Complete the pseudocode for $F4$ below.

```
F4(s, t)
  count  $\leftarrow$  F3(s, t)
  a  $\leftarrow$  BS(s)
  b  $\leftarrow$  BS(t)
  if P[a] < s then
    count  $\leftarrow$  count - 1
  if t < P[b] then
    count  $\leftarrow$  count - 1
  return count
```

1 ***

(3 marks)



Q2 (a)

Tom develops a system to arrange dropping off boxes from a ship to storage areas. He uses a string array S of size k to represent the storage areas. In the following example, areas 3 and 6 each stores a box of apples whereas the other areas are empty.

i	1	2	3	4	5	6	7	8
$S[i]$			Apple			Apple		

Tom writes the pseudocode for a subprogram $CE(N)$ that returns **TRUE** if there are N or more empty areas, **FALSE** otherwise.

```

CE(N)
    count  $\leftarrow$  0
    for i from 1 to k do
        if  $S[i]$  is empty then
            count  $\leftarrow$  count + 1
    if count  $\geq N$  then
        return TRUE
    else
        return FALSE
    
```

(a) Suppose that the initial content of S is

i	1	2	3	4	5	6	7	8
$S[i]$			Apple			Apple		

- (i) What is the return value of $CE(3)$? TRUE ① **** (1 mark)
- (ii) Find the minimum value of N such that $CE(N)$ returns **FALSE**. 7 ① *** (1 mark)



Q2 (b) (i) (ii) ***

Tom writes a subprogram $SC(T, N)$. If there are less than N empty areas, SC only returns -1 . Otherwise, SC puts N boxes of T in the empty areas with the smallest index first and returns 0 .

For example, the initial content of S is

i	1	2	3	4	5	6	7	8
S[i]	Apple		Apple					

After executing $SC(\text{Pear}, 4)$, S becomes

i	1	2	3	4	5	6	7	8
S[i]	Apple	Pear	Apple	Pear	Pear	Pear		

(b) Suppose that the initial content of S is

i	1	2	3	4	5	6	7	8
S[i]			Apple			Apple		

(i) What is the content of S after executing $SC(\text{Peach}, 4)$, $SC(\text{Melon}, 3)$ and $SC(\text{Mango}, 1)$ sequentially?

i	1	2	3	4	5	6	7	8
S[i]	Peach	Peach	Apple	Peach	Peach	Apple	Mango	

1

1

(2 marks)

(ii) What is the return value of $SC(\text{Plum}, 9)$?

-1

1

(1 mark)



Q2 (b)

(iii) Complete the pseudocode for SC below.

```
SC(T, N)
```

```
  if CE(N) then
```

```
    count  $\leftarrow$  N
```

```
    i  $\leftarrow$  0
```

```
    repeat
```

```
      i  $\leftarrow$  i + 1
```

```
      if S[i] is empty then
```

```
        S[i]  $\leftarrow$ 
```

T

①

```
        count  $\leftarrow$ 
```

count - 1

①

```
    until
```

count = 0

①

```
    return 0
```

```
  else
```

```
    return -1
```

(3 marks)



Q2 (c)

Tom uses the following stack operations:

Stack operation	Description
push (X, T)	Store a box of T in area X.
pop (X)	Remove a box from area X and return the box.

Complete the pseudocode for GET below.

GET(T)

while a is not empty do

temp \leftarrow pop(a)

if temp \neq T then

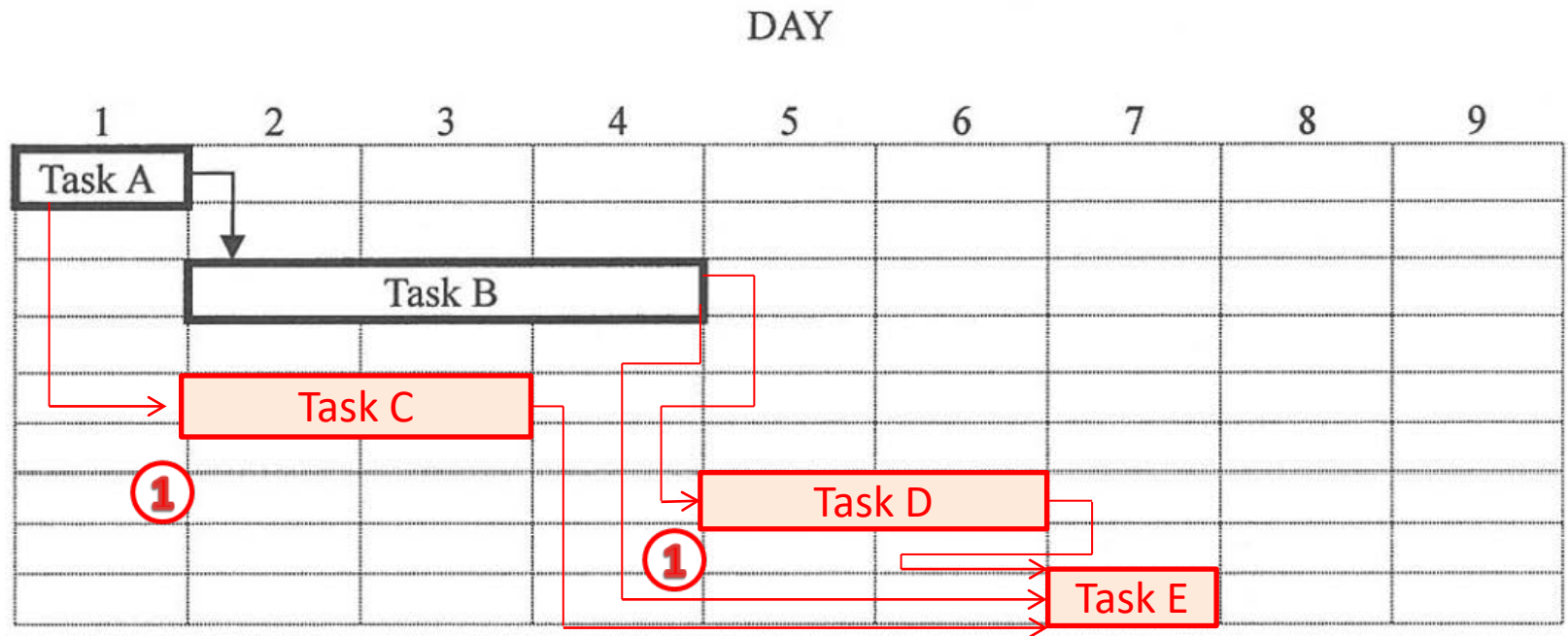
push(**b, temp**) **1**

while **b is not empty** do **1**

push(**a, pop(b)**) **1** **

Q2 (d)

(i) Complete the Gantt Chart below.



@Task with correct incoming arrows and at the correct position (Task C between day 2 and day 6)

1 ***

(3 marks)

(ii) What is the minimum number of days for completing all tasks?

7 days **1**

(1 mark)

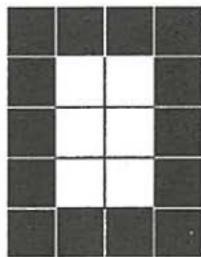


Q3 (a)

Mary writes a subprogram $A \circ B$ for converting A to B by copying data in A to B row by row from the top to the bottom. For example, A in the above is converted to B below.

idx	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
B[idx]	0	1	1	0	1	0	0	1	1	0	0	1	1	1	1	0	1	0	0	0

(a) Mary uses A to represent the following image. Write the content of B after executing $A \circ B$.



①

idx	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
B[idx]	1	1	1	1	1	0	0	1	1	0	0	1	1	0	0	1	1	1	1	1

①

(2 marks)



Q3 (b)

- (i) Complete the following pseudocode for $A \rightarrow B$ that converts A to B .

$A \rightarrow B$

```
for i from 1 to m do
  for j from 1 to n do
```

$B[\boxed{(i-1) * n} + \boxed{j}] \leftarrow A[i, j]$

concept of $x \cdot n$ ①

all correct ① **
(3 marks)

- (ii) Mary writes a subprogram $B \rightarrow A$ that converts B to the original data structure A . Complete the pseudocode for $B \rightarrow A$ below.

$B \rightarrow A$

```
for i from 1 to m do
  for j from 1 to n do
```

$A[i, j] \leftarrow B[(i-1) * n + j]$ ① *

(1 mark)



Q3 (c)

(i) What is the content of P after executing ADD1?

i	1	2	3	4
P[i]	1	0	0	1

②

(2 marks)

(ii) Refer to the following P and A with one error element.

		n			
		1	2	3	4
m	1	1	0	1	0
	2	0	1	0	1
	3	1	0	1	0
	4	1	1	0	0
	5	1	0	0	0
		A			

i	1	2	3	4
P[i]	1	0	1	0

Which column in A contains the error element?

2

①

(1 mark)



Q3 (d)

(i) Mary considers using procedural languages and object-oriented languages to write the subprograms. Give one major difference between these two kinds of programming language.

function / object based

top-down / bottom-up implementation approach

without / with access specifiers

cannot / can overload

1 , 1

(2 marks)

(ii) Mary considers using interpreters and compilers. Give an advantage of each type of translator.

Interpreters: **It is convenient for programmers to test and debug during the development of programs.**

No intermediate object code is generated and hence it takes less memory (efficient).

Compilers:

The execution time is shorter.

The error checking is comprehensive.

1

1

(2 marks)

(iii) Mary chooses to use program libraries instead of writing her own subprograms. Give two reasons to support her choice.

Shorten the development time.

It has fewer possible program bugs.

1

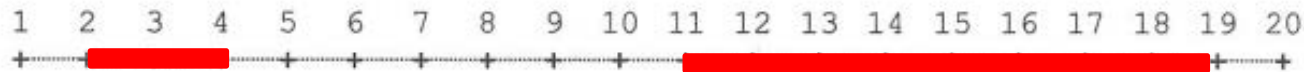
1



(2 marks)

Q4 (a)

(i) Draw the lines to be cut by executing $H_{cut}(2, 4)$, $H_{cut}(11, 13)$ and $H_{cut}(13, 19)$.

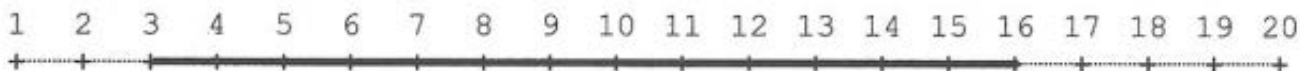
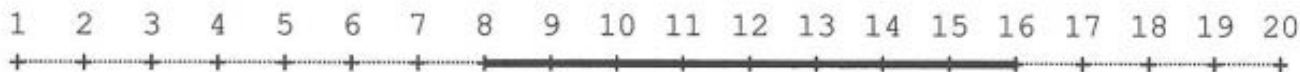
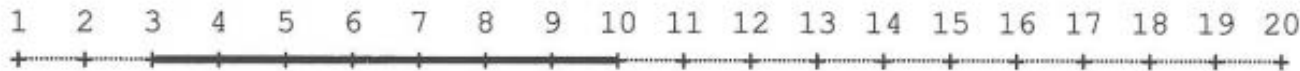


①

①

(2 marks)

(ii) Susan finds that the execution of $H_{cut}(3, 10)$ and $H_{cut}(8, 16)$ is the same as the execution of $H_{cut}(3, 16)$.



Simplify the execution of $H_{cut}(2, 7)$ and $H_{cut}(6, 9)$ so that H_{cut} can be executed once only.

$H_{cut}(\underline{2}, \underline{9})$

①

(1 mark)



Q4 (a)

(iii) Susan develops a subprogram $MH(s1, e1, s2, e2)$ with two overlapping horizontal lines $(s1, e1)$ and $(s2, e2)$ as input parameters that returns a simplified horizontal line. For example, $MH(3, 10, 8, 16)$ will return $(3, 16)$. Complete the pseudocode for MH below.

$MH(s1, e1, s2, e2)$

$a \leftarrow$ minimum of $s1$ and $s2$

$b \leftarrow$

return

①

①

(2 marks)



Q4 (b) (c)

- (b) Susan writes a subprogram CO that checks whether two horizontal lines (s1, e1) and (s2, e2) overlap each other. Complete the pseudocode for CO below.

```
CO(s1, e1, s2, e2)
  if (s1 ≤ e2) AND ( S2 ≤ e1 ) then 2 ***
    return TRUE
  else
    return FALSE
```

(2 marks)

- (c) L is a list that contains horizontal lines. L[i] represents the i-th node that contains a horizontal line (L[i].s, L[i].e). Susan writes the following pseudocode for merging all overlapping horizontal lines in L. Complete the pseudocode below by using MH.

```
for any L[i] and L[j] in L, do
  if i <> j then
    if CO(L[i].s, L[i].e, L[j].s, L[j].e) then
      remove L[ i 1 ] and L[ j 1 ] from L
      insert MH(L[i].s, L[i].e, L[j].s, L[j].e) 1 into L
      ***
```

(3 marks)



Q4 (d)

Complete the waterfall model below.

