HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2021

INFORMATION AND COMMUNICATION TECHNOLOGY

PAPER 1

8:30 am – 10:30 am (2 hours)

This paper must be answered in English

GENERAL INSTRUCTIONS

1. There are two sections, A and B, in this Paper.

2. Section A consists of multiple-choice questions in this question paper. Section B contains conventional questions printed separately in the Question-Answer Book.

3. Answers to Section A should be marked on the Multiple-choice Answer Sheet. Answers to Section B should be written in the spaces provided in the Question-Answer Book. **The Answer Sheet for Section A and the Question-Answer Book for Section B must be handed in separately at the end of the examination.**

INSTRUCTIONS FOR SECTION A (MULTIPLE-CHOICE QUESTIONS)

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should first stick a barcode label and insert the information required in the spaces provided. No extra time will be given for sticking on the barcode label after the 'Time is up' announcement.

2. When told to open this book, you should check that all the questions are there. Look for the words **'END OF SECTION A'** after the last question.

3. All questions carry equal marks.

4. **ANSWER ALL QUESTIONS**. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured.

5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

6. No marks will be deducted for wrong answers.

Not to be taken away before the end of the examination session

There are 40 questions in this paper. Choose the most suitable answers.

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
   B. (1) and (3) only
   C. (2) and (3) only
   D. (1), (2) and (3)

2. Which of the following additions of numbers in 8-bit two's complement representation will result in an overflow error?

   A. `0011 0110 + 0011 1100`
   B. `0100 0010 + 1000 0001`
   C. `1001 1100 + 1111 0110`
   D. `1011 1010 + 1100 0100`

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

   A. `3A`
   B. `3C`
   C. `58`
   D. `59`

4. When creating a database table in database software, what should users usually set?

   (1) The data type of each field
   (2) The maximum number of records
   (3) Primary key

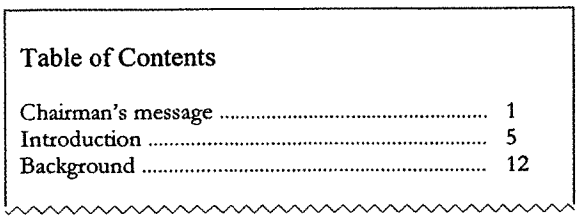
   A. (1) and (2) only
   B. (1) and (3) only
   C. (2) and (3) only
   D. (1), (2) and (3)

5. Eva uses WAV format instead of MP3 format when recording music performance. What is/are the benefit(s) of this?

   (1) The file size of the audio file is larger.
   (2) The audio quality is better.
   (3) There are no cross-platform issues.

   A. (1) only
   B. (2) only
   C. (1) and (3) only
   D. (2) and (3) only

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



A. Tim has to input a formula for calculating the page numbers
B. Tim has to input the chapter name in the table of contents
C. the page numbers can be updated accordingly
D. the new chapter will be inserted as the last chapter

7. John adds verbal annotations to a presentation file. Which of the following statements is/are correct?

(1) The file size of the presentation increases.
(2) The number of slides in the presentation increases.
(3) Videos cannot be embedded in slides with a verbal annotation.

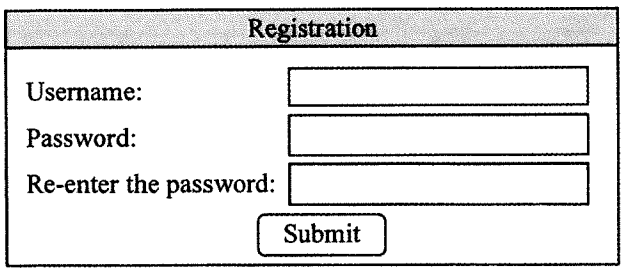
A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

8. Mary is a marketing manager and plans to send invitation letters to selected customers. She will extract data from a customer database. What information processes should she do?

(1) Filtering
(2) Mail merging
(3) 'What-if' analysis

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

9. What is the purpose of asking a user to enter a password twice in an online system?



A. Data validation
B. Data verification
C. Data organisation
D. Data preparation

10. Peter wants to add the content in X.jpg and Y.xlsx to Z.docx using object linking. Which of the following statements about Object Linking and Embedding (OLE) is correct?

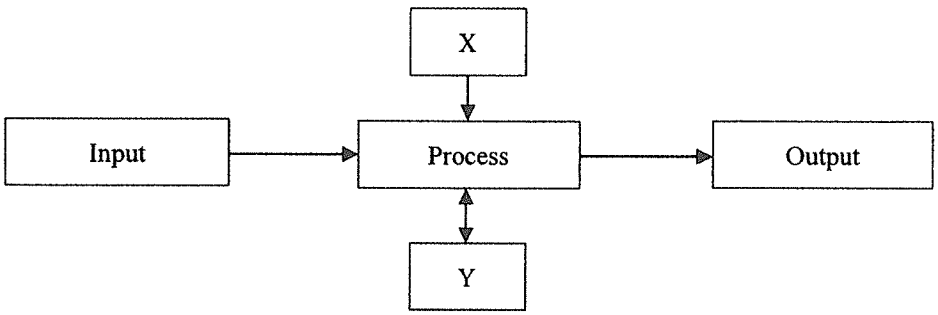
A. OLE does not apply to the file format of X.
B. The file size of X should be smaller than that of Z before Peter's action.
C. The file size of Z will be larger than that of Y after Peter's action.
D. Changes to data in Y can affect the subsequent printout of Z.

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
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

12. The basic concept of the 'Input-Process-Output' cycle is illustrated in the following chart. What are X and Y?



	X	Y
A.	Unicode	Binary number
B.	Internet	Network device
C.	Program	Storage
D.	Database	Query

13. Eva uses a spreadsheet to store hundreds of records of online meetings, as follows:

	A	B	C	D	E	F	...
1	Date	Participant	Meeting code	Time	IP	Type	...
2	30-1-2020	Mary	AB-1234	45	123.234.12.3	Tablet	...
3	30-1-2020	Peter	AB-1234	45	121.123.12.3	Mobile phone	...
4	28-2-2020	John	AB-1266	90	123.234.12.5	Desktop	...
5	18-3-2020	John	AB-1268	120	123.234.12.5	Desktop	...
⋮	⋮		⋮	⋮	⋮	⋮	

She wants to create a pivot table to find the number of meetings that each participant has attended.

FILTERS	COLUMNS
ROWS	VALUES

In which of the following areas should 'Participant' be put?

(1) FILTERS
(2) COLUMNS
(3) ROWS
(4) VALUES

A. (1) only
B. (4) only
C. (1) and (2) only
D. (3) and (4) only

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
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

15. Which of the following requires a driver program?

(1) Editing a word processing document
(2) Connecting to a new printer
(3) Removing a software package

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

16. David builds a computer system at home that his friends can log in to and on which they can play an online football game together. Which of the following modes of processing is/are involved?

(1) Online interactive processing
(2) Batch processing
(3) Real-time processing

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

17. John has a desktop computer installed with a 500GB SSD and a 2TB hard disk drive. Why is an operating system installed in the SSD instead of the hard disk drive?

A. The operating system is not open source software.
B. The files of the operating system are frequently used.
C. The storage size required for the operating system is smaller than 500 GB.
D. Data files need to be stored in the hard disk.

18. Which of the following is a recent development in CPU?

A. Pre-installation of an operating system
B. Decreasing the number of processing units
C. Increasing the clock rate
D. Increasing the power consumption

19. Peter wants to buy a computer for using multimedia learning software packages. Which of the following is the **least** important factor?

A. Storage size of SSD
B. Storage size of RAM
C. Storage size of ROM
D. CPU clock rate

20. What are the advantages of using an e-book reading device instead of a tablet computer to read e-books?

(1) Lower power consumption
(2) Lighter in weight
(3) Higher computational power

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

21. The instruction of the assembly language `'LOAD 1000'` is executed in a CPU. Which of the following components decodes the instruction?

A. Buses
B. Registers
C. ALU
D. CU

22. Which of the following is commonly used for connecting two LANs?

A. Firewall
B. Broadband modem
C. Router
D. Anti-virus software

23. Which of the following is **not** a multimedia file format?

A. ZIP
B. MP3
C. MP4
D. PNG

24. A supermarket will provide an online platform for customers to buy food. Which of the following should be considered when designing the user interface?

(1) Font size
(2) Colour
(3) Language

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

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
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

26. Mr Li rents online file storage services for the staff working in his office, instead of setting up file servers. Why?

(1) The bandwidth of the Internet connection for the office is not sufficient.
(2) Additional technical staff is not needed in the office.
(3) It gives flexibility when increasing the storage size.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

27. Which of the following about HTTP is/are correct?

(1) It is used to transfer hypertext documents.
(2) It is used to translate URLs into IP addresses.
(3) It is used to store the browsing history.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

28. In a school playground, although a wired network has been installed, the school installs an Access Point connecting to the network. Why?

(1) Students can use tablet computers for lessons.
(2) The network can be used 24 hours a day.
(3) The data transfer rate for the network connections is higher.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

29. What is the output of the following algorithm?

```
X ← 9
Y ← 2
Repeat
        Output the remainder of (X / Y)
        X ← the integral part of (X / Y)
Until X = 0
```

A. 10
B. 110
C. 101
D. 1001

30. After writing the source code of a program, which of the following should be done according to the problem-solving procedures?

(1) Outline the input and output requirements of the problem.
(2) Test the program with boundary cases.
(3) Define the scope of the problem.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

31. Assume that `X = 5`, `Y = 6` and `Z = 7`. Which of the following Boolean expressions returns TRUE?

A. `((X < 0) AND (Y >= 6)) AND (Z > 10)`
B. `((X < 0) OR (Y <= 6)) AND (Z > 10)`
C. `((X < 0) OR (Y >= 6)) AND (Z > 10)`
D. `((X < 0) OR (Y <= 6)) OR (Z > 10)`

32. What is the output of the following algorithm with the initial values in the array `P`?

P[1]	P[2]	P[3]	P[4]
0	1	1	0

```
Q ← 0
for i from 1 to 4 do
      If P[i] = 1 then
            Q ← 1 - Q
      Output Q
```

A. 0100
B. 0110
C. 1000
D. 1001

33. What is the output of the following algorithm?

```
sum ← 0
j ← 12
Repeat
      sum ← sum + 1
      j ← j - 2
Until j <= 2
Output sum
```

A. 7
B. 6
C. 5
D. 4

34. What is the output of the following algorithm?

```
For i from 1 to 5 do
        A[i] ← i
S ← 0
i ← 1
While  i > S  do
        S ← S + A[i]*A[i+1]
        i ← i + 1
Output S
```

A. 40
B. 20
C. 8
D. 2

35. What is the output of the following algorithm?

```
X ← 6
Y ← 4
H ← 2
While  H > 0  do
        X ← X + Y
        Y ← X - Y
        X ← X - Y
        H ← H - 1
Output Y
```

A. 10
B. 6
C. 4
D. 2

36. What can Alice do when using open source software?

(1) Seek approval from the software developer before using the software.
(2) Amend the source code for her own use.
(3) Amend the source code drastically and own the copyright of the entire software.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

37. What should be considered when using information from the Internet to write a report?

(1) Some information on the Internet is unreliable.
(2) Most information on the Internet is free.
(3) Many hackers steal personal information through social media.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

38. Which of the following can narrow the digital divide in the society?

(1) Providing computers to students for learning
(2) Providing self-service kiosks for ordering food in restaurants
(3) Using electronic payment to replace cash payment in shops

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

39. Which of the following Internet activities are probably infringements of copyright?

(1) Extracting a video from an old movie DVD and uploading it to the Internet
(2) Drawing a picture and sharing it with friends using peer-to-peer (p2p) software
(3) Downloading newspaper articles from the Internet and publishing a book containing them

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

40. Which of the following is/are the common measures for online systems to authenticate user identities?

(1) DNS
(2) Security tokens
(3) Firewalls

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

END OF SECTION A

2021-DSE
ICT

PAPER 1
(SECT B)

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2021

Please stick the barcode label here.

Candidate Number									

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 space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3 and 5.

(2) Refer to the general instructions on the cover of the Question Paper for Section A.

(3) **ANSWER ALL QUESTIONS.** Write your answers in the spaces provided in this Question-Answer book. Do not write in the margins. Answers written in the margins will not be marked.

(4) Supplementary answer sheets will be supplied on request. Write your Candidate Number, mark the question number box and stick a barcode label on each sheet, and fasten them with string **INSIDE** this book.

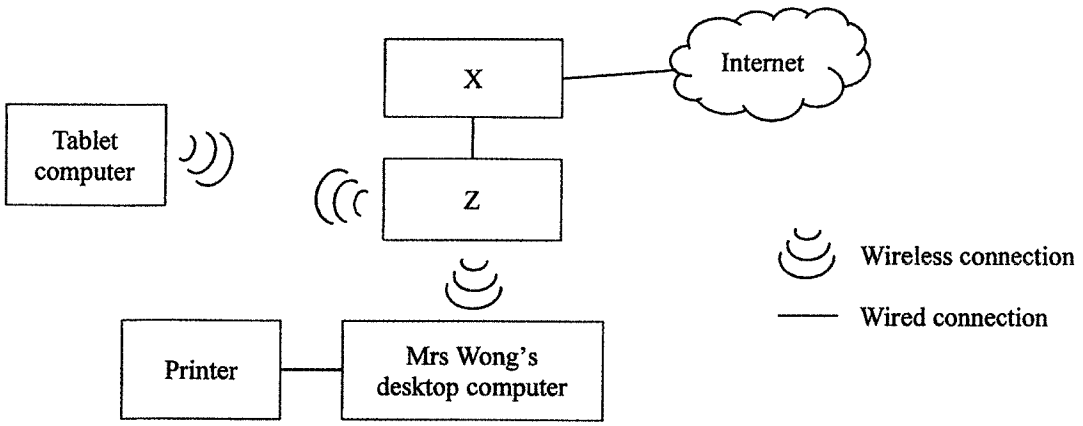
(5) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

(6) The last page of this Question-Answer book contains SQL commands and spreadsheet functions which you may find useful.

* A 2 0 0 E 0 1 B *

Answer all questions.

1. 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:



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

(i) What are X and Z?

X: _____ Z: _____

(2 marks)

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

_____

_____

_____

_____

(2 marks)

(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.

_____

_____

(1 mark)

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

_____

_____

(1 mark)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

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

(2 marks)

(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?

(2 marks)

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

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

2. A school library has a wireless network.

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

(2 marks)

The school buys two types of tablet computers, P and Q, with the following specifications for students to use:

Specification	P	Q
CPU	5 GHz, 10 cores	1 GHz, 4 cores
RAM	16 GB	4 GB
Storage device	512 GB SSD	16 GB SSD
Screen size	12-inch touch screen	7-inch touch screen
Screen resolution	2736 x 1824	1024 x 600
Connectivity	Bluetooth WiFi	Bluetooth WiFi + Cellular
Other	Physical keyboard 1.2 kg weight Microphone	260g weight Microphone

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

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Please stick the barcode label here.

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

(2 marks)

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

(2 marks)

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

(2 marks)

(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?

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

3. Peter designs an algorithm to encrypt an array of binary digits, A, as shown below:

```
I ← 5
repeat
        I ← I - 1
        A[I] ← 1 - A[I]
until A[I] = 1
```

(a) (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]

(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]

(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 ← 5
repeat
        I ← I - 1
        A[I] ← 1 - A[I]
until (A[I] = 1)  [          ]  [                    ]
```

(2 marks)

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

```
Flag ← 1
for I from [      ] down to 1 do
    if Flag = [      ] then
        A[I] ← 1 - A[I]
    if A[I] = [      ] then
        Flag ← 0
```

(3 marks)

Answers written in the margins will not be marked.

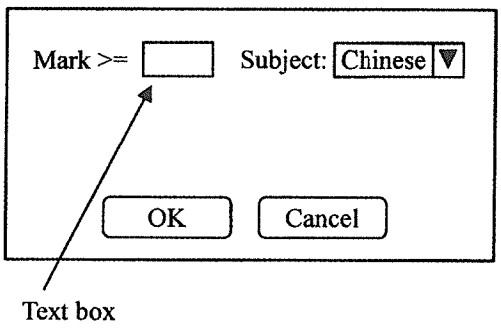
Answers written in the margins will not be marked.

(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.

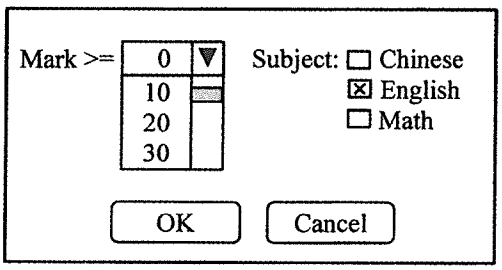
(2 marks)

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

Design 1



Design 2



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

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Ms Li designs a database table, SCORE, to store the examination marks of students. Some records of SCORE are listed below:

SCORE

IDNO	SNAME	CLASS	SUBJECT	MARK
10204	Wong Siu Man	1A	Chinese	90
10204	Wong Siu Man	1A	English	88
10204	Wong Siu Man	1A	Mathematics	100
20345	Chan Tai Man	1A	Chinese	70
20345	Chan Tai Man	1A	Mathematics	80
34563	Wong Siu Man	1B	Chinese	50

The numbers in IDNO are student numbers and the sum of all digits of a student number can be divisible by 7. For example, the number 10204 in IDNO is valid where

the sum = 1 + 0 + 2 + 0 + 4 = 7, which is divisible by 7.

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

(1 mark)

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

_____

_____

_____

(1 mark)

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

(i) State the primary key for SCORE. _____

(1 mark)

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

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

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

Ms Li plans to find the ranks of students of Class 1A in each subject. She copies data in SCORE to a spreadsheet and sorts the data in ascending order of SUBJECT and then in descending order of MARK, as shown below:

	A	B	C	D	E	F	G
1	IDNO	SNAME	CLASS	SUBJECT	MARK	RANK	RANK1
2	10204	Wong Siu Man	1A	Chinese	90		
3	10024	Chan Li Li	1A	Chinese	88		
4	13300	Lee Man Man	1A	Chinese	88		
⋮	⋮	⋮	⋮	⋮	⋮		
31	11113	Ho Man Man	1A	Chinese	20		
32	10204	Wong Siu Man	1A	English	88		
33	13300	Lee Man Man	1A	English	80		
⋮	⋮	⋮	⋮	⋮	⋮		
61	10024	Chan Li Li	1A	English	30		
62	10024	Chan Li Li	1A	Mathematics	100		
63	10204	Wong Siu Man	1A	Mathematics	100		
⋮	⋮	⋮	⋮	⋮	⋮		
91	13300	Lee Man Man	1A	Mathematics	10		

(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: _____

Displayed value: _____

(2 marks)

(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. _____

(1 mark)

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

_____

_____

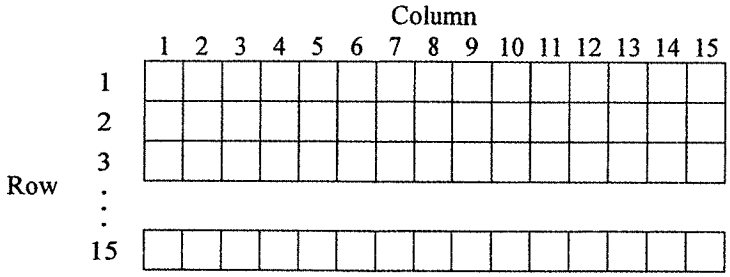
_____

(2 marks)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

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



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.

_____

_____

_____

(2 marks)

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:

`11` `0100`
Y 4

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

Colour: _____ Number of pixels: _____

(2 marks)

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`

(2 marks)

Answers written in the margins will not be marked.

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

B	B	Y	B	B	B	B	B	B	B	B	B	B	B	B

(2 marks)

(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.

(1 mark)

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

(2 marks)

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

(2 marks)

END OF PAPER

Answers written in the margins will not be marked.

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Database (SQL commands – based on SQL-92 Standard)

Constants	TRUE, FALSE
Operators	+, –, *, /, >, <, =, >=, <=, <>, %, _ , ' , AND, NOT, OR
SQL	ABSOLUTE (ABS), AVG, INT, MAX, MIN, SUM, COUNT, AT, CHAR_LENGTH (LEN), LOWER, TRIM, SPACE, SUBSTRING (SUBSTR/MID), UPPER, AS, BETWEEN, BY, ASC, DESC, DISTINCT, FROM, GROUP, HAVING, LIKE, NULL, ORDER, SELECT, WHERE

Electronic Spreadsheet

Constants	TRUE, FALSE
Operators	+, –, *, /, <, >, =, <>, <=, >=
Functions	ABS, INT, RAND, SQRT, ROUND, AND, NOT, OR, CHAR, CONCATENATE (&), ISBLANK, LEFT, LEN, LOWER, MID, PROPER, RIGHT, TEXT, TRIM, UPPER, VALUE, AVERAGE, COUNT, COUNTA, COUNTBLANK, COUNTIF, MAX, MIN, RANK, SUM, SUMIF, FIND, VLOOKUP, IF