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

1. Peter creates Chart 1 in a spreadsheet file. He wants to modify Chart 1 so that it becomes Chart 2. Which chart setting should he change?

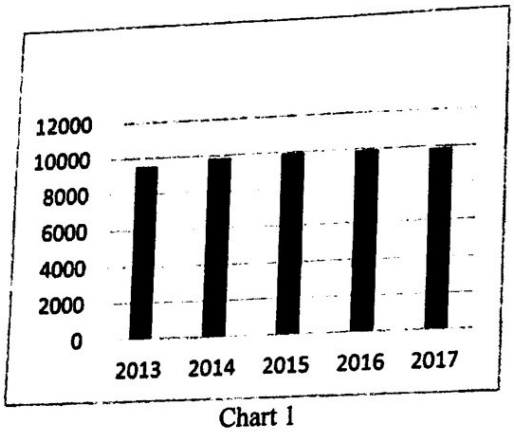


Chart 1

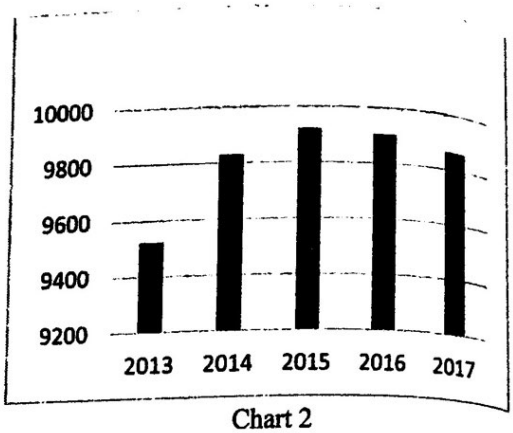


Chart 2

A. Legend
B. Data source
C. Axis
D. Chart type

A database table `PROD` has seven records, as shown below:

PNAME	WEIGHT	PSTAT
SALT	1	A
SUGAR	1	P
SHAMPOO	1	P
TOOTHPASTE	3	P
ORANGE	4	S
CHARCOAL	5	P
NOODLES	6	S

What would be the output after executing the following SQL command?

```
SELECT MAX(WEIGHT) FROM PROD WHERE PSTAT <> 'S'
```

A. 1
B. 5
C. 6
D. 11

When changing the password of a school Intranet account, which of the following is an example of data verification?

A. Input a new password twice.
B. Input a new password and a mobile phone number.
C. Input a new password that consists of at least one special character.
D. Input the old password and a new password.

4. The file sizes of the following original files are all 1 MB. Under normal circumstances, after compressing them, which compressed file has the largest file size?

	Original files	Compressed files
A.	testA.html	testA.zip
B.	testB.doc	testB.zip
C.	testC.txt	testC.zip
D.	testD.jpg	testD.zip

5. Below is an example of Korean text:

안 녕 하 세 요

Which of the following character encoding methods can be used to represent Korean text?

(1) ASCII
(2) Unicode
(3) Big-5 code

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

6. Which of the following are appropriate for presenting a storyboard?

(1) A slide show
(2) A multimedia document
(3) A database file

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

7. A company designs a mobile application to process staff records. In each record, 10 bits are used to store staff numbers and 12 bytes are used to store Chinese names. How many staff records can the mobile application support?

A. 2^{10}
B. 2^{12}
C. 2^{22}
D. 2^{96}

8. John writes a program to process student information, including student name, average mark and number of subjects taken. Which data types should John use for storing the corresponding student information?

	Student name	Average mark	Number of subjects taken
A.	Boolean	integer	real
B.	Boolean	real	integer
C.	character	integer	real
D.	character	real	integer

9. Which of the following is the 8-bit two's complement representation of the decimal value -8?

A. 1000 1000
B. 1111 1000
C. 1000 0000
D. 0000 1000

10. Mary inserts a hyperlink in a document file. What are the possible consequences when following the hyperlink?

(1) Open a video file.
(2) Jump to another page of this document.
(3) Jump to a page of another document.

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

11. A text file contains a character string '*IT*'. Peter uses a program to view the ASCII codes of the character string in the hexadecimal number system, as shown below:

2A	49	54	2A

How many bits are required to store the character string?

A. 8
B. 16
C. 32
D. 64

12. Which of the following elements can be included in a PDF file?

(1) Photos
(2) Videos
(3) Hyperlinks

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

13. The following two barcodes, X and Y, are found on a soft drink can and an advertising poster respectively. What is the major difference between them?

X

Y

A. The area of X must be larger than that of Y.
B. Only Y can be read by a smartphone.
C. Y can represent more data.
D. Y cannot represent characters.

14. Which of the following statements about mail merge is correct?

A. Only one file is needed in each mail merge.
B. Mail merge is mainly used for sending email.
C. Data can be sorted and filtered for a mail merge.
D. Mail merge usually involves presentation software.

15. Free online encyclopedias such as *Wikipedia* contain a huge number of articles. Which of the following statements about the online encyclopedias are correct?

(1) People can search the relevant articles for a topic quickly.
(2) The articles have no copyright.
(3) These encyclopedias are updated frequently.

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

16. A router should be used to connect _____.

A. two different networks
B. a printer and a local area network
C. two computers
D. a computer to a server

17. Which of the following are the basic functions of an operating system?

(1) Email management
(2) Memory management
(3) Input/output management

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

18. Why is a solid state drive (SSD) commonly used in mobile devices instead of a hard disk drive?

A. The physical size of a SSD is smaller.
B. The storage capacity of a SSD is smaller.
C. The data access rate of a SSD is lower.
D. Mobile devices do not support hard disk drives.

19. Which of the following can help reduce the time needed to access files in a hard disk drive?

A. Redundant Array of Independent Disks (RAID)
B. Virtual Private Network (VPN)
C. Driver programs
D. Defragmentation software

20. Read the configuration of a desktop computer below:

- Intel® Core™ i7 CPU
- 16GB DDR4 RAM
- 1TB SSD
- 802.11ac Wi-Fi

What information can be found out from the configuration?

(1) The viewable size of the display unit
(2) The maximum data transfer rate of a wireless network
(3) The time to start up a computer

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

21. Which of the following are the latest trends in hard disk drive development?

(1) Lower power consumption
(2) Longer lifespan
(3) More built-in software provided

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

22. Which of the following statements about the fetch-decode-execute cycle in a CPU is correct?

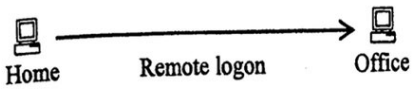
A. Registers are used in the cycle.
B. The cycle is an assembly language program.
C. The sequence of the instructions in the cycle mainly depends on the CPU clock rate.
D. The cycle is mainly used to perform arithmetic operations.

23. In a Point-Of-Sale system in a restaurant, which of the following is/are the reason(s) for using thermal printers to print receipts?

(1) The receipt printout can be kept longer.
(2) It is quiet during printing.
(3) The printing time is short.

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

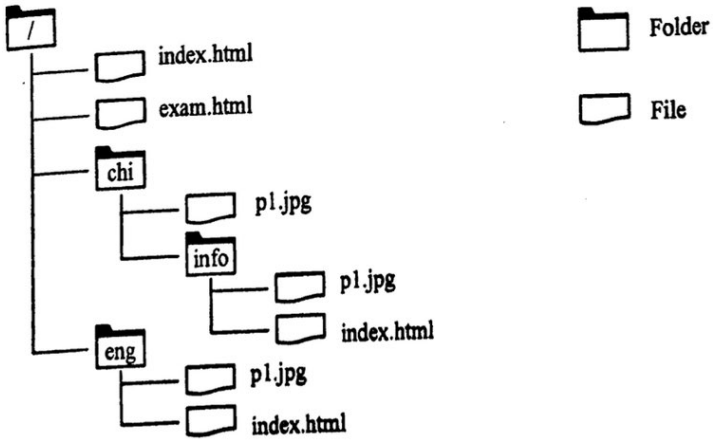
24. At home, Mary logs on to a computer in her office and does some word processing.



Which of the following statements about the remote logon is correct?

A. Both computers should have the same word processing software.
B. Both computers should have the same firewall.
C. The remote logon supports data encryption.
D. Two computers are involved and hence word processing is faster.

25. The following diagram is part of the folder structure of www.abc.edu.hk:



Which of the following URLs is not valid?

A. http://www.abc.edu.hk/chi/p1.jpg
B. http://www.abc.edu.hk/info/chi/p1.jpg
C. http://www.abc.edu.hk/eng/p1.jpg
D. http://www.abc.edu.hk/index.html

26. Which of the following is not an email protocol?

A. IMAP
B. SMTP
C. POP
D. FTP

27. Amy can browse the web site of ABC School through its IP address, but not its URL. What is the possible reason for this?

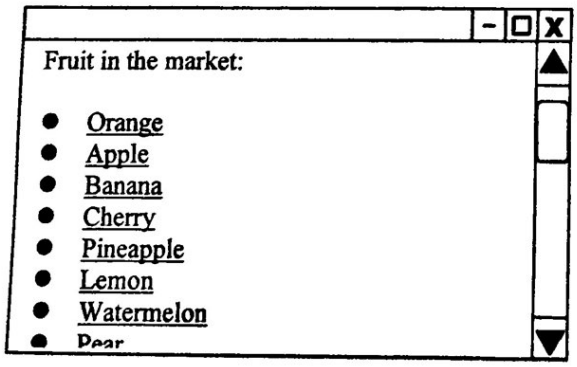
A. The corresponding web pages have not been uploaded onto the web server.
B. The domain name system (DNS) server is temporarily out of service.
C. The browser in use is not the latest version.
D. Some plug-ins for the browser in use have not been installed.

28. When watching videos from a web site using streaming technology, which of the following will be involved?

(1) DNS
(2) FTP
(3) IP

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

29. Study the following web page:



Which of the following can improve the ease of navigation?

(1) Tables
(2) Frames
(3) Background music

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

30. The following algorithm is used to find the value of $(1^2 + 2^2 + 3^2 + \ldots + N^2)$.

```
INPUT N
S ← 0
WHILE [          ]
        S ← S + N x N
        N ← N - 1
OUTPUT S
```

What should be in the box?

A. N > 0
B. N > 1
C. N < 0
D. N < 1

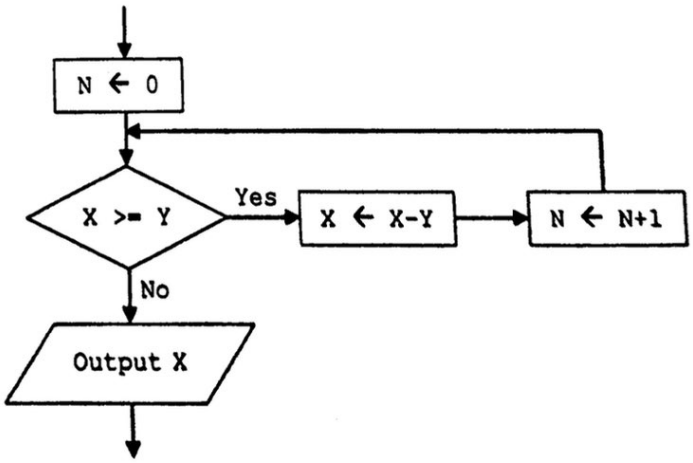
31. Study the following algorithm:

```
INPUT n
IF n < -6 THEN
   y ← y + 2
ELSE  IF   n > 9  THEN
           y ← y - 2
      ELSE y ← y x 2
```

Which of the following sets of input data is most suitable for testing the algorithm?

A. -6, 0, 9
B. -2, 0, 1, 2
C. -20, -6, 0, 9, 15
D. -20, -10, 0, 1, 10, 20

32. Study the following segment of a flowchart:



Suppose that the initial values of X and Y are 14 and 4 respectively. What is the output?

A. 0
B. 1
C. 2
D. 3

33. Suppose that X = 1, Y = 2 and Z = 3. Which of the following Boolean expressions is 'true'?

A. ((X = 1) AND (Y > -2)) AND (Z > 3)
B. ((X = 1) AND (Y > -2)) OR (Z > 3)
C. ((X = 1) OR (Y > -2)) AND (Z > 3)
D. (X = 1) AND ((Y > -2) AND (Z > 3))

34. What are the characteristics of using modularity for designing computer solutions?

(1) Usually modularity is used to solve simple problems.
(2) Modules may be reusable.
(3) The development cost is higher.
(4) Modules can be independently developed.

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

35. What are the good ergonomic practices in software design?

(1) Fixed font size
(2) Appropriate system messages to users
(3) Consistent user interface

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

36. Ms Lee is a photographer. Mr Cheung downloads a lot of copyright photos from her web site and uses them in his tutorial school without her approval. What legal consequences are there of doing this?

(1) Mr Cheung needs to compensate Ms Lee.
(2) Mr Cheung commits a criminal offence.
(3) Mr Cheung needs to close down his tutorial school.

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

37. Why do we need Secure Sockets Layer (SSL) on the Internet?

A. An IP address includes at least four values.
B. The socket for power supply can be protected.
C. Data transmission can be faster.
D. Data can be safely transmitted.

38. What is/are the major benefit(s) of using data encryption for transferring confidential information over the Internet?

(1) Hackers cannot collect the encrypted data easily.
(2) Hackers cannot read the confidential information easily.
(3) Hackers cannot delete the confidential information easily.

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

39. What is/are the appropriate measure(s) to take to protect the intellectual property rights of photos posted on the Internet?

(1) Digital signature
(2) Digital watermark
(3) Firewall

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

40. What is/are the benefit(s) of using a fingerprint over a password for authentication in computer systems?

(1) In general, the input time is shorter.
(2) The system development cost is cheaper.
(3) It results in fewer mistakes as long as the finger is clean.

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

END OF PAPER

Answer all questions.

A secondary school develops an integrated online student system and provides a number of workstations on the campus for students to use to access the system.

(a) The student system was designed mainly for learning English.

(i) There are two options below for installing the input devices of the workstations. Give an advantage of each option.

Touch screen: _____

_____

Keyboard and mouse: _____

_____

(2 marks)

(ii) Other than display panels and printers, suggest an additional output device for the workstations and justify its use.

_____

_____

(1 mark)

(b) Network interface cards, network cables and switches are needed to install the workstations. Briefly explain the uses of these hardware components.

Network interface cards: _____

_____

Network cables: _____

_____

Switches: _____

_____

(3 marks)

(c) Give two benefits for learning of using the student system over reading English library books.

_____

_____

_____

_____

(2 marks)

The integrated online student system also provides an email service.

(d) (i) Students can forward all received emails from this system to their personal email accounts automatically. What is the major benefit for the students of doing this?

(1 mark)

The email service allows students to send files through email in the following two ways:

M1: Attach a file to an email.
M2: Include a hyperlink to a file in an email.

(ii) Give a benefit of using M2 over M1.

(1 mark)

(iii) Give a benefit of using M1 over M2.

(1 mark)

Answers written in the margins will not be marked.

2. Peter is an IT technician in a school.

(a) Peter installs anti-virus software in all computers.

(i) The anti-virus software needs to be updated. Why? Give two reasons.

(2 marks)

(ii) Other than anti-virus software, suggest another security measure for the school network and give the security threat that this measure can reduce.

(2 marks)

(b) Teachers sometimes request Peter to install software on their computers. Peter works on the installation every Saturday morning.

(i) Which mode of operation, batch processing, parallel processing or real-time processing, best describes Peter's work? Explain your answer briefly.

(2 marks)

Answers in the margins will not be marked.

(ii) Peter browses a web site to download particular freeware, as shown below:

Choose the operating system for downloading the freeware:

Linux MacOS Windows

Give two differences between these operating systems.

(2 marks)

(c) The school investigates the digital divide among students' families.

(i) Other than household income, suggest two significant factors that cause the digital divide.

(2 marks)

(ii) Give two ways of narrowing the digital divide.

(2 marks)

3. In a university, all lectures are recorded on video. Mr Ng, the IT manager of the university, plans to build an online system for students to watch the videos.

(a) Compare AVI and MP4. Give a benefit of using each format to store the videos.

AVI: _____

_____

MP4: _____

_____

(2 marks)

(b) Mr Ng allocates 60 GB storage space for each course. In the system, a 1-minute video takes up approximately 11 MB. Estimate the maximum number of hours of video that can be stored for each course. Show your calculation.

_____

_____

_____

_____

(2 marks)

(c) Mr Ng wants to increase the number of hours of video stored.

(i) He finds that using a data compressor cannot help much. Why not?

_____

_____

(1 mark)

(ii) He finds that using defragmentation software cannot help much either. Why not?

_____

_____

_____

_____

(2 marks)

(iii) Suggest a solution for Mr Ng, without changing the size of the allocated storage space.

_____

_____

_____

(1 mark)

Answers written in the margins will not be marked.

Answers written in the margins will not be marked.

(d) Mr Ng considers using streaming technology to broadcast lectures live. Give a benefit of using streaming technology and identify its limitation.

(2 marks)

(e) Is Public Key Infrastructure (PKI) suitable for preventing eavesdropping and interception? Explain briefly.

(2 marks)

Ms Wong uses a database table ACT to store information on extra-curricular activities in her school. Suppose that ACT has the following five records:

CODE	NAME	TYPE	QUOTA	TEACHER
10207	English Club	A	20	John Ho
10102	Chinese Club	A	40	Mary Li
20215	Japanese Club	B	10	Peter Wong
44002	Chess Club	B	25	Greg Li
40105	Mathematics Club	A	30	Greg Li

(a) Explain why TEACHER cannot be a primary key for ACT. Use an example to illustrate your answer.

(1 mark)

(b) What is the output after executing the following SQL command?

```
SELECT TYPE, SUM(QUOTA) FROM ACT GROUP BY TYPE
```

(2 marks)

(c) (i) Ms Wong defines a rule in CODE for validation: the sum of the five digits of a value in CODE is divisible by 10.

In the five records, which value in CODE is invalid? _____

(1 mark)

(ii) QUOTA stores the quota for each activity. Suggest two validation checks on QUOTA.

_____

_____

_____

(2 marks)

(iii) Ms Wong finds that incorrect data can still be entered into the database table even when validation checks are applied. Suggest a way to improve the accuracy of the input data.

_____

_____

(1 mark)

(d) Ms Wong copies the records in ACT into a spreadsheet:

	A	B	C	D	E
1	CODE	NAME	TYPE	QUOTA	TEACHER
2	10207	English Club	A	20	John Ho
3	10102	Chinese Club	A	40	Mary Li
4	20215	Japanese Club	B	10	Peter Wong
5	44002	Chess Club	B	25	Greg Li
6	40105	Mathematics Club	A	30	Greg Li
7					
8			Average	25	
9					
10			TYPE	Number of activities	
11			A	3	
12			B	2	

(i) Ms Wong enters a formula in D8 to store the average quota of the activities. Write down the formula in D8.

_____

(1 mark)

(ii) Ms Wong uses D11 and D12 to store the number of activities of TYPE='A' and TYPE='B' respectively. She enters a formula in D11 and then copies it to D12. Write down the formula in D11.

_____

(2 marks)

(e) There are three new extra-curricular activities, namely Spanish Club, Robotics Club and Fencing Club. Ms Wong needs to prepare a presentation with several slides to introduce the activities to students in a morning assembly. In the presentation, she will use some text and a photo to describe each activity. Draft the layout design of the presentation, with annotations.

(3 marks)

5. Mary designs an algorithm of a number guessing game as follows:

```
N ← 100
ANSWER ← a random integer between 1 and N inclusive
do
    input an integer into GUESS
    if (GUESS < 1) or (GUESS > N) then
            output  "Out of range!"
    else if (GUESS <> ANSWER) then
            output  "Try again!"
until (GUESS = ANSWER)
output  "You win!"
```

(a) Suppose the value of ANSWER is 19. Suggest an input value to test the algorithm for each output.

Input	Output
	Out of range!
	Try again!
	You win!

(3 marks)

(b) Mary plans to make two modifications to the algorithm:

1. If GUESS is smaller than ANSWER, display "Too small!" and if GUESS is larger than ANSWER, display "Too large!";
2. Allow users to guess at most 5 times.

(i) Complete the algorithm below showing the modifications.

Line number	Content
1	K ← 0
2	N ← 100
3	ANSWER ← a random integer between 1 and N inclusive
4	do
5	input an integer into GUESS
6	if (GUESS < 1) or (GUESS > N) then
7	output "Out of range!"
8	else if([ ]) then
9	output "Too small!"
10	else if([ ]) then
11	output "Too large!"
12	K ← [ ]
13	until (GUESS = ANSWER) or ([ ])
14	if (GUESS = ANSWER) then
15	output "You win!"

(4 marks)

(ii) If Line 14 'if (GUESS = ANSWER) then' is omitted, the output of the algorithm may be wrong. Why?

(1 mark)

(c) Mary completes the number guessing game and uploads the program to the Internet for the public to play.

(i) Mary licenses the program as open source software. What can users do with the program? Give two examples.

(2 marks)

(ii) Some users install the program on their mobile devices and play the game for a long time every day, leading to some health problems. Suggest two ways to relieve these health problems, other than taking breaks.

(2 marks)

END OF PAPER

Answers written in the margins will not be marked.