J A M E S   R U S E
AGRICULTURAL HIGH SCHOOL

2009
HIGHER SCHOOL CERTIFICATE
INTERNAL EXAMINATION

Information Processes and Technology

HSC TRIAL ASSESSMENT TASK

Total marks – 125

(Section A) Pages 2–7

20 marks
- Attempt Questions 1–20
- Allow about 25 minutes for this section

(Section B) Pages 8–17

105 marks
- Attempt Questions 21–26
- Allow about 2 hours 35 minutes for this section

General Instructions
- Reading time – 5 minutes
- Working time – 3 hours
- Write using black or blue pen
- You must provide your own writing paper
- Draw diagrams using pencil
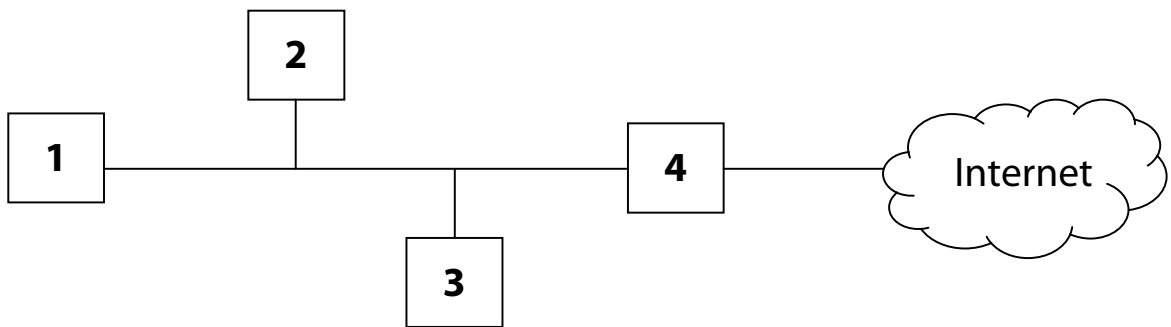- Mark allocations are provided for each question

SECTION A
Multiple Choice

1. A department store has abandoned its proposed internet shopping website because the website would discourage customers from using the physical department store.

   Which if the following best describes the reason why this decision was made?

   A. The website was not technically feasible.
   B. The website was not economically feasible.
   C. There was insufficient time to implement the website.
   D. The website did not fit the objectives of the department store.

2. In the following diagram, the boxes represent devices on a network.

   Which device on this network represents a router?

   A. 1
   B. 2
   C. 3
   D. 4

3. Which of the following are ALL tools that help overcome physical boundaries to enable virtual organisations?

   A. Email, decision tree, video-conferencing
   B. An intranet, the internet, teleconferencing
   C. Gantt chart, file sharing, web-conferencing
   D. Chat rooms, discussion groups, system flowchart

Use the following information to answer Questions 4–7.

The Sheriff's Office in NSW is responsible for organising citizens to participate as members of juries for court cases. Courthouses are located in Sydney and regionally throughout NSW. A relational database is used by the Office in Sydney to record names, contact details, previous jury service and the court in which that citizen is a juror. This central data can be accessed by each courthouse in the state via a network.

4. An entity forms part of the schema for any relational database. Which of the following are examples of possible entities for this database?

   A. The first and second names of jurors
   B. The computer running the database and the file server hosting it
   C. The juror and the court
   D. The link between court case and juror and the link between juror and court number

5. Which of the following is an example of a suitable key field for the juror table?

   A. Jury members' surnames
   B. Jury members' first names combined with their surnames
   C. Jury members' date of birth combined with surnames
   D. An invented numeric code uniquely assigned to each jury member

6. Due to the nature of the data stored within it, help desk operators must often perform urgent and accurate searches of the database.

   Which of the following is a suitable search method?

   A. Trained database managers to perform the searches
   B. Query by example (QBE)
   C. Prepared reports
   D. Structured query language (SQL)

7. Network communication between the courts and the Sheriff's Office has been established. This network is known as which of the following?

   A. An Ethernet network
   B. A WAN
   C. A LAN
   D. An ISDN network

8. Two nodes on a LAN attempt to communicate at the same time. A collision occurs.

   Which of the following correctly outlines what will take place after the collision so that eventually both nodes communicate successfully?

   A. Each node waits for a free token before attempting to communicate.
   B. Each node waits a random amount of time before checking if a token is free.
   C. Each node waits a random amount of time before attempting to communicate.
   D. Each node waits until it has permission to communicate from the network controller.

9. In October 2006, the rock band Wolfmother streamed the first live concert to mobile phones. The show was encoded and compressed, then uploaded to a web server. A journalist reported that during fast sections of the guitar, the audio was distorted and broken.

   What would most likely have caused this distortion?

   A. The speed of the server
   B. Electromagnetic interference
   C. Limitations of mobile bandwidth
   D. Limitations of the speakers in mobile phones

Use the following information to answer Questions 10–11.

The following SQL statement generates a report from a flat file database. The database is used as part of a music store's CD catalogue system.

```
SELECT songcode, artistfirstname, artistsurname, releaseyear,

FROM songfile

WHERE releaseyear=2007 AND genre IS rock

ORDER BY artistsurname DESC
```

10. Which of the following describes the final order of the artists in the report?
    A. Artists alphabetically Z to A by surname
    B. Artists alphabetically A to Z by surname
    C. Songs alphabetically Z to A by title
    D. Songs alphabetically A to Z by title

11. Which of the following statements is true?
    A. Output will be all songs released by each artist in the catalogue
    B. Output will be all rock songs released in 2007 by each artist in the catalogue
    C. Output will be all rock songs released by each artist in the catalogue
    D. Output will be all songs released in 2007 by each rock artist in the catalogue

12. A database stores data about players in an Under 15 basketball team. The field for a player's date of birth only accepts dates in the form DD/MM/YYYY and does not accept dates earlier than 01/01/1994.

    What are two issues addressed here?

    A. Data integrity and the Y2K bug
    B. Data validation and data integrity
    C. Data redundancy and the Y2K bug
    D. Data redundancy and data validation

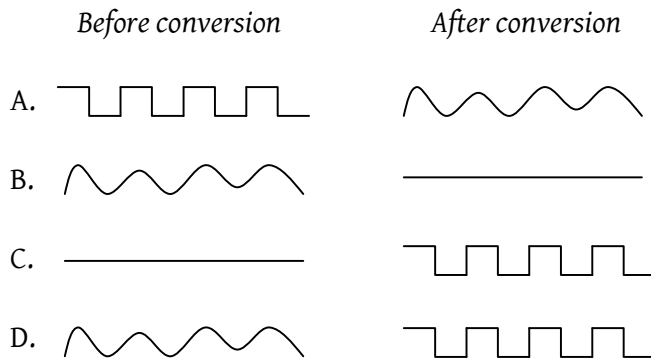13. Sebastian is using an internet search engine to investigate the extinction of the Golden Toad species.

    What search phrase will locate the most relevant information?

    A. "extinction + golden + toad"
    B. extinction + golden + toad
    C. extinction + "golden toad"
    D. extinction – golden + toad

14. The Roads and Traffic Authority uses a secure database in its offices to update information about licensed drivers in New South Wales. This database is accessed by authorised staff at their computer terminals through an online authentication service.

    Which option correctly identifies participants and data/information within this system?

	Participants	Data/information
A.	Drivers	Licence number, driver's details
B.	Drivers	Computer terminal, Internet
C.	RTA employees	Licence number, driver's details
D.	RTA employees	Computer terminal, Internet

15. Which of the following graphically represents analogue to digital conversion of a telecommunications signal?

Before conversion	*After conversion*
A.	
B.	
C.	
D.	

16. In 2007, Centrelink installed a new data warehouse that stores detailed information on its clients. This information is available to other agencies in charge of welfare, employment and social policy.

    What technique will allow these agencies to retrieve detailed information from Centrelink's data warehouse?

    A. Data back-up
    B. Data mining
    C. Normalisation
    D. What-if analysis

17. Jean investigates the use of a personal information system to produce party invitations. She is uncertain if she has the software on her computer to produce the invitations. She has only one week to complete the task.

    What feasibilities apply to Jean's situation?

    A. Economic and ethical
    B. Technical and schedule
    C. Operational and technical
    D. Schedule and organisational

18. A free-text search is undertaken on the following hypertext document.

> **Definition of BANDWIDTH**
>
> **In general, <u>bandwidth</u> is associated with telecommunications in which a wide <u>band</u> of frequencies is able to transmit information.**
>
> **Related terms are <u>wideband</u> (a synonym), <u>baseband</u> (a one-channel <u>band</u>), and <u>narrowband</u> (sometimes meaning just wide enough to carry voice, or simply 'not <u>broadband</u>').**

In the free-text search, a * can be used to replace from 0 to 7 characters in a word. Which of the following searches would locate all the words containing 'band'?

- A. *band
- B. band*
- C. *band*
- D. * band *

19. A new online system is being developed to allow doctors to access patient records in hospital wards. Which of the following does NOT relate to potential social and ethical issues of this new system?

- A. Protection of the system from unauthorised access
- B. Inclusion of data validation techniques to ensure only accurate data is entered
- C. Production of user documentation that helps doctors to easily access required data
- D. Production of accurate system design documentation for future system development

20. Which option correctly identifies activities used for testing, evaluating and maintaining an information system?

	Testing	**Evaluating**	**Maintaining**
A.	Checking that the original objectives are met	Using live data	Deciding on a system conversion method
B.	Ensuring performance specifications are met	Checking that the original objectives are met	Applying a software upgrade
C.	Using live data	Checking that the original objectives are met	Creating a prototype
D.	Deciding on a system conversion method	Using live data	Backing up system data

SECTION B
Extended Answer

QUESTION 21   **[15 marks]**

The organisers of next year's school athletics carnival propose to use information technology to accurately calculate finishing times for all track events. Competitors will have a timing device attached to their shoes prior to each race. Computerised timing mats will be placed at the start and finish lines to record exactly when the runner begins and ends. Results for each race will be uploaded directly to school staff laptops and posted onto the intranet immediately. After the carnival is completed, videos of each race will be uploaded and embedded beside the results, and photos of each of the competitors will also be viewable on each race page.

a. Describe ONE social issue and ONE ethical issue related to the display of results on the school intranet. **[3]**

b. Describe each of the following components in the context of the proposed information system, and explain how these components interact to achieve the goals of the system: **[4]**

   - Purpose
   - Participants
   - Data/information
   - Information technology

c. Describe criteria that could be used to judge the success of the new information system and explain how to determine if the criteria have been satisfied. **[4]**

d. After the completion of the athletics carnival, the same technology used to assist with calculating and tabulating the results of each race is repurposed for use in the school's ongoing fitness program. Students are allowed to borrow timing devices and laptops linked to them, in order to record their progress. Software installed on each of the laptops monitors the training of each student and provides statistics including (but not limited to) total distance run, average distance run per training session, average running speed and standard levels of adolescent fitness for comparison. **[4]**

   Describe how each of the following processes is integral to the functioning of this new information system:

   - Collecting
   - Analysing
   - Storing & retrieving
   - Displaying

QUESTION 22 [19 marks]

Shown below is a screenshot taken from the official website for the popular Channel Ten series, *MasterChef Australia.* Use it to answers parts (a) – (d) on the next page.

MasterChef AUSTRALIA

| Video | Contestants | The Show | Episodes | Recipes | Photos | Trivia | Forums |

Latest Episode: The Grand Finale

Three rounds decide who is Australia's first MasterChef.

See more

Recipes
Sage and Garlic Chicken with Celeriac Puree and Sp...

Episodes
The Grand Finale...

Forums
Catch up on the latest hot topics...

Contestant Call
Are you Australia's next MasterChef?...

MasterChef Trivia
How well do you know the show?...

O Exclusive Video Recipes

Poh – Sambal Petai and Glutenous Rice Dumpling
Winning Recipes – Sambal Petai and Glutenous Rice Dumpling...

Andre – Loose Polenta and Semolina with Bug Bisque
Winning Recipe – Loose Polenta and Semolina with Bug Bisque...

Justine - Terrine of Zucchini
Winning Recipe –Terrine of Zucchini stuffed with Prawns and Ricotta

More ▶

O The Masterclass

Lamb Brain Cereal
Masterclass Recipe - MasterChef...

Lobster Linguine
Masterclass Recipe - MasterChef...

Fried Lambs Brains with Bacon Crumble and Apple Vinaigrette
Masterclass Recipe - MasterChef...

More ▶

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JavaScript/Standard Tags:

O MasterChef Podcast

Q & A with the Judges
Listen to Matt Preston, George Calombaris and Gary Mehigan answer questions from viewers

a. The main image in the centre of the page is 512 by 288 pixels in size, and it is stored in 24-bit colour.

  (i) Demonstrate how to calculate the size of the image, in kilobytes. Explain what each number in the calculation represents. Do NOT calculate the answer. **[3]**

  (ii) Explain why GIF compression would be an unsuitable method to reduce the file size of this image. **[2]**

b. Identify and describe FOUR different multimedia elements displayed on the website. **[3]**

c. Identify the types of software that you would use to design and create a website such as *MasterChef Australia*. Justify your selection of each type of software. **[5]**

d. The *MasterChef Australia* website is an example of the merging of many different media on one website. **[6]**

  Identify the developments in hardware and telecommunications that have enabled the integration of media, and discuss the issues and implications of this integration.

QUESTION 23 [21 marks]

Mobile information technology has changed the way people live and function on a day-to-day basis.

a. On June 29, 2007, Apple Inc. released the *iPhone,* an Internet-connected, multimedia smartphone. Its main distinguishing feature was a multi-touch screen, though it also included a digital camera and media player equivalent to a video-playing iPod. It has sold roughly 21 million units worldwide since it was launched, and was named *Time* magazine's *Invention of the Year* in 2007. **[6]**

  The iPhone's integration with ubiquitous internet access offers opportunities for users to access multimedia-rich services and content anywhere at any time, such as videos on demand, interactive television, gaming, shopping and online education.

  Discuss issues that may arise from the widespread use of these services and content. In your response you may consider aspects such as:

  • Ownership of data,
  • Changing nature of work,
  • Interpersonal and social relationships,
  • Equity of access.

b. Jack Dorsey designed the *Twitter* social networking and micro-blogging service in 2006. It enables its users to send and read 140-character text-based messages known as *tweets.* Tweets are displayed on their author's profile page on Twitter's website, and they are also delivered to the author's subscribers who are known as *followers.* Tweets can be published either by sending a mobile phone SMS to the website, or by using the website directly from a computer. The majority of tweets are composed in response to the question, "What are you doing?"

While the service is mainly used for personal purposes, it has also begun to play a key role in breaking news of world events. Information about the Mumbai attacks (November 2008) and the crash-landing of a commercial plane in the Hudson River in New York (January 2009) were transmitted via Twitter before many of the mainstream news channels had the story.

(i) Draw a data flow diagram that illustrates the movement of data around the Twitter information system when a user sends a single tweet. **[4]**

(ii) Critically analyse the effect of using Twitter on a regular basis. In your response you may consider aspects such as: **[6]**

- Globalisation,
- Virtual communities,
- Privacy,
- Emerging trends in communications.

c. The *Digital Education Revolution* is an initiative of the Australian government aimed at embedding information and communications technologies into Australian schools. Its principal component is the $2.1 billion National Secondary School Computer Fund, which provides netbooks (small laptops) to selected high school students free-of-charge for educational use. **[5]**

To provide internet access for the netbooks, dedicated wireless networks are to be installed in schools nationwide. Consultants have been asked by the Department of Education to prepare a feasibility study for the new networks.

Discuss the issues that should be considered by these consultants. In your response you may consider aspects such as:

- Technical issues,
- Economic issues,
- Staff expertise,
- Other relevant issues.

QUESTION 24 [16 marks]

Use the following information to answers the questions below.

> ## Clever camera promises improved safety
>
> **An Australian company is developing an automotive safety product to detect when a car's driver is likely to fall asleep. The product, called *SleepCam*, is to be mounted on a car's dashboard.**
>
> **To estimate the positioning of the driver's eyes, SleepCam continually monitors the more easily-determined position of the driver's head, based on its larger features (ears, nose and chin). It calculates where the driver is looking by measuring the shape of the eyes and the position of the iris.**
>
> **SleepCam also monitors how frequently the driver blinks, matching this data to predetermined blinking patterns that indicate a person is drowsy. From this information, the system determines the probability that the driver is falling asleep, and sounds an alarm if moderate drowsiness is detected. If severe drowsiness is detected, a voice-over warns the driver and instructs them to pull over and rest.**

a. The heart of SleepCam is an intelligent decision support system.

   i. Draw a simple decision tree that illustrates the conditions, rules and actions that govern SleepCam's basic operations. **[2]**

   ii. Determine if SleepCam is being used in a structured, semi-structured or unstructured situation, and justify your answer. **[3]**

   iii. Identify the type of decision support system used to implement SleepCam's functionality, and explain how this system would *analyse* the data. **[5]**

b. A large transport company is considering the use of SleepCam technology to monitor fatigue in its long-distance truck drivers. **[6]**

Discuss implications that may arise for the company and the truck drivers. In your response you may consider aspects such as:

- Potential misuses of SleepCam,
- Responsibility for decision making,
- The changing nature of technology.

QUESTION 25 [13 marks]

The *20Q* website was invented by Robin Burgener in 1996 based on work he began eight years earlier. A player thinks of an object and *20Q* asks a series of questions to which the player usually answers 'Yes' or 'No'. Other choices such as 'Unknown', 'Irrelevant' or 'Probably' are also possible.

The *20Q* website claims that *20Q* guesses the secret object correctly about 80% of the time by asking only 20 questions (sometimes less). It also states that the game uses a neural network and every time one of the 30,000–50,000 daily users plays the game, it continues to 'learn'. A subset of data from the *20Q* website has been captured in the form of a handheld toy, although this version does not 'learn' after each game.

A Help screen from the website and a typical game are reproduced below.

> **When it guesses the player's object incorrectly—something that happened frequently in the first months of the game's use—the player types in the correct answer and that object becomes part of 20Q's growing neural network. The Artificial Intelligence then looks back over all the questions it just asked and associates the player's answers with the object it just learned. As more people play, 20Q gets better and better at understanding how each object is characterised.**

This is a printout of a typical *20Q* game where the secret object was an egg:

1. Is it Animal, Vegetable, Mineral, or Other? **Animal.**
2. Does it have short fur? **Irrelevant.**
3. Does it make a good pet? **No.**
4. Can it scratch? **No.**
5. Does it have ears? **No.**
6. Does it have feelings? **No.**
7. Does it dig holes? **No.**
8. Does it breathe? **No.**
9. Is it a specific colour? **Yes.**
10. Does it taste good when fried? **Yes.**
11. Do you use it in public? **Sometimes.**
12. Does it roll? **Yes.**
13. Can it be used in a pie? **Probably.**
14. Can it be dried? **No.**
15. Does it reflect objects? **No.**
16. Is it healthy? **Sometimes.**
17. I am guessing that it is an egg?

a. Despite its simple appearance, the *20Q* site is actually supported by an immensely powerful decision support system.

    i. Describe how the *20Q* website might use the principles of a neural network to guess that the object in the example above was an egg. **[4]**

    ii. Describe how *20Q* could acquire new facts about an egg. **[4]**

b. A General Practitioner in a large medical centre proposes customising the 20Q application for the field of medical diagnosis. The doctor wishes to have patients complete a 20Q session consisting of 20 diagnostic questions about their symptoms while in the waiting room. **[5]**

Discuss the technical, social and ethical issues which should be considered before considering implementation.

QUESTION 26 [21 marks]

Chinese paramilitary police patrol in Urumqi, western Jina's Xinjiang province. Photograph taken by Eugene Hoshiko / Associated Press

Mobs roam restless Urumqi[1]

Mobs wielding makeshift weapons continued to roam the city on Wednesday, despite a massive show of force by Chinese troops.

By Robert J. Saiget
July 8, 2009

In Urumqi, the capital of the remote northwest Xinjiang region where 197 people died in unrest on Sunday, army helicopters circled overhead as thousands of soldiers and riot police filled the city shouting out "protect the people".

"We support this," said a 45-year-old Han Chinese as he watched the troops roll by in trucks. "But they should have got here sooner. It took them three days to do this. Why so long?"

President Hu Jintao abandoned a G8 (Group of Eight) summit in Italy, in what observers said was an unprecedented move, to tackle one of China's worst spikes in ethnic tensions in decades. After authorities blamed Muslim Uyghurs for Sunday's unrest that also left more than 1,700 people injured, Han Chinese took to the streets with shovels, meat cleavers and other improvised weapons vowing to defend themselves.

After a night-time curfew was declared on Tuesday, Chinese authorities appeared determined to show they were able to maintain order. Thousands of riot police wearing helmets and carrying shields lined up on a main road in Urumqi dividing the city centre from a Uyghur district, with columns of soldiers behind them.

Internet access was revoked in parts of Urumqi after the deadly riots erupted, to stop the flow of information that it saw as a dangerous threat. "We cut the Internet connection in some areas of Urumqi in order to quench the riot quickly and prevent violence from spreading to other places," Li Zhi, a Communist Party official, told a news conference. Further, Li accused exiled Uyghur leader Rebiya Kadeer of orchestrating the violence over the Internet and through telephone calls. She denied the charge. Nur Bekri, governor of the region, further accused protesters of using the internet and text messages to mobilise rioters.

A technical official working for state-owned telecommunications company said shutting down the Internet in Urumqi, or only parts of the city, was easy. "You can do it in one second. There is a big backbone network and all you need to do is to switch off the telecom route," the official told AFP, speaking on condition of anonymity due to the sensitivity of the topic.

Despite Chinese officials' decision to cut off the Internet and mobile phones, pictures, videos and updates from Urumqi poured into websites such as Twitter, YouTube and Flickr. Media watchdog Reporters Without Borders accused authorities of wanting to see Urumqi "cut off from the rest of the world." In an endorsed statement, they asserted that "once again, the Chinese government has chosen to cut communications in order to prevent the free flow of information. We firmly condemn this behaviour."

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[1] Reproduced by permission from http://news.smh.com.au/breaking-news-world/mobs-roam-chinas-restive-urumqi-20090708-dd8m.html; sections adapted from http://newsinfo.inquirer.net/breakingnews/infotech/view/20090707-214343/China-says-Web-access-cut-off-due-to-riots

China restores limited internet access after Urumqi violence[2]

Block on calls from China to overseas numbers and on most text messages remains in place.

By Tania Branigan
Beijing, China
July 28, 2009

Normal internet access in China's troubled north-western region of Xinjiang may not be resumed for months, it has emerged, as officials begin to allow users to visit a small number of sites.

Officials have begun to allow users access to a small number of sites. Photograph remains the property of The Guardian (guardian.co.uk)

The internet was blocked across the region three weeks ago after inter-ethnic violence in Urumqi killed at least 197 people. Authorities also shut down text message services.

Mobile phone users are now receiving texts again – but only in the form of a daily update from the authorities and weather reports. The first, on Sunday, told them the security situation had improved and urged them not to believe rumours.

A block on calls to overseas numbers – from any phone – also remains in place.

Authorities told media groups that there was now access to a small selection of sites including internet banking, the online stock exchange and university enrolment services. A statement from the Telecommunications Administration this weekend said that business and government-related sites would also reopen, although it did not indicate when.

"We have received no instruction on when to fully resume the public internet connection in Xinjiang," said Haimiti Mijiti, vice-president of China Telecom's Xinjiang branch. Some have speculated that normal access would not be restored until after 1 October, the 60th anniversary of the founding of the People's Republic of China. When asked to comment on this, Mijiti responded: "There is no set time given yet."

Nur Bekri, the governor of Xinjiang, told reporters recently: "Internet control was necessary ... It became a tool to spread false information." The authorities said yesterday that false rumours were still circulating in the city – such as claims that people had taken hostage pensioners, women and children, demanding the release of suspects detained after the unrest.

"Cutting off the Internet and short messaging service is the action that Chinese government decided to take. Under extreme circumstances, such as after the Urumqi riot, it is understandable," said Nigel Hickson, the acting director of the UK Department for Business Innovation & Skills. "But I don't think it is a long-term solution because the Chinese government cannot block the Internet and short messaging service forever."

Most citizens agree – some more than others. "No Internet, no business for me," said Li Fenfa, an Urumqi resident who runs an online business selling dry fruit and has seen no transactions after the Internet was cut.

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[2] Reproduced by permission from http://www.guardian.co.uk/world/2009/jul/28/china-restores-limited-internet-access; sections adapted from http://www.chinadaily.com.cn/china/2009-07-28/content8479195.htm

a. Identify the *types of technologies* (NOT specific examples of those technologies) that the government was aiming to restrict. **[3]**

b. Explain how communications systems were related to the riots. **[3]**

c. Analyse the aspects of the situation in Urumqi that led to the government's response. **[4]**

d. Propose an argument that supports or opposes the deactivation of Urumqi's telecommunications during the riots, with reference to relevant social & ethical issues. **[5]**

e. Compare and contrast communications with mobile phones and internet access to communications with non-computer-based systems. In your response you may consider aspects such as: **[6]**

- Technologies,
- Quality of information,
- Impacts on users.

- END OF EXAM -

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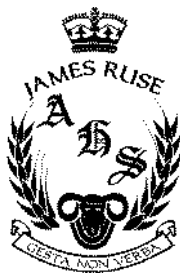
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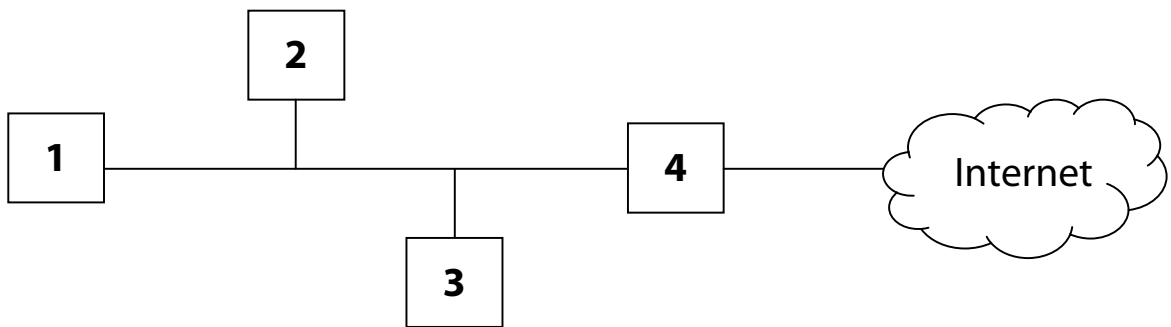- Mark allocations are provided for each question

SECTION A
Multiple Choice

1. A department store has abandoned its proposed internet shopping website because the website would discourage customers from using the physical department store.

   Which if the following best describes the reason why this decision was made?

   A. The website was not technically feasible.
   B. The website was not economically feasible.
   C. There was insufficient time to implement the website.
   D. The website did not fit the objectives of the department store.

2. In the following diagram, the boxes represent devices on a network.

   Which device on this network represents a router?

   A. 1
   B. 2
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3. Which of the following are ALL tools that help overcome physical boundaries to enable virtual organisations?

   A. Email, decision tree, video-conferencing
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4. An entity forms part of the schema for any relational database. Which of the following are examples of possible entities for this database?

    A. The first and second names of jurors
    B. The computer running the database and the file server hosting it
    C. The juror and the court
    D. The link between court case and juror and the link between juror and court number

5. Which of the following is an example of a suitable key field for the juror table?

    A. Jury members' surnames
    B. Jury members' first names combined with their surnames
    C. Jury members' date of birth combined with surnames
    D. An invented numeric code uniquely assigned to each jury member

6. Due to the nature of the data stored within it, help desk operators must often perform urgent and accurate searches of the database.

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    A. Trained database managers to perform the searches
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7. Network communication between the courts and the Sheriff's Office has been established. This network is known as which of the following?

    A. An Ethernet network
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   Which of the following correctly outlines what will take place after the collision so that eventually both nodes communicate successfully?

   A. Each node waits for a free token before attempting to communicate.
   B. Each node waits a random amount of time before checking if a token is free.
   C. Each node waits a random amount of time before attempting to communicate.
   D. Each node waits until it has permission to communicate from the network controller.

9. In October 2006, the rock band Wolfmother streamed the first live concert to mobile phones. The show was encoded and compressed, then uploaded to a web server. A journalist reported that during fast sections of the guitar, the audio was distorted and broken.

   What would most likely have caused this distortion?

   A. The speed of the server
   B. Electromagnetic interference
   C. Limitations of mobile bandwidth
   D. Limitations of the speakers in mobile phones

Use the following information to answer Questions 10–11.

The following SQL statement generates a report from a flat file database. The database is used as part of a music store's CD catalogue system.

```
SELECT songcode, artistfirstname, artistsurname, releaseyear,

FROM songfile

WHERE releaseyear=2007 AND genre IS rock

ORDER BY artistsurname DESC
```

10. Which of the following describes the final order of the artists in the report?
    A. Artists alphabetically Z to A by surname
    B. Artists alphabetically A to Z by surname
    C. Songs alphabetically Z to A by title
    D. Songs alphabetically A to Z by title

11. Which of the following statements is true?
    A. Output will be all songs released by each artist in the catalogue
    B. Output will be all rock songs released in 2007 by each artist in the catalogue
    C. Output will be all rock songs released by each artist in the catalogue
    D. Output will be all songs released in 2007 by each rock artist in the catalogue

12. A database stores data about players in an Under 15 basketball team. The field for a player's date of birth only accepts dates in the form DD/MM/YYYY and does not accept dates earlier than 01/01/1994.

    What are two issues addressed here?

    A. Data integrity and the Y2K bug
    B. Data validation and data integrity
    C. Data redundancy and the Y2K bug
    D. Data redundancy and data validation

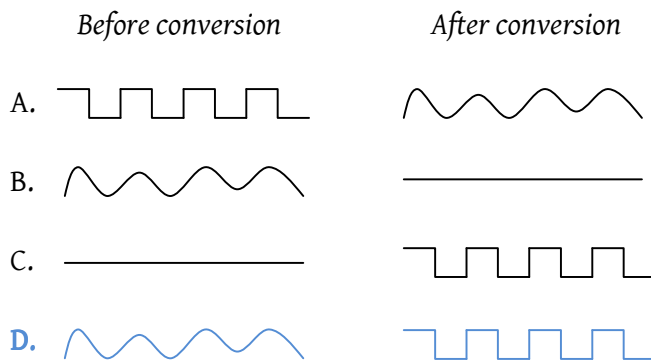13. Sebastian is using an internet search engine to investigate the extinction of the Golden Toad species.

    What search phrase will locate the most relevant information?

    A. "extinction + golden + toad"
    B. extinction + golden + toad
    C. extinction + "golden toad"
    D. extinction – golden + toad

14. The Roads and Traffic Authority uses a secure database in its offices to update information about licensed drivers in New South Wales. This database is accessed by authorised staff at their computer terminals through an online authentication service.

    Which option correctly identifies participants and data/information within this system?

	Participants	Data/information
A.	Drivers	Licence number, driver's details
B.	Drivers	Computer terminal, Internet
C.	**RTA employees**	**Licence number, driver's details**
D.	RTA employees	Computer terminal, Internet

15. Which of the following graphically represents analogue to digital conversion of a telecommunications signal?

Before conversion   *After conversion*

A.

B.

C.

D.

16. In 2007, Centrelink installed a new data warehouse that stores detailed information on its clients. This information is available to other agencies in charge of welfare, employment and social policy.

    What technique will allow these agencies to retrieve detailed information from Centrelink's data warehouse?

    A. Data back-up
    B. Data mining
    C. Normalisation
    D. What-if analysis

17. Jean investigates the use of a personal information system to produce party invitations. She is uncertain if she has the software on her computer to produce the invitations. She has only one week to complete the task.

    What feasibilities apply to Jean's situation?

    A. Economic and ethical
    B. Technical and schedule
    C. Operational and technical
    D. Schedule and organisational

18. A free-text search is undertaken on the following hypertext document.

> **Definition of BANDWIDTH**
>
> **In general, <u>bandwidth</u> is associated with telecommunications in which a wide <u>band</u> of frequencies is able to transmit information.**
>
> **Related terms are <u>wideband</u> (a synonym), <u>baseband</u> (a one-channel <u>band</u>), and <u>narrowband</u> (sometimes meaning just wide enough to carry voice, or simply 'not <u>broadband</u>').**

In the free-text search, a * can be used to replace from 0 to 7 characters in a word. Which of the following searches would locate all the words containing 'band'?

A. *band
B. band*
C. *band*
D. * band *

19. A new online system is being developed to allow doctors to access patient records in hospital wards. Which of the following does NOT relate to potential social and ethical issues of this new system?

A. Protection of the system from unauthorised access
B. Inclusion of data validation techniques to ensure only accurate data is entered
C. Production of user documentation that helps doctors to easily access required data
D. Production of accurate system design documentation for future system development

20. Which option correctly identifies activities used for testing, evaluating and maintaining an information system?

	Testing	Evaluating	Maintaining
A.	Checking that the original objectives are met	Using live data	Deciding on a system conversion method
B.	Ensuring performance specifications are met	Checking that the original objectives are met	Applying a software upgrade
C.	Using live data	Checking that the original objectives are met	Creating a prototype
D.	Deciding on a system conversion method	Using live data	Backing up system data

SECTION B
Extended Answer

QUESTION 21   **[15 marks]**

The organisers of next year's school athletics carnival propose to use information technology to accurately calculate finishing times for all track events. Competitors will have a timing device attached to their shoes prior to each race. Computerised timing mats will be placed at the start and finish lines to record exactly when the runner begins and ends. Results for each race will be uploaded directly to school staff laptops and posted onto the intranet immediately. After the carnival is completed, videos of each race will be uploaded and embedded beside the results, and photos of each of the competitors will also be viewable on each race page.

a. Describe ONE social issue and ONE ethical issue related to the display of results on the school intranet.   **[3]**

Outcomes assessed: H1.1, H3.1

Marking Criteria	Marks
Provides characteristics and features of one social issue and one ethical issue related to the display of results on the website; issues must be distinct	3
Identifies one social and/or one ethical issue related to the display of results on the website and provides characteristics and features of one; issues may overlap	2
Identifies two social and/or ethical issues relating to the display of results on the website	1

Ethical issues, if discussed from an appropriate perspective, may be accepted as social issues.

- **Social issues**
    - Undesired publicity. Care has to be taken with regard to the publication of positions in the fun run for everyone to see. Results could embarrass both a serious runner and a fun runner.
    - Changing nature of work. A job which previously required little or no technical knowledge will now involve significant technical expertise; training will be required.
    - Expense. Sophisticated equipment is costly to purchase and maintain, and the impact of this on the school budget must be considered.

- **Ethical issues**
    - Privacy
        - It is important that the fun run organisers only publish the name and the time (and if necessary the place) but not the address, phone numbers or any other identifying information.
        - Runners may object to being visually identifiable on a semi-public website.
    - Data accuracy/validation/integrity. The computerised equipment may report erroneous times that would have to be checked against manual timekeepers.

b. Describe each of the following components in the context of the proposed information **[4]** system, and explain how these components interact to achieve the goals of the system:

- Purpose
- Participants
- Data/information
- Information technology

Outcomes assessed: H1.1, H1.2, H2.1, H3.1, H6.1

Marking Criteria	Marks
Provides characteristics and features of all the identified components in the proposed information system and provides how/why the components work together to achieve the goals of the information system	4
Identifies components in the proposed information system; better answers should provide how/why some of the components work together to achieve the goals of the IS	2-3
Provides the characteristics and features of at least one of the identified components	1

- **Purpose**
  - To accurately calculate the times for the race automatically using specific information technology
  - To automatically publish (display) the results on the intranet.

- **Participants**
  - The teachers / technical staff responsible for entering data to the site and those who are responsible for maintaining the site
  - The students / teachers responsible for collecting video / photo data for the website
  - NOT merely the runners – these are people in the environment as they contribute data to the system but are not responsible for collecting it
  - NOT those who use the fun run website to access the results including people who check their own times/results and others who are interested in accessing the site; these are just end users

- **Data/information**
  - Names and details of the participants
  - The times that are collected at the start and finish
  - Photos of competitors

- **Information technology**
  - Hardware:
    - timing device attached to the runners shoes
    - computerised timing mats

- computer used to collect the results
- modem and cables/base stations for the communication to occur
- computers used to create and maintain the website
  - o Software:
    - program to create the website
    - communications software
    - a database to store the competitor's details
    - web browser

- **Interaction to achieve system goals**
  - o The names of the competitors are collected manually via a form and entered into the database on the computer or by competitors entering the information on-line on the website using information technology. The data entry operators and those who register on-line are participants information system. On the day of the fun run the times are collected by the information technology hardware using the timing device attached to the runner and the timing mats as the runners pass over them. The data collected (names and times) are transformed into information and the results are displayed on the website.

  c. Describe criteria that could be used to judge the success of the new information system **[4]** and explain how to determine if the criteria have been satisfied.

Outcomes assessed: H1.1, H3.1

Marking Criteria	Marks
Provides characteristics and features of at least two criteria that could be used to judge the success of the new IS, and describes how to determine if each criteria has been met	4
Provides characteristics and features of at least two criteria that could be used to judge the success of the new system and describes how to determine if at least one of the criteria has been met	3
Provides characteristics and features of at least one criterion OR provides some description of how to determine the criteria have been met	1-2

Criteria that could be used to determine the success of the new information system include:
- **Usage.** The amount of traffic on the website – by installing a counter on the site to determine the number of hits that the site has achieved, indicating the number of competitors who checked results and/or interested people looking at the site. The number of hits should approach or go beyond the number of competitors.
- **Time saving.** The time/personnel involved in the collection of the data – names, details and times on the day and compare to the time/personnel involved in the previous manual system. The information system will be successful if the organisation is completed more quickly and with fewer personnel than the former system.

- **Data accuracy**. The accuracy of the times could be checked by the inclusion of some manual timing devices that would check the accuracy of the timers and the timing mats by comparing the manual time to the automatic timing system.
- **Effective communications.** The website could be checked immediately after each race and the automatically-generated web pages can be read to determine whether they display the required data.

** Note that identifying criteria for failure (e.g. incomplete records) is not the same as identifying criteria for success (e.g. significant time saving).
** User feedback is not a criterion for judging success; it is a method of gathering data that must involve its own explicit criteria.

d. After the completion of the athletics carnival, the same technology used to assist with calculating and tabulating the results of each race is repurposed for use in the school's ongoing fitness program. Students are allowed to borrow timing devices and laptops linked to them, in order to record their progress. Software installed on each of the laptops monitors the training of each student and provides statistics including (but not limited to) total distance run, average distance run per training session, average running speed and standard levels of adolescent fitness for comparison. **[4]**

Describe how each of the following processes is integral to the functioning of this new information system:

- Collecting; Analysing; Storing & retrieving; Displaying

Marking Criteria	Marks
Provides characteristics and features for the four named processes and directly relates each one to the system	4
Provides characteristics and features of all named processes and relates some of them to the system	3
Provides characteristics and features of some of the processes without directly relating them to the system	1-2

- **Collecting:** data must be collected from timing devices so that students can have a quantitative and historical record of their physical fitness
- **Analysing:** graphs or charts based off the recorded numerical data will allow students to interpret their performance, see how they have progressed, perform relevant calculations (e.g. take averages) identify patterns and trends (for areas of strength and weakness) and compare themselves against standard levels of fitness (or their peers)
- **Storing & retrieving:** the nature of the data requires it to be accessible at a later date, so it must be stored safely and securely (privacy becomes an issue since the data can be regarded as sensitive and personal); PERSISTENCE of data (i.e. maintaining records over a sustained period of time) or other rationale for long-term S & R must be explicitly referred to
- **Displaying:** Results must be visible in some form that allows for meaningful understanding and knowledge to be inferred from the recorded data

** Responses had to describe the process *in the context of the actual system*, not in abstract terms; relevant examples of each process had to be referenced in order to explain how this specific system would not be able to function (i.e. accomplish its purpose) without the given processes.

QUESTION 22 [19 marks]

Shown below is a screenshot taken from the official website for the popular Channel Ten series, *MasterChef Australia.* Use it to answers parts (a) – (d) on the next page.

a. The main image in the centre of the page is 512 by 288 pixels in size, and it is stored in 24-bit colour.

(i) Demonstrate how to calculate the size of the image, in kilobytes. Explain what **[3]** each number in the calculation represents. Do NOT calculate the answer.

Outcomes assessed: H1.1

Marking Criteria	Marks
The working is essentially correct AND an explanation is provided for the majority of numbers	3
Working shown is a correct calculation, with no explanation	2
Incorrect working and/or with limited explanation	1

Number of pixels = 512×288
Bit-depth = 24, meaning that each pixel requires 3 bytes of storage
∴ Number of **bytes** = $512 \times 288 \times 3$
∴ Number of **kilobytes** = $512 \times 288 \times 3 \div 1024$

- - - - - - - - - - - - - - OR - - - - - - - - - - - - - -

Number of pixels = 512×288
Bit-depth = 24
∴ Number of **bits** = $512 \times 288 \times 24$
∴ Number of **bytes** = $512 \times 288 \times 24 \div 8$
∴ Number of **kilobytes** = $512 \times 288 \times 24 \div 8 \div 1024$

(The answer, for the curious, is 432 KB.)

(ii) Explain why GIF compression would be an unsuitable method to reduce the file **[2]** size of this image.

Marking Criteria	Marks
Provides characteristics of GIF compression and directly relates these to its inappropriateness for compressing photographic images	2
Identifies characteristics of GIF compression; does not relate this to its suitability for compressing the given image	1

- **Characteristics of GIF**
  - o Maximum of 8-bit colour (256 distinct colours)
  - o Compression method is suited to large blocks of solid colour
- **Reasons for unsuitability**
  - o Low bit-depth does not match up with image's stated 24-bit colour
  - o Compression method does not accurately imitate continuous shades of colour

** Describing images as "high quality" or "low quality" is inadequate; *quality* is a subjective term that must be qualified (e.g. low bit-depth)
** GIF compression does *not* compromise the *resolution* of an image in any way; it sacrifices colour palette
** GIF files are no less suited to small or large files than any other form of compression
** Stating that GIF compression is lossy does not disqualify it as a valid method of compression

b. Identify and describe FOUR different multimedia elements displayed on the website. **[3]**

Outcomes assessed: H1.1 , H2.1

Marking Criteria	Marks
Demonstrates a clear understanding of the multimedia elements by correctly identifying and describing four different elements	3
Demonstrates a limited understanding of the multimedia elements by identifying only two elements, and/or providing limited description(s)	1-2

- **Text** on this website presents short snippets of information that summarise the content that can be found after navigating to other sections of the site. The small paragraphs *"Three rounds decide who is Australia's first MasterChef"*, *"Sage and Garlic Chicken with Celeriac Puree and Sp…"* are examples of text.
- **Hypertext** allows users to move to a different part of the document or different website by clicking on the hypertext link. The headings *Recipes, Episodes, Forums, Contestant Call* and *MasterChef Trivia* are all examples of hyperlinks.
- **Audio** is digitised sound. There is a link to the *MasterChef Podcast* in the bottom right corner of the page.
- **Images** can be seen throughout the page. Examples include the row of contestants' portraits at the top, the main image subtitled *Latest Episode: The Grand Finale,* and the thumbnail images next to each of the links in the bottom half of the page.
- **Video** is accessed on this webpage through the links *Episodes* and *Exclusive Video Recipes*.

c. Identify the types of software that you would use to design and create a website such as **[5]** *MasterChef Australia.* Justify your selection of each type of software.

Outcomes assessed: H1.1, H5.1

Marking Criteria	Marks
Identifies and provides a clear justification of the different types of software used for designing and creating a website with elements of ABC online, explicitly referring to packages for designing websites AND designing multimedia	4-5
Identifies and provides adequate justification of two different types of software used for designing and creating websites	3
Identifies one type of software used for designing and creating websites AND/OR provides a limited justification	1-2

- An authoring software package would be an obvious choice of software for the creation of this website as it allows you to combine all of the elements of multimedia and create all of the hyperlinks required; however there would also be other programs that were used prior to the final compilation of the website. A graphics-editing program would be needed to create the images used on ABC Online.
- A graphics package would allow the graphic artist to use a lot more tools, to edit and crop the pictures, which may not be available on the authoring software.
- Specialist content
  - Word processing program could be used by the variety of people who have contributed articles for the website
  - The relevant staff responsible for the production of audio and video would also use specialist programs for audio and video digitisation and editing.

Stronger answers linked the benefits of each kind of software directly to the particular content found on the MasterChef website.

d. The *MasterChef Australia* website is an example of the merging of many different media   **[6]**
on one website.

Identify the developments in hardware and telecommunications that have enabled the
integration of media, and discuss the issues and implications of this integration.

Outcomes assessed: H3.1, H4.1

Marking Criteria	Marks
Response demonstrates a clear understanding of the developments that have occurred in a range of hardware and telecommunications that facilitate this integration AND a clear understanding of the issues and implications of these developments for multimedia use, identifying issues and providing points for/against the progress of these developments	5-6
Response demonstrates an adequate understanding of the developments that have occurred in some hardware and/or telecommunications that facilitate this integration AND/OR an adequate understanding of the issues and/or implications for multimedia use	3-4
Response demonstrates a limited understanding of the developments that have occurred in hardware and/or telecommunications that facilitate this integration AND/OR a limited understanding of the issues and/or implications for multimedia use	1-2

- **Computer hardware developments**
    - Greater amount of storage has made it possible to store and manipulate increased amounts of images and videos, both on disk and in memory, allowing improved presentations to be prepared.
    - CPU speed needs to be faster to deal with the increased file sizes and the greater processing required (e.g. dealing with file compression).
- **Sophisticated display devices**
    - Monitors and graphics cards are capable of outputting more colours at higher resolution, allowing for the accurate representation of video content and photographic material
- **Portable multimedia devices**
    - The emergence and proliferation of affordable digital still cameras and digital video cameras has allowed the general population to integrate these media more readily in their presentations and web pages.
- **Broadband internet**
    - Web pages with high amounts of graphics have previously been considered slow to load, but the emergence of broadband technology has increased the speed of

download and waiting times for downloads have dramatically reduced. There has been increasing amounts of multimedia on websites.

o This improvement in telecommunications has allowed people at home to view a wide range of graphic images, video, television and news from across the world – seemingly as it happens.

- **Dominance of the internet**
    o The Internet is replacing traditional methods of getting news from newspapers and television, it is introducing new forms of entertainment such as on-line games and communication via teleconferencing is reducing the need for business people to fly executives around the world for expensive meetings and conferences.
    o The integration of multimedia and the Internet has changed the way that we shop and businesses will continue to change as the trend increases.

- **Implications**
    o The recent developments in computing, communications and their related technologies has enabled the integration of media has changed the way that people work, shop and entertain themselves.
    o Overwhelming levels of data
    o Copyright issues
    o Increased possibility of finding misinformation
    o Decline of competitor media (e.g. newspaper); rise of inter-related media (e.g. television, MasterChef TV show)
    o Changing nature of work. Creation and growth of new industry and jobs (e.g. web designers, multimedia designers, website hosts, and content writers); loss of previous jobs associated with less popular media

QUESTION 23 [21 marks]

Mobile information technology has changed the way people live and function on a day-to-day basis.

a. On June 29, 2007, Apple Inc. released the *iPhone,* an Internet-connected, multimedia smartphone. Its main distinguishing feature was a multi-touch screen, though it also included a digital camera and media player equivalent to a video-playing iPod. It has sold roughly 21 million units worldwide since it was launched, and was named *Time* magazine's *Invention of the Year* in 2007. **[6]**

The iPhone's integration with ubiquitous internet access offers opportunities for users to access multimedia-rich services and content anywhere at any time, such as videos on demand, interactive television, gaming, shopping and online education.

Discuss issues that may arise from the widespread use of these services and content. In your response you may consider aspects such as:

- Ownership of data,
- Changing nature of work,

- Interpersonal and social relationships,
- Equity of access.

Outcomes assessed: H3.1, H5.2

Marking Criteria	Marks
Response shows a clear understanding of issues associated with the services of iPhone technologies through a thorough discussion of multiple issues. Better answers will identify a range of issues that arise out of the capabilities of the iPhone and its services	5-6
Response demonstrates an adequate understanding of the developments that have occurred in some hardware and/or telecommunications that facilitate this integration AND/OR an adequate understanding of the issues and/or implications for multimedia use	3-4
Response demonstrates a limited understanding of the developments that have occurred in hardware and/or telecommunications that facilitate this integration AND/OR a limited understanding of the issues and/or implications for multimedia use	1-2

- **Ownership of data**: The ownership of data downloaded can be hard to determine since they can be spread around conveniently with iPhone technology.
- **Changing nature of work**:
    - New jobs are created to do with providing and maintaining online services; the jobs of those associated with the businesses replaced by these services will be in jeopardy.
    - New jobs related to the development, maintenance and manufacture of iPhone hardware (justifiably significant due to massive number of sales; not a niche market).
    - Telecommuting and teleconferencing can take place through an iPhone's internet connection and video camera.
    - Responding to work-based communications can extend outside a typical office environment to any location where the iPhone has network reception.
- **Privacy**: Privacy may also be at risk since the iPhone technology enables a connection to the Internet. This access, coupled with the camera on the iPhone, can allow for unsolicited photographs or videos to be published within seconds of seeing an event or person.
- **Security**:
    - Extreme portability of iPhone makes theft or accidental loss a high risk. This can result in personal information being discovered.
    - High volume of potentially sensitive data being transmitted over wireless connections (e.g. credit card numbers when users make online purchases or transactions) emphasises importance of strong encryption methods
- **Interpersonal and social relationships**:
    - Increase in potential for hacking and misinterpretation.
    - Decreased physical contact.

- o   Enables relationships over large distances that would be impossible otherwise.
- **Equity of access**: The widespread use of iPhones raises the important issue of equity of access, as it would be an expensive item.
- **Ergonomics**:
  - o   Continual use of the small iPhone screen for reading text and numerical data, without sufficient breaks, could be detrimental to eyesight.
  - o   Repetitive strain injury could result from continually using the multi-touch screen for typing messages and playing interactive games.
- **Occupational health and safety**:
  - o   People may read websites or watch videos while driving in their cars, creating a highly dangerous situation.
  - o   Radiation is emitted by mobile phone devices. Since the iPhone can be used simply as a media player, this may result in hours of additional radiation exposure than normal. This in turn could lead to serious health problems.
- **Convergence of technology**: Separate devices used to be required for still/video photography (digital cameras), interactive games (e.g. Nintendo DS, PSP), playing multimedia content (e.g. iPod, MP3 players), surfing the internet (netbooks), replying emails (Blackberry) and making phone calls (mobile phones). Now, all of these services can be found in a single piece of technology.
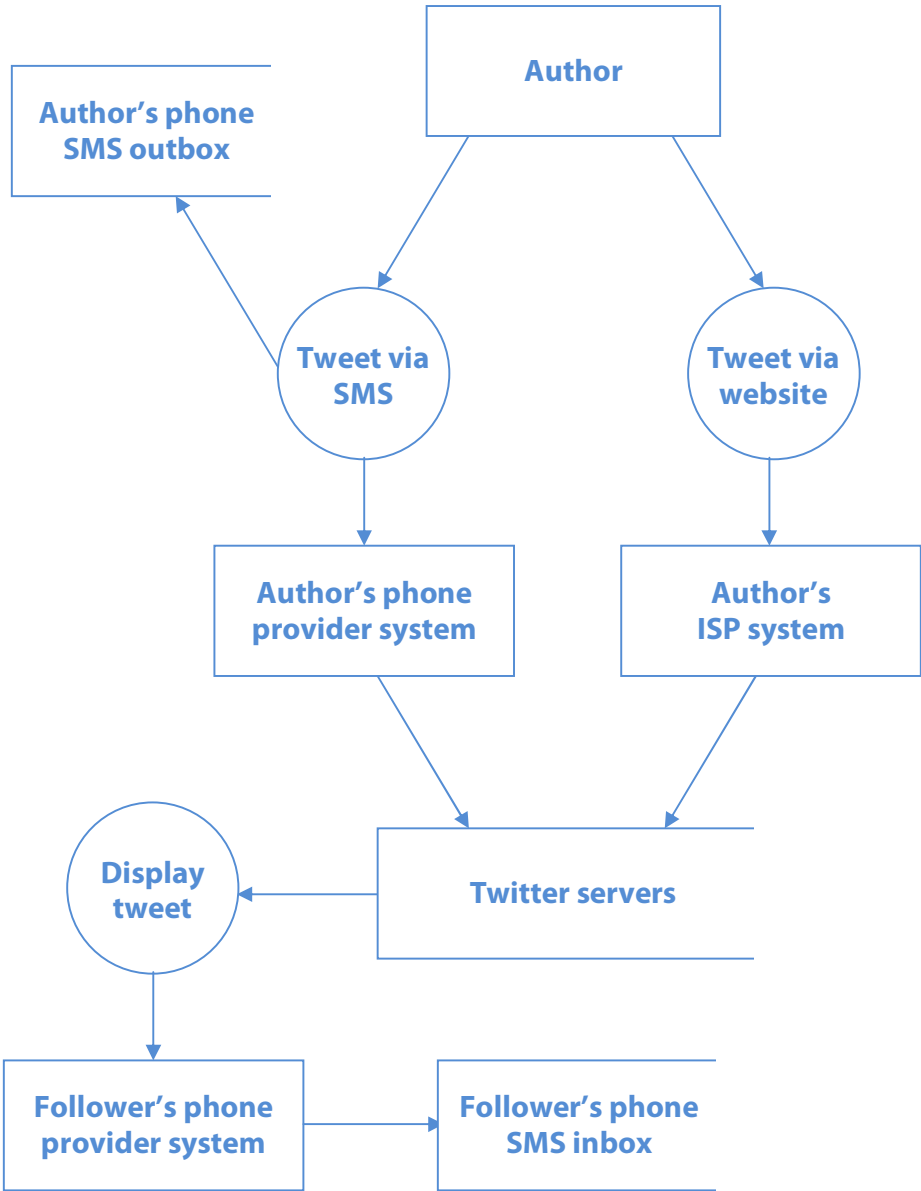- Issues with **data integrity** may also occur as more people use the technology.

b. Jack Dorsey designed the *Twitter* social networking and micro-blogging service in 2006. It enables its users to send and read 140-character text-based messages known as *tweets*. Tweets are displayed on their author's profile page on Twitter's website, and they are also delivered to the author's subscribers who are known as *followers.* Tweets can be published either by sending a mobile phone SMS to the website, or by using the website directly from a computer. The majority of tweets are composed in response to the question, "What are you doing?"

While the service is mainly used for personal purposes, it has also begun to play a key role in breaking news of world events. Information about the Mumbai attacks (November 2008) and the crash-landing of a commercial plane in the Hudson River in New York (January 2009) were transmitted via Twitter before many of the mainstream news channels had the story.

(i)   Draw a data flow diagram that illustrates the movement of data around the   **[4]** Twitter information system when a user sends a single tweet.

Marking Criteria	Marks
Diagram clearly demonstrates coherent understanding of the movement of data through the system AND distinguishes correctly between entities, actions/processes and data stores; better responses accounted for multiple methods of data entry and for flow of data to followers	3-4

Diagram demonstrates adequate understanding of the flow of data through the system AND/OR distinguishes between entities, actions/processes and data stores	2
Diagram demonstrates limited understanding of the flow of data through the system and fails to distinguish between entities, actions/processes and data stores	1

(ii) Critically analyse the effect of using Twitter on a regular basis. In your response **[6]** you may consider aspects such as:

- Globalisation,
- Virtual communities,
- Privacy,
- Emerging trends in communications.

Marking Criteria	Marks
Identifies issues in all four named areas AND elaborates in a way that illustrates a depth of understanding of the issues and how they relate to each of the areas. Better responses also showed an understanding of the relationships between the four areas, including the positive and negative aspects of these relationships	5-6
Identifies issues in some or all four areas, elaborates in a way that shows some understanding of the issues and attempts to relate the issues to the areas. Some attempt may be made to discuss the relationships between the areas	3-4
Identifies some issues in the four areas and makes an attempt to elaborate	1-2

- **Globalisation**:
  - Physical barriers are broken down, allowing easy and virtually instantaneous communication between people on different continents (e.g. even as a tool for journalism)
- **Virtual communities**:
  - People of similar interests are united by following significant Twitterers (e.g. celebrities, politicians) and by tweeting on the same event
  - Changing nature of work – employees in the field can now send and receive updates and instructions with affordable and easily-accessible technology; massive dedicated information systems no longer need to be developed for individual companies
  - Questionable social value and psychological effect of having frequent and personal interactions with individuals whom you may never meet in person
  - Twitter can become an additional avenue for anonymous cyber-bullying that can be very difficult to effectively curtail
- **Privacy**:
  - Content can be created and transmitted so quickly that breaches of privacy (both intentional and unintentional) can quickly spiral out of control and are difficult to restrain. Once a tweet has been sent, the nature of the service means that it will be instantly sent to followers with no opportunity to cancel or retract.
- **Emerging trends in communications**:
  - Dramatic increase in the speed of communications; updates are transmitted in seconds, directly to followers' mobile phones wherever they may be

- o Dominance of text-based conversations can lead to insincerity and potential for fraud (e.g. tweeting under a false name)
  - o Brevity of interactions becomes valued; however, misinterpretation becomes increasingly likely since tweets are composed quickly and can even be mistyped on a mobile phone keypad
  - o Government censorship may be enforced upon Twitter due to its potential for spreading politically significant information
- **Relationships between issues**:
  - o Virtual communities that span different countries can now communicate with the same speed and convenience as people in the same suburb.
    - ▪ <u>Positive</u>: interest groups or non-government organisations working on humanitarian efforts.
    - ▪ <u>Negative</u>: terrorist cells seeking to co-ordinate attacks.
  - o Mass dispersion of information can now take place virtually instantaneously.
    - ▪ <u>Positive</u>: breaking news of emergencies, allows rapid responses (increased likelihood of relevant and up-to-date data)
    - ▪ <u>Negative</u>: breaches of privacy now multiply in breadth, speed and severity
  - o Electronic communication (emerging trend) is starting to dominate over the other forms of media; television, radio and print are now being challenged by electronic communication in the spheres of politics (e.g. Barack Obama), entertainment (e.g. Ashton Kutcher) and broadcasting (e.g. news networks, cf. newspapers –> websites)
    - ▪ <u>Positive</u>: competition of services means higher quality of service overall
    - ▪ <u>Negative</u>: data integrity is disputed since misinformation can socially proliferate (thus becoming harder to identify and distinguish from accurate data); inequity of access

c. The *Digital Education Revolution* is an initiative of the Australian government aimed at embedding information and communications technologies into Australian schools. Its principal component is the $2.1 billion National Secondary School Computer Fund, which provides netbooks (small laptops) to selected high school students free-of-charge for educational use.   **[5]**

To provide internet access for the netbooks, dedicated wireless networks are to be installed in schools nationwide. Consultants have been asked by the Department of Education to prepare a feasibility study for the new networks.

Discuss the issues that should be considered by these consultants. In your response you may consider aspects such as:

- Technical issues,
- Economic issues,
- Staff expertise,
- Other relevant issues.

Outcomes assessed: H1.1, H6.1, H6.2, H7.1

Marking Criteria	Marks
Response identifies issues included in the feasibility study and provides points for and/or against each of these issues. Better responses will examine the issues with clear reference to the network scenario provided and provide other relevant issues such as organisational and scheduling feasibility	4-5
Response identifies relatively relevant issues included in the feasibility study with limited or no discussion.	2-3
Response identifies at least one relevant issue	1

- **Technical issues**:
    - Wireless network will need to handle the increased volume of traffic from netbooks throughout the school. Since the wireless network will be dedicated to providing internet access for the netbooks, use of bandwidth-intensive multimedia websites must be monitored. Failure of internet access during a lesson, for instance, could potentially bring the lesson to a standstill.
    - Every indication of the future indicates that students will be required to produce their own short videos for their different subjects. The student demands in the near future will not remain static but will increase. It is questionable that the new proposed solution will cope with the increased demands and scalability required in the near future.
    - The importance of security escalates dramatically with the installation of a school-wide wireless network. All communications would have to be encrypted heavily and the network would have to be passphrase-protected, otherwise neighbours and people in the vicinity can simply tap into the network. If the passphrase were to be accidentally or maliciously leaked, this could cause significant breaches in security.
- **Economic issues**:
    - The multi-billion dollar fund must be able to serve schools throughout the country equitably, so this will place constraints on the quality and specifications of the hardware purchased to implement these networks.
    - The costs of initially hiring technicians to install these networks and integrate them effectively into schools must also be considered, as well as the wages of technical support officers who are to provide ongoing maintenance and support.
    - The economic issues should probably be looked over a medium-term (e.g. 5 year) period as compared to just short-term (e.g. one year). The outlay that needs to take place may be more 'affordable' over the medium term as compared to a shorter time period.
    - The Network server and the Data server would have to be up-to-date and be quite powerful to cope with the demands of the Network. The Network server and the Data server would have to be updated regardless of the solution.

- o There are costs involved in the hardware and software infrastructure required for the network but the costing would look much more reasonable over the medium term.
- **Staff expertise**:
  - o More on-site IT staff may be required to service the new solution due to its complexity. An alternative could be to subscribe to a technical support service who could resolve most issues remotely.
  - o For the usual academic staff member, it is envisaged that they should not have to undertake too much training on this new network solution. The backend of the network would be seamless and the staff would not be aware of what was happening in the background. The skills that are involved in having students use laptops on the new network should be very similar to the old network.
  - o Information Technology staff would more than likely be needed on site to deal with the myriad of problems that arise at a school. As more nodes or layers are added to a network, the more training the IT staff will have to undertake and perhaps even more personnel.
- **Other issues**:
  - o Occupational health and safety – the effects of radiation from wireless networks have not been the subject of long-term scientific research, and so are not entirely understood.
  - o With the internet becoming even more readily available to students throughout the school, surveillance, filtering and censorship of inappropriate online material is an even more significant issue than before.

QUESTION 24 [14 marks]

Use the following information to answers the questions below.

Clever camera promises improved safety

An Australian company is developing an automotive safety product to detect when a car's driver is likely to fall asleep. The product, called *SleepCam*, is to be mounted on a car's dashboard.

To estimate the positioning of the driver's eyes, SleepCam continually monitors the more easily-determined position of the driver's head, based on its larger features (ears, nose and chin). It calculates where the driver is looking by measuring the shape of the eyes and the position of the iris.

SleepCam also monitors how frequently the driver blinks, matching this data to predetermined blinking patterns that indicate a person is drowsy. From this information, the system determines the probability that the driver is falling asleep, and sounds an alarm if moderate drowsiness is detected. If severe drowsiness is detected, a voice-over warns the driver and instructs them to pull over and rest.

a. The heart of SleepCam is an intelligent decision support system.

    i. Draw a simple decision tree that illustrates the conditions, rules and actions that govern SleepCam's basic operations. **[2]**

Marking Criteria	Marks
Diagram graphically maps out the decision process, including all relevant conditions, branches, decision points and outcomes	2
Diagram graphically maps out the decision process, but lacks some relevant conditions, branches, decision points or outcomes	1
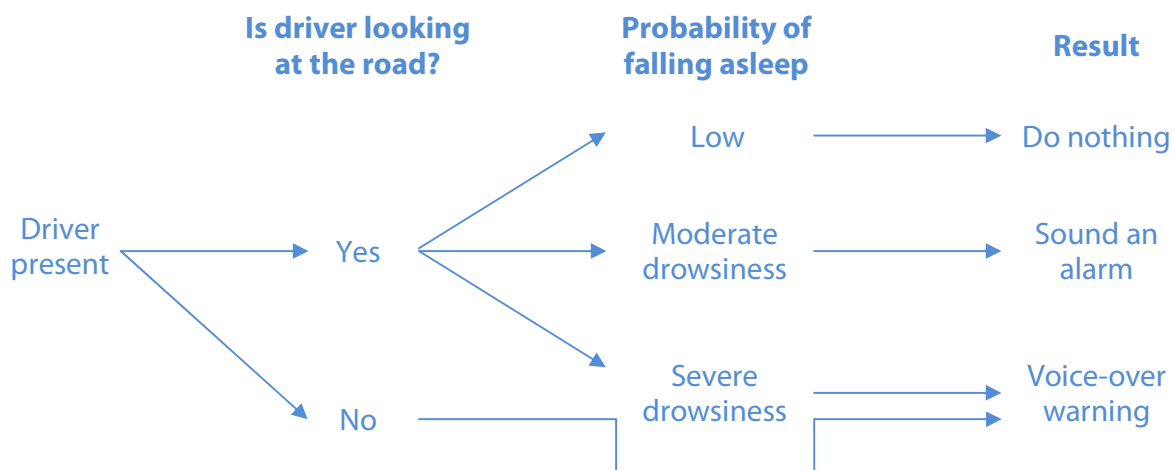
** Numerous answers suggested conditions that had little or no relation to the data provided in the question itself.

    ii. Determine if SleepCam is being used in a structured, semi-structured or unstructured situation, and justify your answer. **[3]**

Outcomes assessed: H1.2, H2.1

Marking Criteria	Marks
A determination is made and justification is given for semi-structured situation; identifies the basic characteristics of a semi-structured situation Better responses will clearly relate to the SleepCam system - - - - - - - - - - - - - OR - - - - - - - - - - - - - Identifies unstructured situation with detailed justification	2-3
Identifies semi-structured situation without justification - - - - - - - - - - - - - OR - - - - - - - - - - - - - Identifies unstructured situation with little or no justification	1

- **<u>Invalid Response</u>: Structured**
  - Structured decisions involve solutions that are clearly identifiable, often through straightforward mathematical calculations.
  - The nature of the data being processed and the complexity of the algorithms required for SleepCam to function effectively disqualify the situation from being described as completely structured.

- **<u>Possible Response</u>: Unstructured**
  - Responses could argue that there are too many factors or variables to accurately determine the sleepiness of the driver. An example of these factors could include the truck having different drivers with different blinking patterns when they are tired. The system would need to be calibrated for every driver that used the truck.
  - Despite this, it is difficult to conclusively argue that the situation is completely unstructured since the recommendations of the system (e.g. take no action, sound alarm, sound voice-over) are reasonably straightforward, even simplistic.

- **<u>Best Response</u>: Semi-structured**
  - Relevant data (e.g. driver's blinking rate) may not always be known
  - If relevant data is known, outcomes can be predicted with reasonable accuracy
  - The system's inputs come essentially from video data, which (like image data) is highly unstructured and difficult to analyse artificially with certainty

iii. Identify the type of decision support system used to implement SleepCam's functionality, and explain how this system would *analyse* the data. **[5]**

Outcomes assessed: H1.2, H2.1

Marking Criteria	Marks
Response demonstrates a clear understanding of a recognised Decision Support System to implement the SleepCam system by identifying an appropriate Decision Support System and clearly explaining how that Decision Support System analyses data Better responses will clearly relate the explanation to the scenario	4-5
Response recognises a valid Decision Support System supported by some detail about how the Decision Support System analyses data	3
Response recognizes a plausible Decision Support System and provides some additional correct detail about that Decision Support System Weaker responses will only name a Decision Support System	1-2

- Correct identification: an **expert system** could be used to implement the SleepCam system. Other systems (e.g. spreadsheet, artificial neural network) do not match the description of SleepCam provided in the question, but marks could be awarded if the subsequent explanation of the system's functions were detailed and correct.

- **Data analysis**
  - Data would be collected from studies that investigated a large number of drivers attempting different types of trips in different types of trucks, and then combined with the knowledge of sleep experts and ophthalmologists (eye doctors).
  - This data would be entered into a knowledge base and from this data a set of rules could be determined.
  - When the SleepCam system is actively monitoring an actual driver, it would analyse the video data it collects by **identifying patterns and trends** in the driver's blinking behaviour. This would then be **compared** by the SleepCam system to heuristics in its knowledge base, and **calculations** would be performed to ascertain a numerical value for the individual's level of sleepiness. Based on these processes, appropriate action could be taken.
  - Overall drowsiness levels for different drivers, journeys and times of day could be **calculated** and **represented graphically** to help drivers better understand their own patterns of drowsiness and when/where they are most likely to occur.

b. A large transport company is considering the use of SleepCam technology to monitor **[6]** fatigue in its long-distance truck drivers.

Discuss implications that may arise for the company and the truck drivers. In your response you may consider aspects such as:

- Potential misuses of SleepCam,
- Responsibility for decision making,
- The changing nature of technology.

Outcomes assessed: H4.1, H5.1

Marking Criteria	Marks
Provides multiple arguments FOR and/or AGAINST the use of SleepCam to monitor fatigue in long-distance truck drivers by addressing aspects such as those identified in the question from the perspective of the COMPANY and the DRIVER; Better responses will connect arguments directly to the SleepCam Decision Support System and not to DSSs in general	5-6
Provides arguments for AND/OR against the use of SleepCam Decision Support System by addressing a limited number of aspects such as those identified in the question from the perspective of the company AND/OR the driver	3-4
Provides an argument(s) for or against the use of SleepCam	1-2

Implications that could arise by the introduction of the SleepCam system to monitor fatigue in truck drivers could include discussion of the following:

- **Potential misuses of Sleepcam**
    - Head office spying on drivers
    - Invasion of drivers privacy
    - All drivers will have different blinking patterns
    - Drivers trucks becoming in operational due to 'false alarms' generated by the system
    - Unfair dismissal of drivers who are observed to trigger SleepCam's alarms more frequently due to increased levels of sleepiness (perhaps due to lifestyle or other health reasons)
- **Responsibility for decision making**
    - System designers, programmers and testers
    - Researchers, sleep experts and ophthalmologists responsible for contributing to the knowledge base of SleepCam
    - Who has control of the system
    - Responsibility of an accident if the system fails
    - The driver may possess the ability to over-ride, deactivate, or incorrectly calibrate the system, which may absolve the SleepCam company of responsibility. If an accident occurred, a method for determining whether this was the case must be in place.
- **The changing nature of technology**
    - Cost of the system
    - Development of hardware and software for implementation of the system
    - Education and training of the drivers (changing nature of work)
    - Actual lives depend on the success or failure of the system; reliance on technology replacing other measures for ensuring safety (e.g. "stop, revive, survive")

QUESTION 25 [16 marks]

The *20Q* website was invented by Robin Burgener in 1996 based on work he began eight years earlier. A player thinks of an object and *20Q* asks a series of questions to which the player usually answers 'Yes' or 'No'. Other choices such as 'Unknown', 'Irrelevant' or 'Probably' are also possible.

The *20Q* website claims that *20Q* guesses the secret object correctly about 80% of the time by asking only 20 questions (sometimes less). It also states that the game uses a neural network and every time one of the 30,000–50,000 daily users plays the game, it continues to 'learn'. A subset of data from the *20Q* website has been captured in the form of a handheld toy, although this version does not 'learn' after each game.

A Help screen from the website and a typical game are reproduced below.

> When it guesses the player's object incorrectly—something that happened frequently in the first months of the game's use—the player types in the correct answer and that object becomes part of 20Q's growing neural network. The Artificial Intelligence then looks back over all the questions it just asked and associates the player's answers with the object it just learned. As more people play, 20Q gets better and better at understanding how each object is characterised.

This is a printout of a typical *20Q* game where the secret object was an egg:

1. Is it Animal, Vegetable, Mineral, or Other? **Animal.**
2. Does it have short fur? **Irrelevant.**
3. Does it make a good pet? **No.**
4. Can it scratch? **No.**
5. Does it have ears? **No.**
6. Does it have feelings? **No.**
7. Does it dig holes? **No.**
8. Does it breathe? **No.**
9. Is it a specific colour? **Yes.**
10. Does it taste good when fried? **Yes.**
11. Do you use it in public? **Sometimes.**
12. Does it roll? **Yes.**
13. Can it be used in a pie? **Probably.**
14. Can it be dried? **No.**
15. Does it reflect objects? **No.**
16. Is it healthy? **Sometimes.**
17. I am guessing that it is an egg?

a. Despite its simple appearance, the *20Q* site is actually supported by an immensely powerful decision support system.

    i. Describe how the *20Q* website might use the principles of a neural network to guess **[4]** that the object in the example above was an egg.

Marking Criteria	Marks
Provides characteristics and features of a neural network's guiding principles and functions; thorough and accurate description of neural network with relation to this scenario; better responses will directly relate to the 20Q system	4
Answer does not relate directly to 20Q scenario	3
Inadequate or incomplete response	1-2

- System 'learns' by (a) initially asking general questions of all objects, and then by (b) confirming its knowledge by delivering questions for which prior responses are known.
- Players do not always answer the same way to the same questions, but the system weights responses based on the statistical record of previous responses for each object.
  - Questions which receive highly consistent responses of "yes" or "no" are weighted more heavily.
  - Questions which receive highly consistent responses of "unsure" or "irrelevant", or questions which receive highly erratic responses, will not be asked as much in the future if a certain type of object is suspected (as asking these questions is not likely to help the DSS narrow down its list of possible solutions).
- As millions of people have previously responded a certain way to these questions, the current player's responses to the 20 questions will isolate an egg as the most probable option among other possibilities.
  - The system recognises the most likely answer based on what previous objects match the set of answers best.
  - If the system's best guesses all turn out to be wrong, it requests the player to provide the correct answer. In this way, the neural network's knowledge base is either (a) expanded to include previously unknown objects or (b) updated to incorporate more accurate data on recognised objects.
- 20Q is comprised not of a single super-intelligent processing unit, but by multiple smaller processing elements that work together. Parallel processing will be employed to deal with the massive processing requirements of the game.

ii. Describe how *20Q* could acquire new facts about an egg. **[4]**

Marking Criteria	Marks
Thorough and accurate description	4
Failure to relate to this scenario	3
Inadequate or incomplete response	1-2

- The system randomly generates a range of diverse questions on objects that it desires to understand better. It then gathers together all of the answers that end up with the answer being an egg. These answers are then analysed to determine trends (such as which types of questions are more likely to relate given positive answers to previous particular questions), and incorporated into the system's knowledge base.
- The system is also likely to ask questions that will allow it to distinguish between very similar objects, leading to an ability to correctly identify a person's secret object with greater detail.

b. A General Practitioner in a large medical centre proposes customising the 20Q **[5]** application for the field of medical diagnosis. The doctor wishes to have patients complete a 20Q session consisting of 20 diagnostic questions about their symptoms while in the waiting room.

Discuss the technical, social and ethical issues which should be considered before considering implementation.

Marking Criteria	Marks
Arguments both for and against the implementation of the medical 20Q system are presented; the perspective of both patients and doctors is considered	5
Arguments for and/or against the system are provided; perspective of patients or doctors is addressed	3-4
Inadequate or incomplete response	1-2

- **Ethical**:
  - Legal implications in case of incorrect diagnosis and possibility that patients with unsatisfactory final outcomes will blame the lack of direct human intervention
  - Slowness to diagnose compared to doctor using intuition and prior experience to circumvent chain of reasoning
  - Incorrect conclusions or difficulty of interpretation of machine diagnosis
  - Copyright on 20Q game needs permission

- **Social**:
    - Patients' resistance to filling in forms
    - Patients unwilling to trust a DSS or artificial intelligence
    - Patients too willing to trust a DSS or artificial intelligence
    - Doctors too ready to trust diagnosis by DSS
    - Inability of patients to accurately judge or diagnose their own condition
    - Changing nature of work
        - GPs will need to be trained in correctly operating and interpreting the DSS
        - Additional staff may be required by the medical centre to service/maintain the technical aspects of the DSS
    - Patients may find embarrassing conditions both easier or more difficult to report to an electronic-based system rather than an actual human being
    - Appointments at the medical centre could be accelerated dramatically, since common cases can be dealt with in a quicker fashion that does not rely on the presence and input of the medical professionals

- **Technical**:
    - The human body and pathology (study of infections, diseases, cancers etc.) is massively complex; therefore, sophisticated and powerful hardware and software will be required to facilitate 20Q-style system
        - e.g. large amounts of storage space to contain ever-increasing patient survey records as part of the neural network's 'knowledge'
        - e.g. data entry equipment (a la information kiosk) required in doctors' waiting rooms to allow patients to fill out the survey
    - Potential breakdown of network, server, workstation
    - Medical diagnosis too broad to facilitate accurate application
    - In order to be effective, the medical 20Q system must be extensively trained before used in a real-life context with actual patients; this data must be sourced and incorporated into the neural network
    - The current success rate of 80% will need to be increased significantly
    - Decisions of the medical 20Q system may be unintentionally skewed in one direction by being constantly trained on a small number of frequent patients
    - After sufficient training, the medical 20Q system may be (a) more consistent at applying the principles of medicine to a patient's situation and (b) more perceptive in identifying obscure connections between symptom patterns and the underlying illness

QUESTION 26 [21 marks]

Chinese paramilitary police patrol in Urumqi, western Jina's Xinjiang province. Photograph taken by Eugene Hoshiko / Associated Press

Mobs roam restless Urumqi[1]

Mobs wielding makeshift weapons continued to roam the city on Wednesday, despite a massive show of force by Chinese troops.

By Robert J. Saiget
July 8, 2009

In Urumqi, the capital of the remote northwest Xinjiang region where 197 people died in unrest on Sunday, army helicopters circled overhead as thousands of soldiers and riot police filled the city shouting out "protect the people".

"We support this," said a 45-year-old Han Chinese as he watched the troops roll by in trucks. "But they should have got here sooner. It took them three days to do this. Why so long?"

President Hu Jintao abandoned a G8 (Group of Eight) summit in Italy, in what observers said was an unprecedented move, to tackle one of China's worst spikes in ethnic tensions in decades. After authorities blamed Muslim Uyghurs for Sunday's unrest that also left more than 1,700 people injured, Han Chinese took to the streets with shovels, meat cleavers and other improvised weapons vowing to defend themselves.

After a night-time curfew was declared on Tuesday, Chinese authorities appeared determined to show they were able to maintain order. Thousands of riot police wearing helmets and carrying shields lined up on a main road in Urumqi dividing the city centre from a Uyghur district, with columns of soldiers behind them.

Internet access was revoked in parts of Urumqi after the deadly riots erupted, to stop the flow of information that it saw as a dangerous threat. "We cut the Internet connection in some areas of Urumqi in order to quench the riot quickly and prevent violence from spreading to other places," Li Zhi, a Communist Party official, told a news conference. Further, Li accused exiled Uyghur leader Rebiya Kadeer of orchestrating the violence over the Internet and through telephone calls. She denied the charge. Nur Bekri, governor of the region, further accused protesters of using the internet and text messages to mobilise rioters.

A technical official working for state-owned telecommunications company said shutting down the Internet in Urumqi, or only parts of the city, was easy. "You can do it in one second. There is a big backbone network and all you need to do is to switch off the telecom route," the official told AFP, speaking on condition of anonymity due to the sensitivity of the topic.

Despite Chinese officials' decision to cut off the Internet and mobile phones, pictures, videos and updates from Urumqi poured into websites such as Twitter, YouTube and Flickr. Media watchdog Reporters Without Borders accused authorities of wanting to see Urumqi "cut off from the rest of the world." In an endorsed statement, they asserted that "once again, the Chinese government has chosen to cut communications in order to prevent the free flow of information. We firmly condemn this behaviour."

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[1] Reproduced by permission from http://news.smh.com.au/breaking-news-world/mobs-roam-chinas-restive-urumqi-20090708-dd8m.html; sections adapted from http://newsinfo.inquirer.net/breakingnews/infotech/view/20090707-214343/China-says-Web-access-cut-off-due-to-riots

China restores limited internet access after Urumqi violence[2]

Block on calls from China to overseas numbers and on most text messages remains in place.

By Tania Branigan
Beijing, China
July 28, 2009

Officials have begun to allow users access to a small number of sites. Photograph remains the property of The Guardian (guardian.co.uk)

Normal internet access in China's troubled north-western region of Xinjiang may not be resumed for months, it has emerged, as officials begin to allow users to visit a small number of sites. The internet was blocked across the region three weeks ago after inter-ethnic violence in Urumqi killed at least 197 people. Authorities also shut down text message services.

Mobile phone users are now receiving texts again – but only in the form of a daily update from the authorities and weather reports. The first, on Sunday, told them the security situation had improved and urged them not to believe rumours.

A block on calls to overseas numbers – from any phone – also remains in place.

Authorities told media groups that there was now access to a small selection of sites including internet banking, the online stock exchange and university enrolment services. A statement from the Telecommunications Administration this weekend said that business and government-related sites would also reopen, although it did not indicate when.

"We have received no instruction on when to fully resume the public internet connection in Xinjiang," said Haimiti Mijiti, vice-president of China Telecom's Xinjiang branch. Some have speculated that normal access would not be restored until after 1 October, the 60th anniversary of the founding of the People's Republic of China. When asked to comment on this, Mijiti responded: "There is no set time given yet."

Nur Bekri, the governor of Xinjiang, told reporters recently: "Internet control was necessary ... It became a tool to spread false information." The authorities said yesterday that false rumours were still circulating in the city – such as claims that people had taken hostage pensioners, women and children, demanding the release of suspects detained after the unrest.

"Cutting off the Internet and short messaging service is the action that Chinese government decided to take. Under extreme circumstances, such as after the Urumqi riot, it is understandable," said Nigel Hickson, the acting director of the UK Department for Business Innovation & Skills. "But I don't think it is a long-term solution because the Chinese government cannot block the Internet and short messaging service forever."

Most citizens agree – some more than others. "No Internet, no business for me," said Li Fenfa, an Urumqi resident who runs an online business selling dry fruit and has seen no transactions after the Internet was cut.

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[2] Reproduced by permission from http://www.guardian.co.uk/world/2009/jul/28/china-restores-limited-internet-access; sections adapted from http://www.chinadaily.com.cn/china/2009-07-28/content8479195.htm

a. Identify the *types of technologies* (NOT specific examples of those technologies) that the government was aiming to restrict. **[3]**

Marking Criteria	Marks
Response names all three classes of technologies of involved; better responses provided detail on the *nature* of the technology restricted	3
Response names some of the major technologies that have been restricted	1-2

- **Internet access**
    - Social networking websites
    - News services
- **Mobile phones**
    - Text messaging services (i.e. SMS)
- **International phone calls**

b. Explain how communications systems were related to the riots. **[3]**

Marking Criteria	Marks
Demonstrates a clear understanding of the potential uses of communications systems AND relates these to the context of the riots; presents direct relationship between communications systems and the riots; better responses included both positive and negative aspects and distinguished between alleged and confirmed elements of the report	3
Demonstrates a limited understanding of the potential uses of communications systems, AND/OR relates these to the riots; identifies aspects that relate to one group's perspective within the situation	1-2

- **Alleged**
    - Initial organisation of the riots and mobilisation of rioters by Rebiya Kadeer over the internet and through telephone calls
    - Co-ordination of people movement and logistics during the riots
    - Persistence of false rumours after the riots
- **Confirmed**
    - Authorities placed initial blame on one ethnic group (Muslim Uyghurs), and once this information had spread via communications systems, the other ethnic group (Han Chinese) responded with further violence
    - Dissemination of pictures, videos and updates from residents onto worldwide social networking and multimedia websites during the riots
    - Government-organised daily updates and weather reports to residents through re-activated text messaging service after the riots

c. Analyse the aspects of the situation in Urumqi that led to the government's response. **[4]**

Marking Criteria	Marks
Demonstrates a depth of understanding by identifying a range of aspects relevant to the situation and drawing out some implications of those aspects	3-4
Demonstrates some understanding by identifying some aspects relevant to the situation with limited/no discussion of their characteristics or implications	1-2

- **Severity of violence**. 197 people confirmed dead and 1,700 people confirmed injured. "One of China's worst spikes in ethnic tensions in decades." This led to the sending in of additional paramilitary forces, as cutting communications alone would not quell the violence.
- Potential **significance of information and information systems** in instigating, spreading and prolonging the riots. Initial organisation allegedly took place remotely via telecommunications systems; further violence was encouraged by the publishing of blame. Further unwanted criticism of the government or ethnic vilification could spread nationwide and internationally through the use of the restricted communications systems.
- **Ease of quick response,** especially compared to the deploying of military forces (which reportedly took 3 days). "All you need to do is switch off the telecom route."
- **Disrupting** organised violence and replacing it with government and military control.
- **Proximity** of significant anniversary. Speculation suggests that the government may desire to restrict bad publicity in the lead-up to the 60th anniversary of the nation's founding.
- Persistent **reliance on technology** led to the government's partial restoration of internet access to a small selection of authorised websites.

d. Propose an argument that supports or opposes the deactivation of Urumqi's **[5]** telecommunications during the riots, with reference to relevant social & ethical issues.

Marking Criteria	Marks
Response identifies relevant social and ethical issues present in the situation, discusses these issues and outlines an argument that is detailed and coherent; better responses will support or oppose the government's actions by clearly addressing issues raised in the scenario	4-5
Response identifies social and/or ethical issues present in the situation, discusses these issues and outlines an argument for or against	2-3
Response and outlines an argument for or against the government's actions with little or no clear reference to relevant social or ethical issues	1

- **Support the deactivation** (6 candidate responses)
    - o Preservation of data integrity/accuracy (prevents intentional false rumours and misinformation from spreading quickly)
    - o Extreme violence justifies drastic action to ensure public safety
    - o Significant breach of privacy with unsolicited photos and videos, often depicting disturbing images, being published internationally

- - - - - - - - - - - - - OR - - - - - - - - - - - - - -

- **Oppose the deactivation** (6 candidate responses)
    - o Citizens rights to free speech are unfairly curtailed (especially on a global scale)
    - o Innocent end users are affected by the deactivation of the system (e.g. online business owners, cf. Li Fenfa and changing nature of work)
    - o Deactivation of telecommunications could prevent threatened residents from calling for assistance, resulting in further violence
    - o Disputable effectiveness; Twitter, YouTube and Flickr still inundated with multimedia and updates relevant to the riot
    - o Setting a precedent for the government to unilaterally ban all forms of electronic communication, which may have been for public safety in this situation, but may be for malicious reasons in the future
    - o Nature of the internet as an unrestricted and uncontrolled medium

e. Compare and contrast communications with mobile phones and internet access to communications with non-computer-based systems. In your response you may consider aspects such as: **[6]**

- Technologies,
- Quality of information,
- Impacts on users.

Marking Criteria	Marks
Response demonstrates a clear understanding of a range of similarities and/or differences between computer-based and non-computer-based communications systems Addresses a range of different aspects such as those identified in the question and provides clear explanations to show how they are the same or different; better responses must include both similarities and differences related to the scenario	5-6

Response demonstrates an adequate understanding of the similarities and/or differences between computer-based and non-computer-based communications systems Addresses different aspects such as those identified in the question and providing some explanations; better responses will address multiple aspects	3-4
Response demonstrates a limited understanding of the similarities and/or differences computer-based and non-computer-based communications systems Addresses and/or explains a small number of aspects; poorer responses may only address one aspect with no explanation	1-2

- **Essential nature and purpose – shared qualities**
  - Both types of communications systems centre upon the transmitting and receiving of data between people
  - Both types are subject to the issues of bias (intentional and unintentional) and data integrity (especially with the spread of inaccurate, outdated or incomplete data)
  - Both types are amoral and can be used equally to (e.g.) organise riots or to co-ordinate police forces / humanitarian relief
  - Both types are convenient in different contexts and individual situations

- **Speed and reach**
  - **Computer-based (CB):** worldwide broadcasting to multiple audiences within seconds, accessible from anywhere with mobile phones
  - **Non-computer based (NCB):** limited to local area, communicate with smaller groups of people, longer time frame requirements

- **Sincerity/authenticity**
  - **CB**: sacrificed significantly for non-multimedia forms (e.g. text messaging)
  - **NCB**: clearer due to transmitting & receiving of body language and linguistic cues

- **Security/fraud**
  - **CB**: impersonation is far easier over CB communications systems
  - **NCB**: impersonation is extremely difficult except when large budgets and sophisticated methods are used (e.g. espionage)

- **Quality of information**
  - **CB**: data is more prolific and often found in greater detail, especially with regard to overseas/international events (e.g. news websites); multimedia can be transmitted; misinformation can be more easily published and may blend in with the facts
  - **NCB**: though it is more limited in its scope and level of detail, the information gained through NCB communications are often regarded as higher quality and more trustworthy; only limited forms of media can be transmitted; higher data integrity

- **Cost**
  - **CB**:
    - Technologies are expensive to design, develop, manufacture and purchase (this raises the issue of equity of access)
    - Most CB communications systems required the prior installation of a massive, nation-scale infrastructure before they were able to function at all (e.g. telephone communications, mobile phone towers and satellites, internet links between countries)
    - Training and expertise are often required to effectively operate CB communications technology, which also incurs its own costs
  - **NCB**:
    - Low-cost/free (e.g. postal mail, face-to-face)
    - Basic/no infrastructure required
    - No costly training required for effective use

– END OF EXAM –