

2009 HSC Information Processes and Technology Sample Answers

This document contains 'sample answers', or, in the case of some questions, 'answer may include'. These are developed by the examination committee for two purposes. The committee does this:

- (a) as part of the development of the examination paper to ensure the questions will effectively assess students' knowledge and skills, and
- (b) in order to provide some advice to the Supervisor of Marking about the nature and scope of the responses expected of students.

The 'sample answers' or similar advice, are not intended to be exemplary or even complete responses. They have been reproduced in their original form as part of the examination committee's 'working document'. While the handwritten notes have been typed for legibility, no further editorial change or addition has occurred.

Section II

Question 21 (a)

Answers could include:

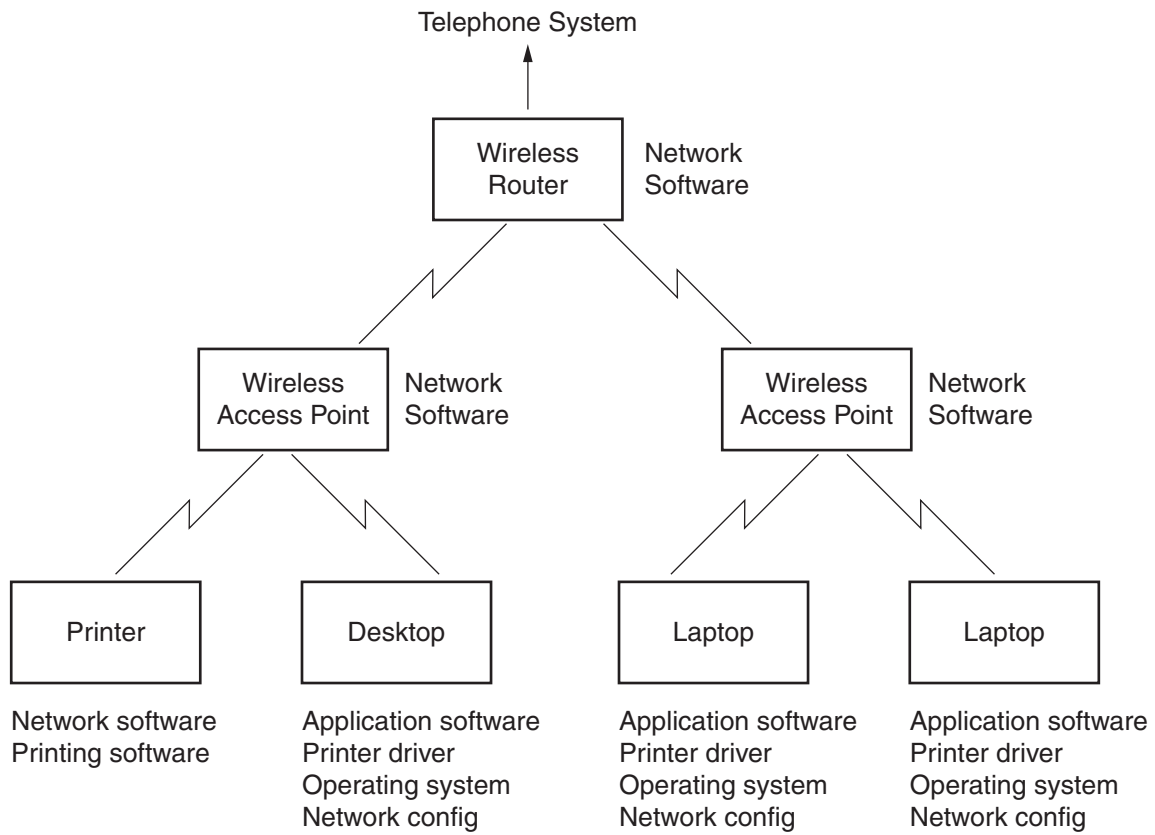
Economic feasibility – do they have sufficient funds to purchase equipment (communication hardware and software, eg, modem, firewall, etc) and to install (may need outside contractor) the wireless network? Do they have sufficient funds to maintain the system in the future (eg, upgrades and security software)?

Operational feasibility – considering that the father and child's computers are not connected to the internet at the moment – do they have the skill to connect the computers to the wireless network and trouble shoot when problem arises with connection?

Technical feasibility – is there hardware and software available for a wireless network? (Wireless modem, router, communication software, security software such as firewall, antivirus). These are readily available on the market and are usually self-installed following instruction from the internet service provider. Do they have the technical skill to install the route/access point/USB wireless key etc? These can be purchased – linked back to economic feasibility.

Question 21 (b)

Answers could include:



Diagrams may vary, consider in relation to essential components.

Question 21 (c)***Answers could include:***

Advantages of wireless/disadvantages of cabled:

- Easy installation as no cabling/wiring is required – longer time will be required if cabled are installed to lay wires
- No ugly cabling or repainting of the Morgan's house
- Additional machines can be added easily into a wireless network
- Wireless – can work anywhere in the house or within reach, no need to stay in one location; cabled – stay at the same place for connection

Disadvantages of wireless/advantages of cabled:

- Wireless connection is less reliable compared to cabled network and is subject to interference from other wireless communication / may not go through solid thick brick walls or multiple levels of the house / may not be accessible in all areas of the house
- If wireless connection fails, harder to trouble shoot than cabled
- Laptops/pc need to be wireless compatible otherwise additional equipment is required
- Less secure compared to cabled network – more sophisticated security software required, others may tap into the network and use up download unit

Question 22 (a)**Sample answer:**

I = protocol – Hypertext Transmission Protocol

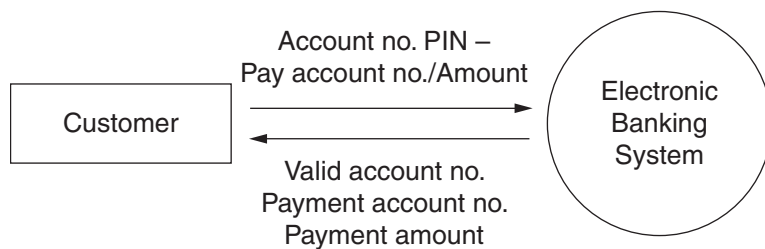
II = name of internet computer/DNS Server

III = file path for accessing a particular web page/file

Protocol – identifies the rules for the computer to communicate with the web node and access data/doc on the web node

DNS Server – identifies the name of the computer on which the document/data is stored in this case, the bank one computer

The file path is essential to direct the customer to the appropriate part of the website/page/file.

Question 22 (b)**Sample answer:****Question 22 (c)****Sample answer:**

Collecting: user is required to enter their account number and PIN into the system

The system compares this data with data stored in the Account File. If the data is correct (account number and PIN match) the account is validated and the valid account number is passed onto the next process.

Processing: The account number and PIN are compared to data stored in the Account File, which contains valid account number and associated PINs. If the data matches the info in the file, the account is validated and the data is sent onto the next process. If the data does not match a message will be displayed informing the user that there has been an error.

Storage and Retrieval

Data stored and retrieved

– account No, PIN

Data entered

– account No, PIN

Data output

– valid account No.

Question 23 (a)***Answers could include:***

The underlying purpose of the ISA System is to provide improved safety for the community.

Question 23 (b)***Answers could include:*****Technology**

A GPS (Global Positioning System) receiver is required in the vehicle to interact with the GPS satellite so that the car's computer can use the GPS data to calculate the speed of the vehicle. The computer also needs to compare the speed measured with data stored on road speed limit databases. Internet access is required to access the latest speed limits from the database. The car's computer emits a noise/signal to alert the driver of overspeeding (voice/sound output device required in the car's computer). The car's computer system needs to be capable of controlling the speed of the car. The on-board computer needs to be able to be disabled when needed (only temporary for L-plate and P-plate drivers).

Question 23 (c)***Sample answers:*****Issue 1**

Changing nature of work – the proposed system has the potential to change the way that people drive their cars. The driver can no longer totally decide on the speed to travel, as the vehicle could automatically adjust the speed. Even if the driver is allowed to over ride, this can still be confusing and at least, require another layer of decision making. Data/info is provided for the driver to decide on the speed whether asked for or not. This may be beneficial to avoid speeding but the automatic changes/beeping sounds can cause stress for drivers, especially the ones that drive for a living. They may also worry about the accuracy and reliability of the system and worry that it may cause accidents. Education and training may be required before the implementation.

Issue 2

Accuracy and reliability of data – the accuracy and reliability of the technology has significant impact on the safety of the driver and others on the road. Incorrect adjustments or adjustments that happen too fast can lead to accidents. If the data is incorrect and stored or monitored by authority, L-plate, P-plate and drivers under court order may be unfairly treated. When an accident happens, the cause of the accident may also be complicated by this technology. Was the driver at fault or the computer in the car?

Question 23 (d)***Answers could include:***

Higher quality answers would identify components and the relationship between them: draw out and relate implications. Answers could include: Keeping track of prisoners, parents keeping track of children (children keeping track of parents), speed limiters for truck drivers, length of time people are driving could be monitored eg truck drivers, older people, people with history of sleep disorders, etc.

Question 24 (a)**Sample answer:**

On-line system – difficult for customers to ask questions or seek help (usually no patience for email reply). User interface needs to be easy to use and understand.

Accuracy and reliability will be highly important. If it is not an online store, the shop assistant may remember the customer or some info when things go wrong. In an online environment, if the transaction is not recorded correctly, it can be very difficult to retrace the steps and frustrating for both the company and the customer, especially if the transaction is lost.

Finally, the system is designed for the customers (customer = profits), the needs of the customer should have utmost importance to the system design. The graphics on the webpages, the procedure for ordering, the navigation of the site, the product stocked should all be based on the needs of the customer. The system needs to attract customers to do so, it needs to cater for their needs.

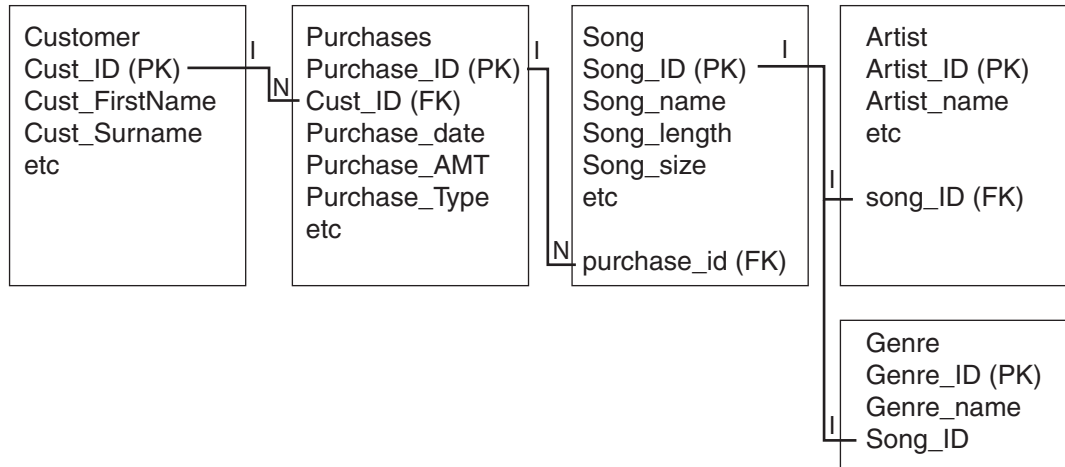
Question 24 (b)**Sample answer:**

<i>Field Name</i>	<i>Data Type</i>	<i>Size/Format</i>	<i>Description</i>	<i>Example</i>
Customer ID	Text	8	Unique identifier of transaction eg TI724961	T421
Lastname	Text	20	Identifies customer's last name	Smith
Firstname	Text	20	Identifies customer's first name	Jenny
Email address	Text	30	Identifies customer's email address	jenny.smith@mywork.com.au

Question 24 (c)**Sample answer:**

Tables

- Customer
- Artist
- Genre
- Song



Section III

Question 25 (a) (i)

Sample answer:

A series of events important to an organisation that involve a request, an acknowledgement, an action and an outcome.

Question 25 (a) (ii)

Sample answer:

An example of a batch transaction processing system is the generation of telephone bills. The transaction details (duration, source, determination, etc) of each call is stored when it takes place. On regular basis, once a month, the transaction are processed as a group. They are sorted by customers and a summary of transaction (bill) is generated for each customer.

Question 25 (b)

Sample answer:

Off-site backup – used to reduce risks associated with disaster situations

Grandfather – father – son:

The grandfather, father, son procedure is appropriate when an organisation needs to backup on a daily basis, and needs to store a minimum of 3 weeks of data.

Question 25 (c) (i)*Sample answer:*

E-Ticket Passenger Receipt		
Name:	Smith John	E-Ticket No: 12345
Date of Issue:	14 Nov 2009-03-24	Flight No: 60
Airline:	ABC Airlines	
Departure Date	Departure Time	Departure From
12 th Dec	08:30	Sydney
Arrival Date	Arrival Time	Arrival At
12 th Dec	17:30	Hong Kong
Flight Fare:	\$1200.00	
Credit Card:	XXXX XXXX XXXX 1975	
CONFIRMED.		

Name appearing on e-ticket identifies name of passenger flying airline.

Departure date, time and from identifies where and when flight will take place.

Arrival date, time and at, identifies where and when flight will arrive at destination.

e-ticket NO is the unique identifier of the ticket. Flight fare lists cost of flight and method of payment and payment details.

Question 25 (c) (ii)***Sample answer:***Collecting

Destination, flight date, departure time are collected from the customer, via internet technology, so that the system can search for a flight that matches the requirements. These are collected via list boxes to minimise typing, ensure consistent input data format and only allow the customer to select what is available. Confirmations are collected from the customer to signal to the system to accept the transaction. Before the details are confirmed, the customer can make changes. Credit card details are collected in 'free format' to allow for different types of cards marks will still be helpful to customers.

Storage and retrieval

The flight database needs to be stored on a direct-access storage device for searching and retrieval in real time processing. When a seat is booked, record needs to be updated immediately to avoid double booking. In fact, even when the flight is being considered (usually a time limit is set), an indicator needs to be stored to 'lock' the seat away from other customers to avoid double-bookings. Arrival time, fare, allocated seat number are retrieved from the DB to provide info for the customer. If the customer does not go ahead with the transaction, the 'lock' needs to be removed. Storing and retrieval takes place all the time in real time to 'lock' records, store finalised transaction records in the database and to search for flight details for customers. A powerful processor with lots of memory is required to facilitate these real time storage and retrieval. A large volume storage device is also required for the high amount of data. Journaling or imaging is required to safeguard data in case of system failure. Some kind of 'real-time backup'.

Analysing

The hardware needs to have large amounts of primary storage and secondary storage for fast searching of appropriate flight given the customer's destination, date and departure time. A powerful processor is required to calculate fare and perform retrieval and update quickly. The destination, date and departure time are compared to the flight details stored on the online flight DB and the closest matching one will be recommended to the customer.

Question 25 (c) (iii)***Sample answers:***

- Can book any time and at anywhere with the access to internet technology
- No need to travel to a travel agent
- From the airline's point of view, no need to maintain a shopfront and staff to service the shop ⇒ cost reduction
- From the user point of view, more difficult or impossible to discuss options of travel, less personal, must stick to screen format and question
- If seats are limited, the online system is fairer for customers as they 'compete' for a seat
- Provides peace of mind as the ticket is issued instantly in the online system
- Privacy – customers have more privacy to choose/shop online provided that security software is installed
- The online system needs to be very accurate and allow customers to verify and confirm details. Mistakes may not be known for sometime (say, booking 3 months ahead) and finding out the mistake at the airport can be frustrating. A person/human system has more person-to-person discussion/feedback/checking opportunities.

Question 26 (a) (i)***Sample answer:***

A Geographical Information System (GIS) captures, stores, analyses, manages and presents data that refers to or is linked to location. OR Geographical Information Systems represent data using maps.

Question 26 (a) (ii)***Sample answer:***

A business which sells 3G phones can use Google Earth and zoom in on areas with 3G coverage and then examine areas where they have few customers but there is high population density. A tag may display the underlying data or perhaps statistics or even a graph related to the current map location.

Question 26 (b)***Sample answer:***

- Knowledge engineer – codes the knowledge of the human expert into if-the rules and data of the knowledge base
- The human expert – provides the knowledge of the particular field based on studies, experience and research, works with the knowledge engineer to build the knowledge base, helps clarify ambiguities.

Question 26 (c) (i)***Sample answer:***

Artificial neural networks simulate the organisation, analysis and processing information processes performed by the human brain. Like the human brain, ANNs are able to learn by experience and then apply their new knowledge to new unseen problems. These characteristics make artificial neural networks particularly well suited to complex unstructured decision situations where the method of solution is poorly understood. Unlike the human brain, artificial neural networks are designed to solve specific types of problems.

Expert systems select the best solution to an information problem by combining the knowledge of human experts with the computer's ability to sort and match data. An expert system applies human expertise to a given task or to solving a problem. It is designed to operate in a defined area known as domain. It applies reasoning procedures (rules and formulae) to output results. Expert systems expand the availability of knowledge and provide consistency of output.

Question 26 (c) (ii)**Sample answer:**

Data

Date and time

Open-ocean swell readings

Location

Way the beach faces

Geographic features such as headlands, off shore reefs, contours of the sea bed

Loss of energy due to wrapping

Magnification of swell due to deep nearshore water depth

Information

Swell direction

Wave height

- Collecting – the process by which data is entered into or captured by a computer system, including:

- deciding what data is required
- how it is sourced
- how it is encoded for entry into the system

Data listed above would be collected and input into the system. Some of the data would be common knowledge eg data and time, location whilst other data would be obtained by instruments or sensors in the ocean eg open-ocean swell readings

- Analysis – the process by which data is interpreted, transforming it into information
ANNA learns over time, constantly improving by readjusting and re-weighting surf heights as each new swell hits the coast, incrementally factoring in the local characteristics of individual beaches.
- Displaying – the process that controls the format of information presented to the participant or user.
Produces incrementally more accurate forecasts for nearshore wave heights possible in the form of graphs as shown in the scenario.

Question 26 (c) (iii)**Sample answer:**

Possibly more accurate wave size predication for a location

Loss of human expertise in the field

Consequences if predictions are wrong eg safety of surfers, tsunamis

Surfers to rely on computer decision making to decide when and/or where they will go surfing
eg greater reliance on access to technology

Decision making might not be able to cope with ‘out-of-left-field’ input

Whose responsibility for decisions made using this decision support sytem?

- Other issues could include:
- Accuracy of data and information
- Data quality
- Appropriate information use

Question 27 (a) (i)***Sample answer:***

An output device that performs physical actions to alter objects eg a motor.

Question 27 (a) (ii)***Sample answer:***

CAD: Computer Aided Design – components are modelled using a computer program during the design process

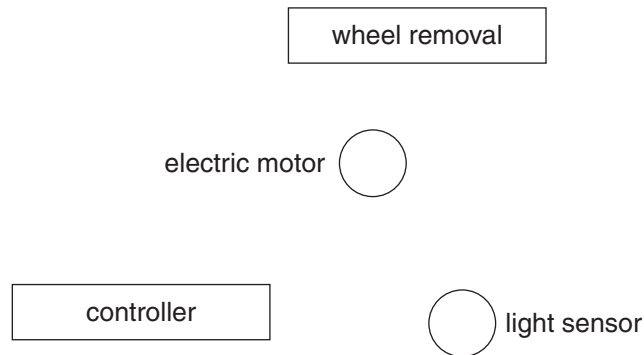
CAM: Computer Aided Manufacturing – where computer controlled machines are used to make products during the manufacturing process

Question 27 (b)

Outcomes assessed: H1.1, H1.2, H2.2, H6.1, H7.1

Answers could include:

- Continuous – no set starting or finishing point with the system performing the same job eg oil refining, power generation
- Batch – separate production runs, with the system being modified in-between to perform different but similar functions, eg seasonal fruit being canned, or different drink flavours being bottled.
- Discrete – system deals with a single item but performs multiple tasks on that item eg, automated car wash

Question 27 (c) (i)*Sample answer:*

The block diagram is a graphical way for showing the relationships between the processors, controllers, sensors and actuators – like a flow chart. It shows the processes and the devices involved, in a graphical format to make it easy to understand.

Question 27 (c) (ii)***Answers could include:*****Data**

- Car manufacturer
- Model No.
- Type
- Reusable parts
- Year of production

Information

- Car dimensions
- Reusable part
- Part location-coordinates

Collecting — data listed above would be collected and input into the system. Some of the data would be common knowledge eg, car manufacturer, model no., year and type, whilst others data would be obtained by sensors in the manufacturing system eg, specific reusable part location.

Displaying — The actuator performs two functions in this aim:

- 1 motor moves car along assembly line in preparation for part to be removed.
- 2 motor also moves removed tyre to appropriate area for future distribution

Transmitting & receiving:

- Signals from light sensor are transmitted to the automated wrench which then removes wheel nuts, analogue collection, digital transmission, analogue output.

Question 27 (c) (iii)***Answers could include:*****Repetition of tasks**

The tasks performed are repetitive, consistent, decision making is prevented by the system, so are very suited to automated manufacturing. This also avoids boredom suffered by humans if they need to perform the tasks. Machines are also likely to be able to perform the tasks faster and more consistently.

Quality control

Quality control can be great as the tasks are performed consistently. However, defective parts may not be identified by the machinery during the repetitive process.

Question 28 (a) (i)***Sample answer:***

A pixel is a picture element which is the smallest element of a bit-mapped image.

Question 28 (a) (ii)***Sample answer:***

Screen resolution is the number of pixels on a screen usually expressed as the number of pixels across X number of pixels down. The more the pixels the higher the resolution (finer quality) of the screen.

Question 28 (b)***Answers could include:***

- Content providers – experts in the subject matter of the project
- System designers and project managers – responsible for the overall design, development and completion of the project
- Those skilled in the collection and editing of each of the media types to meet the project's purpose
- Those skilled in design and layout – ensure that the screen layout and flow of information meet the project's goals
- Those with technical skills to support the use of the information technology being used – hardware and software maintenance of the project

Question 28 (c) (i)***Answers could include:***

Audio Data

- MP3 – lossy compression. Popular format for distribution of audio data
- Wav – lossy, lossless or non compressed. Able to include raw or compressed audio data
- WMA – lossy compression and Microsoft format
- MID – lossless or no compression. (This is usually used for music so more detailed justification would be required)

Animations

- SWF – Shockwave Flash. Compression can be none, lossy or lossless. Flexible format that can contain video, animation and many other features
- MPG – common file format that usually contains video compressed using one of the earlier MPEG video codecs.
- Quicktime – Apple format from which the current MP4 standard was developed. Usually lossy compression.
- AVI – IBM format. Usually lossy compression
- WMV – lossy compression. Used for streaming video data.

Question 28 (c) (ii)***Answers could include:***

Collecting

- Content providers and designers work together provide data in the form of
 - Recordings of voices speaking common English words and phrases
 - Animations for showing English being used in common situations
 - Text or other data for the Information link
- Collection of membership data of the participants for the Join Us and Login sections
- Data collected from participants as part of the Blog section
- File formats have impact on processing

Organising

- Designers using storyboards to plan the layout of the website
- Information on the website being arranged in a meaningful way

Processing

- Compression and decompression of audio, video and images
- Linking of different hypermedia elements
- Membership data edit or updated for further use

Question 28 (c) (iii)***Answers could include:***Issues

- Time difference – may not be easy to meet at an agreed time
- Privacy and security – especially for young children, the conversation may need to be monitored to make sure that personal info is not revealed (not showing faces may help but losing the facial expression will not be great for practicing English and conversation)
- In addition to privacy, the content also needs to be monitored to make sure that no in appropriate content/language' is used
- The proposal has merit in that it allows people to learn together without having to travel (save time and money)
- If they are going to use technology similar to video conferencing, the equipment can be expensive (web cam will be ok)