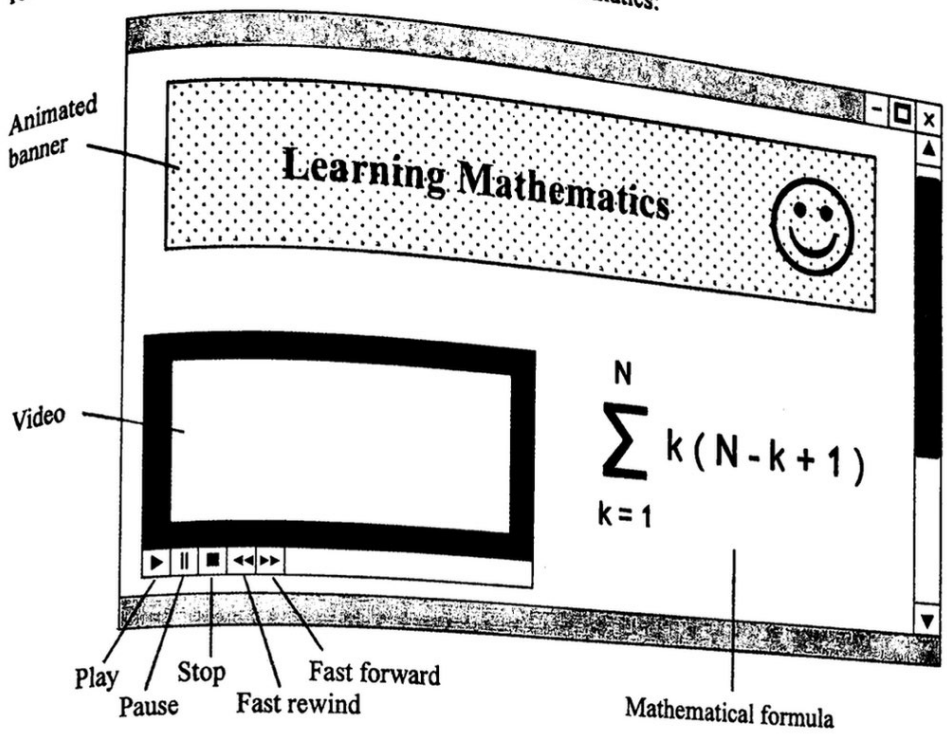
Answer all questions.

1. Tom constructs the following web page for teaching mathematics:



(a) Tom creates the animated banner on the web page in GIF format instead of in SWF format. Give two reasons for this.

(2 marks)

(b) The specifications of the video on the web page are

Frame rate:	30 fps
Colour depth:	12 bits
Frame size:	4096 × 2160
Duration:	30 minutes

(i) Estimate the file size of the video without compression in GB. Show your calculation.

(2 marks)

(ii) Tom compresses the video and delivers it at a bit rate of 40 Mbps. Estimate the file size of t compressed video in GB. Show your calculation.

(2 marks)

Tom uses five buttons to control the video. They are Play, Pause, Stop, Fast rewind and Fast forward.

(iii) To simplify the design, which two buttons can be combined into one new button? Describe the function of the new button briefly.

(1 mark)

(iv) Suggest two additional controls for the video and describe their functions briefly.

(2 marks)

Answers written in the margins will not be marked.

Tom considers using one of the following methods to show the mathematical formula on the web page.

Method 1: Use text (a style sheet) to show the mathematical formula.
Method 2: Use an image (JPEG) to show the mathematical formula.

(c) (i) Give **two** advantages of Method 1 over Method 2.

_____

_____

_____

_____

(2 marks)

(ii) What should Tom do to make the formula accessible to the blind?

_____

_____

(1 mark)

(d) Tom includes two different content attributes in the metadata of the web page, as shown below. For each content attribute, state its purpose and suggest an Internet application that will use the content attribute.

(i) `"mathematics,summation"`

Purpose: _____

_____

_____

Internet application: _____

(2 marks)

(ii) `"UTF-8"`

Purpose: _____

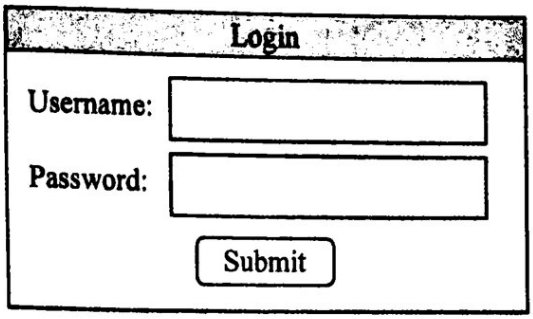
_____

_____

Internet application: _____

(2 marks)

2. Ms Li develops an online system which students can use to enrol in extracurricular activities. Its login page is



(a) Give **two** examples of validation checks on the client side which occur after clicking the 'Submit' button on the login page.

(2 marks)

(b) Some hackers write programs which constantly attempt to log on to the online system using different passwords.

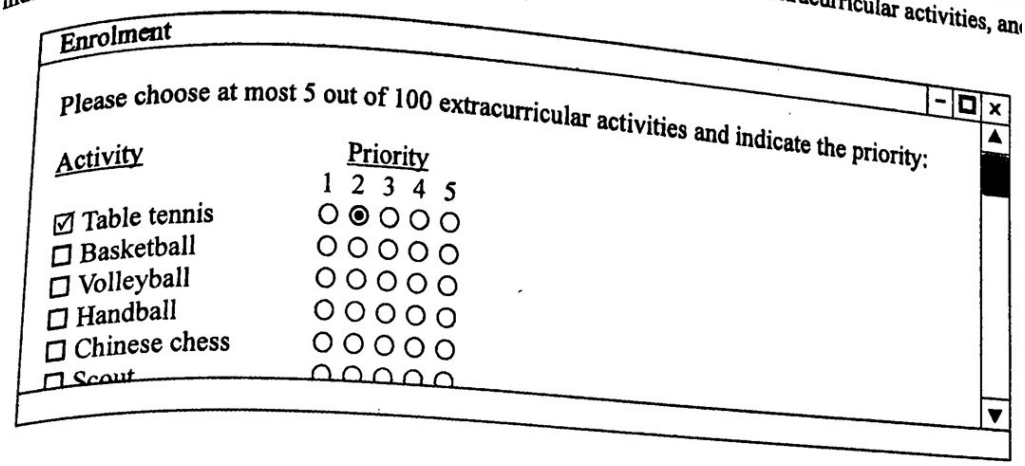
(i) Give **two** possible impacts on the online system.

(2 marks)

(ii) Suggest **two** measures to address this problem.

(2 marks)

(c) Students use the following enrolment page to choose at most 5 out of 100 extracurricular activities, and indicate the priority.



(i) Give **three** potential problems with the design of the enrolment page.

Problem 1: _____

_____

Problem 2: _____

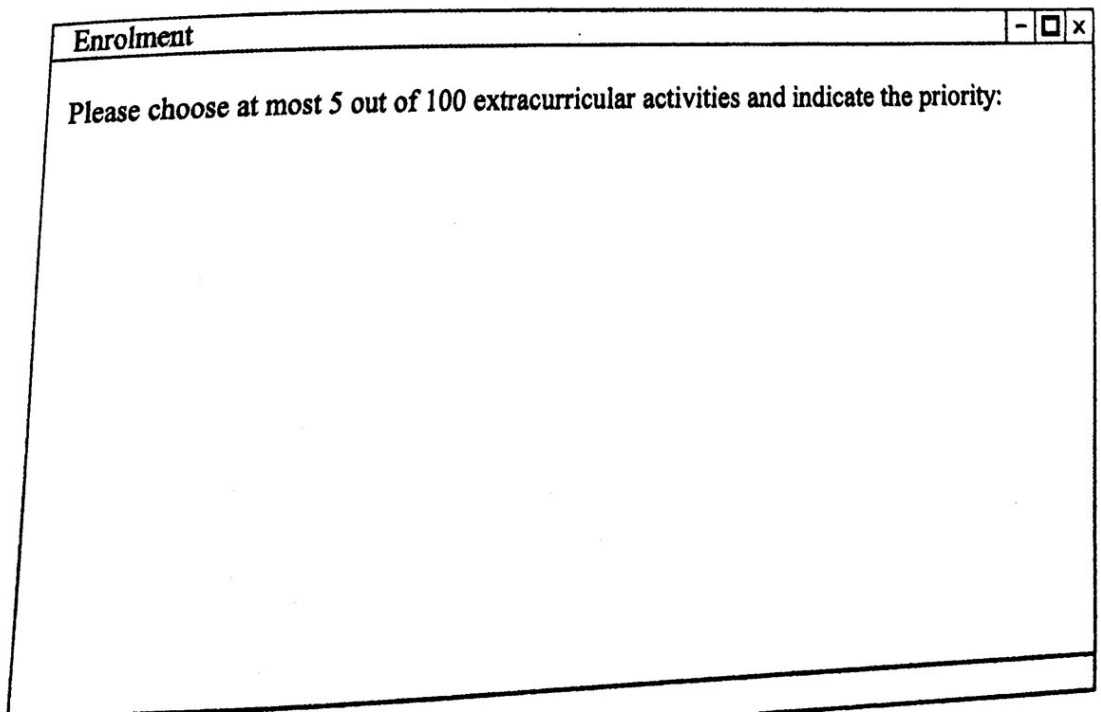
_____

Problem 3: _____

_____

(3 marks

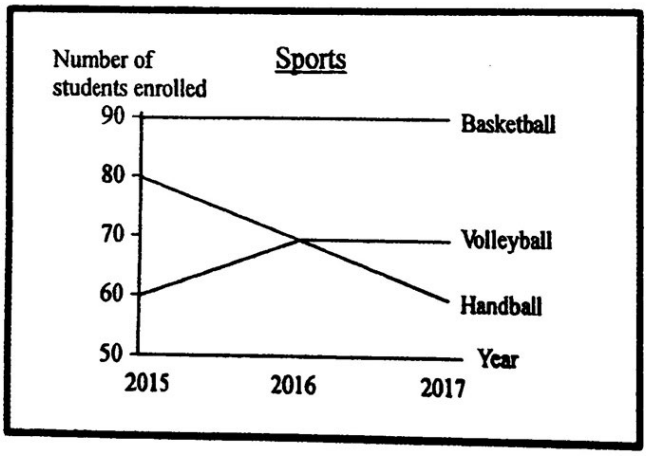
(ii) Draft a new enrolment page to solve the design problems above and describe how students can use this new enrolment page.



Description:

(4 marks)

(d) Ms Li creates a colour line chart on a web page about extracurricular sports activities. Students use a black and white printer to print the line chart, as shown in the printout below:



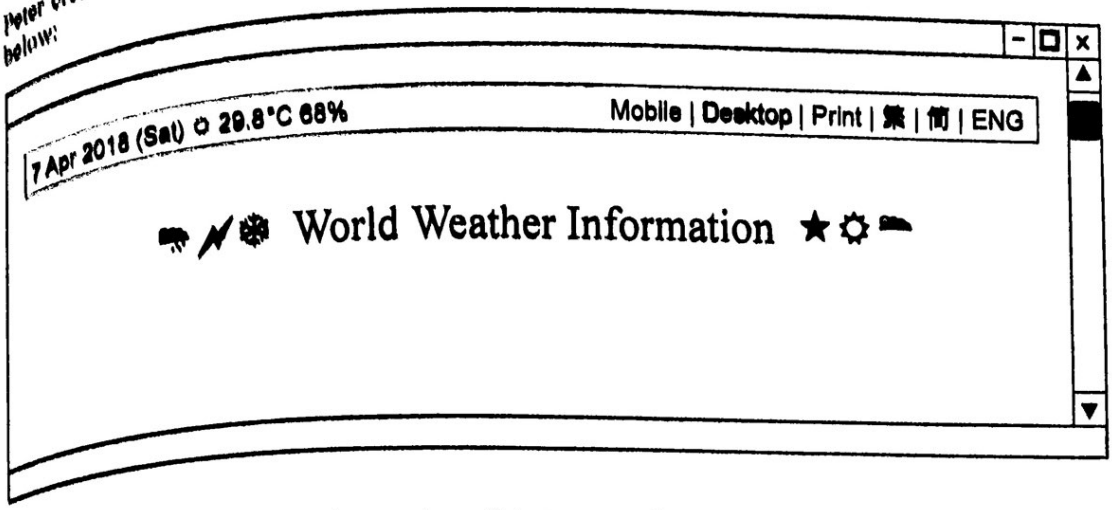
What information in the printout is ambiguous? Suggest a change to an attribute of the line chart to solve this issue.

(2 marks)

Answers written in the margins will not be marked.

Answers written in the ma...

Peter creates a web site about world weather. He browses the desktop version of the web site, as shown below:



(a) In the top right hand corner, there are hyperlinks to access the mobile version and the print version of the web site.

(i) From a design point of view, what are the major differences between the desktop version and the mobile version? Give two examples.

(2 marks)

(ii) From a design point of view, what are the major differences between the desktop version and the print version? Give two examples.

(2 marks)

(iii) When mobile devices are used to browse the web site, how may the location information of the mobile devices help improve the users' experience?

(1 mark)

(b) The web site provides audio files of weather reports with background music. Peter considers th following three settings:

	Setting 1	Setting 2	Setting 3
Sampling rate (kHz)	11	44.1	88.2
Sample size (bit)	8	16	24
Number of channels	1	2	2

Peter chooses Setting 2.

(i) Briefly explain why Peter chooses Setting 2 over Setting 1.

(1 mark)

(ii) Briefly explain why Peter chooses Setting 2 over Setting 3.

(1 mark)

(iii) Peter keeps the uncompressed audio files for editing and each file is limited to 20 MB. What is the maximum length a weather report could be? Show your calculation.

(2 marks)

(c) The web site provides video files of weather reports. Peter considers the following four settings:

	Setting 1	Setting 2	Setting 3	Setting 4
Frame rate (fps)	15	15	30	15
Frame size	3840 × 2160	1920 × 1080	2560 × 1600	3840 × 2160
Colour depth (bit)	24	30	24	30

For each of the following requirements, select the most appropriate setting.

Requirement	Setting
The file size is the smallest.	
The aspect ratio of the videos is 16:10.	
The videos contain fast moving objects.	
The display quality of still images is the best.	

(4 marks)

4. Mr Wong designs a web site which includes mathematical games.

(a) Mr Wong is deciding on a colour scheme for the text and background of the web site. He uses an `RGB` triplet, `RGB(x,y,z)`, to represent a colour, where `x`, `y` and `z` are integers between 0 and 255 inclusive.

(i) How many different colours can the `RGB` triplet represent?

_____

_____

(1 mark)

(ii) Here are three colour schemes:

	Scheme 1	Scheme 2	Scheme 3
Text	`RGB(255,255,255)`	`RGB(200,100,100)`	`RGB( 0, 0,100)`
Background	`RGB( 0, 0, 0)`	`RGB(201,101,101)`	`RGB(180,180,180)`

One of the colour schemes should not be used by Mr Wong. Which one? Explain your answer briefly.

_____

_____

_____

_____

(2 marks)

(b) Mr Wong decides to use vector graphics instead of bitmaps for the web site. Give two reasons for his decision.

_____

_____

_____

_____

(2 marks)

Answers written in the margins will not be marked.

(c) Mr Wong designs a mathematical game that generates questions, as follows:

`[A] + B = C` where `B` and `C` are random integers and `A` is the answer.

An example of the questions is

`[?] + 18 = 50`

After an answer is submitted for a question, the game checks the correctness of the answer and continues to generate questions until 10 questions have been answered correctly. The result of each question ('correctly answered'/'wrongly answered') should be displayed during the game.

Assume that `myrand` is a subprogram that returns a random integer. Describe a script for this mathematical game using `myrand` and the following variables.

Variable	Description
B	Store the first random integer
C	Store the second random integer
A	Store an input value
N	Store the total number of questions correctly answered

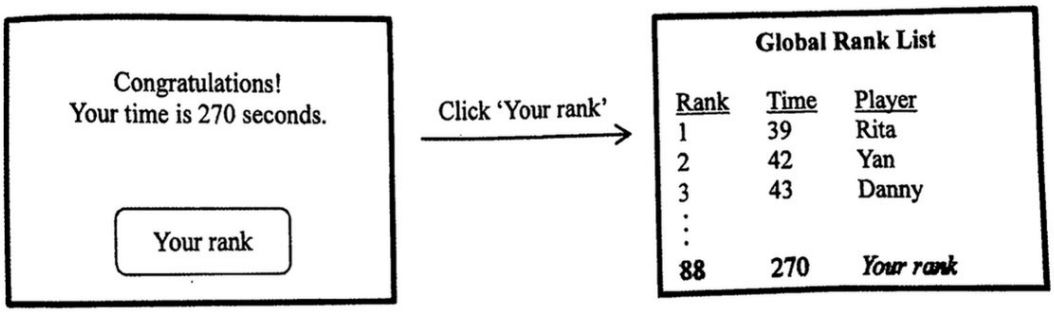
(6 marks)

Answers written in the margin will not be marked.

(d) Mr Wong finds that players have to re-enter their game preferences every time they visit the web site with the same browsers. What web page design feature on the client side should Mr Wong use so that the players do not need to re-enter their preferences? Explain your answer briefly.

(2 marks)

(e) Mr Wong designs the following two screen outputs to be shown at the end of the game.



The time needed to complete the game is recorded on the client side. Describe the process for generating this global rank list.

(3 marks)

END OF PAPER

Answers written in the margins will not be marked.