

Answer all questions.

1. John creates a web site for a cycling competition.

- (a) He designs a logo for the competition and decides to use GIF format instead of JPG format. Give an advantage and disadvantage of his decision.

Advantage: GIF is suitable for animation.

Disadvantage: The loading time of GIF is quite long as there is a risk it does not function properly, especially if it is blurred.

(2 marks)

- (b) He designs a 256-colour logo with 1600×1200 pixels.

- (i) Estimate the uncompressed file size in KB of the logo. Show your calculation.

$$\begin{aligned} \text{File size: } & 1600 \times 1200 \times 256 \div 1024^2 \\ & = 6000 \text{ KB} \end{aligned}$$

(2 marks)

- (ii) The logo is shown on a display unit with the resolutions 1920×1080 . Will this logo be distorted? Explain briefly.

$$\begin{aligned} \text{Aspect ratio: } & 1920 : 1080 \\ & = 16 : 9 \end{aligned}$$

This logo is distorted because the dimensions of the logo does not match the aspect ratio, which also blurs the logo.

(2 marks)

- (c) Other than audio quality, give **two** considerations that John should take into account when choosing background music for the web site.

Suitable audio file and the file size of the audio.

(2 marks)

In the web site, there are three settings for video streaming.

	Setting A	Setting B	Setting C
Video bitrate	1000 kbps	2000 kbps	3000 kbps
Bandwidth for each viewer	2 Mbps	1 Mbps	2 Mbps

- (d) (i) In general, which setting provides the shortest waiting time for viewing videos? Explain briefly.

Setting C. The bitrate is larger than that of A and B and it loads videos faster.

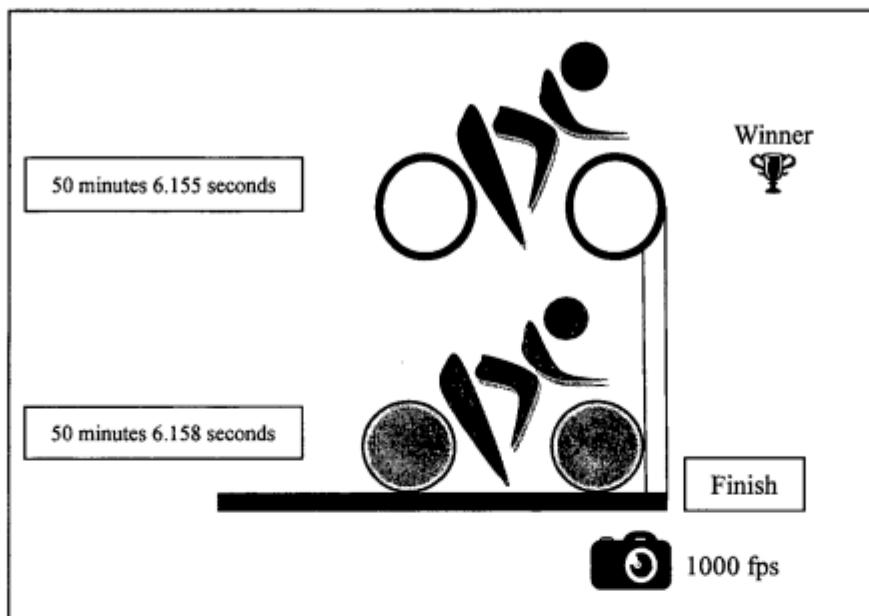
(2 marks)

- (ii) John uses Setting B, but the video playing is not smooth. He thinks that increasing the bandwidth to 2 Mbps can solve this problem. Do you agree? Explain briefly.

No. If the bandwidth is long, there is not enough remaining space for streamers to stream a video, and it is clear it is still distorted.

(2 marks)

- (e) In the competition, the finishing times of two cyclists are 50 minutes 6.155 seconds and 50 minutes 6.158 seconds respectively. Will a video camera with the frame rate 1000 fps be able to help judge the winner? Justify your answer.



Answers written in the margins will not be marked.

Yes. 1000 fps is suitable because it is highly accurate to find out who crossed the finish line first in about 0.1 milliseconds.

(2 marks)

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2. Amy listens to songs via an audio streaming platform A.

- (a) The platform provides music files with lossy compression for users to download. Give **one** advantage and **two** disadvantages of using lossy compression over lossless compression.

Advantage: It is suitable for lossy compression files in streaming.

Disadvantages: Some data is removed during lossy compression, and it is not useful for users to embed lossy compression files because of extremely large file size

(3 marks)

- (b) (i) Amy downloads a 4-minute song with the following specifications. Estimate the file size of the downloaded song in MB. Show your calculation.

Sampling rate: 11.2 kHz
Sample size: 16-bit
Number of channels: 8

$$\begin{aligned} \text{File size: } & 11.2 \times 1000 \times 16 \times 8 \times 4 \times 60 \div (8 \times 1024^2) \\ & = 41.0 \text{ MB } (3 \text{ sig.fig.}) \end{aligned}$$

(2 marks)

There is another audio streaming platform B. The settings of the two platforms are

Platform A	Platform B
16-bit, 11.2 kHz	192 kbps

- (ii) What is the bitrate of Platform A? Show your calculation.

*Bit rate: 11.2 × 16
= 179.2 kbps*

(2 marks)

- (iii) Which platform provides better audio quality in general? Explain briefly.

Platform B, because of its high bit rate.

(1 mark)

- (c) Amy tries to register an account with Platform B, as shown below.

Case 1:

Registration

Enter your email address to register a new account:

Amylee1211#abc.edu.hk

Submit

Amylee1211#abc.edu.hk is an invalid email address.

Case 2:

Registration

Enter your email address to register a new account:

Amylee1211@abc.edu.hk

Submit

Amylee1211@abc.edu.hk has been used by another user.

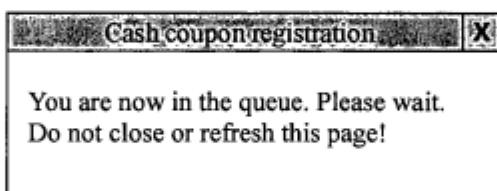
Client-side scripting and server-side scripting are used for generating the dialogue boxes in Case 1 and Case 2. Briefly describe how the dialogue boxes are generated with scripting.

Case 1: When the user submits the email address, it is transferred to a central server for storage and using data validation, it reveals the validation error to the user so that the format will be inputted correctly.

Case 2: The submitted preference is sent to a server, then checks whose user has the same email address, then sends the notification to the user that this needs a different email address.

(4 marks)

- (d) Platform B organises a promotion campaign. Below is the dialogue box shown to users.



Below are users' comments:

User 1: I've been waiting for a long time!

User 2: Is the server out of order? Should I refresh this page?

The design cannot provide good user experience. Suggest two improvements for this.

for server-side scripting, add in Cascading Style Sheets or JavaScript to utilize the process of 1 user getting a discount. Also, enhance the effectiveness of the website with batch processing which executes batch jobs.

(2 marks)

Answers written in the margins will not be marked.

3. Peter works in a smart home company.
(a) There is a smart home control interface, as shown below.

Smart@Home

Bedroom 1	
Bedroom 2	
Bedroom 3	Light colour
Dining room	Temperature
Kitchen	
Toilet	

Jungle green #3BB0BF	▲
Green 1CAC78	▼
Forest green 6DAE81	On
Fern 71BC78	Off

Submit

Smart@Home

Bedroom 1	
Bedroom 2	
Bedroom 3	
Dining room	Light colour
Kitchen	Temperature
Toilet	

15.0 °C	▲
15.1 °C	▼
15.2 °C	On
15.3 °C	Off

Submit

Answers written in the margins will not be marked.

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Peter wants to improve the interface with the following requirements:

- The interface should be used on tablets.
- The interface should support the choice between 128 light colours.
- The interface should be user-friendly.

Redesign the interface for Peter with three different types of input controls. Annotate your design, where appropriate.

Smart@Home

Select room:

<input checked="" type="checkbox"/>	Bedroom 1
<input type="checkbox"/>	Bedroom 2
<input type="checkbox"/>	Bedroom 3
<input type="checkbox"/>	Dining room
<input type="checkbox"/>	Kitchen
<input type="checkbox"/>	Toilet

Reveals the list of available rooms with scroll function, and only one attribute can be chosen

Select quality:

light colour

Temperature

To reduce error, 1 category should be chosen

Pick a suitable room temperature:

15.7 °C

Can type integers for temperature consideration

Pick a suitable colour:

Light yellow

Can type any colour for inner environment consideration

Preference:

Bedroom 1

Temperature: 15.7 °C

Stores the desired preference for users to re-confirm.

Reset

Confirm

(6 marks)

Peter creates a web site to sell home appliances. He drafts the web page below.

Hong Kong Eng 繁 簡

Sales

Model AP1 HK\$6,000

Model AP2 HK\$7,000

Model CF3 HK\$500

Model ST2 HK\$800

Model RF1 HK\$5,300

Items only sold in Hong Kong

- (b) Other than selection of language, give two examples of using location information to enhance the user experience.

For GPS, it is easy to suggest a location where the available model was sold, and up-to-date when revealing a suitable location.

(2 marks)

- (c) Give two examples of using cookies to enhance the user experience.

Storing the preference in case the user forgot what brand it is, where the preferred website is accessed again without re-login, and saves the data typed in the website so that nothing can be wiped out.

(2 marks)

- (d) Below are the tags in an HTML file in Peter's web site.

```
<!DOCTYPE html>
...
<head>
...
<style>
...
<title>
...
<body>
...
```

- (i) Under which tag should metadata be placed? *(style)*

(1 mark)

- (ii) Peter decides to add metadata to the web page. Give two reasons to support his decision.

Metadata can save the info of the website as its preference and also can change into when the others are already processed, or sold out.

(2 marks)

- (iii) Give two examples of attributes that can be placed under the tag <style>.

(slide), (bg color)

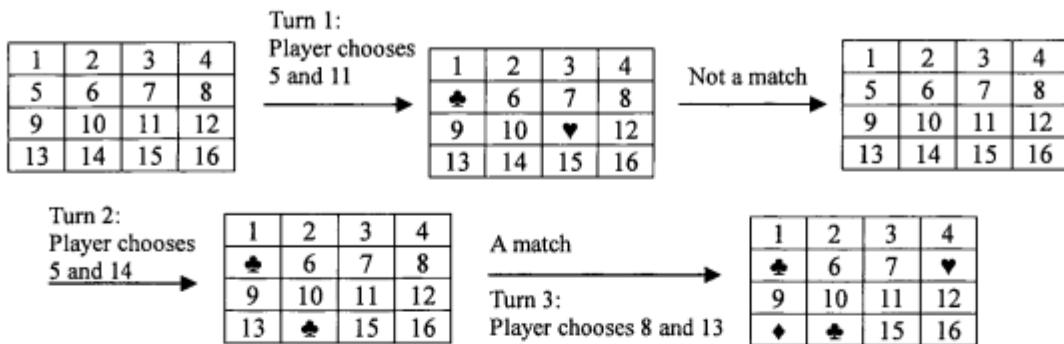
(2 marks)

- (e) Peter decides to create a sitemap. Give two examples of using a sitemap to support web accessibility.

Finding exact venues for upcoming sales events, and searching new brands that are also available in the required country where it needs shipping.

(2 marks)

4. Mary designs a matching game. There are 8 pairs of different images stored and hidden in 16 boxes labelled 1 to 16. For each turn, the player chooses any two boxes and the corresponding images will be displayed. If the two images are the same, they will continue to be displayed; otherwise, they will be hidden again. The game ends when all the images are displayed, and the total number of turns will be displayed.



The game will

- check if the two selected images are the same,
- check if all the images are displayed, and
- count the total number of turns.

Variable	Description
i	An integer variable.
IMAGE[i]	An array for storing the image in the box i.
SHOWN[i]	An array for storing 1 if the image in the box i is displayed, 0 otherwise.
ALLSHOWN	A Boolean variable for indicating whether all the images are displayed.
N	An integer variable for storing the total number of turns.

- (a) (i) The client-side script CHECKMATCH checks if the images stored in the two selected boxes are the same, and updates the total number of turns. Complete the pseudocode for CHECKMATCH below.

```

CHECKMATCH
  X ← label of player's selected box
  Y ← label of player's selected box
  if SHOWN[X]=1 OR [ ] then
    Output 'Image(s) has/have been displayed.'
  else
    N ← [ ]
    display IMAGE[X]
    display IMAGE[Y]
    if [ ] OR [ ] then
      SHOWN[X] ← 1
      SHOWN[Y] ← 1
    else
      hide IMAGE[X]
      hide IMAGE[Y]
  end if
end if

```

(3 marks)

- (ii) Complete the following client-side script CHECKEND to check if all images are displayed.

CHECKEND

ALLSHOWN ← TRUE

```
IF SHOWN[X] = i OR SHOWN[Y] = i THEN  
    Output 'All images are displayed.'  
else  
    hide IMAGE[X]  
    hide IMAGE[Y]
```

return ALLSHOWN

(3 marks)

- (b) To share the game with her friends, Mary creates some web pages.

- (i) Though a newer version of HTML is available, Mary still chooses an older version of HTML to create the web pages. Give a reason to support her choice.

It is quite simple to set up traditionally.

(1 mark)

- (ii) Mary confirms that the hyperlinks in the web pages are valid and then uploads the web pages to a web site. Later, some friends tell her that there are some invalid hyperlinks in the web pages. Give two possible reasons why these hyperlinks are invalid.

Those hyperlinks are not secure and it is a high risk that those hyperlinks grant access into a phishing website.

(2 marks)

- (c) Mary plans to purchase web hosting services instead of setting up a server at home. Other than the cost, give an advantage and disadvantage of her plan.

Advantage: Advanced control of all users entering the game.

Disadvantage: Requires a lot of HTML attributes and special CSS and JavaScript attributes to enable web-hosting

(2 marks)

- (d) Mary develops a login system for her friends to log on to the web site. She is worried that hackers would attempt to use multiple usernames and passwords to log on. Suggest **two** methods to reduce the risk of this happening.

Use identity verification for 1 user each to prove that he owns the account, and add a firewall to block incoming attacks.

(2 marks)

- (e) Mary wants to show the URL of her web site on a poster to the public. However, she finds that the URL is too long to remember. Suggest **two** methods to solve this problem.

Use a domain name system to replace her long domain name into a recognizable domain name, and try to shorten the domain name with important keywords, such as www.game.edu.hk.

(2 marks)

END OF PAPER