International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY
STANDARD LEVEL
PAPER 1

Friday 4 May 2012 (afternoon)

1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

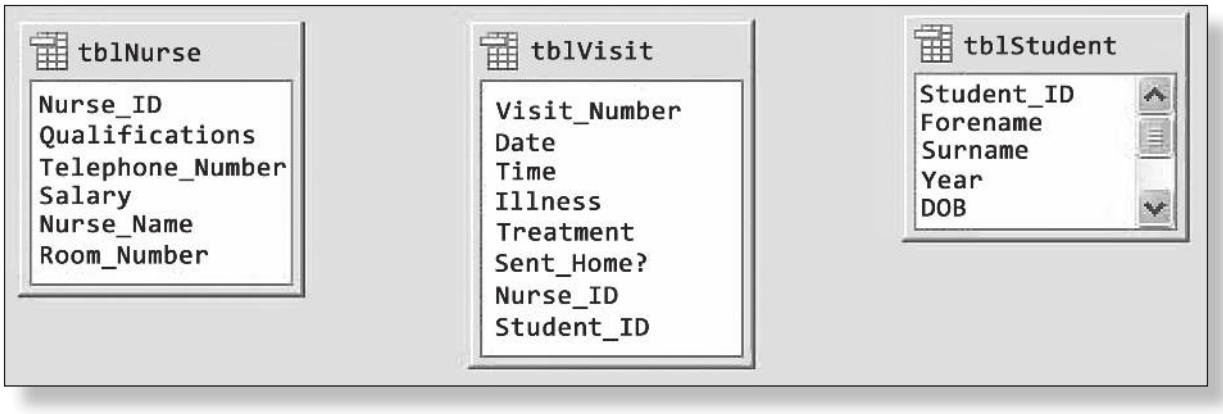
- Do not open this examination paper until instructed to do so.
- Answer three questions. Each question is worth *[20 marks]*.
- The maximum mark for this examination paper is *[60 marks]*.

*Answer **three** questions. Each question is worth [20 marks].*

1. Implementation of a school database

Golden Sylvie School needs to be able to manage information such as students' personal details, health details, grades, parents' contact details and financial statements. To solve this management problem the school has purchased a relational database application.

One purpose of this database is to keep a record of students' visits to the school nurse. This part of the relational database is illustrated below.



(a) (i) State the name of the primary key field of the table *tblVisit*. *[1]*

(ii) State the relationship between the tables *tblNurse* and *tblVisit*. *[1]*

(iii) State a field type that would be suitable for *Surname* in the table *tblStudent*. *[1]*

(iv) State a field type that would be suitable for *Salary* in the table *tblNurse*. *[1]*

(v) State a field type that would be suitable for *Sent_Home?* in the table *tblVisit*. *[1]*

(vi) State a field type that would be suitable for *Telephone_Number* in the table *tblNurse*. *[1]*

(This question continues on the following page)

(Question 1 continued)

(b) (i) The database will allow teachers to export data to a spreadsheet.

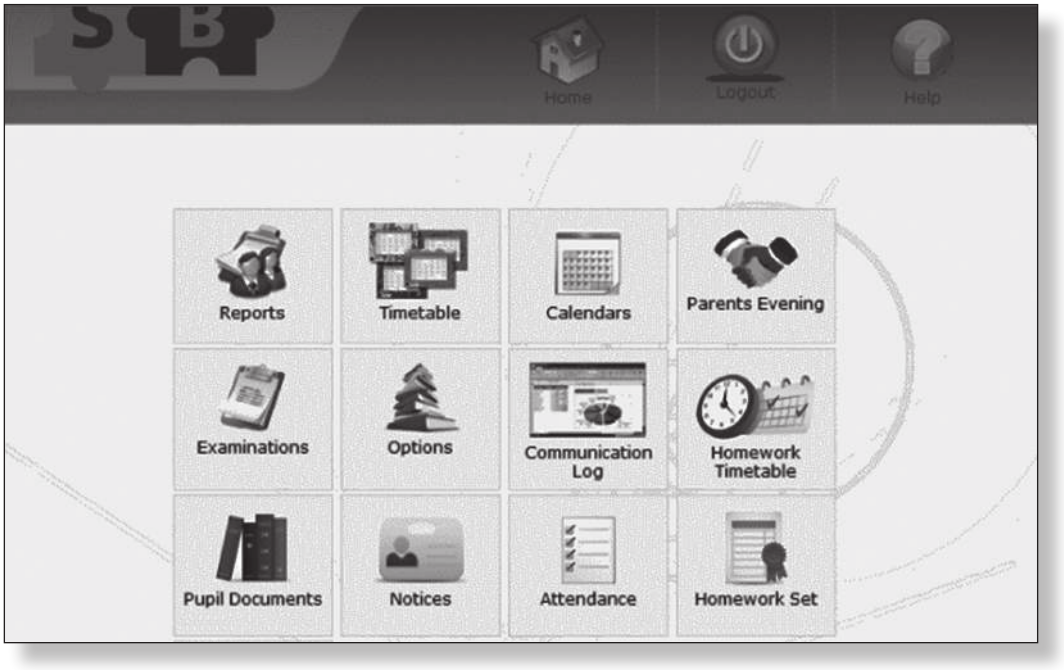
Explain **one** reason why teachers would export data from the database to a spreadsheet. *[2]*

(ii) The new database will also require teachers to undertake training to be able to use it.

A local company is offering to train users in the use of the new system.
The two options proposed are:
- online training
- face-to-face training.

Contrast the two options. *[4]*

(c) The following screen shows the options this database will have in its online version.



[Used with permission]

When the system was purchased it was possible to include a Virtual Private Network (VPN), giving remote access to teachers to this database, which is held on the school's server.

Discuss the impact for the school of the decision to allow teachers remote access to the school server. *[8]*

2. Home network

James and James IT is an IT company that provides customers with a home service and can help them install a local area network (LAN) at home. One of the company's customers is the Perez family.

James and James IT will analyse the family needs, taking into account the type and number of computers that will be used in the house and other peripherals such as printers and scanners. It will also investigate the most likely pattern of computer usage to be able to recommend the best possible solution.

[Source: http://www.googobits.com/articles/2975-how-to-install-a-lan-in-your-home.html, 12 October 2005]

(a) (i) Identify **four** advantages of using a home local area network (LAN) rather than several stand alone computers. *[4]*

(ii) *James and James IT* will only deal with the installation of equipment in the house for the local area network (LAN). The family will have to contact the Internet Service Provider (ISP) they wish to use.

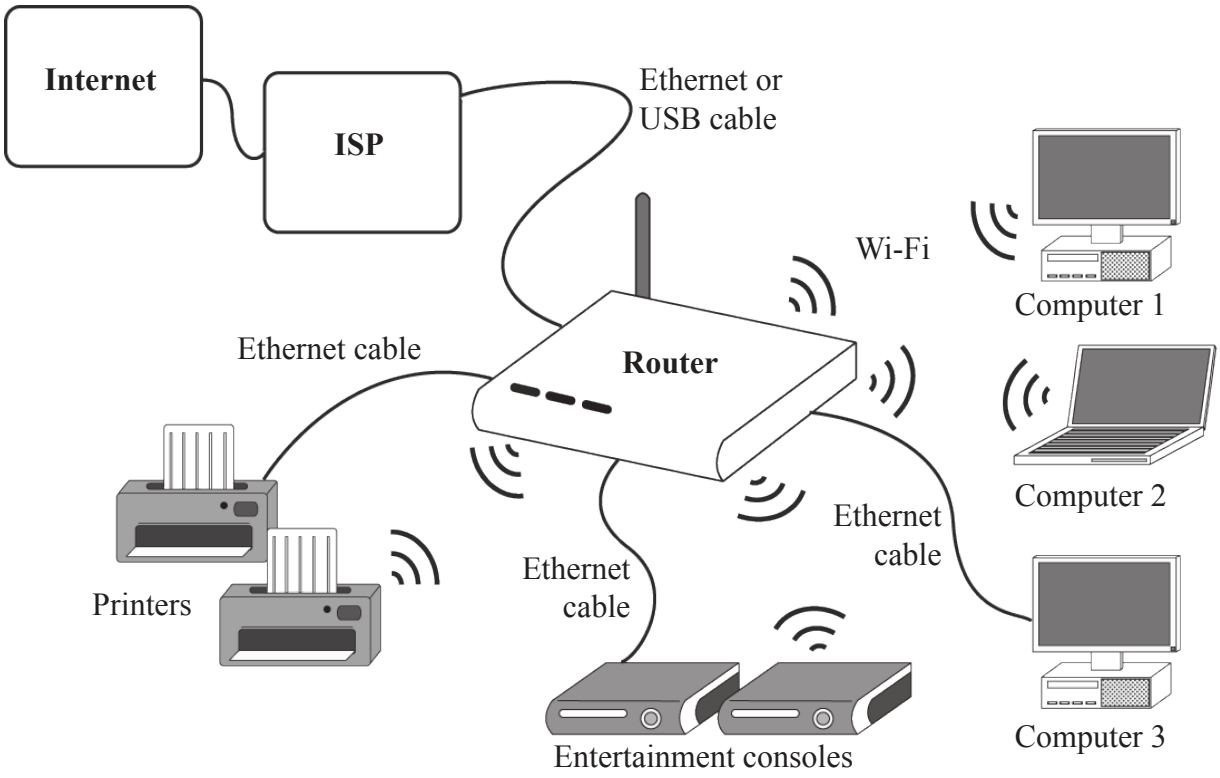
Describe the role of the ISP. *[2]*

(This question continues on the following page)

(Question 2 continued)

(b) *James and James IT* have given the family a choice of a wireless network, a wired network, or a mixture of both.

The Perez family have chosen to have a combination of wireless and wired networks. See the diagram below.



Explain the decision of the Perez family to install a mixed network. *[6]*

(c) The Perez family was concerned about having a peer-to-peer (P2P) network at home and decided to ask *James and James IT* to convert their peer-to-peer network to a client-server network.

Evaluate this decision. *[8]*

3. Telemedicine

Many countries are increasing their use of telemedicine as a method of providing healthcare in remote locations. To transfer the data from a remote location to a hospital, two methods may be used: *real-time* or *store and forward*. *Store and forward* is a technique common in messaging services. Data is sent from one device to a receiving device, but first it passes through an exchange server, such as an email server. It may take 24 to 48 hours for the message to be received.

[Source: http://historiadelatelemedicinaschirlysuarez.blogspot.com/2010/09/importancia-de-la-telemedicina.html, 17 June 2011]

(a) (i) Define the term *real-time communication*. *[2]*

(ii) After an accident an image of an x-ray of a badly broken leg was taken in bitmap format. To ensure the resolution was clear/high enough for a doctor to see the extent of the injuries, the image size was 12 MB (Megabyte). The connection the doctor will be using has a speed of 240 kb/s (kilobit per second).

Calculate how long it will take to download the image of the x-ray. *(Show your working.)* *[2]*

(iii) In some cases the technology available in the remote locations will not allow for large images to be sent to the hospital.

Identify **two** methods to resolve this problem. *[2]*

(This question continues on the following page)

(Question 3 continued)

(b) (i) Explain **one** situation in telemedicine that is better suited to *real-time* data transfer and **one** situation in telemedicine that is better suited to *store and forward* data transfer. *[4]*

(ii) Many mobile devices use *store and forward* to manage data transfer.

Explain **one** reason for using *store and forward* by such devices. *[2]*

(c) In many countries doctors are using videoconferencing to treat patients remotely. Evaluate this medical practice. *[8]*

4. Traffic control

Traffic control systems use digital video cameras at strategic locations to provide a view of the traffic. Camera operators are able to move and zoom the cameras. Images are centrally stored on a network and can be made available to emergency services and information services. Images can be refreshed every 30 seconds.

[Source: First image: http://commons.wikimedia.org/wiki/File:Trafic_control_center.jpg
Second image: http://commons.wikimedia.org/wiki/File:North_end_Truck_1-9_at_Tonnelle_Circle.jpg]

Traffic control systems provide traffic information to people who request it. This information is available at their website or by request via emails or SMS alerts. This allows users to have the latest information and traffic updates on the move as information is provided for cell phones and hand-held devices as well.

(a) (i) Define the term *SMS alerts*. *[2]*

(ii) Identify **two** ways information about traffic can be captured electronically at a certain location. *[2]*

(iii) Outline **two** ways how this information may be transferred to a central location. *[2]*

(This question continues on the following page)

(Question 4 continued)

[Source: www.dft.gov.uk/itstoolkit/Tools/T4.php, last accessed 7 July 2012]

(b) The data collected can be used to develop models of traffic flow at various times of the day and in various situations such as during periods of heavy snow. Information from these models is used to manage traffic flows on major roads and will determine what decisions need to be made in controlling traffic on a day-to-day basis.

Analyse the decision to use these models to manage traffic flow. *[6]*

(c) Discuss the impact of having the information from traffic control systems available to the police. *[8]*

5. Improving Lima's transport system

Lima has been promoting a new transport system which has been designed to make it easier to travel from one side of the city to the other. However, the transport system has not worked as well as expected and citizens of Lima have used social networking websites such as *Facebook* and *YouTube* to report problems, such as extreme delays between buses, or a road accident.

[Used with permission]

(a) (i) Describe what is meant by *social networking*. *[2]*

(ii) Different types of files can be uploaded to highlight the traffic problems described above.

Describe **two** appropriate types of files which could be uploaded **and** how they highlight the problem. *[4]*

(This question continues on the following page)

(Question 5 continued)

(b) Some managers of local businesses have realized that social networking may provide new business opportunities and have created company webpages on *Facebook*.

Explain why companies will use social networking websites to develop new business opportunities. *[6]*

(c) Although the *Facebook* page reporting system is not managed by the Lima authorities, they are using it to solve the transport problems that happen in the city of Lima.

The Lima authorities are considering implementing an official website for reporting transport problems.

To what extent is a social networking website preferable to an official website for reporting transport problems? *[8]*