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**INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY
STANDARD LEVEL
PAPER 2**

Friday 15 May 2009 (morning)

2 hours

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Section A: answer all parts of the question.
- Section B: answer two questions.

SECTION A

Answer *all* parts of the question.

Area of Impact: Business and Employment

1. A major telecommunications company is setting up a call centre room with 100 terminals using a thin-client approach.

A thin client is a network computer without a hard disk drive with limited storage and processing capabilities. This computer typically will only contain what is necessary to connect to a network and start up a web browser. Storage and most processing occurs on the server.

[Source: the glossary of *The National Center for Education Statistics* (NCES), <http://nces.ed.gov/index.asp>, 28 September 2007]

The company is also considering introducing monitoring software to gain information about the productivity of the employees.



[Source: Call Center, http://www.h3c.com/portal/About_H3C/Photos/Corporate_Photos/, 28 September 2007]

- (a) Identify **two** components of the thin client computer that are needed to enable it to be part of a network. [2 marks]
- (b) Describe **two** features of a client/server network. [4 marks]
- (c) Explain why a change to a thin-client approach could be beneficial for the call centre. [4 marks]
- (d) Evaluate the usefulness of information collected from network monitoring systems to assess the productivity of employees. [10 marks]

SECTION B

Answer **two** questions.

Area of Impact: Education

2. A school in Peru takes students on a five day science field trip to Tambopata in the jungle. Students participate in activities to learn about ecology, the weather and adaptation of plants and animals.

Each group has a laptop, which is kept in the main campsite. Each group takes a digital camera and a data logging device with different sensors to the jungle. At the end of each day, back at the campsite, the student must enter the data collected onto the laptop and prepare their daily report. There is no Internet connection in the area.

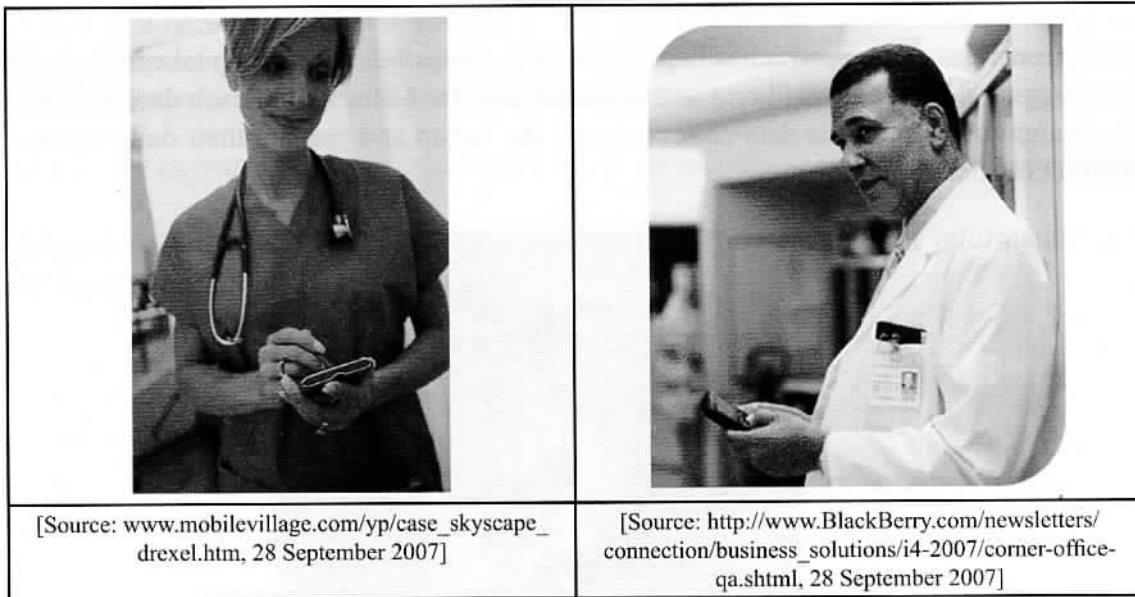


[Source: <http://www.harris-educational.com/Probeware/tour/hardware.htm>, 1 October 2007]

- (a) Identify **two** ways data collected during the day may be entered into the laptop computer. *[2 marks]*
- (b) Students use a spreadsheet to show some of their results. Describe **two** ways a spreadsheet can be used to analyse the results obtained during their activities. *[4 marks]*
- (c) Once students return from their trip they have to report back to their class showing their findings and what they have learned. Explain **one** advantage of using a word processor and **one** advantage of using presentation software to report about the work done during their field trip. *[4 marks]*
- (d) Taking school IT equipment such as laptops, digital cameras, data logging devices and sensors to a field trip causes some concerns for the school and teachers. To what extent are these concerns outweighed by the educational advantages for the students? *[10 marks]*

Area of Impact: Health

3. Hospital administrators would like to introduce new technologies to improve medical care in hospitals. One proposal is to improve the communications and the flow of information between staff. As a trial four intensive care doctors have been given PDAs such as *BlackBerry*® devices which are used as part of a wireless handheld e-mail system. Nurses log onto their desktops to communicate with doctors. This system has been tested for over a year at the ICU (Intensive Care Unit) of *Trillium Health Centre* in Mississauga, Canada.



- (a) Identify **two** hardware features of a PDA. [2 marks]

- (b) Describe **two** ways the new hospital wireless system can be protected from intrusion. [4 marks]

- (c) Explain **one** advantage and **one** disadvantage of the introduction of these *BlackBerry*® devices in the hospital. [4 marks]

- (d) Discuss the implications for the hospital if these *BlackBerry*® or similar devices were given to staff in all hospital areas. [10 marks]

Area of Impact: Arts, Entertainment and Leisure

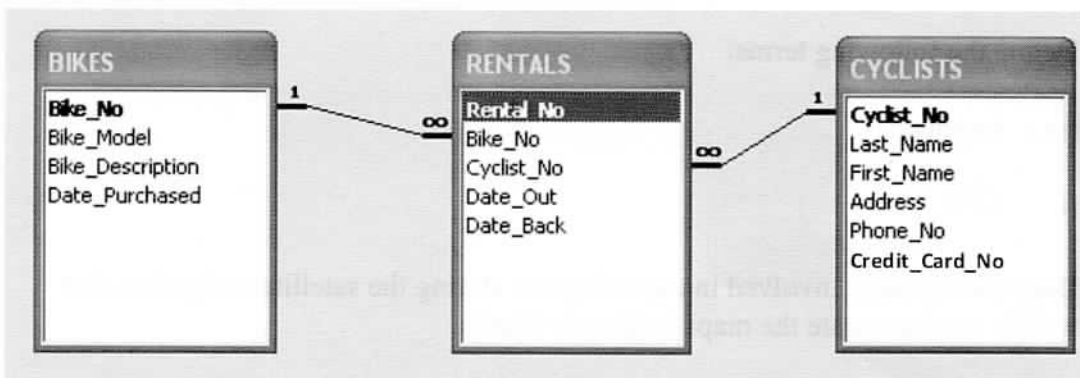
- 4. Many large cities now provide citizens with rental bikes in order to minimize car traffic and pollution. Bikes are placed in bike racks across the city. Cyclists can sign up for the scheme at a bike rental office giving their contact details plus credit card number, which are added to a central database. They receive a smart card plus a secret code or PIN.

At the end of the journey the cyclist returns the bike to the nearest bike rack and secures the bike so it is registered. If a bike is not returned in 24 hours a payment is deducted from the cyclist's bank or credit card. Once registered on the database cyclists can rent a bike from any rental location.



[Source: <http://www.rfidjournal.com/article/articleview/2013/1/1/>, 14 August 2007]

- (a) Identify **two** IT features of a smart card. [2 marks]
- (b) Describe the process to authenticate the cyclist when collecting a bike. [4 marks]
- (c) When a bike is rented, information about the bike and cyclist are sent to the central database. With reference to the diagram below, explain the benefits of using a relational database instead of a flat-file database. [4 marks]



- (d) Discuss the privacy **and** security concerns that could arise through the use of a database to record bike rentals. [10 marks]

Area of Impact: Science and the Environment

5. *Google Earth* is free software which provides access to terabytes of geographical information. When you open *Google Earth* it connects to *Google's* servers. The images in *Google Earth* come from numerous satellite images and aerial photographs.

[Source: adapted from *How stuff works*, <http://travel.howstuffworks.com/google-earth1.htm>, 14 August 2007]

With little computer knowledge it is possible to search the satellite images and geographic information system data to find information about places across the world.

If a mobile phone has GPS functionality then *Google Maps* for mobile can be used to help you find the way to your destination.



[Source: <http://earth.google.com/>, 1 August 2008]

- (a) Define the following terms:
- (i) *terabyte* [1 mark]
 - (ii) *GPS*. [1 mark]
- (b) Describe the steps involved in capturing and storing the satellite image data that will be used to create the maps in *Google Earth*. [4 marks]

(This question continues on the following page)

(Question 5 continued)

- (c) The mobile phone, shown below, has GPS functionality and *Google Maps* installed. Explain how GPS technology and mapping software work together to allow the operator to find the way to a destination, for example Los Angeles Airport.

[4 marks]



[Source: <http://www.google.com/gmm/images/bbgps.png>, 14 August 2007]

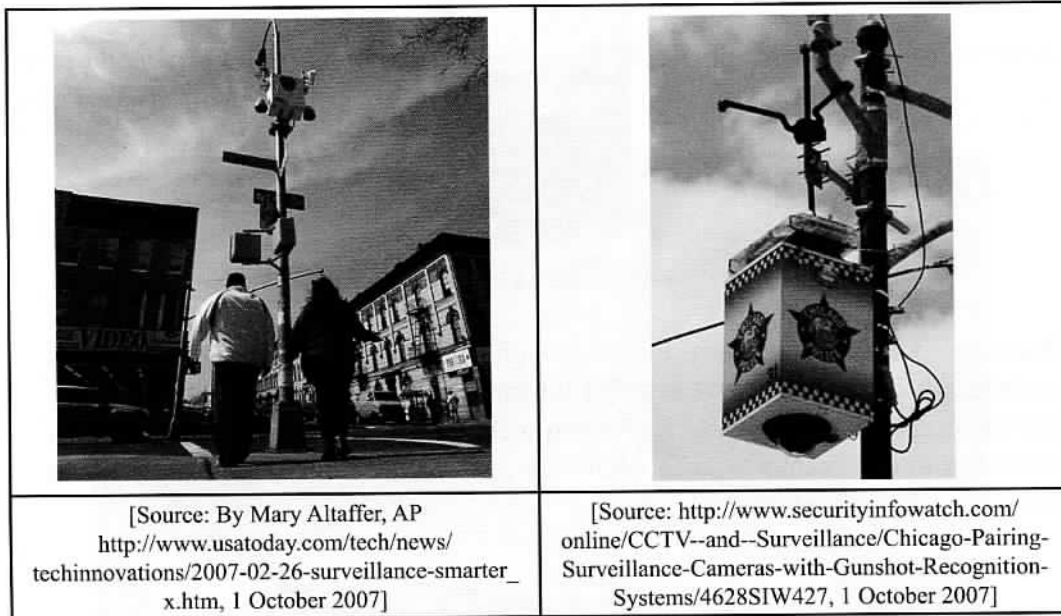
- (d) There has been some concern that the resolution of images in *Google Earth* is too high, allowing access to detailed information about people and buildings. Due to complaints the *Google Earth* designers have made some of the locations blurred or of low resolution. To what extent is this decision to alter the maps at users' requests acceptable?

[10 marks]

Area of Impact: Politics and Government

6. A smart video surveillance program is being implemented by the police in Chicago, USA. The system aims to expand the current surveillance system by adding license plate recognition and intelligent search capabilities. Some cameras are linked using a wireless network.

This new equipment will be programmed to detect unusual situations and report them to the police department. The license plate recognition system will use Optical Character Recognition (OCR).



- (a) Identify **two** features of Optical Character Recognition. *[2 marks]*

- (b) Describe **two** situations where the use of a wireless link between the camera and the network would not be possible. *[4 marks]*

- (c) Explain how this new expanded system will be able to detect unusual situations. *[4 marks]*

- (d) To what extent are citizens' concerns about the expanded system outweighed by the benefits of it providing continuous information to the police department? *[10 marks]*