

Log on to IT for CSEC® Third edition

Questions and answers 1

Fill in the blanks

- 1 A set of instructions that a computer needs to carry out its tasks is known as a **program**.
- 2 **Data** is a set of raw facts and figures.
- 3 **Input devices** are used to get the data and instructions into the computer for processing.
- 4 Processing takes place in that part of the computer known as the **central processing unit**.
- 5 **Fifth generation** computers will be able to mimic many of the things that so far can only be done by human beings.
- 6 The **control unit** directs and co-ordinates all the activities within the CPU.
- 7 An **embedded** computer is a special-purpose computer that is used inside of a device and is usually dedicated to specific functions.
- 8 A **register** is a temporary storage location that holds a single instruction or data item.
- 9 The **program counter** holds the address of the current instruction in the control unit.
- 10 The **arithmetic logic unit** performs all the arithmetic and logic functions in a computer.
- 11 The **main memory** holds data and instructions that the computer is processing at the time.
- 12 **Output devices** translate information processed by the computer into a form that the user can understand.

True or False?

- 1 Data and information are the same. **False**
- 2 The CPU is the main part of the computer. **True**
- 3 All the data is processed in the memory unit. **True**
- 4 The control unit sends data from the memory to the ALU for processing. **True**
- 5 Output devices translate information processed by the computer into a form that the user can understand. **True**
- 6 A modern mainframe has the same processing power as a very powerful PC. **False**
- 7 An embedded computer is housed on a single microprocessor board. **True**
- 8 The most popular computers today are mainframe computers. **False**
- 9 A register can hold data permanently. **False**
- 10 The program counter is found in the control unit. **True**

Multiple-choice questions

- 1 Which of the following devices is not found in the CPU of a computer?
a Arithmetic logic unit
c Control unit
b **Secondary storage**
d Register
- 2 Where in the computer would the instructions to add two numbers be carried out?
a Screen
b External storage
c **CPU**
d Keyboard
- 3 Which of these is a function of the control unit?
a **Fetch and decode instructions from memory**
b Store data for processing
c Perform logical operations
d Perform arithmetic operations
- 4 Which of the following types of computers has the fastest processing speed?
a Laptops
b Mainframes
c Embedded computers
d **Supercomputers**
- 5 Which of the following is not an example of a peripheral device?
a Keyboard
b Mouse
c **RAM**
d Speakers
- 6 A program is a:
a hardware device.
b memory device.
c **set of instructions.**
d register.
- 7 Which device is not found in the CPU?
a ALU
b Control unit
c Instruction register
d **Printer**
- 8 The ALU processes data and stores it in:
a the main memory.
b **the instruction register.**
c the control unit.
d the program counter.
- 9 Which one of the following is not a function of the control unit?
a Fetch instructions from memory
b Decode instructions
c **Process instructions**
d Fetch data for required instructions
- 10 Complex scientific research is usually done using:
a personal computers.
b **supercomputers.**
c minicomputers.
d mainframe computers.

Short-answer questions

- 1 Define the terms 'hardware' and 'software'.

Hardware is all the parts of the computer system you can see and touch (physical parts). It consists of both the internal and external components of the computer.

Software is a set of instructions (called a program) that a computer needs to carry out its tasks. For example, if you want to use the computer to type a letter, draw a picture or do some accounting work, you would need different types of software to accomplish these tasks. Some typical examples of software are word processors, spreadsheets, graphics packages and database packages.

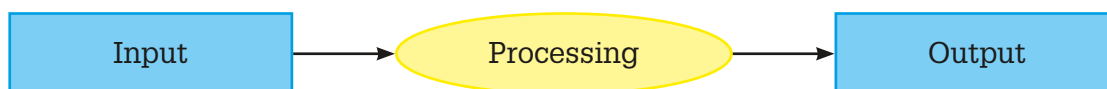
- 2 Using examples, explain the difference between data and information.

Data is all the raw facts and figures that a computer processes by following a set of instructions called a program. Data by itself has no meaning; it can be in the form of letters (a, b, c, d ... x, y, z, and so on), numbers (1, 2, 3, 15, 456, and so on), pictures, sounds or symbols.

Information is what we get when we attach meaning to data. For example: The numbers 56, 98, 100 are random numbers. However, after processing these numbers, they can be averaged by the computer to represent a student's grade point average. Or, for example, if you were to collect the temperature of your classroom each day for a month, you would have collected data. When you instruct a computer to arrange (sort) this data, you could get information such as: the highest, lowest and mean (average) temperature over the period. This information may then be useful, for example, to determine if a classroom is too hot or cold for comfortable working. If the information were just raw data, it would not be easy to interpret. So the computer would have helped you to look at a real-life situation or problem and make some sense of it.

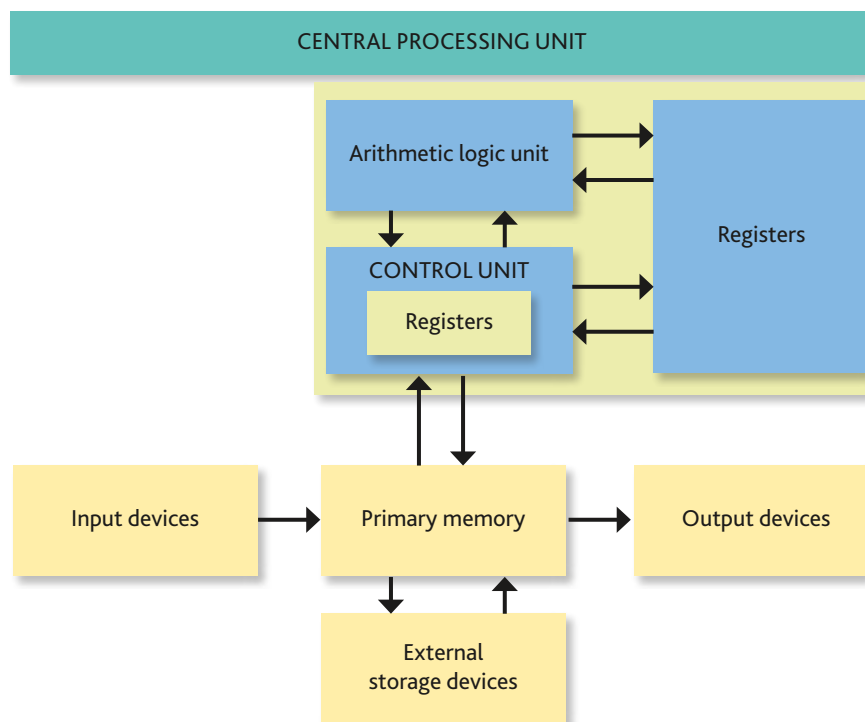
- 3 Draw a diagram showing the three stages of processing.

The three stages of processing are shown here.



- 4 a Draw a block diagram to illustrate the main components of a computer system.

The main components of a computer system are shown here.



- b Describe the functions of the two main units found in the central processing unit.

The two main units found in the central processing unit (CPU) are the control unit (CU) and the arithmetic and logic unit (ALU). The CU is primarily responsible for the movement of data and instructions from itself to the main memory and ALU and back. The ALU performs all the arithmetic and logic functions in a computer.

- 5 Explain the purpose of the following devices:

- a input device.
- b output device.
- c main memory.

- a **Input devices** are used to get data and instructions into the computer for processing.
- b **Output devices** translate information processed by the computer into a form which the user can understand.
- c The **main memory** holds data and instructions that the computer is processing at the time.

- 6 State FOUR reasons why we use computers.

Four reasons why we use computers:

- advanced speed
- data processing accuracy
- to store a large amount of data in a small space
- the ability of computers to work continuously without becoming tired.

- 7 Describe the features of a personal computer (PC).

A PC consists of a system unit, a keyboard, a mouse and a display screen, and has all the functional elements found in any larger system. It is designed to perform the input, control, arithmetic/logic, output and storage functions. It can execute software program instructions to perform a very wide variety of tasks. Individuals, businesses and organisations use personal computers.

- 8
- a Explain the difference between a mainframe computer and a supercomputer.
 - b State TWO reasons why a bank may want to purchase a mainframe computer.
 - c Differentiate between a notebook computer and a subnotebook computer.
 - d What is an embedded computer?

- a A **mainframe computer** is a large computer that is used for calculations and dealing with a huge amount of data.
The primary focus of a **supercomputer** is speed; they are designed to process complex scientific applications. Mainframe computers are not as powerful as supercomputers.
- b A bank may want to use a mainframe computer for these two reasons:
 - It has the processing power to perform tasks that require a lot of computational power.
 - It also has the advanced speed of processing.
- c A **notebook computer** is a portable computer that weighs two to four kilograms and is roughly the size of a large thick notebook. Notebook PCs can easily be tucked into a briefcase and can use power from an electrical outlet or rechargeable batteries.
A **subnotebook computer** weighs about half a kilogram and can fit in a large jacket pocket. It has a small screen a small keyboard without the mouse function. It can perform many of the functions of notebooks, but not to the same degree of complexity.
- d An **embedded computer** is a special-purpose computer used inside a device and is usually dedicated to specific functions. They are commonly used in items such as answering machines, washing machines, cameras, cars, motors, sewing machines, clocks and microwaves.

9 Discuss with your classmates how a portable computer could assist these professionals:

- a a teacher.
- b a police officer.
- c a newspaper reporter.
- d a sales representative.

- a A **teacher** could use a portable computer to plan lessons, and prepare multimedia presentations.
- b A **police officer** could use a portable computer to investigate crimes and carry out forensic operations.
- c A **newspaper reporter** could use a portable computer to write articles, edit pictures and submit them while on the go.
- d A **sales representative** could use a portable computer to promote sales, handle figures and make projections.

Research questions

- 1 Your school principal wants to purchase a very fast desktop computer for the school and a laptop computer for himself. He asks you to prepare a list of the five fastest desktop computers and a list of the five fastest laptop computers. Present the information in a table with the following headings: name of computer, processing speed, manufacturer and approximate cost.

The table should be set out as follows. Some examples have been given. If any students find it difficult to find information, you could let them research these examples.

Fastest desktop computers	Processing speed	Manufacturer	Approximate cost
Apple iMac with Retina 5K display			
Dell Inspiron 3000			
Apple Mac mini			
Asus K31CD-DS71			
Acer Revo One RL85			
Fastest desktop computers	Processing speed	Manufacturer	Approximate cost
Dell Alienware 17 R5			
MSI GS65 Stealth			
Acer Predator Helios 300			
Dell XPS 13			
Apple MacBook Pro			

- 2** Using the internet to conduct your research, make a list of the top five most powerful supercomputers in the world. You are required to create a table with the name of the computer, processing speed, the purpose for which the computer is used, manufacturer and approximate cost.

Students should draw a table that has five columns and six rows. The five columns should have the following headings from left to right:

Computer	Processing speed	Purpose
Manufacturer	Approximate cost	

The remaining rows should have the following information under the correct headings. The top five most powerful supercomputers in the world are:

- IBM Summit at the Oak Ridge National Laboratory; top speed: 122.3 petaflops
- Sunway TaihuLight; top speed (Linpack performance): 93 petaflops
- IBM Sierra; top speed: 71.6 petaflops
- Tianhe-2; top speed: 61.4 petaflops
- AI Bridging Cloud Infrastructure (ABCI); top speed: 19.9 petaflops.

- 3** A friend would like to buy a computer to play computer games. She would like you to provide her with a list of suggestions of the specifications for this computer, as well as three computers on the market that she can buy, which would allow her to play most of the modern computer games.

Students might find something like this example answer. Accept all answers that show that students have thought carefully about their choices.

Best overall ALIENWARE AURORA	Best value CYBERPOWERPC GAMER EXTREME VR	Best for upgrading DELL XPS TOWER SE
4.5/5 REVIEW \$719.99 Alienware	4.5/5 REVIEW \$779.99 Amazon	4.5/5 REVIEW \$549.99 Dell
VR READY Select models	VR READY Yes	VR READY Yes
PROCESSOR Intel Core i5-8400	PROCESSOR Intel Core i5-7400	PROCESSOR Intel core i5-8400
RAM 8GB	RAM 8GB	RAM 8GB
GRAPHICS CARD AMD Radeon RX 560	GRAPHICS CARD AMD Radeon RX 580	GRAPHICS CARD Nvidia CTX 1050 Ti CPU

4 Use the internet to research these tasks:

a Create a timeline to show the evolution of processors.

b Explain how computers are used in predicting weather forecasts, modelling, data crunching and automation.

a Students' timelines will vary but should show the five generations of computers:

First generation (1945–1956)

The vacuum tube or valve was the main electronic component of first-generation computers.

Second generation (1956–1963)

Transistors were invented in 1947 and these formed the basis for second-generation computers.

Third generation (1964–1970)

With the invention of the integrated circuit (IC), or chip, computers became even smaller, faster, more reliable, more energy-efficient and cheaper than their predecessors. Another third-generation development was the invention and use of 'high-level' languages, which used English words and the base-10 number system to program the computer.

Fourth generation (1971–present)

Fourth-generation computers are still based on the chip, but with many more components packed inside. First, there was large-scale integration (LSI), where hundreds of components were placed on the chip. By the 1980s, very large-scale integration squeezed thousands of components onto a chip. Ultra-large-scale integration (ULSI) increased that number to millions of components. Computers became even smaller, cheaper and much more reliable; their processing capabilities increased accordingly.

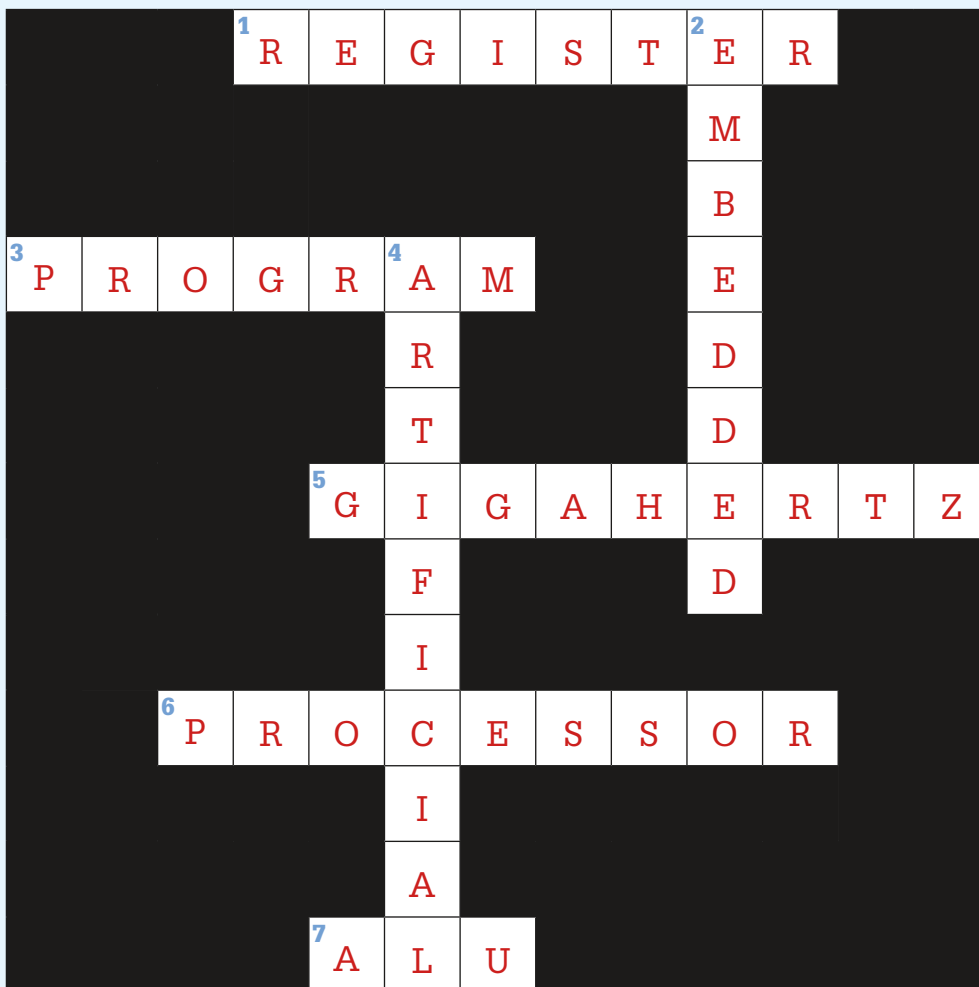
Fifth generation (present–future)

Fifth-generation computers will be able to mimic many of the things that so far have only been within the capacity of human beings to achieve, namely that they will demonstrate a certain level of artificial intelligence (AI). An AI program would eliminate the need for users to write programs, since they could communicate their orders to the computer in ordinary English.

b Computers are used in:

- **predicting weather forecasts**, to forecast substantial changes in the Earth's climate
- **modelling**, to simulate social interactions in artificial intelligence (AI)
- **data crunching**, which consists of preparing and modelling a system or application that is used
- **automation**, to control the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens and switching on telephone networks.

Crossword



Across

- 1** A device in the control unit that is used to store data and instructions that are needed immediately and frequently (8)
- 3** A set of instructions that the computer needs to carry out a task (7)
- 5** It represents billions of machine cycles per second (9)
- 6** Also known as the brain of the computer (9)
- 7** Performs the logic functions in the computer (3)

Down

- 2** A special-purpose computer used inside a device (8)
- 4** A type of intelligence that will be used in fifth-generation computers (10)

Questions and answers 2

Matching descriptions

- 1** Match each item in Column A with its description in Column B. Write the number and the correct letter.

Column A	Column B
(1) MICR	(a) Found on items in the supermarket
(2) Braille keyboard	(b) For playing games
(3) Joystick	(c) A card containing a tiny memory chip
(4) Barcode reader	(d) Used to assess multiple choice exams
(5) OMR	(e) Used by visually-impaired persons
(6) OCR	(f) Used to read bank cheques
(7) Smart card	(g) Translates text on paper into electronic text on the computer

True or False?

- 1** Source documents are documents on which data is first recorded. **True**
- 2** Source documents and turnaround documents are the same. **False**
- 3** RFID must be passed over a scanner. **False**
- 4** A smart card contains a microchip embedded in the card. **True**
- 5** Digital cameras do not require film. **True**
- 6** Biometric devices are less accurate than passwords. **False**
- 7** Remote controls are now used by computers as a wireless input communications device. **True**
- 8** OMR is used to read cheques. **False**

Multiple-choice questions

- 1 Which of the following is not a validation method?
- a Range check
 - b Check digit
 - c Dual input**
 - d Format check
- 2 Checking for accurate copying of data is known as:
- a validation.
 - b verification.**
 - c source document.
 - d data capture.
- 3 Which one of the following is not an advantage of magnetic stripe codes?
- a Easy and cheap to produce
 - b Strip can store enough information for simple transactions
 - c Data can be changed, altered, forged or erased by magnetic fields**
 - d Cut down on paperwork that would otherwise be involved in a transaction
- 4 Which of the following is not true about barcodes?
- a Cheaper than RFID
 - b Can be reused again and again**
 - c Can become difficult to read if they are ripped, soiled or removed
 - d Must be passed over a reader
- 5 OCR:
- a detects marks on paper.
 - b detects the unique ridges in a fingerprint.
 - c understands and easily converts handwritten text.
 - d detects the shape of characters.**
- 6 Which of the following is a scanning device?
- a Optical mark reader**
 - b Touch pad
 - c Light pen
 - d Remote control

Short-answer questions

- 1 Give definitions for (a) a verification check and (b) a validation check.

- a** A **verification check** ensures that data from the medium it was originally stored on is accurately transcribed or copied into a computer.
- b** A **validation check** is the checking of data for errors before the actual processing. It is used to determine if the data entered is incomplete, inaccurate or unreasonable.

- 2 If some data passes a validation check, does this mean that the data is correct?

Yes, it is true, as it is used to determine if the data entered is incomplete, inaccurate or unreasonable.

- 3 Suggest the name of a field in a student database on which a range check can be used.

Possible fields are: Age, Date of birth, Average marks. (Any one)

- 4 Using the method illustrated in this book, calculate the check digit to complete the ISBN number: 167053442.

The check digit is 10. Working out:

$$(1 \times 10) + (6 \times 9) + (7 \times 8) + (0 \times 7) + (5 \times 6) + (3 \times 5) + (4 \times 4) + (4 \times 3) + (2 \times 2)$$

$$10 + 54 + 56 + 0 + 30 + 15 + 16 + 12 + 4 = 197/11$$

$$= 17 \text{ remainder } 10$$

- 5 You have been asked to select input devices that would be used by physically-challenged persons in an organisation. List FOUR devices and explain the kind of person who would be able to use the device and why.

Four devices that could be used by physically-challenged persons, the kind of person who would be able to use the device and why, are:

- Smart glasses, which are designed like a pair of glasses, allow you to interact with a computer anywhere and anytime, much like a hands-free smartphone; communication takes place using voice commands. People who cannot use their hands/arms would benefit from using them.
- Surface electromyography (EMG) are sensors that measure muscle movement or activity and are used in bionics. For example: Mouth-based interfaces (designed for people with disabilities) have sensors that are applied to the face or throat to attempt to recognise the patterns of muscle movement required for speech.
- A Braille keyboard can be used by people who are visually impaired. They can use their sense of touch to type.
- Keyglove for amputees is an example of a wearable glove that virtually controls both the mouse and keyboard.

- 6 State TWO advantages and TWO disadvantages of the smart card over the magnetic stripe card.

Two **advantages** of using the smart card over the magnetic stripe card are:

- They are easy and cheap to produce.
- They cut down on paperwork that would otherwise be involved in a transaction, hence helping to save the environment.

Two **disadvantages** of smart cards compared to magnetic cards are:

- The chip can potentially be damaged.
- The chip (and the machines that read it) is a little more expensive to produce than the old-style magnetic strip.

- 7 A pharmaceutical research company has decided to introduce biometric systems for security reasons. Consider TWO alternatives and discuss the advantages of using biometric systems over those systems.

Two advantages of using biometric systems for security reasons is that they can be used to identify individuals through:

- their body characteristics such as face geometry (such as fingerprints)
- iris or retinal scans
- vein and voice patterns.

(Any two)

All these forms of identifying an individual can be input into a computer system set up for security purposes.

Video cameras and sensors are other forms of security measures but won't work as well as biometric systems.

- 8 State TWO disadvantages of a digital camera or a digital video camera.

TWO disadvantages of a digital camera or digital video camera are:

- It is relatively easy to lose or erase a digital camera's memory cards.
- Individuals must always transfer the photographs to a computer or CD.

- 9 Explain how sensors work and list FOUR types of sensors.

A sensor is a device that detects or measures a physical property and records, indicates, or otherwise responds to it.

Four types of sensors are light, heat, pressure and weight sensors.

10 What is RFID and how does it work?

Radio frequency identification (RFID) is the use of radio waves to read and capture information stored on a tag attached to an object. Functions of RFID include:

- tracking animals
- tagging merchandise in stores
- as a means of security to reduce theft
- to distinguish between cartons from one manufacturer with different expiry dates.

11 Explain the differences between a barcode and a QR code.

The differences between a barcode and a QR code are that unlike barcodes, which hold information in one direction horizontally, QR codes hold information in two directions, vertically and horizontally. This allows the storage of more information than the regular barcode. Also, if a QR code is damaged or dirty it will still work, whereas a barcode won't.

Challenge questions

- 1** Five different types of customers have asked you to assist them in selecting input devices for their use. Recommend suitable devices for each of them.

- a** A stay-at-home mother with two small children – a 3-year-old and an 8-year-old. She has a small budget but uses the internet often. Her children also use the computer.

Suitable devices for a stay-at-home mother with small children: touchscreen, mouse, keyboard, dance pads, light guns.

- b** Ms Patrick has a small home office and works mainly from home but communicates with the head office frequently. She is a real-estate agent for a local real-estate company. She often needs to send documents to the head office.

Suitable devices for Ms Patrick in her home office: scanner, keyboard, mouse.

- c** Mr Jay is a pharmaceutical sales representative who is always commuting to and from his various clients. While he is on the road he is frequently in contact with his clients and also head office. He also sends and receives sensitive information between his clients and the head office.

Suitable devices for Mr Jay, the pharmaceutical sales representative: touchscreen, microphone, webcam.

- d** Mr Tom is a freelance animator and graphics designer with a well-established clientele of big and small companies and individuals. He designs and produces advertisements for his clients.

Suitable devices for Mr Tom, the freelance animator and graphics designer: graphics tablet, light pen, mouse, keyboard.

- e** The manager, Mr MacFarlan, is from a large business college that conducts video conferencing of many of its classes. He wants to suitably equip the staff of more than 100 employees.

Suitable devices for Mr MacFarlan's employees: webcam, microphone, mouse, keyboard.

- f** Mr Joseph is interested in becoming a DJ (disk jockey). He has been disk jockeying for family and close friends but is now being offered more jobs in his community. He needs the right input devices for his career path.

Suitable devices for Mr Joseph: microphone, MIDI (musical instrument digital interface) port.

- g** Darcy is an aspiring author who has written a few books. She is accustomed to writing on paper and has recently upgraded to a computer. She is told that there are input devices that can make her job easier.

Suitable devices for Darcy, the aspiring author: scanner, microphone, keyboard, mouse.

- 2** A large supermarket in your area is considering implementing a self-checkout system as a means of reducing their costs. A number of the top managers agree; however, many feel that it will encourage shoplifting. What input devices are needed for such a system? What input devices could be put in place or used to monitor such a system? (A self-checkout system is one in which the customer scans the barcode, weighs the produce, bags the items and pays for the items without the assistance of an attendant or checkout person.)

The input devices that could be put in place are: barcode readers, touchscreen, keyboard. The input devices that can be used to secure the system are video cameras and biometrics.

Research questions

- 1** A non-profit organisation in your community that cares for children with physical and mental disabilities has asked you to recommend some input devices that would assist the children in their daily lives. Select at least THREE devices and explain how these devices would help to improve the lives of the children, making reference to the disability on which each device will have an impact.

There are input devices for people with physical disabilities in order to make data entry easier, faster and more efficient for people with physical disabilities.

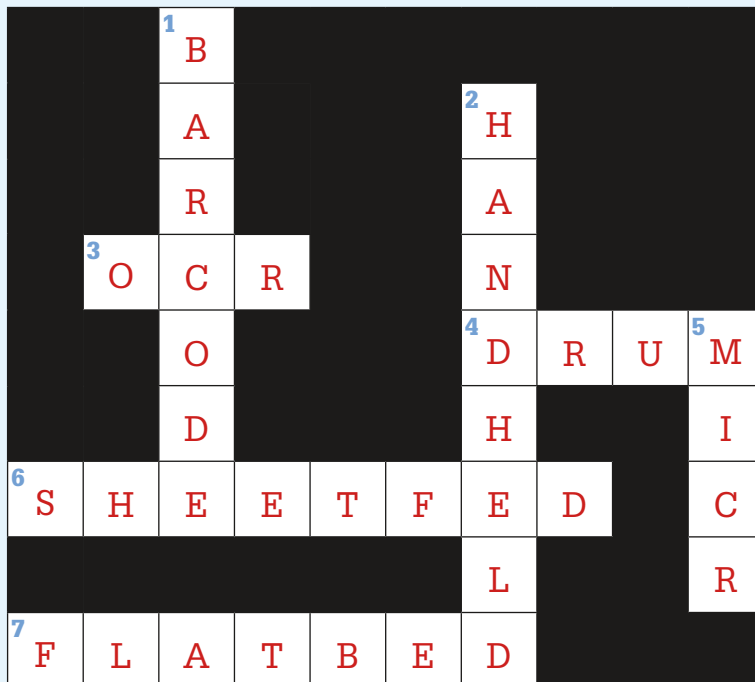
- For gaming, a hybrid controller combines aspects of a keyboard, gaming pad, mouse and joystick. It is designed to be used with only one hand.
- A Braille keyboard allows people with visual impairment to use their sense of touch to type.
- Wearable input devices:
 - Smart Glasses are designed like a pair of eyeglasses, which allows the user to interact with a computer anywhere and anytime, much like a hands-free smartphone. The user can communicate with the glasses using voice commands, as there is no mouse or keyboard.
 - Gesture recognition or motion tracking input devices allow the user to control the function of the mouse pointer or keyboard function through motion control. Keyglove is an example of a wearable glove that virtually controls both the mouse and keyboard.
 - Another example is Massless pen, which is a pen that can be used to create 3D designs in a virtual environment by movements in the air.
 - Surface electromyography (EMG) are sensors that measure muscle movement or activity and are used in bionics. For example, mouth-based interfaces (designed for people with disabilities) have sensors that are applied to the face or throat to attempt to recognise the patterns of muscle movement required for speech.

(Any three)

- 2** Select one emerging input device and describe its use and function and justify its possible future potential.

Emerging input devices are electronic paper and electronic ink (e-paper and e-ink), which are digital paper-like technologies that have the look and feel of paper and are part of green technology. (Any one)

Crossword



Across

- 3** Has difficulty translating handwritten text to electronic text (3)
- 4** Type of scanner found in the publishing industry, to capture images of high detail (4)
- 6** Type of scanner where the image must be fed through a device containing rollers (two words) (8)
- 7** Type of scanner where the image is placed on a level surface (two words) (7)

Down

- 1** A set of vertical lines of various thickness (7)
- 2** User drags scanner over image (two words) (8)
- 5** Used to read cheques (4)

Questions and answers 3

Copy and fill in the blanks questions

- 1 A **byte** can hold the code for one character.
- 2 A **bit** is the smallest unit of storage.
- 3 **Direct access** is the data access method used by magnetic disks.
- 4 A **gigabyte (GB)** is about 1 billion bytes.
- 5 Magnetic tapes are mainly used for **backup purposes**.
- 6 Optical discs are read by **laser lights**.
- 7 The concentric circles in a disk are known as **tracks**.
- 8 The tracks with the same number in each disk in a disk pack are known as **cylinders**.
- 9 **Flash** memory has no moving parts.
- 10 **Cloud computing** is the use of a network of remote servers hosted on the internet to store, manage and process data.

True or False?

- 1 Primary storage consists of RAM and ROM chips. **True**
- 2 A magnetic disk has a number of concentric circles called tracks. **True**
- 3 RAM chips hold data permanently. **False**
- 4 The user inputs data and instructions into a ROM chip. **False**
- 5 A byte has the capacity to represent one character. **True**
- 6 EPROM chips cannot be erased. **False**
- 7 Magnetic tapes allow direct access to data stored. **False**
- 8 Magnetic tape is difficult to update. **True**
- 9 A USB drive cannot be easily removed from a system. **False**
- 10 Blu-ray is the most suitable type of optical disc for storing high-definition video. **True**

Multiple-choice questions

- 1 What does the acronym ROM stand for?
a Random Only Memory
c Read Optical Module
b Read Only Memory
d Random Organising Memory
- 2 Which device holds data and instructions when it is not in use?
a Primary storage
c Monitor
b System unit
d Secondary storage
- 3 The smallest unit of storage is a:
a byte.
c megabyte.
b bit.
d terabyte.
- 4 Another name for primary storage is:
a secondary storage.
c magnetic tape.
b immediate access storage.
d hard disk.
- 5 Where are data and instructions held so that they are available to the CPU for processing?
a ROM
c CD-ROM
b DVD
d RAM
- 6 When a disk is formatted, which of the following happens?
a All data on disk is erased
b Becomes damaged
c Data files are copied onto disk
d Contains files to boot up the computer
- 7 Magnetic tape is used to:
a hold data necessary for starting up the computer.
b back up large amounts of data.
c hold data that the computer is processing at the time.
d do none of the above.
- 8 Which of the following is a disadvantage of cloud storage?
a Usability (much slower than local backups)
b Cost savings
c Disaster recovery (can be used as an off-site backup)
d Ease of use
- 9 Which of the following storage media use laser technology to read and store data?
a USB drive
c Magnetic tape
b Hard disk
d CD-ROM

- 10 Which of the following would be the BEST option to expand your laptop's secondary storage capacity?
- a Use magnetic tape
 - b Store data on DVDs
 - c Store data on CD-ROM
 - d Use solid state memory devices

Short-answer questions

- 1 Explain the functions of RAM and ROM.

RAM (Random Access Memory) is a form of primary memory. RAM is called working memory, as it is used to hold data and instructions (programs) temporarily (volatile memory) while processing is taking place. It also holds the results from processing, so that data can be sent to either output or storage devices.

ROM (Read Only Memory) is a form of primary memory and comes with its contents fixed and unchangeable (non-volatile memory) at the time of manufacturing. It is sometimes referred to as 'hard-wired' (firmware). This ensures that the instructions in the ROM are always available, with or without power to the ROM chip.

- 2 Explain with the use of examples the difference between the terms 'storage device' and 'storage medium'.

A **storage device** is any device that can read or write electronic data to/from the storage medium/media, for example, hard drive, CD drive.

A **storage medium** (plural is media) is any physical material, component or technology used to keep or retrieve electronic data, for example, hard disks, CDs.

- 3 What is the function of secondary storage?

Secondary storage, also called auxiliary or backup storage, is used to store data and instructions when they are not being processed.

- 4 List the criteria used in selecting a secondary storage device for a particular use.

The criteria used are: storage capacity, access speed, size, portability and cost.

- 5 What kinds of secondary storage devices do large computer systems use?

For data recovery, large computers use: magnetic tapes.

For daily storage, large computers use: solid state drives (SSDs), raid storage systems, cloud storage.

- 6 State whether EACH of these storage media is a primary or a secondary storage medium.

- a RAM
- b Magnetic tape
- c Solid state memory
- d PROM

- a RAM – primary storage medium
- b Magnetic tape – secondary storage medium
- c Solid state memory – secondary storage medium
- d PROM – primary storage medium

- 7 Explain, using examples, the terms 'serial access' and 'direct access'.

Serial access means that you can access data in the order in which it is written, therefore there is no pre-determined order in which it was stored.

Direct access means that you can go directly to a specific piece of data without having to access any other data.

- 8 Define the following terms: 'bit', 'byte', 'word' and 'word length'.

A **bit** is the smallest unit of storage.

A **byte** is made up of eight (8) bits and has the storage power to represent one written character.

A **word** is the amount of bits a computer can process in one operation.

The **word length** is the number of bits in a word.

- 9 Define the terms 'track', 'sector' and 'cylinder'.

A **track** is a concentric ring (data storage ring) on a computer floppy diskette or hard drive that is capable of storing information.

A **sector** is a 'wedge-like' portion of the hard disk, which is subdivided by tracks.

A **cylinder** is made up of all the tracks of the same number from all the hard disks that make up the hard disk drives, which can be read or written to at the same time. For example, if you start from the bottom of a stack of hard disks, track 5 of the second hard disk will be directly above track 5 of the first hard disk. Track 5 of the third hard disk will be directly above track 5 of the first and second hard disks and so on. If you put these together on top of each other, you'd have something that looks like a tin can with no top or bottom – a cylinder.

- 10 Explain what happens to a disk when it is formatted.

Before any data can be stored on a hard disk it must be formatted. Formatting sets up the tracks, sectors and cylinders on the disk.

- 11 List THREE precautions for the care of optical discs.

Some guidelines for the proper handling of optical disks are:

- CDs and DVDs should be stored in their cases when not in use, to prevent them from being scratched or getting dirty.
- Avoid soiling the surface of a CD – hold it by the edge or centre hole.
- Keep your CDs clean by gently wiping both sides with a clean damp cloth from the centre to the outer edge, not by wiping around the disk. Wiping in a circle can create a curved scratch, which can confuse the laser. For stubborn dirt, use isopropyl alcohol or methanol, or CD/DVD cleaning detergent.
- Do not write on the top side of the CD with a ballpoint pen or other hard object, as this can damage the data layer on the other side. Use a CD marker instead.
- Do not write on the top side with a fine-point marker or with any solvent-based marker. (Solvent may dissolve the protective layer.)
- Do not expose a CD to high temperature or humidity for an extended period of time, as the CD may warp.

(Any three)

12 Give the similarities and differences between each of the following pairs:

a RAM and ROM

Similarities:

Both RAM and ROM are forms of primary/main memory.

Differences:

RAM is volatile memory and needs electrical current to hold data, therefore RAM holds data temporarily.

ROM is non-volatile memory and does not need an electrical current to hold data, therefore ROM holds data permanently.

The data in RAM can be changed, whereas the data in ROM cannot be changed easily.

b Hard disk and magnetic tape

Similarities:

Hard disk and magnetic tape are both types of secondary storage.

Both the hard disk and magnetic tape store data via the use of magnetism.

Differences:

Hard disk accesses data on the disk via direct access, whereas magnetic tape uses sequential access.

Hard disk writes data onto the disk via tracks and sectors, whereas magnetic tape writes data via magnetised spots on the iron oxide of a plastic ribbon.

c Primary storage and secondary storage

Similarities:

Both primary storage and secondary storage are types of storage within a computer system.

Differences:

Primary storage can store data temporally (RAM) and permanently (ROM), whereas secondary storage can only hold data permanently.

Primary storage holds data or instructions for current processing or a process in action, whereas secondary storage holds data to be used in the future.

13 Define the term 'SSD'. List devices that use SSDs.

Solid state drives (SSD) are flash memory storage devices that are designed to store data without reading or writing on rotating disks, the way hard disk drives (HDDs) do. Some devices that use SSD are: personal computers, cell phones, cable TV set-up boxes and video game consoles.

Research questions

1 The manager of your community sports club wants to purchase a personal computer to perform some of the clerical and accounting work of the club, such as to store information about club members, create and maintain club accounts, create word-processed documents and flyers for advertising club events. The manager would also like to buy a personal computer that can be used for playing some of the latest computer games. You are required to:

- a** create two lists of three computers each that the manager can choose from to satisfy both requirements. Each list must state the type and speed of the processor and the primary and secondary storage capacity of the computer.
- b** give reasons for each choice.

a and b List of three computers to choose from, with reasons for each choice:

Standard PC specs:

Processor – dual core @ 2.4 GHz (i5 Intel processor or equivalent AMD)

RAM – 8 GB

Hard Drive – 500 GB 5400 RPM hard drive

This is the baseline PC. It would be able to run most games and can do all applications required by the manager at the most affordable price.

Mid-level PC specs

Processor Core i7 @ 4.20 GHz

RAM – 8GB

1 TB SSD storage instead of a hard drive

This mid-level PC expands the speed and storage capabilities of the standard PC but increases in price.

High-end gaming PC specs

Processor – Core i7 or i9 @ 4.9 GHz

RAM – 16 GB DDR4

2 TB SSD

This high-end gaming PC has a very high speed and excellent storage capabilities, which are suitable for gaming, but has a higher price.

2 Solid state storage devices are becoming very popular as secondary storage devices. Using the internet to conduct your research, create a table of three types of solid-state storage devices. The table should indicate the following:

- a** The range of the storage capacities of each device
- b** The advantages of each device
- c** The disadvantages of each device
- d** Where each device is used.

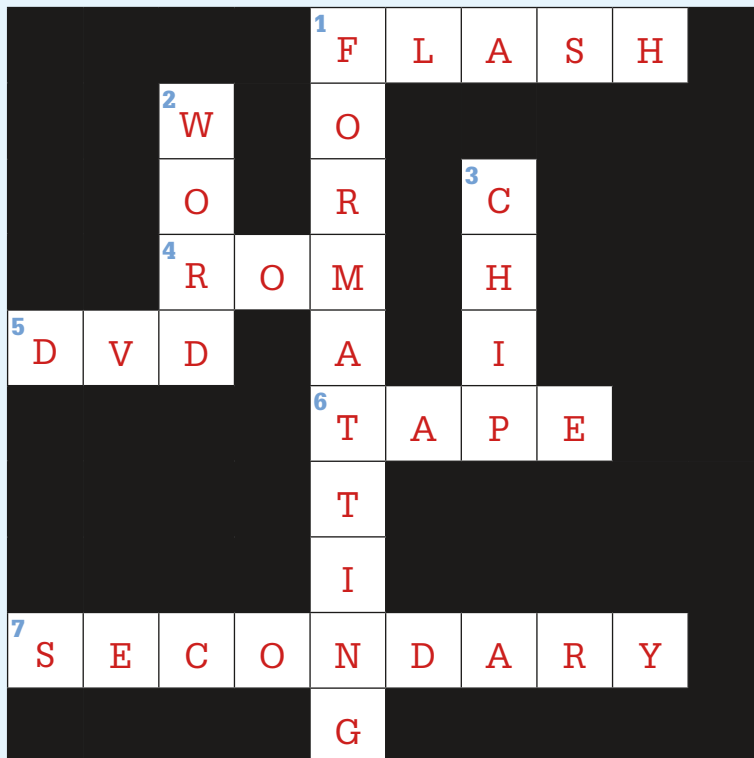
SSD type	Storage capacity range	Advantage	Disadvantage	Practical use
M.2. SATA SSD	1 TB–4TB	Smaller physical size	Slower interface time	Basic PC spec Lower price
NVMe SSD	16TB	Extreme higher speeds and efficiency Large storage capacity	Very new technology, compatibility issues High price	Server environments running in real time
PCIe SSD	24TB	Better performance than SATA	Lower data transfer rates Higher cost per GB than other SSDs	Online transactions Data centres/warehouses

3 Use the internet to conduct research to complete the following tasks:

- a** Create a timeline to show the development of storage options over the last 10 years.
- b** Explain the term 'holographic storage'.

- a** Students should be able to research a timeline of storage options fairly easily on the internet.
If anyone struggles, you could suggest that they type in 'data storage timeline' or 'history of data storage technology' to find relevant information.
- b** **Holographic storage** is computer storage that uses laser beams to store computer-generated data in three dimensions. For example, if you have a bank credit card containing a logo in the form of a hologram, the idea is to use this type of technology to store computer information. The goal is to store a lot of data in a small amount of space. In the foreseeable future, the technology is expected to yield storage capacities up to a terabyte in drives that are the same physical size as current drives. It is sometimes referred to as Three Dimension storage (3D Storage). (Source: <https://searchstorage.techtarget.com/definition/holographic-storage>)

Crossword



Across

- 1** Memory device used in digital cameras and cell phones (5)
- 4** Holds data and instructions necessary for starting up the computer (3)
- 5** Stores movies with high-quality sound and video (3)
- 6** This medium only provides serial access (4)
- 7** A type of storage that holds data on a permanent basis for later use (9)

Down

- 1** Performing this operation on a disk erases all the information (10)
- 2** The number of bits the computer can process in one operation (4)
- 3** It contains millions of transistors and capacitors (4)

Questions and answers 4

True or False?

- 1 The image aspect ratio is the number of times the image is repainted or refreshed on the screen.
False
- 2 Plotters are useful for producing architectural drawings, building plans, maps and CAD drawings. **True**
- 3 Sensors send output to the processor of the controlling computer. **True**
- 4 Impact printers have much faster printing speeds. **False**
- 5 Laser printers produce an image by spraying ink onto the paper in a dot matrix pattern.
False
- 6 An LED (light-emitting diode) projector has arrays of red, blue and yellow diodes. **True**
- 7 Microfiche is a rectangular sheet of film on which many frames/pages of information can be stored. **True**
- 8 An inkjet printer is an example of a non-impact printer. **True**
- 9 Headphones are a type of speaker that are placed in the ear. **True**
- 10 A GPS (Global Positioning System) uses a network of computers to determine position or location on the Earth and displays it on the GPS screen. **True**

Multiple-choice questions

- 1 A monitor's capabilities depend on all except:
a resolution. **b** size.
c refresh rate. **d print quality.**
- 2 NLQ refers to:
a refresh rate. **b** the number of characters per second.
c print quality. **d** type of monitor.
- 3 All the following are non-impact printers except for:
a the dot matrix printer. **b** the thermal printer.
c the inkjet printer. **d** the laser printer.
- 4 Which is not a characteristic of laser printers?
a Are quiet
b Have high print speeds
c Use toner similar to that of photocopiers
d Can produce multiple copies by printing on duplicating paper
- 5 Microfilm output is stored on:
a rectangular sheets of film. **b** photographic paper.
c magnetic paper. **d a roll of film.**

Short-answer questions

- 1 Give TWO advantages and TWO disadvantages of a non-impact printer over an impact printer.

Two advantages of a non-impact printer over an impact printer:

- Non-impact printers are much quieter than impact printers, and so are useful in hospitals, busy offices, and so on.
- Non-impact printers have much faster printing speeds than impact printers.

Two disadvantages of a non-impact printer over an impact printer:

- Non-impact printers sometimes require special paper.
- Non-impact printers do not have multiple-copy facilities, that is, they cannot produce multiple copies by printing on duplicating paper.

- 2 Explain the difference between a line printer and a character printer.

Line printers print a line at a time, or so it appears as multiple hammer-like keys forming a line of text that hit the page at one time.

Character printers print one character at a time, much like a typewriter.

- 3 Explain the difference between microfilm and microfiche.

Microfilm is a roll of film.

Microfiche is a rectangular sheet of film on which many frames/pages of information can be stored.

- 4 A number of output devices can be used to help physically-challenged people. Select TWO and explain how these devices work towards making things easier for the physically challenged.

Two examples of output devices that can be used by the physically challenged:

- A Braille printer, also called a Braille embosser, is an impact printer that converts text into the Braille code, producing patterns of raised dots on paper for use by the blind.
- A Braille reader, also called a Braille display device, is a device a set of round pins become raised through the flat surface of the device in which as the computer text output is converted to Braille.

- 5 Give ONE advantage of output on microfilm over that on printed paper.

Microfilm is physical output, similar to printing, and is used to store large volumes of data. The prints can be read using a special magnifying machine. This is unlike printed paper, which would carry printed output based on the quality of the print via the printer. (Also, we can note that the shelf-life of microfilm is a lot longer than that of paper).

- 6 A number of output devices produce human readable, as well as machine-readable output. Explain the difference and list ONE of each type of device.

Output that can be read by human beings is said to be human readable, whereas output that cannot be understood by humans is said to be machine readable. An example of human readable output is visual display output, for example, via VDUs. Examples of machine readable output are barcodes or MICR printed documents.

- 7** Describe how a robotic arm can be used in an assembly line.

Robotic arms can be used in an assembly line by using the 'arms' to replace human beings for use during monotonous and physically-straining tasks, such as those on an assembly line for production purposes. It has been found that the delivery and efficiency of the robotic arms creates higher-quality output.

- 8** You are a consultant to a small business that types documents and creates presentations for individuals. Select a suitable printer and explain to your client why you have chosen that printer for their business.

A laser printer would be most suitable. These printers can generate a large number of pages per minute, for example, 40 ppm (pages per minute), and can deliver higher-quality output than ink-jet printers.

- 9** List TWO attributes of a monitor that affects its display and explain how the monitor is affected.

The following are attributes of a monitor that affect its display, with an explanation of how the monitor is affected.

Resolution: This determines the clarity and sharpness of an image when displayed on the screen. The more pixels there are on a screen, the higher the resolution, and the greater the level of detail that can be shown in an image.

Refresh rate: This is the number of times the image is repainted or refreshed on the screen per second. If this process is slow, the screen may appear to flicker. The faster the refresh rate the less noticeable the flickering on the screen.

- 10** Explain the difference between LCD and plasma flat-screen monitors.

LCD (liquid crystal display) uses liquid crystals, a type of substance that can change states from liquid to solid and so change their appearance when an electric current is passed through them.

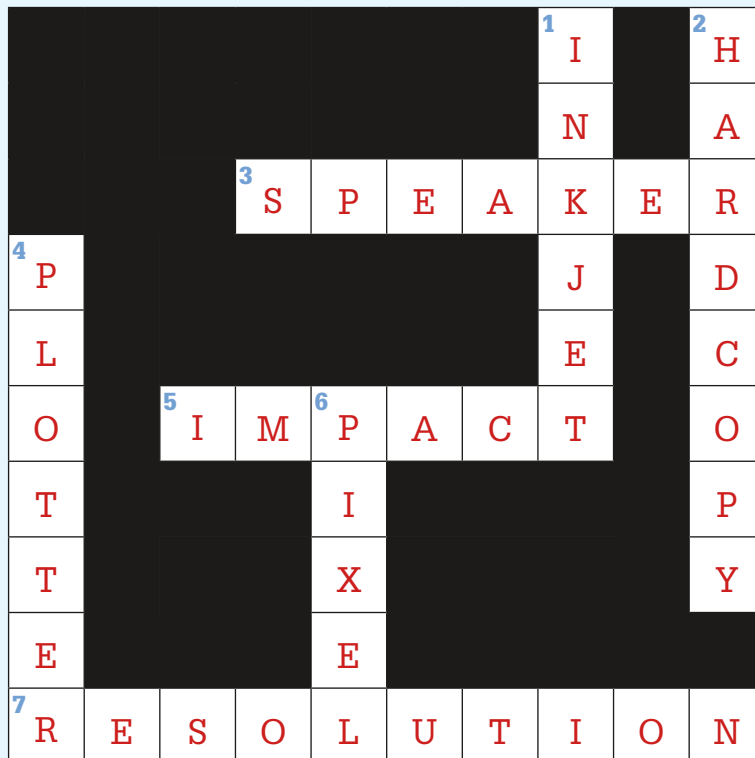
Plasma display creates light by a plasma discharge from phosphors between two flat panels of glass. This works a bit like each pixel being a fluorescent light that can be switched on or off.

- 11** State whether you would use a printer or a plotter to print the following documents:

- | | |
|-------------------------------------|---|
| a A résumé | b A prenuptial agreement contract |
| c A design for a new gown | d A recipe |
| e The redesign of a bathroom | f A map to get from the centre of the town to your home. |

- | |
|---|
| a A résumé – use a printer. |
| b A prenuptial agreement contract – use a printer. |
| c A design for a new gown – use a printer. |
| d A recipe – use a printer. |
| e The redesign of a bathroom – use a plotter. |
| f A map to get from the centre of the town to your home – use a plotter. |

Crossword



Across

- 3** Sound output (7)
- 5** The print head of this printer strikes the paper (6)
- 7** Clarity of an image (10)

Down

- 1** Sprays ink onto paper in a dot matrix pattern (6)
- 2** Permanent output (two words) (8)
- 4** Specialised output device used to produce architectural drawings (7)
- 6** Smallest unit on the screen (5)

Challenge questions

- 1** Five different types of customers have asked you to assist them in selecting output devices. Recommend appropriate devices to them:

- a** A stay-at-home mother with a teenager has a small budget but uses the internet often. Her child also uses the computer for schoolwork and entertainment.

Recommendation of output devices for the stay-at-home mother with a teenager: inkjet printer, headphones, visual display unit (VDU), modem and speakers.

- b** Ms Patrick has a small home office and works mainly from home but communicates with the head office frequently. She is a real-estate agent for a local real-estate company. She often needs to send documents to the head office.

Recommendation of output devices for Ms Patrick: inkjet printer, visual display unit (VDU), laser printer, modem.

- c** Mr Jay is a pharmaceutical sales representative who is always commuting to and from his various clients. While he is on the road, he is frequently in contact with his clients and also with head office. He also sends and receives sensitive information between his clients and the head office.

Recommendation of output devices for Mr Jay, the pharmaceutical sales representative: visual display unit (VDU) mini, modem, mobile printer.

- d** Mr Tom is a freelance animator and graphics designer who designs and produces advertisements. He has a well-established clientele of big and small companies, and individuals.

Recommendation of output devices for Mr Tom, the freelance animator and graphics designer: high-resolution visual display unit (Hi-res VDU), modem, laser printer, speakers, headphones.

- e** Mr MacFarlan is a manager for a large business college that conducts video conferencing of many of its classes. He has a staff of over 100 employees who need suitable equipment.

Recommendation of output devices for Mr MacFarlan, the manager: headphones, visual display unit, speakers, modem.

- f** Mr Joseph is interested in becoming a DJ (disk jockey). He has been disk jockeying for family and close friends but is now being offered more jobs in his community. Can you recommend some output devices for his career path?

Recommendation of output devices for Mr Joseph: headphones, visual display unit (VDU).

- g** Darcy is an aspiring author who has written a few books. She usually writes on paper, but has recently upgraded to a computer. She is told that there are output devices that can make her job easier.

Recommendation of output devices for Darcy, the aspiring author: laser printer, headphones, visual display unit, speech synthesis devices.

- 2** There are many types of printers on the market. List a number of questions that you would ask yourself or that a salesperson would ask you when you are purchasing a printer.

Examples of questions to ask when purchasing a printer:

- What speed does the printer print at?
- What quality does the printer deliver?
- What is the cost of the printer?
- What is the cost of replacement ink/toner?
- Is it a colour printer or black printer?

Project

- Your teacher wants to purchase a 3D printer for the class, but is being discouraged by colleagues because of the negative stories they have heard about 3D printing. Your teacher has asked you to assist him in justifying the need for this device by indicating the pros and cons of making use of a 3D printer in the class. A company in the community has agreed to fund the purchase of the printer if a convincing argument can be made.

Hints and suggestions for the pros and cons of making use of a 3D printer in class:

Pros – freedom of design, rapid prototyping, lighter yet stronger parts, waste reduction and speed.

Cons – limited materials, limited build volume, development of large volumes and parts structure.

- Select one emerging output device. Describe its use and function, and justify its possible future potential.

Hints and suggestions for an emerging output device, its use and function and justification of its possible future potential:

Virtual reality (VR) headset – This is a head-mounted device that provides virtual reality for the wearer. Virtual reality (VR) headsets are widely used with video games but they are also used in other applications, including simulators and trainers. They comprise a stereoscopic head-mounted display (providing separate images for each eye), stereo sound, and head-motion tracking sensors (which may include, for example, gyroscopes, accelerometers, magnetometers, structured light systems. Some VR headsets also have eye-tracking sensors and gaming controllers. In the future, other than the obvious gaming applications, VR headsets can be used for first person immersion into movies, flight and training simulations and combat and 'real-life' situation training.

Questions and answers 5

Fill in the blanks

- 1 **Discrete data** is data that can be counted.
- 2 **Continuous data** is data that can be measured and recorded at many different points.
- 3 A bit is short for **binary digit**.
- 4 A single bit can represent one of **two** values.
- 5 All the characters that a computer can store and process are called the **character set** of that computer.
- 6 ASCII uses seven bits to represent each character plus an extra bit called a **parity** bit.
- 7 The standard ASCII code defines **128** character codes.
- 8 A **control** code is a non-printable code that is used to tell the computer to carry out a command.
- 9 Characters are represented by a code called the **character** code.
- 10 Two of the most common codes used to represent characters are the seven-bit ASCII code and the eight-bit **EBCDIC**.

True or False?

- 1 A bistable device is one that can be set to two or more states. **True**
- 2 Each digit in the decimal number system has a value that depends on its position or place in the number. **True**
- 3 In sign and magnitude representation, 4 bits can represent the range -7 to $+7$ numbers. **False**
- 4 In one's complement, negative numbers are represented by simply flipping all the digits. **True**
- 5 A parity bit is an extra bit that is added to a byte to help to ensure data integrity. **True**

Multiple-choice questions

- 1 A bistable device can be set to:
a 1 state.
c 3 states.
b 2 states.
d an infinite number of states.
- 2 A parity bit is added to a byte to:
a make up 8 bits.
c assist with calculations.
b ensure data integrity.
d represent none of the above.
- 3 In a sign and magnitude representation, 4 bits can represent:
a the range -4 to $+4$.
b the range -3 to $+3$.
c the range -7 to $+7$.
d none of the above.
- 4 Two's complement is one of the most commonly used methods of representing:
a signed (positive and negative) integers.
b unsigned integers.
c positive numbers only.
d negative numbers only.
- 5 Which letter is represented by the ASCII code 100 0101?
a A
b B
c F
d E

Short-answer questions

- 1 Explain the difference between the two types of data. Give examples of each type.

The two types of data are discrete data and continuous data.

Discrete data is data that can be counted; for example, the number of cars in a car park or the number of people that responded 'yes' or 'no' to a question, whereas **continuous data** (also known as analogue data) is data that can be measured and can be recorded at many different points. For example, the temperature of a liquid can be recorded as 35 degrees Celsius ($^{\circ}\text{C}$).

2 Convert the following decimal numbers to binary:

a 7_{10}

b 15_{10}

c 25_{10}

d 71_{10}

e 205_{10}

a

2	7	7 divided by 2 gives you 3 remainder 1
2	3 R 1	3 divided by 2 gives you 1 remainder 1
2	1 R 1	1 divided by 2 gives you 0 remainder 1
	0 R 1	
	Therefore $7_{10} = 111_2$	

b

2	15	15 divided by 2 gives you 7 remainder 1
2	7 R 1	7 divided by 2 gives you 3 remainder 1
2	3 R 1	3 divided by 2 gives you 1 remainder 1
	1 R 1	1 divided by 2 gives you 0 remainder 1
	0 R 1	
	Therefore $15_{10} = 1111_2$	

c

2	25	25 divided by 2 gives you 12 remainder 1
2	12 R 1	12 divided by 2 gives you 6 remainder 0
2	6 R 0	6 divided by 2 gives you 3 remainder 0
2	3 R 0	3 divided by 2 gives you 1 remainder 1
2	1 R 1	1 divided by 2 gives you 0 remainder 1
	0 R 1	
	Therefore $25_{10} = 11001_2$	

d

2	71	71 divided by 2 gives you 35 remainder 1
2	35 R 1	35 divided by 2 gives you 17 remainder 1
2	17 R 1	17 divided by 2 gives you 8 remainder 1
2	8 R 1	8 divided by 2 gives you 4 remainder 0
2	4 R 0	4 divided by 2 gives you 2 remainder 0
2	2 R 0	2 divided by 2 gives you 1 remainder 0
2	1 R 0	1 divided by 2 gives you 0 remainder 1
	0 R 1	
	Therefore $71_{10} = 1000111_2$	

e

2	205		205 divided by 2 gives you 102 remainder 1
2	102	R 1	102 divided by 2 gives you 51 remainder 0
2	51	R 0	51 divided by 2 gives you 25 remainder 1
2	25	R 1	25 divided by 2 gives you 12 remainder 1
2	12	R 1	12 divided by 2 gives you 6 remainder 0
2	6	R 0	6 divided by 2 gives you 3 remainder 0
2	3	R 0	3 divided by 2 gives you 1 remainder 1
2	1	R 1	1 divided by 2 gives you 0 remainder 1
	0	R 1	
	Therefore 205_{10} = 11001101_2		

3 Convert the following binary numbers to decimal:

a 0011_2

b 00110001_2

c 10111001_2

d 10110111_2

e 11111111_2

a

2^3	2^2	2^1	2^0	
8	4	2	1	This row shows the value of each digit in that position: the 'place value'.
0	0	1	1	Each digit in this row is multiplied by its place value, above.
0	0	2	1	Sum the totals.
				The result is 3.
				Therefore $0011_2 = 3_{10}$

b

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	This row shows the value of each digit in that position: the 'place value'.
0	0	1	1	0	0	0	1	Each digit in this row is multiplied by its place value, above.
0	0	32	16	0	0	0	1	Sum the totals.
								The result is 49.
								Therefore $00110001_2 = 49_{10}$

c

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	This row shows the value of each digit in that position: the 'place value'.
1	0	1	1	1	0	0	1	Each digit in this row is multiplied by its place value, above.
128	0	32	16	8	0	0	1	Sum the totals.
								The result is 185.
Therefore $10111001_2 = 185_{10}$								

d

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	This row shows the value of each digit in that position: the 'place value'.
1	0	1	1	0	1	1	1	Each digit in this row is multiplied by its place value, above.
128	0	32	16	0	4	2	1	Sum the totals.
								The result is 183.
Therefore $10110111_2 = 183_{10}$								

e

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
128	64	32	16	8	4	2	1	This row shows the value of each digit in that position: the 'place value'.
1	1	1	1	1	1	1	1	Each digit in this row is multiplied by its place value, above.
128	64	32	16	8	4	2	1	Sum the totals.
								The result is 255.
Therefore $11111111_2 = 255_{10}$								

4 Add the following binary numbers. Give the answer in binary form.

a $101_2 + 110_2$

b $011_2 + 100_2$

c $01011_2 + 110_2$

d $011011_2 + 01011_2$

e $110101_2 + 01101_2$

a $101_2 + 110_2$

101	Step 1: starting from the right-most column ($0 + 1$) = 1
+ 110	Step 2: middle column ($1 + 0$) = 1
1011	Step 3: left column $1 + 1 = 0$ carry 1

Therefore $101_2 + 110_2 = 1011_2$

b $011_2 + 100_2$

$$\begin{array}{r} 011 \\ + 100 \\ \hline 111 \end{array}$$

Step 1: starting from the right-most column $(0 + 1) = 1$
 Step 2: middle column $(0 + 1 = 1)$
 Step 3: left column $1 + 0 = 1$

Therefore $011_2 + 100_2 = 111_2$

c $01011_2 + 110_2$

$$\begin{array}{r} 01011 \\ + 110 \\ \hline 10001 \end{array}$$

Step 1: starting from the right-most column $(0 + 1) = 1$
 Step 2: $1 + 1 = 0$ carry 1
 Step 3: $1 + 1 = 0$ carry 1
 Step 4: $1 + 1 = 0$ carry 1
 Step 5: left column $0 + 1 = 1$

Therefore $01011_2 + 110_2 = 10001_2$

d $011011_2 + 01011_2$

$$\begin{array}{r} 011011 \\ + 01011 \\ \hline 100110 \end{array}$$

Step 1: starting from the right-most column $(1 + 1) = 0$ carry 1
 Step 2: $1 + 1 + 1 = 1$ carry 1
 Step 3: $0 + 1 = 1$
 Step 4: $1 + 1 = 0$ carry 1
 Step 5: $1 + 1 = 0$ carry 1
 Step 6: $0 + 1 = 1$

Therefore $011011_2 + 01011_2 = 100110_2$

e $110101_2 + 01101_2$

$$\begin{array}{r} 110101 \\ + 01101 \\ \hline 1000010 \end{array}$$

Step 1: starting from the right-most column $(1 + 1) = 0$ carry 1
 Step 2: $0 + 1 = 1$
 Step 3: $1 + 1 = 0$ carry 1
 Step 4: $1 + 1 = 0$ carry 1
 Step 5: $1 + 1 = 0$ carry 1
 Step 6: $1 + 1 = 0$ carry 1

Therefore $110101_2 + 01101_2 = 1000010_2$

- 5 a** Convert the decimal number 4510 to binary.
b What is the one's complement representation of -45_{10} ?
c What is the two's complement representation of -45_{10} ?
d What is the BCD representation of -45_{10} ?
e What is the sign and magnitude representation of -45_{10} ?

- a** 0010 1101₂
b 1101 0010₂
c 1101 0011₂
d 1011 0100 0101₂
e 1010 1101₂

- 6** The following 8-bit pattern represents the two's complement of an integer: 111001101.
 What is the decimal equivalent?

Decimal equivalent of 111001101 is 461¹⁰

- 7** Subtract the binary number 0011011 from 11110010.

11010111

- 8** Explain the term 'parity bit'.

A **parity bit** is an extra binary digit used to check for transmission errors, and appended to a binary word to make the total number of 1s odd (odd parity) or even (even parity).

- 9** Which range of integers can be represented using two's complement with:

a 4 bits?

b 6 bits?

c 8 bits?

- a** 0 to 15
b 0 to 63
c 0 to 127

- 10** What is the decimal equivalent of the following BCD representations? The first four bits represent the sign (1011 for negative and 1010 for positive).

a 1011 1001 1000 0111

b 1010 0010 0101 0111

c 1010 0101 0111 0011 1001

- a** -987
b 257
c 5739

- 11** Give the ASCII representation of the following statement: 'Meet me at 6'.

The ASCII representation of 'Meet me at 6' is:

M = 1001101

e = 1100101

e = 1100101

t = 1110100

m = 1101101

e = 1100101

a = 1100001

t = 1110100

6 = 0110110

- 12** The ASCII code for the letter 'F' is 01000110.
What is the ASCII code for the letter 'K'?

The ASCII code for the letter 'K' is: 1001011.

- 13** Using an example, explain a 'bistable device'.

A **bistable device** is a device that can function in one of only two positions, for example, a light bulb that can be either in the 'on' or 'off' state. On a magnetic disk or magnetic tape, the two states can be represented by a magnetised spot or an unmagnetised spot. In a microchip, the transistor is similar to an electronic switch that can turn current on and off.

- 14** Determine the BCD representation of 65_{10} .

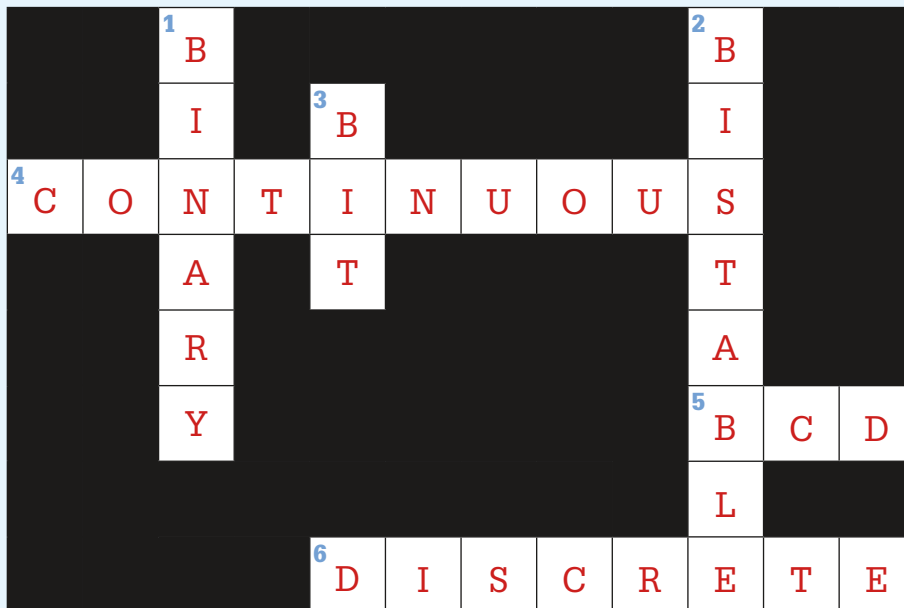
The BCD representation of 65_{10} is: 01100101.

Research questions

Conduct research on the internet to explain how fractions and decimals are represented in a computer.

Students' research will vary. For anyone who has difficulty, suggest that they Google the question or key words, then they too, should be able to come up with suitable material to write about.

Crossword



Across

- 4** Data that can be measured and can be recorded at many different points (10)
- 5** A binary representation that is very common in electronic devices such as pocket calculators and microwave ovens where a numeric value is to be displayed (3)
- 6** Data that can be counted (8)

Down

- 1** A number system which consists of two digits 0 and 1 (6)
- 2** A device that can be set to one or two states at any point in time (8)
- 3** Can represent one or two values, 0 and 1 (3)

Questions and answers 6

Fill in the blanks

- 1 **Specialised** software is written for a specific task rather than for a broad application area.
- 2 Software written to meet the specific needs of a company is known as **custom-written software**.
- 3 Software that manages and supports the resources and operations of a computer system is known as **system software**.
- 4 Programs developed to carry out specific tasks or solve particular problems are called **application software**.
- 5 **Multiprocessing** refers to a computer's ability to support more than one process at the same time.
- 6 The **operating system (OS)** is a set of programs that governs the operations of a computer.
- 7 Software can be classified into two major types: **application software** and **system software**.
- 8 The **user interface** is the user-controllable part of the operating system that allows a user to communicate or interact with it.
- 9 The process of loading operating system software into a computer's main memory from disk is known as **booting**.
- 10 A set of related, specialised programs combined in a unified package that allows data to be transferred easily between the programs is known as **integrated software**.

True or False?

- 1 Computer games are an example of application software. **True**
- 2 A word processor is an example of general-purpose software. **True**
- 3 Integrated software packages take up more storage space than individual applications. **False**
- 4 A payroll program is an example of specialised software. **True**
- 5 Customised software and custom-written software are the same. **False**
- 6 Custom-written software has an increased probability of undetected error. **True**
- 7 The operating system is one category of system software. **True**
- 8 The operating systems of smartphones and tablets are embedded in a RAM chip. **False**
- 9 Batch processing can be used in airline booking systems. **False**
- 10 Assemblers, compilers and interpreters are all language translators. **True**

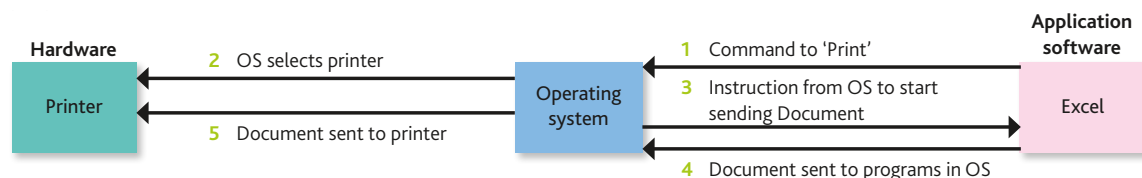
Multiple-choice questions

- 1 Which of the following is not a utility program?
 - a Disk repair program
 - b Backup program
 - c Spreadsheet program**
 - d File defragmentation program
- 2 Application software consists of:
 - a entertainment software.
 - b productivity software.
 - c speciality software.
 - d all of the above.**
- 3 An integrated software package:
 - a can transfer data from one component to another very easily.
 - b costs less than individual applications.
 - c takes up less disk space than individual applications.
 - d contains all of the above.**
- 4 Which of the following is not considered to be system software?
 - a Graphics presentation software**
 - b Operating system
 - c Utility program
 - d Language translators
- 5 Which of the following is not a function of the operating system?
 - a Managing files and memory
 - b Managing tasks
 - c Creating a document**
 - d Managing input and output devices

Short-answer questions

- 1 Draw a diagram to represent the relationship between the operating system, the application software and the hardware.

Diagram to represent the relationship between the operating system, the application software and the hardware:



- 2 What are the advantages and disadvantages of integrated software?

The advantages and disadvantages of integrated software are as follows.

Advantages:

Integrated software is a set of related programs combined in a single package that allows data to be transferred easily between the programs and has a similar look across the programs.

- A basic integrated package may contain a word processor, spreadsheet, database and communications and graphics presentation programs, so a major advantage of these packages is the ease with which data can be transferred from one component to another.
- It takes up less disk space than individual applications.
- You can move much faster from one application to the next.
- It is usually easier to learn, as the user interface for choosing commands is the same.
- It tends to be more powerful and versatile than individual applications.
- It is less likely to crash and contains fewer errors, since it has been widely tried and tested.
- The producers' after-sales service is often good (for example, online help facilities); users can also get support from user groups and magazines.
- It is usually cheaper than purchasing the packages individually.

Disadvantages:

- Not all the features of single applications are included.
- Some integrated packages do not contain all the applications that may be required to complete a task.

- 3 a Define the term 'operating system'.
b List THREE types of operating systems.
c List FOUR functions of the operating system.

- a An **operating system** (OS) is a set of programs that governs the operation of a computer. The OS manages all software and peripheral hardware and accesses the central processing unit (CPU) for memory or storage purposes. It also makes it possible for a system to run applications simultaneously.
- b Types of operating systems:
Some older operating systems that were used in PC computers include Windows 98, Windows ME (Millennium Edition), Windows 2000, Windows XP, Windows NT, Apple® operating systems (for example, OS9 and OS X®), OS/2, Linux and Unix. There are Unix operating systems for PCs and mainframe computers.
- c Four functions of the operating system are:
- **Managing computer resources** – Managing all the resources of the computer system is a large part of the operating system's function.
 - **Managing files and memory** – The operating system manages all the files on a computer. It keeps track of the locations where programs and data are stored in the computer's memory.
 - **Maintaining security** – In networks and larger computers, each user is given a username or ID and password to gain access to the computer system. The operating system keeps a register of all these names so that only persons with valid usernames or IDs and passwords can access the system. This prevents access by hackers and unauthorised persons. The operating system also keeps a log of which users logged in, the length of time each user stayed on the system and what they did.
 - **Managing tasks** – Early computers ran one process at a time. However, because of the fast speed of the CPU and the much slower speeds of input/output devices, the CPU remained idle much of the time. This problem was further compounded with the development of multi-core processors. To reduce the idle time of the CPU and to ensure that each job is executed, multitasking, multiprogramming and multiprocessing are the methods used to do this.

- 4 Explain the terms: 'time-sharing', 'batch processing' and 'real-time processing'.

Time-sharing allows many users at different terminals to use a computer at the same time.

Batch processing is where programs and data are collected in a batch queue before processing starts.

Real-time processing systems are designed to respond to an event within a predetermined time. As soon as the data is input it is processed and output immediately.

5 Explain the difference between multiprogramming and multiprocessing.

- **Multiprogramming** refers to the computer's ability to run two or more programs at the same time, using a single processor.
- **Multiprocessing** refers to a computer system's ability to support more than one process (program) at the same time using multiple processors. This generally increases processing times.

6 a List THREE types of user interfaces.

b Explain how each type of user interface operates.

a Three types of user interfaces:

- graphical user interface (GUI)
- menu-driven interface
- command-driven interface.

b Explanation of how each type of user interface operates:

- GUI uses icons and menus to allow a user to interact with the system.
- A menu-driven interface allows a user to use the mouse or keyboard to select options from a predefined list.
- A command-driven interface allows the user to input a list of commands to interact with the system.

7 a Define the term 'utility program'.

b Give the functions of any THREE utility programs.

a A **utility program** is a system software program, which provides useful services, such as performing common tasks and 'housekeeping' routines.

b Functions of utility programs:

- **Backup** – The backup utility allows you to make a duplicate copy of every file on your hard disk, which can be stored on an external hard drive or on cloud storage (storage that is accessible on the internet, for example, Google Drive™, Dropbox, and so on).
- **Disk repair** – A disk repair utility scans a hard disk for bad sectors (defective areas) and either makes repairs to these sectors or marks the defective area so that the operating system will not store any data in that location.
- **Virus protection** – Anti-virus software programs are also utility programs.
- **File defragmentation** – When files are stored in a new computer or hard disk, they are stored next to one another (contiguously). After using your computer for a while, you will probably have deleted old files and added new ones. The computer fills free gaps with new files, including parts of files. After a while, the constituent parts of a typical file are scattered all over your hard disk – they are fragmented. This can really slow down your computer, as the operating system must first find all the parts of a file before they can be put back together and loaded. A defragmenter utility finds these fragmented files and organises them back in a continuous manner.

(Any three)

- 8 Explain the difference between batch processing and online processing.

In **batch processing** systems, all data is collected together before being processed in a single operation. Typically, the processing of payrolls, electricity bills, invoices and daily transactions are dealt with in this way. This method of operation lends itself to jobs with similar inputs, processing and outputs where no human intervention is needed. Jobs are stored in a queue until the computer is ready to deal with them. Batch-processed jobs are often done overnight.

In **online processing**, also known as transaction processing or pseudo-real-time processing, data is processed as soon as it is available. The processing is interactive, which means that processing takes place as a 'conversation' between the user and the computer: the computer responds to the user's input by outputting some data before the user can input any more data.

- 9 Name a broader category of software that best describes the following software.

- a Microsoft Office 2016
- b Windows 10
- c Medical Expert System

- a Microsoft Office 2016 is an integrated software package.
- b Windows 10 is a Microsoft operating system.
- c Medical Expert System is specialised software.

- 10 a Which interface requires the user to input commands by typing in the instructions to perform tasks?
- b Which interface requires the user to use a mouse to select icons to perform tasks?
- c Name an interface other than the answers for parts (a) and (b).

- a The command-driven interface requires the user to input commands by typing in the instructions to perform tasks.
- b The menu-driven interface requires the user to use a mouse to select icons to perform tasks.
- c Interface other than those in parts (a) and (b):
 - touch user interface
 - graphical user interface (GUI).(Any one)

Research questions

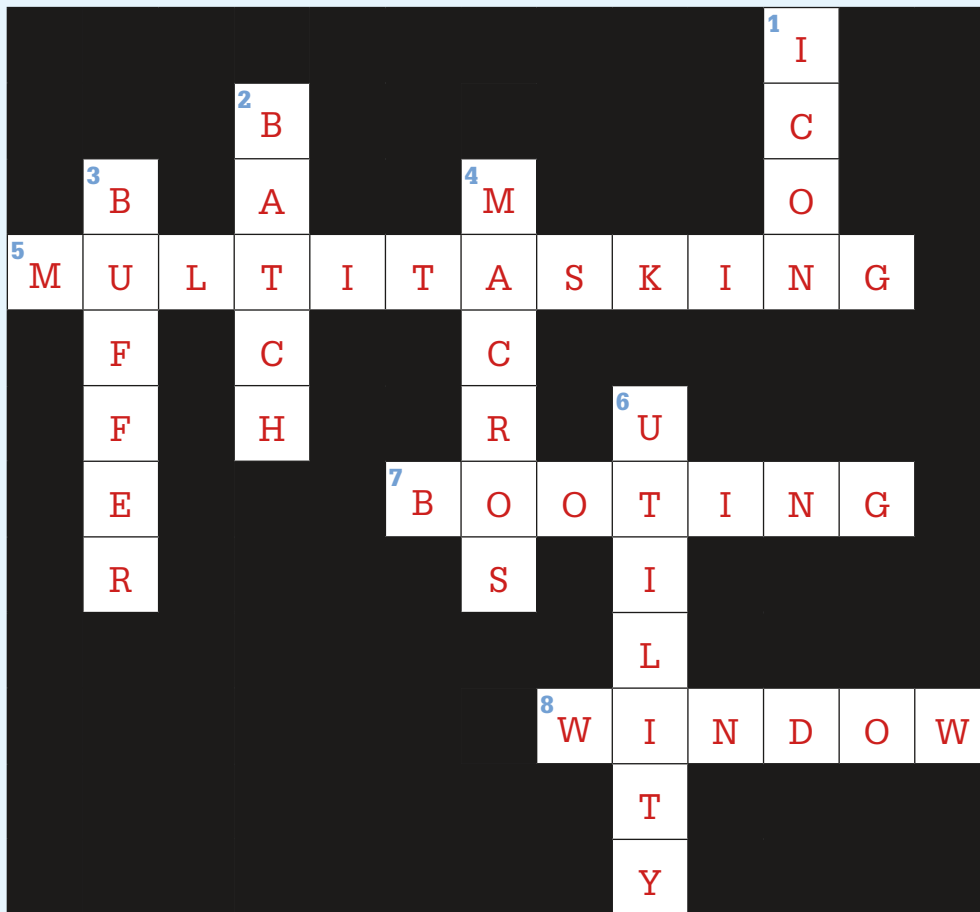
- 1** You are the IT security analyst at a manufacturing company. Your company would like to purchase new computers and needs to decide which type of operating system would be best for the company. You are asked to prepare a comparative report on the latest versions of the Windows, Linux and macOS® operating systems.
- 2** Your school recently upgraded the operating system on all the computers in the school to Windows 10. The principal of the school asks that you explore the tools that are included in the Windows 10 operating system and determine if they are sufficient for the security needs of the school. You need to use the web to research firewalls, automatic updates and malware software included in the Windows 10 operating system. If your research suggests that any of the tools are inadequate, then you should recommend other software. You are required to present a detailed report to the principal.
- 3** Your friend would like to purchase a smartphone and has come to you for advice because you are studying ICT. Use the WWW to conduct research on Android and iOS: examine the differences in the features, security options, speed and reliability of these two operating systems. Create a short report to assist your friend in making a decision.

Students' research will vary for each question.

- 1** Did students (Were they able to ...) prepare a comparative report on the latest versions of the three operating systems? If anyone has difficulty with doing the research, suggest that they search for 'comparison of latest versions of Windows, Linux and macOS® operating systems'. Or, they could search for each operating system in turn and collate the details, then tabulate the information.
- 2** Did students (Were they able to ...):
 - explore the tools that are included in the Windows 10 operating system and determine if they are sufficient for the security needs of the school?
 - research firewalls, automatic updates and malware software included in the Windows 10 operating system?
 - find anything that suggested that any of the tools are inadequate?
 - recommend other software?
 - prepare a detailed report to present to the principal?
- 3** Did students (Were they able to ...):
 - do research to find information on Android and iOS, in which they examined the differences in the features, security options, speed and reliability of these two operating systems?
 - create a short report to assist the friend with making a decision?

Students should be able to find the information fairly easily. Suggest that they create a table or spreadsheet with the comparative information.

Crossword



Across

- 5** The ability of the computer to appear to run more than one program at the same time (12)
- 7** The process of loading operating system software into a computer's main memory from disk (7)
- 8** A rectangular area that displays information on the screen of a computer (6)

Down

- 1** A pictorial representation of a file, folder or program (4)
- 2** A processing system where programs and data are collected in a queue before processing (5)
- 3** An area of memory that temporarily holds data being transferred to be processed or output (6)
- 4** Short programs, written to automate several steps in software, such as databases, spreadsheets and word processors (6)
- 6** System software programs that provide a useful service by performing common tasks and 'housekeeping' routines (7)

Questions and answers 7

Fill in the blanks

- 1 The internet is a **network** that connects computers worldwide via a huge set of telecommunications links.
- 2 A **modem** converts analogue signals to digital signals for transmission over telephone lines.
- 3 A **DSL** modem is a digital device that allows voice, video and data to be sent as digital signals over ordinary copper wire telephone lines or fibre optic cables.
- 4 Computers connected to the internet use a protocol called **TCP/IP**.
- 5 The **internet protocol (IP)** address identifies a computer as a node on the internet.
- 6 The **domain name** system was developed to allow users to refer to hosts by names.
- 7 **Emails** enable users to send electronic messages (text, sound, video and graphics) to one individual or to a group of individuals on the WWW.
- 8 The **mail server** is a computer on the internet that operates like the traditional post office.
- 9 A **mailing list** is a group of people using email to communicate their views.

True or False?

- 1 The internet is owned by the American government. **False**
- 2 The internet is a worldwide network of networks. **True**
- 3 All modems convert digital signals to analogue signals and vice versa. **False**
- 4 Some internet connections allow users to have continuous internet service. **True**
- 5 TCP/IP is a hardware device found on the motherboard of the computer. **False**
- 6 A browser is used to navigate the WWW. **True**
- 7 Each computer has a unique IP address that identifies it on the internet. **True**
- 8 The internet and the WWW are the same. **False**

Multiple-choice questions

- 1 The internet is owned by:
a a world-wide governing body. **b** the United States government.
c large organisations. **d no single organisation.**
- 2 TCP/IP is a protocol suite that was designed to be used with:
a Apple® computers.
b all computers.
c IBM-compatible computers (that is, PCs).
d none of the above.
- 3 Which of the following is not a browser?
a Google™ search **b** Microsoft internet Explorer
c Netscape Navigator **d** Mozilla Firefox
- 4 Which of the following can you do with browsers?
a View hundreds of millions of web pages all over the world
b Send and receive email
c Participate in online conferences
d All of the above
- 5 The IP address of a computer on the internet consists of:
a 4 bits. **b** 8 bits.
c 16 bits. **d 32 bits**
- 6 Which of the following would you use to create web pages?
a HTML **b** FTP
c HTTP **d** TCP/IP
- 7 Each website on the internet has a unique address. What is the address referred to as?
a HTML **b URL**
c HTTP **d** TCP/IP
- 8 Which of the following network devices is best suited to connect two different networks?
a Network interface card **b** Switch
c Gateway **d** Modem

- 9 Which of the following network devices connects multiple devices on the same network to facilitate communication among the devices?
- a Network interface card **b Switch**
c Router d Modem
- 10 Which of the following devices allows your home computer to connect to your internet service provider?
- a Network interface card b Switch
b Router d Modem

Short-answer questions

- 1 a What is the internet?
b List the hardware requirements needed to connect to the internet.
i Explain the term 'internet service provider'.
ii List and explain THREE types of communications links that may be used to get an internet connection.
iii What is an IP address and why is it necessary?

- a The **internet** is a network, made up of other networks, which connects computers worldwide via a huge set of telecommunications links.
- b Hardware requirements for connecting to the internet: computer device (desktop, laptop, tablet) or other devices such as game consoles and mobile devices, modem and a communications link (fibre optic line, copper line, LTE or wireless).
- i An **internet service provider** (ISP) is a company that has a direct connection to the internet and gives users access to it, usually for a fee. The company generally has a small network that is connected via a high speed communications link to a high-speed link that forms part of the internet's backbone (supercomputers and other large networks that make up the internet worldwide).
- ii Types of communication links:
- satellite broadband
 - ADSL (asymmetric direct subscriber line)
 - cable broadband
 - fibre optic.
- (Any three)

Explanation of each type of communications link:

- **Satellite broadband** works by transmitting data thousands of kilometres up into the atmosphere to a satellite in orbit, and then back down to an internet service provider's hub back on Earth. Setting up a satellite broadband connection requires a satellite dish and a transmitter. The long distance that data must travel in space results in a relatively slow download connection speed of up to 30 Mbps. The connection can also be unstable due to weather interferences such as thunderstorms. Satellite broadband is an option available for those who live in rural areas where traditional fixed-line broadband services are not available.
- **ADSL (asymmetric direct subscriber line)** is the traditional type of broadband connection that works by transmitting data over copper telephone lines. This is the same line that is used to deliver landline calls. It can provide speeds of up to 100 Mbps.
- **Cable broadband** uses coaxial cable to transmit information at speeds ranging from 36 Mbps to over 300 Mbps to homes or businesses. A cable broadband connection can provide cable TV, phone and internet-ready technology.
- **Fibre optic** broadband transmits information through pulses of light sent via dedicated fibre optic cable at speeds of over 1000 Mbps. As with cable broadband, fibre optic provides cable TV, phone and internet-ready technology to homes or businesses using one cable.

(Any three)

- iii The **IP or internet protocol address** is a unique address that identifies each computer as a node on the internet so that information can be sent to it. An IP address has two parts. The first part is used as a network address and the last part is the host address. For example, the IP address 192.168.1.152 can be divided into two parts as follows:

- 192.168.1. refers to the network
- 152 refers to the host.

The network part of the address is similar to a house address, number or postcode. The host part of the address is similar to a person's name on the mail who lives at that address. The IP address might be constant – that is, remain the same every time you connect to the internet (static) – or it could be a temporary address that changes each time you connect to the internet (dynamic).

- 2** List the different types of modems and explain how they differ.

The different types of modems are digital subscriber line (DSL), cable, fibre and satellite.

The modems differ in the following ways:

- A **DSL modem** is capable of transferring data over a standard copper telephone line.
- A **cable modem** is capable of transferring data over a coaxial cable line.
- A **fibre modem** is capable of transferring data over a fibre optic line.
- A **satellite modem** is capable of transferring data over a satellite connection.

- 3** Many people now use email for sending letters.

a What is email?

b List THREE advantages and TWO disadvantages of email over normal mail.

c Why does a user need to have a password to access and send email?

d Give TWO advantages of using email as opposed to using a phone.

a **Email** enables users locally and worldwide to send electronic messages (text, sound, video and graphics) to one individual or to a group of individuals, and to receive messages from others.

b Advantages of email over normal mail:

- A powerful feature of emails is the option to send attachments. For example, a document created in Microsoft Word can be attached to an email message and received by the recipient with an email program.
- Email is much faster than mail delivered by the traditional postal system. An email can be sent to an email subscriber in any part of the world in a matter of seconds or minutes (depending on the 'traffic' on the internet).
- A subscriber can access his or her email from any part of the world as long as internet access is available.
- Apart from the fee that a subscriber has to pay to an ISP for internet access, sending email is free. You can send as many emails as you like at no additional charge and at your own convenience, any time of the day or night.

(Any three)

Disadvantages of email over normal mail:

- Emails can contain viruses.
- Emails lack a personal touch.

c A user needs to have a password to access and send email in order to maintain the confidentiality of an email.

d Advantages of using email as opposed to using a phone:

- The user send an email to multiple people at one time.
- Recipients can reply at their leisure.
- Attachments can be added to an email.
- The contents of an email can be kept as proof of a transaction.

(Any two)

4 How do you believe podcasting should be used in schools?

Examples of how podcasting should be used in schools:

- Allow students to create and share content.
- Students could review class notes at their convenience.
- Students who miss classes can access the class notes so that they can make up for missed classes.

5 Give TWO examples of how a browser may be used for:

a business purposes.

b personal use.

a Examples of how a browser may be used for business purposes:

- for selling products
- to conduct meetings
- to advertise the business.

(Any two)

b Examples of how a browser may be used for personal use:

- for shopping online
- to chat online
- for watching and listening to recorded broadcasts.

(Any two)

6 With the aid of examples, explain what URLs are.

A URL, or uniform resource locator, is the address of an internet file, and is usually in this format, made up of four parts:

Protocol://Server/Path/Filename

Explained, these parts are, from left to right:

- the name of the internet protocol, usually 'http', giving access to the site
- the server (hostname, for example, WWW), the computer on which the document is located
- the path (directory hierarchy); the top-level directory and any lower-level sub-directories (separated by '/' characters) in which the required file is to be found
- filename; the actual file name of the document.

7 What are some of the benefits that can be gained by a company that has set up an intranet?

Some of the benefits that can be gained by a company that has set up an intranet are:

- An intranet can be thought of as a micro version of the internet within a company or organisation. It offers the same features as the global internet but in the company.
- Many companies handle large volumes of information such as training manuals, company reports, job openings/descriptions and newsletters. Authorised users within the company can use the company's intranet to find information easily and quickly.
- The documents in an intranet contain tags that provide links to other documents found in the company's network (or outside on the wider internet). This is handled using the same browsers, other software and TCP/IP, as used for the internet.

- 8 Using an example, briefly explain how the domain name system (DNS) operates.

A **domain name system (DNS)** is a distributed database system for translating a host computer name (such as 'a.b.com') to an IP address (such as '192.54.122.5') or vice versa.

The DNS divides the internet into a series of domains. It uses a hierarchical naming system or tree structure to represent a host. A domain is divided into second-level domains, which further subdivide into third-level domains and so on. A host is therefore named for the largest domain to which it belongs, then for any sub-domains within the largest domain, and then finally for the unique hostname. The DNS system allows an internet host to find another internet host by translating the hostname to the IP address of the computer.

At the top level, there are domains corresponding to educational institutions (edu), commercial entities (com), public organisations (org), governmental bodies (gov) and the military (mil). Individual organisations each get their name at the second level of the naming hierarchy. For example, Microsoft has 'Microsoft.com' and the Association of Curriculum Developers has 'ASCD.org'.

Departments within an organisation will be at the third level of the hierarchy, for example, 'shop.ASCD.org'. Sometimes a fourth level, which includes the unique hostname, is included. For example, if your domain is 'fun.com', which points to your website, you can create 'holiday.fun.com', which points to the holiday section of your website. You may also have a 'Caribbean.holiday.fun.com', which now gives the name of the computer in the holiday section of the website. The complete name of a host, therefore, includes the unique hostname, all sub-organisation units, the organisational name and the top-level domain.

- 9 List THREE types of websites and explain their purpose.

Types of websites and the purpose of each:

- **Personal websites** – Individuals can create a personal website that can be used to display family photos, an online diary or information that they would like to share. These websites can be created from scratch using HTML or by using free website building sites.
- **Photo-sharing websites** – Websites such as Flickr.com and Google Photos™ photo storage and organising platform offer free photo-sharing and hosting services. Also, many digital cameras, photo printers and smartphones come with software to create digital photo slide shows, which can be uploaded to the Web.
- **Community building websites (social websites, forum websites, and sharing websites)** – These websites build online communities of people who want to interact with other people socially or meet people who share their interests. Some of the best-known websites of this type are facebook.com, LinkedIn.com and Twitter.com. For sharing and discussing mutual interests, there are online forums for practically any subject you can think of. These forum websites can be a great source of information.

- **Mobile device websites** – Mobile devices (smartphones, tablets, watches, and so on) are used extensively today. One problem is that standard websites are difficult to view and sometimes take a long time to download on some of these devices, with their small screens and wireless connections. Websites whose pages are narrower in width and take up less bandwidth work much better for mobile devices. A new domain designation .mobi, which has been available since the year 2006, has been created to identify websites that are ‘mobile friendly’. Increasingly, designers are being encouraged to make their websites responsive so that they can adapt to different screen sizes. This reflects the changing way in which we are using the Web, with more of us using small screens such as smartphones and tablets rather than computers with larger screens. Google™ search now favours responsive designs in its searches.
 - **Informational websites** – Informational websites are websites that provide information on a wide range of topics. Newspaper companies, television companies, governments and business organisations all have websites that offer information to the public. One of the main informational sites available is wikipedia.org, the online encyclopaedia. This site allows members to contribute and edit articles. In addition, business owners often create websites to provide information about the products they sell. They can create a hybrid website by adding an e-commerce feature whereby the company can perform business transactions.
 - **Directory websites** – Directory websites are the modern version of the printed Yellow Pages in phone books to find services and businesses. Directories can be dedicated to a certain topic or industry, or they can cover geographical areas. Some examples of general website directories are real estate, events, jobs, hotels, restaurants, and so on.
 - **E-commerce websites** – There are millions of small businesses who use their e-commerce websites to sell their products over the internet. Just about anything that can be sold in a brick-and-mortar store can be sold online – with far fewer overheads! Some popular e-commerce sites are AMAZON, eBay, Tmall and Alibaba.
- (Any three)

10 The use of mobile wireless data services continues to increase worldwide. Mobile commerce is one application that has been continuously growing.

a Explain THREE advantages of mobile commerce.

b Explain how mobile data services can be used in education.

- a** Advantages of mobile commerce (m-commerce):
- Businesses do not need expensive high street shops.
 - Customers can shop from anywhere and get purchases delivered anywhere.
 - M-commerce can make services or applications available to consumers whenever and wherever a need arises.
 - Users can get any information they need, whenever they want, regardless of their location, via mobile devices that are able to connect to the internet.

- Through mobile devices, business entities can approach customers anywhere and anytime. As a result, customers are no longer restricted by time or place in accessing e-commerce activities.
 - In addition, mobile devices are easy to carry and can connect easily and quickly to the internet, Intranet, other mobile devices and online databases, therefore making accessing services more convenient.
- b** How mobile data services can be used in education, for example, mobile data services can:
- create a pathway to a wealth of information and research materials, educational resources
 - increase opportunities for learning in and out of the classroom
 - enable teachers to use online materials to prepare lessons, so leading students to widening their range of learning
 - save time, which means that teachers can focus on and give more time to supporting individual student's learning needs, thus helping to rectify inequalities in education
 - help to reduce costs for educational administrators.

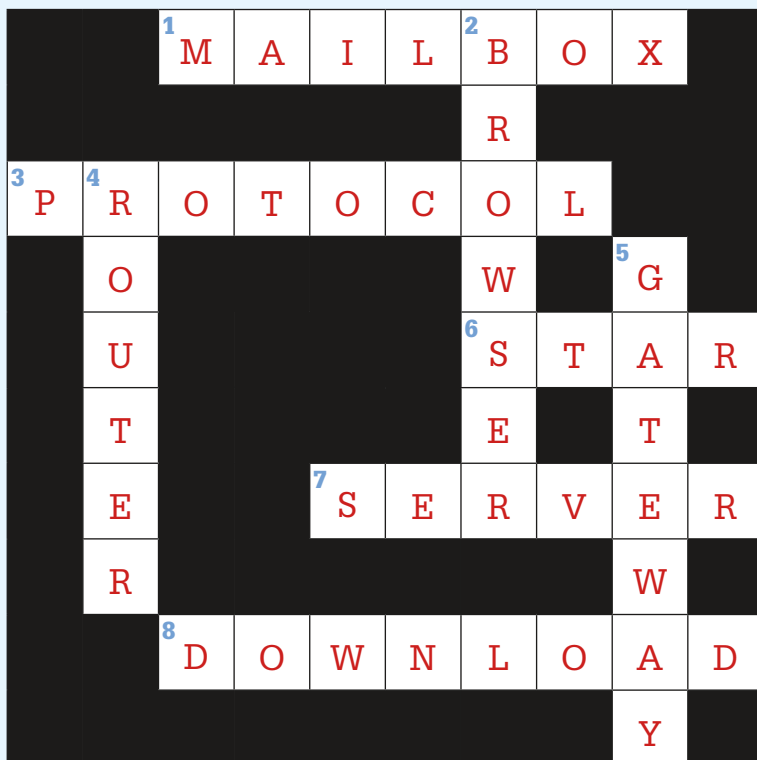
Research questions

- 1** A school has recently been granted an internet connection. The school principal intends to network all the computers on the school compound. As the president of the ICT club at the school, she has come to you for advice. She would like answers to the following questions:
 - a** What type of network (wireless or wired) is best suited for the school?
 - b** What are the advantages and disadvantages of this network?
 - c** What equipment would be required to set up this network?
 - d** What software would be required to ensure that both networks will function?
 - e** Will you please provide a sketch of all the devices in a wired and wireless solution?
- 2** The principal has also asked that you provide her with a report on how the availability of the internet and networked computers can improve student learning.

Students' research will vary.

- 1** Has the student:
 - a** found out what type of network (wireless or wired) is best suited for the school?
 - b** researched the advantages and disadvantages of this network?
 - c** investigated the equipment that would be required to set up this network?
 - d** found out what software would be required to ensure that both networks will function?
 - e** provided a sketch of all the devices in a wired and wireless solution?
- 2** Has the student prepared a suitable report for the principal on how the availability of the internet and networked computers can improve student learning?

Crossword



Across

- 1** An area of storage allocated to you by a mail server (7)
- 3** A set of rules that defines how computers interact or communicate with each other (8)
- 6** This topology connects the computers on the network through a central hub (4)
- 7** It runs the networking software that allows resources to be shared with other computers on the network (6)
- 8** The term used to describe the copying of a file from one computer on the internet to a storage device on your computer (8)

Down

- 2** Used to navigate the WWW (7)
- 4** A device or computer designed specifically for sending packets of data to their correct destination (6)
- 5** An interface that enables communication between two different networks (7)

Questions and answers 8

True or False?

- 1 An array is a special variable that is used to store a number of elements of the same type.
True
- 2 Pseudocode is a programming language. **False**
- 3 In the WHILE construct, the computer executes a set of statements or instructions repeatedly, for as long as a given condition is false. **False**
- 4 Modular programming is also called 'top-down analysis' or 'top-down design methodology'.
True
- 5 In the REPEAT...UNTIL construct, the computer executes a set of statements or instructions once. **False**
- 6 Programming instructions can be divided into three main types: Input and Storage instructions, Processing instructions and Output instructions. **True**
- 7 When you know how many times statements within a loop are to be repeated, the WHILE construct is used. **True**
- 8 A computer program is a series of coded instructions for the computer to obey in order to solve a problem. **True**
- 9 Flowcharts are diagrams that are used to represent pseudocode visually. **True**
- 10 A construct is a word that instructs the computer what must be done to accomplish a specific task. **False**

Questions and answers 9

True or False?

- 1 Writeln or Write statement text is printed when enclosed with double quotations marks. **False**
- 2 A Writeln statement causes the cursor to be positioned at the beginning of the next line. **False**
- 3 The end of a Pascal program is terminated by the statement 'STOP'. **False**
- 4 The Write statement causes the cursor to be positioned at the end of the statement being read. **False**
- 5 A comment cannot be written anywhere in a program. **False**
- 6 A comment in VB may be enclosed using { and }. **False**
- 7 A comment cannot be enclosed using (* and *). **False**
- 8 The '&' is an operator in Visual Basic. **False**
- 9 Semi-colons are not placed at the end of statements in the Visual Basic programming language. **True**
- 10 Every program statement in the Pascal program is terminated by a full stop. **False**

Questions and answers 10

Fill in the blanks

- 1 One way of safeguarding a system is to perform a **risk** assessment.
- 2 A **vulnerability** is a flaw in a system that can be exploited to cause loss or harm.
- 3 A set of circumstances that has the potential to cause loss or harm is known as a **threat**.
- 4 **Data integrity** concerns the consistency, accuracy and reliability of data.
- 5 **Encryption** is one of the most effective methods of securing data from electronic eavesdropping.
- 6 **Anti-virus software** is used to scan your personal computer hard disk for known viruses and remove them once they are found.
- 7 A program, a hardware device or a combination of both, that filters the information coming in through the internet connection to your computer system or network is called a **firewall**.
- 8 **Malware** is a term used to describe different types of malicious software, which include viruses, worms, spyware, ransomware, Trojans and bots.
- 9 A **virus** is a program that activates itself unknown to the user and destroys or corrupts data.
- 10 **Data privacy** refers to the rights of individuals to determine what information is stored about them and how that information will be used.

True or False?

- 1 Data integrity and security mean the same thing. **False**
- 2 Distributing work to a number of employees instead of just one is a physical safeguard method of securing data. **False**
- 3 Passwords for files and folders can be used to protect data. **True**
- 4 Encryption is not a very effective method of protecting data during storage or transmission. **False**
- 5 A firewall can consist of software, hardware or a combination of both of these. **True**
- 6 Viruses can cause businesses to lose millions of dollars. **True**
- 7 Viruses cannot be spread through emails. **False**
- 8 Internet fraud occurs mainly through telemarketing. **True**
- 9 In many countries, individuals are legally entitled to determine what information is stored about them and how that information will be used. **True**
- 10 Hacking is the unauthorised accessing of a computer system. **True**

Multiple-choice questions

- 1 Data integrity concerns:
 - a consistency of data.
 - b accuracy of data.
 - c reliability of data.
 - d **all of the above.**
- 2 Data integrity can be compromised by:
 - a human error.
 - b natural disaster.
 - c viruses.
 - d **all of the above.**
- 3 Which of the following is not a physical safeguard method used to secure data?
 - a Biometric scans
 - b **Anti-virus programs**
 - c Security guards
 - d Fireproof safe
- 4 Which of the following is not a software safeguard method used to secure data?
 - a Passwords for the system
 - b Audit trails
 - c Encryption
 - d **The operating system**
- 5 Which of the following is not a computer virus?
 - a Worm
 - b Trojan horse
 - c Email virus
 - d **McAfee**
- 6 You can protect your computer against viruses by:
 - a installing an anti-virus package.
 - b not using storage media from other computers.
 - c not opening email attachments that contain any executable files with the extension .exe, .com or .vbs.
 - d **all of the above.**
- 7 Which one of the following is not a type of software piracy?
 - a Internet piracy
 - b Copying freeware
 - c Counterfeiting
 - d **Licensed-user duplication for unlicensed users**
- 8 A criminally-minded hacker may access a computer system to:
 - a install anti-virus software.
 - b **steal important and confidential information.**
 - c inform companies of security loopholes in their system.
 - d play games.

Short-answer questions

- 1 Explain the term 'data privacy'.

Data privacy refers to the right of individuals to determine what information is stored about them and how that information will be used.

- 2 a Define the term 'software piracy'.

b Describe FOUR types of software piracy.

c Do you feel someone should be jailed or fined if found guilty of software piracy?

a **Software piracy** is the unauthorised copying, usage or selling of software that is copyrighted and is not public domain software or freeware.

b Four types of software piracy:

- internet piracy
- copying freeware
- counterfeiting
- pre-installed software; using it in more computers than is allowed.

c Students will have their own viewpoints about whether someone should be jailed or fined if found guilty of software piracy. Encourage constructive discussion around the topic and make sure that students respect one another's viewpoints.

- 3 a Define the term 'hacking'.

b List FIVE reasons why people may hack.

c List THREE methods used to gain illegal access to a computer.

d State THREE methods that can be used to prevent unauthorised access to computer facilities.

a **Hacking** is the unauthorised accessing of a computer system.

b Five reasons why people may hack:

- to steal important and highly confidential information
- to copy computer programs illegally
- to alter data
- to delete data or install a virus to destroy or corrupt it
- to transfer money from one bank account to another using electronic funds transfer (EFT).

- c** Three methods used by hackers to gain illegal access to a computer:
- through impersonation or pretending to be someone who is a legitimate user (for example, scammers often send messages, impersonating you, directing people to fake websites or asking them to send money)
 - using brute force attacks, which means trying every possible combination of characters to find the password
 - by remote login, which involves using the flaws in an operating system to find a 'back door' that allows the hacker to connect to a remote computer and control it.
- d** Methods to prevent unauthorised access to computer facilities:
- Use strong passwords.
 - Use passwords for individual files, folders, apps and websites.
 - Use audit trails or access logs (via intrusion detection systems).
 - Encode (scramble) data, called encryption, during storage or transmission so that it cannot be understood by someone who does not have the encryption key or software to convert it back to its original form.
 - Install a firewall package.
 - Install anti-virus software.
- (Any three)

- 4 a** What is computer fraud?
- b** Explain the term 'internet fraud'.
- c** Briefly describe FOUR types of internet fraud.

- a** **Computer fraud** is using a computer in some way to commit a dishonest act by obtaining an advantage or causing the loss of something of value.
- b** **Internet fraud** refers generally to any type of fraud scheme that uses one or more components of the internet – such as chat rooms, email, message boards or websites – to present fraudulent offers to prospective victims and conduct fraudulent transactions.
- c** Types of internet fraud are:
- **Online trading schemes** – Companies or individuals set up virtual shops/malls on websites. The businesses offer high-value but low-priced items that are likely to attract many consumers. Internet fraud occurs when the company or individual bills the customer, collects the money and then does not deliver the items, or delivers a substandard product that is of far less valuable than promised. Another example includes impersonating charities and requesting donations for natural disasters.
 - **Credit card fraud** – This is a variation of online trading schemes. The fraud involves setting up businesses on the internet to lure individuals into giving their credit card numbers so as to steal their money. A common method is to send emails pretending to be from a major bank. These messages direct you to a fake website that asks you to type in your banking details, thereby allowing the fraudster to steal your money.

- **Business opportunity/'work-at-home' schemes online** – There are many fraudulent schemes that use the internet to advertise business opportunities, which supposedly allow individuals to get rich or earn large sums of money working at home. These schemes typically require payment for information and material to start the business or get a job, but then fail to deliver the materials, information or the job.
- **Unexpected prize scams** – These include lottery scams, 'scratchie' scams and travel scams. These scams can be delivered online, by telephone or by email. They inform you that you have won a prize (for example, a large sum of money, shopping vouchers, a free holiday or travel-related products). To claim it you are asked to send money or provide personal information.
- **Unexpected money scams** – These include inheritance scams, 'Nigerian' scams, money reclaim scams and other upfront payment or advance fee fraud. These scams ask you to send money upfront for a product or reward, to provide personal information, to pay lawyer fees, to claim your inheritance or large claim from a distant relative overseas, or to transfer money on someone's behalf with the promise of receiving money in return.
- **Threats and extortion scams** – These involve scammers sending random death threats via SMS or email from a supposed hired 'hit man'. The message will contain a warning unless you send the cash.

(Any four)

- 5** List some steps that someone can take to protect his or her mobile devices.

Steps to take to protect mobile devices:

- Beware of scams. If you receive an email or SMS that looks like a scam, delete it. Do not respond, attempt to unsubscribe, or call any telephone number listed in the message. Most importantly, do not send any money, credit card details or other personal details to scammers.
- Use good, cryptic passwords that cannot be easily guessed, and keep your passwords secret.
- Minimise storage of sensitive information.
- Do not send personal information such as bank account numbers and credit card numbers over open Wi-Fi networks, such as those available in airports and shopping centres. These do not use an encrypted connection, so make it easier for hackers to gain access.
- Secure laptop computers and mobile devices; lock them up or carry them with you. Most smartphone and laptop operating systems allow you to encrypt data stored on them. If the device is stolen, no one can access the data on it unless they have the correct password.
- Do not install or download unknown or unsolicited programs or apps.
- Make sure anti-virus and anti-spyware software are up to date.
- Shut down, lock, log off, or put your computer and other devices to sleep before leaving them unattended, and make sure they require a secure password to start up or wake-up.
- Make backup copies of files or data you are not willing to lose.

- 6 a** Explain the term 'identity theft'.
- b** List some ways criminals use to steal someone's identity.
- c** List some ways to protect oneself from identity theft.

- a Identity theft** is a widespread crime that is continually evolving with the constant evolution of technology and trends. Cybercriminals have a variety of schemes to get a hold of your personal information and use it to steal your money, sell your identity and commit fraud or other crimes in your name. We have already looked at phishing and hacking as two ways criminals can access your personal information.
- b** Some ways that criminals use to steal a person's identity:
- **Credit card theft** – One of the most common identity theft attacks occurs through the use of credit cards. Many people use credit cards everywhere; for shopping, entertainment and paying bills. This means that each time an individual purchases an item, several persons may have access to the individual's credit card. This provides many opportunities for a thief to steal the credit card number. If possible, individuals should use business establishments that allow them to swipe their own card, and they should not let their card out of sight.
 - **Unsecure websites** – Whenever you shop or make a transaction online, there's a chance that an identity thief could intercept (get hold of) your personal information. Before making an online purchase, make sure the website is secure. Websites with a URL that starts with 'https' are usually safe (The 's' shows that it is a secure website.). Identity theft protection services can also help to protect your information when you are online.
 - **Shoulder surfing** – Thieves will stand over the shoulder of unsuspecting individuals while they input their PIN and credit card numbers with the intent to steal the information. When typing your PIN at the ATM or your credit card numbers on your smartphone, make sure that there is no one looking over your shoulder. You should also cover your screen with your hand as you enter personal data in a public setting.
 - **Skimming** – Skimming occurs when an identity thief installs an additional device onto an existing ATM or credit card reader. This device can read your credit card information, including your ATM or debit card PIN. If you notice an oddly shaped credit card reader, or there's a noticeable difference in your regular ATM reader, do not use the machine and notify the owner and police.
 - **Dumpster diving** – Thieves will go through your trash looking for bills, receipts, credit card statements and other documents containing your personal information. Shred your statements or make your account numbers illegible when you throw them away.
 - **Mail theft** – Thieves sometimes steal bank statements or new credit cards directly from the mailbox. If you notice someone has tampered with your mailbox or you think mail is missing, contact your local post office and report the incident to the police.

- c** How to protect yourself from identity theft:
- **Shred** – Shred any documents containing personal information before you toss them in the bin.
 - **Use secure passwords** – Be sure to password protect all your devices, and use a different, unique, and complicated password for each of your online accounts.
 - **Use secure connections** – Never log in to financial accounts or shop online while using free public Wi-Fi, and make sure you encrypt and password protect your Wi-Fi at home.
 - **Monitor** – Review your credit reports and bank accounts periodically to look for suspicious activity and errors that could mean identity theft.
 - **Detect** – Use an identity theft detection product that includes identity theft restoration. If you do become a victim of identity theft, you will be notified quickly and certified specialists will help to restore your identity.

7 a Define the term 'firewall'.

b List THREE attacks to a computer system that can be prevented by a firewall.

- a** A **firewall** is a program, a hardware device or a combination of both that filters the information coming in through your computer system's or network's connection to the internet. It prevents unauthorised users from gaining access. A firewall can also perform audit and alarm functions that record all access attempts to and from a network.
- b** Attacks to a computer system that can be prevented by a firewall:
- **Remote login** – This is when someone is able to connect to your computer and control it in some form, ranging from being able to view or access your files to actually running programs on your computer.
 - **Spam (electronic junk mail)** – By gaining access to a list of email addresses, a person can send unwanted spam to thousands of users.
 - **Denial of service** – This is an attack that floods a computer or website with data, causing it to overload and preventing it from functioning properly. This type of attack is more frequently targeted at businesses, rather than individuals.
 - **Malware** – This is a term used to describe different types of malicious software, which include viruses, worms, spyware, ransomware, trojans and bots. Criminals may use malware to monitor your online activity in the hope that they can steal valuable personal information, such as your credit card details.

(Any three)

- 8 **a** Define the term 'cybercrime'.
- b** Give THREE examples of cybercrime.
- c** Using an example stated in part (b) describe how the crime may occur.

a Cybercrimes are crimes that are directed at computers or other devices (for example, hacking) and where computers or other devices are integral to the offence.

b Examples of cybercrime:

- cyberbullying
- prohibited, obscene, offensive and illegal content
- software, music and video piracy
- phishing
- hacking
- internet fraud.

(Any three)

c Description of how the crimes may occur, for example:

Cyberbullying

Cyberbullying or stalking is when someone engages in offensive, menacing or harassing behaviour using electronic means. Although it has become increasingly common among teenagers, it can happen to people of any age, at any time, and often anonymously. It can affect the individual being bullied badly, for example, you can walk away from a bully at school, but cyberbullies can reach you at home via computer or phone.

Examples of some of the ways cyberbullying can occur include:

- posting hurtful messages, images or videos online
- repeatedly sending unwanted messages online
- sending abusive texts and emails
- excluding or intimidating others online
- creating fake social networking profiles or websites that are hurtful
- nasty online gossip and chat
- any other form of digital communication that is discriminatory, intimidating, intended to cause hurt or make someone fear for their safety.

Prohibited, obscene, offensive and illegal content

Illegal and prohibited content can be found almost anywhere online: newsgroups, forums, blogs, social media, peer-to-peer networks, live visual and audio. One of the major risks of illegal and prohibited content is that it may reach children, for whom such content can be especially damaging. In order to keep the internet safe for all users, you should report prohibited online content. The following types of content may be classified as prohibited, offensive and illegal content:

- child pornography or child abuse
- content that shows extreme sexual violence or materials that are overly violent
- content that provokes the viewer into committing crimes and carrying out violent acts
- content that promotes terrorism or encourages terrorist acts.

Software, music and video piracy

Piracy is the unauthorised copying, usage or selling of software, music or films that are copyrighted. Piracy is an infringement of ownership rights. It is the theft of the work and effort of another individual or company. The owner may therefore lose money they could have earned as a result of piracy, just as if someone were to steal your hard-earned money by picking your pocket on the street. Pirated material is theft, and using it is morally wrong.

Some of the main types of software, music and film piracy are:

- **Licensed-user duplication for unlicensed users:** If someone buys a new computer from a reputable (reliable) company, then within the overall price of the computer, the person may also be paying for copyrighted software that is on that machine. So, at the same time, a private purchaser of a computer is buying a single-user licence for the software on that machine. Licensed-user piracy occurs when the user makes copies of the machine's software and distributes or sells it to other individuals or companies. Another common example is if a company purchases a software package for use on, say 20 machines, but installs the software on more than 20 machines. All the computers in excess of the 20 to which the licence was granted are therefore using pirated software, since the licence was limited. Another example is if someone buys a DVD or CD and makes copies to sell or give to friends.
- **Pre-installed software:** Software piracy can also occur when, for example, a computer store uses a copy of a software package that was licensed for use on one computer but installs it in many computers.
- **Internet piracy:** Some websites allow individuals to download unauthorised copies of software, music or films.
- **Counterfeiting:** This occurs when individuals or companies make illegal copies of software, music and films and package it to look like the original packaging from the manufacturer.

Phishing

Phishing refers to attempts by cybercriminals and hackers to trick you into giving away personal information to gain access to account numbers or to infect your machine with malware. Phishing attempts can happen through a variety of ways, including email, social media or text messages, and can compromise security and lead to theft of personal and financial data, for example, to get credit card details to use online. Phishing messages can come from hijacked accounts of people you know, making them hard to distinguish from real messages, or they can impersonate emails from real organisations such as banks. Additionally, cybercriminals commonly use infected documents or PDF attachments to aid in their phishing attempts.

Hacking

Hacking is the unauthorised accessing of a computer system. Hackers may gain access to your computer or device through security weaknesses, phishing or malware. Once they have compromised your email, banking or social media accounts, hackers can change passwords, preventing you from accessing your accounts. Scammers often send out messages impersonating you, directing people to fake websites, or asking them to send money. Hackers are usually excellent computer programmers. Many hackers are young people who hack into systems just for the challenge or as a prank. This may seem harmless but it can cause great damage and is illegal in many countries. The more criminally-minded hackers access computer systems for one or more reasons:

- to steal important and highly confidential information
- to copy computer programs illegally
- to alter data
- to delete data or install a virus to destroy or corrupt it
- to transfer money from one bank account to another using electronic funds transfer (EFT).

Some of the most common methods that hackers use are:

- Impersonation, or pretending to be someone who is a legitimate user.
- Brute force attacks, such as trying every possible combination of characters to find the password.
- Remote login, using the flaws in operating systems to find a back door that allows a hacker to connect to a remote computer and control it.

Internet fraud

The term 'internet fraud' refers generally to any type of fraud scheme that uses one or more components of the internet – such as chat rooms, email, message boards or websites – to present fraudulent offers to prospective victims and conduct fraudulent transactions.

Some major types of internet fraud are:

- Online trading schemes, such as the buying and selling of products over the internet.
- Credit card fraud, which is a slight variation of online trading schemes.
- Business opportunity/'work-at-home' schemes online, where fraudulent sites offer business opportunities that supposedly allow individuals to get rich or earn large sums of money working at home.
- Unexpected prize scams, which include lottery scams, 'scratchie' scams and travel scams.
- Unexpected money scams, including inheritance scams, 'Nigerian' scams, money reclaim scams and other upfront payment or advance fee fraud. These scams ask you to send money upfront for a product or reward, to provide personal information, to pay lawyer fees, to claim your inheritance or large claim from a distant relative overseas, or to transfer money on someone's behalf with the promise of receiving money in return.
- Threats and extortion scams, which involve scammers sending random death threats via SMS or email from a supposed hired 'hit man'. The message will contain threats unless you send the 'hit man' cash.

(Any one)

- 9 a Explain the term 'phishing'.
- b State THREE tactics used in phishing attempts.
- c Describe TWO ways someone can avoid phishing attempts.

- a **Phishing** refers to attempts by cybercriminals and hackers to trick you into giving away personal information to gain access to account numbers or to infect your machine with malware.
- b Three tactics used in phishing are to send an email, to make contact via social media or via text messages. (Phishing messages can come from hijacked accounts of people you know, making them hard to distinguish from real messages, or they can impersonate emails from real organisations such as banks. Additionally, cybercriminals commonly use infected documents or PDF attachments to aid in their phishing attempts.)
- c To avoid phishing attempts:
- You need to be vigilant because phishing attempts can often get through spam filters and security software that you may have in your computer.
 - Keep an eye out for things such as poor spelling, unexpected urgency (for example, 'you must do this now') or a wrong salutation (for example, your bank saying 'hi Jones' rather than something more formal, such as 'Dear Mr Jones' or 'Hello Fred'.
 - Think twice about clicking a link or opening a document that seems suspicious.
 - Double-check that every URL or email address where you enter your password looks real, for example, it is spelled correctly.
 - If anything raises doubt, delete the communication.
- (Any two)

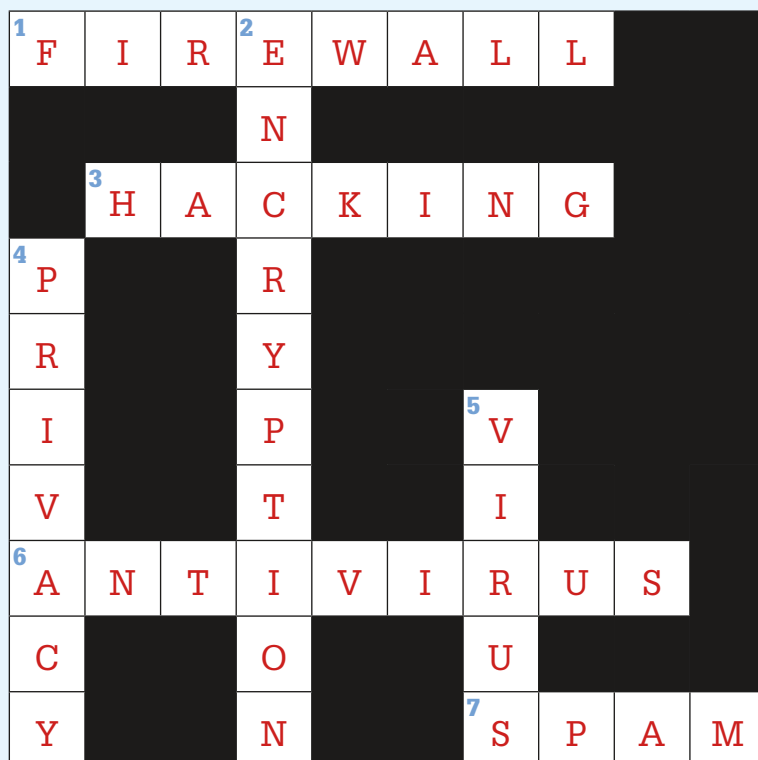
Research questions

- 1** You are an IT intern at a leading shoe manufacturing company. The IT manager said an employee came to him and said she found that since she downloaded an email attachment from a friend, her computer seems to be running very slow. The IT manager believes malware could be the reason for the employee's problem. The manager has asked you to prepare a set of guidelines for employees to follow when they perform the following:
 - a** Access email with suspicious attachments
 - b** Access email from unknown persons
 - c** Respond to emails that ask for personal information
 - d** Surf the Web
- 2** A shoe manufacturing company has lots of competitors who want to steal their designs and other company secrets. You have been asked to design security measures that include both hardware and software methods to protect the company secrets. These measures must be stated in a report to the IT manager.
- 3** At a local university, several students have been affected by cybercrimes. The student guild of the University has asked you to create a set of guidelines for students to follow, to protect themselves and their equipment.

Students' research will vary. Give guidance on research methods as needed.

- 1** Have students prepared a set of guidelines for employees to follow when they perform the different tasks in parts (a) to (d)?
- 2** Have students been able to design security measures that include both hardware and software methods to protect the company secrets? Is the report for the IT manager clear and concise?
- 3** Have students managed to create a set of guidelines to follow, about how to protect themselves and their equipment?

Crossword



Across

- 1** A piece of software, hardware or both that is used to prevent unauthorised access to a computer network (8)
- 3** The unauthorised accessing of a computer system (7)
- 6** A type of software used to protect computer systems from viruses (9)
- 7** Another name for 'electronic junk mail' (4)

Down

- 2** A method used to encode data during storage or transmission (10)
- 4** It refers to the right of individuals to determine what information is stored about them and how that information will be used (7)
- 5** A small piece of software that uses computer networks and security holes to replicate itself (5)

Questions and answers 11

Fill in the blanks

- 1 A **website** is a collection of related web pages linked with hyperlinks that reside in a web server.
- 2 Web pages are written in **HTML** code.
- 3 **Hypertext Markup Language** is the language that web browsers use to understand how to display the contents of a web page.
- 4 Websites are accessible to users via the **World Wide Web (WWW)**.
- 5 Notepad is a basic **text editor** program that you can use to create simple documents.
- 6 Web pages can be created in Notepad by entering HTML code and saving the file as an **.html** file.
- 7 An HTML file is a text file containing markup **tags (commands)**.
- 8 **<HTML>** tells your browser that this is the start of an HTML document.
- 9 A **wireframe** is a simplistic sketch and/or layout of a web page.
- 10 A service that allows organisations and individuals to post a website or web page onto the internet is known as **web hosting**.
- 11 Wix.com and Jimdo are examples of **website builder** software.
- 12 Websites are hosted or stored on special computers called **servers**.
- 13 Site **maintenance** ensures that a website is secure, updated and working properly.

True or False?

- 1 Web pages are written in HTML. **True**
- 2 HTML tags are case sensitive. **False**
- 3 A server-based site is on the server and not on your computer. **True**
- 4 Web pages can be created using application software such as Excel. **True**
- 5 All HTML tags are surrounded by the two characters < and >. **True**
- 6 The text between the <HEAD> tag and the </HEAD> tag is displayed in the browser window. **False**
- 7 Word's built-in HTML translator can automatically convert any text, graphics or hyperlinks that you insert into your Word document into a web-compatible format. **True**
- 8 Microsoft Expression Web is a website authoring application software. **True**
- 9 The SRC tag in HTML inserts an image into a web page. **True**
- 10 The attribution BGCOLOR is used with the BODY tag to change the background colour of a web page. **True**
- 11 Website maintenance is not essential to keep visitors coming back to a site. **False**

Multiple-choice questions

- 1 A website is a collection of:
a sound files. **b** animation files.
c graphic images. **d** web pages.
- 2 Which of the following is NOT a major step in website publishing?
a Planning **b** Designing
c Executing **d** Hosting
- 3 Web pages can be created using:
a application software. **b** an editor program such as Notepad.
c specialist web creation software. **d** all of the above.
- 4 Websites can provide a convenient way of:
a advertising. **b** purchasing items.
c paying bills. **d** all of the above.
- 5 The design of a website depends on:
a the amount of memory space available on your computer.
b purpose and intended users of the site.
c the processing speed of your computer.
d all of the above.

Short-answer questions

- 1 Define the terms 'website' and 'web page'.

A **website** is a collection of web pages that are linked together with hyperlinks and resides in a web server.

A **web page** is a document written using HTML (HyperText Markup Language) and is connected to the world wide web.

- 2 List the FIVE major steps in website publishing.

The major steps (actually six) in website publishing are:

- Planning
- Designing
- Creating
- Evaluation and testing
- Hosting
- Maintaining.

- 3 Describe how you would go about building a web page.

How to go about building a web page:

Planning the layout of the web page is the first stage. At this stage, all the elements need to be thought about, for example, make sure that all the things the audience wants are easy to find on the web page and the web page needs to be well organised and attractive.

Go through the web page to determine what design elements (such as text menus, images, graphics and links) make the most sense for that page. All design elements should be designed in a way that fits together.

The designer should work out the structure and layout of the website beforehand, in order to meet the purpose, user and technical requirements for the target audience and customer.

A tool that can be used for planning the layout of a web page is a wireframe.

- 4 Define the term 'wireframe' and explain its importance in building a website.

A **wireframe**/storyboard can show the direction of movement through the website by laying out the different buttons and links on each page. The importance of a wireframe/storyboard in building a website is to show the structure, mood and organisation of the website.

- 5 List FIVE basic components of a web page.

The components of a web page are:

- a website header
- site navigation
- body/content area
- a footer
- a Back to home page button
- a site map
- Website Search features
- an About us page
- a logo.

(Any five)

- 6 List FOUR different categories of software that can be used to create web pages.

The categories of software that can be used to create web pages are:

- application software, for example, Microsoft Word, Excel and Access
- a text editor program such as Notepad to write an HTML program
- an HTML generator such as Aptana Studio 3
- website builders such as Sitebuilder, Site123, Wix.com and Jimdo
- specialist web creation programs such as Dreamweaver® and Webflow
- website writer software that allows you to write in HTML and create web pages as they appear on the screen, and provides tools to manage a website.

(Any four)

- 7 What are the different types of links you can create in a web page?

The different types of links are hyperlinks, which includes internal links, external links and links to emails.

- 8 Using the tags covered in this chapter, and those that you may have discovered on your own, create a web page about yourself.

Each student's web page will differ. Check that they have understood how to use the tags covered in this chapter.

- 9 Create a web page for your club using Microsoft Word.

Each student's web page will differ. Check that they have understood all the requirements of using Microsoft Word.

- 10 Create a web page for the PTA of your school using HTML in Notepad or Microsoft Word.

Each student's web page will differ. Check that they have understood all the requirements of using HTML in Notepad or Microsoft Word.

- 11** Create a web page for your school using Wix.com.

Each student's web page will differ. Check that they have understood all the requirements of using Wix.com.

- 12** Explain the term 'web hosting'.

Web hosting is a service that allows organisations and individuals to post a website or web page onto the internet. A web host, or web hosting service provider, is a business that provides the technologies and services needed for the website or web page to be viewed on the internet.

- 13** Explain the purpose of maintaining a website.

The purpose of maintaining a website is because they quickly become outdated, old-fashioned and static. When information remains static, there is little reason for people to re-visit the site – and therefore the opportunity to promote new products, ideas and services is lost. A website needs to be kept relevant and up to date.

Research questions

- 1** Make a list of FIVE of the most used website builder software. Place this information on a table under the following headings:
 - a** Name of software
 - b** Cost
 - c** Features offered
 - d** Support offered.
- 2** Make a list of FIVE of the top web hosting companies and their cost for their services.
- 3** Your friends have created a website using HTML. When they open it in the browser on the computer at school it seems to work fine. They would like to make the site available to everyone on the internet. Explain to your friends what they need to do to publish their website onto the internet.
- 4** Maintaining a website is very important to ensuring the success of a website. A few steps to maintain a website are listed in this chapter. Conduct research to find out about other ways to maintain a website. Use the information to prepare a list of instructions someone may follow to maintain a website.

Students' answers will vary for these research questions. Check that they have researched what is asked for in each question. Some example answers have been provided.

- 1** Did students make a list of FIVE of the most used website builder software and place them in a table under the correct headings, as listed in parts (a) to (d)?
For example:

Name of software	Cost	Features offered	Support offered
Sitebuilder			
Site123			
Wix.com			
Jimdo			
Other			

'Other' examples include: Webnode, Weebly, Ucraft, Webstarts, Mozello, Strikingly, One.com, and so on.

Check that students were able to find the information for each of the other three columns of the table.

- 2** Did students make a list of FIVE of the top web hosting companies and their cost for their services?

Some companies students could have found include: Bluehost, HostGator, InMotion, A2 Hosting, SiteGround, iPage, Dreamhost, WP Engine, and so on.

- 3** Were students able to create a well thought-out explanation of what their friends need to do to publish their website onto the internet?

For example, did students include all the required steps such as evaluation and testing?

Evaluation must be done to make sure that the website meets the purpose, user and technical requirements.

Go through the website page by page and look for the features and content in the user and technical requirement. For example:

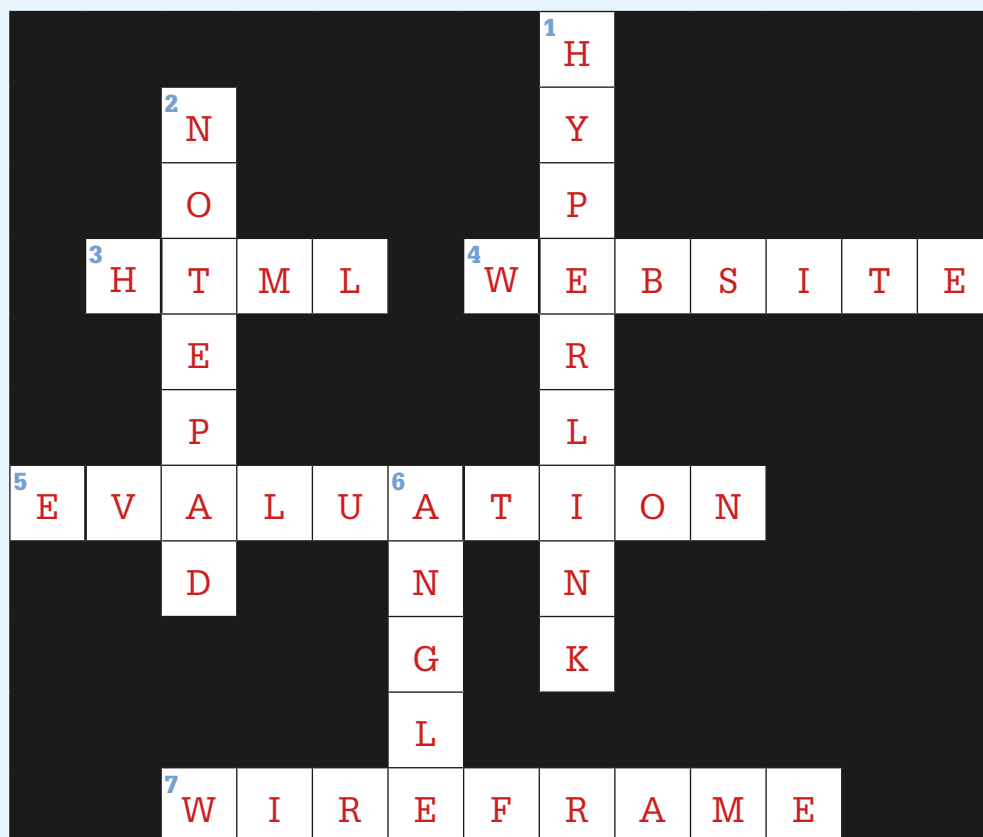
- If there is a requirement to use video, are there videos on the website?
- Are there clear contact, blog and 'About us' sections if the users want to be able to find addresses, read about what the writers have been up to and find out about the writers?
- The users want to be able to link to websites to buy the products that a site reviews – can they do that?
- You put reviews of certain places on your website and the users want to see where they are on a map. Does your website have a map or link to these?
- The users want your website to be 'easy to use'. Is it? How would you test that? This is very difficult to test, as your idea of 'easy to use' might be different from someone else's. One way around this would be to use a test audience (a group of people who match your intended audience whom you invite to try out the website before publishing it). This way, you will get a variety of opinions about how well it works, allowing you to improve it.

Testing the website must be done to make sure that all the content works (for example, the videos all play); all the links and menus work; and all the content is up to date and formatted correctly.

Among the things to check are:

- Do the hyperlinks and menus work?
- Check that the hyperlink or menu item takes you to the correct place when you click on it.
- Check that you can get back to where you came from when you check a hyperlink or menu item.
- Do different media play?
- Can you see all the images? Sometimes these are saved in the wrong place and then the image does not display.
- Do videos and sound work? Sometimes this can depend on how your web browser is set up, so it is a good idea to check these on several different computers. See Figure 11.24.
- Does all the content format correctly?

Crossword



Across

- 3** The extension that must be used to save a Word document as a web page (4)
- 4** A collection of related web pages linked together with hyperlinks and residing in a web server (7)
- 5** A step in creating a website to make sure it meets the purpose, user, and technical requirements (10)
- 7** A simplistic sketch and/or layout of a web page (9)

Down

- 1** Allows you to move to another point within a document or a website by clicking on a word or image (9)
- 2** A basic text editor program that you can use to create web pages (7)
- 6** The types of brackets that surround HTML tags (5)

Questions and answers 12

True or False?

- 1 PowerPoint does not allow you to include sound and videos in your presentation. **False**
- 2 The Blank Presentation start-up option of PowerPoint gives you a blank page with no background or colour scheme. **True**
- 3 AutoContent Wizard guides you through the development of your presentation. **True**
- 4 The 'New Slide' dialog box consists of a number of different layouts. **True**
- 5 There are four panes of development in the Normal view of PowerPoint. **False**
- 6 You cannot change the colour and background once it is already selected. **False**
- 7 You cannot change the sequence of your slides once you have developed your presentation. **False**
- 8 Placeholders can only hold information that you have typed. **False**
- 9 You can preview your animations after making changes. **True**
- 10 You cannot control your PowerPoint presentation by setting the timing and order of animations. **False**
- 11 An animated effect can be placed on an object by selecting either Animation Schemes or Custom Animation. **False**
- 12 Both text and graphics can be animated. **True**
- 13 You can only print six slides on a page. **False**
- 14 Music from a CD cannot be added to a presentation. **False**
- 15 It is appropriate to put as many animations on a slide as you can. **False**
- 16 You cannot print speaker notes, you can only print slides. **False**
- 17 A Master Title is a preset text box. **True**
- 18 The audience will be able to see the speaker notes during a presentation. **False**

Match the icons to their names

- | | |
|---|---|
| 1 Slide Sorter view | 2 Reading view |
| 3 Normal view | 4 Slide Show view |
| a  | b  |
| c  | d  |

- | | | | |
|---------------------|----------|-------------------|----------|
| 1 Slide Sorter view | d | 2 Reading view | c |
| 3 Normal view | b | 4 Slide Show view | a |

Multiple-choice questions

- 1 Which one of the following is not a means of delivering a presentation using PowerPoint?
- a** A slide **b** Printed handout
c Printed note pages **d** **Notes**
- 2 The following are start-up options. Which is not?
- a** Open an existing presentation **b** **Open a new presentation**
c Design template **d** Open Wizard
- 3 Which one of the following is not a pane in the Normal view of PowerPoint?
- a** Outline pane **b** **Slide Development pane**
c Slide Show pane **d** Notes pane
- 4 In which of these can moving slides take place?
- a** Normal view **b** **Slide Sorter view**
c Outline view **d** All of the above
- 5 Which of the following can be added to your presentation?
- a** Sound **b** Graphics
c Video **d** **All of the above**
- 6 To animate an object, which must you choose?
- a** Slide Show from the File menu
b **Animation Effects from the Insert menu**
c Custom Animation from the Format menu
d Custom Animation from the Slide Show menu
- 7 In which of these can moving slides take place?
- a** **Outline pane** **b** Slide Development pane
c Slide Show pane **d** Notes pane
- 8 The Notes pane allows us to:
- a** create our slide show.
b add an animation to our slide.
c **add additional comments about the slide for the presenter.**
d determine if an audience will like our presentation.
- 9 A Slide Master contains:
- a** preset text boxes. **b** consistent appearance.
c preformatted objects. **d** **all of the above.**

- 10** Which of the following are true about animating a presentation?

 - i Animation effects can be applied only to the first slide in your presentation
 - ii The order of an animation in a slide cannot be changed
 - iii Animation Schemes can be used to add an animated effect to a slide

a i only b iii only
c i and ii d ii and iii

11 Which one of the following allows you to run your presentation automatically?

a Transitions b Timing
c Custom Animation d Preset text boxes

12 Which of the following is not a sound effect that can be added to your presentation?

a Music from a CD b Voice recorded sound
c MP3 and MP4 sound d Text

13 A presentation can include all of the following except which one?

a Video b Text
c Chat d Clipart

14 Which of the following is a special effect?

a Fly in b Notes
c Frame d Outline

15 Which of the following is not an effective guideline to follow when creating a presentation?

a Consistent animations b Use as many graphics as possible
c Limit the number of colours d Be mindful of the sound quality

Short-answer questions

- 1 What is a placeholder? Explain its use in PowerPoint.

Placeholders are pre-selected boxes with dotted or hatched borders used to hold titles and other text or objects that helps you to know where you are in a presentation.

- 2 List THREE situations in which PowerPoint presentation software can be used.

PowerPoint can be used to:

- deliver lectures
- present information about a company
- present group projects.

- 3 What is a thumbnail?

Thumbnails are miniature views of a slide which allows you to move them around.

- 4 PowerPoint software can make presentations fun. Give THREE reasons for this.

PowerPoint software can make presentations fun because Powerpoint allows you to add sounds and graphics, animations, transitions and videos, which enhances the quality of your presentation.

- 5 List FIVE guidelines that should be followed to have an effective presentation.

FIVE guidelines that should be followed to have an effective presentation:

- Speak clearly and do not rush your presentation.
- Do not use more than two graphics per slide.
- Avoid using all capital letters as they are hard to read.
- Avoid long sentences as they are difficult to read by your audience.
- Slides should have colours that contrast.

- 6 Explain how sound can enhance your presentation.

Sound can boost the quality of your presentation by making it more exciting and appealing.

- 7 List THREE guidelines that you should use when including sound, animation and transitions in your presentations.

Three guidelines to use when including sound, animation and transitions in presentations:

- Too many animations and transitions can confuse and distract the audience.
- Be consistent with your animations.
- Sound should only be added if it boosts the quality of your presentation.

- 8 Explain the purpose of using a Slide Master template.

Slide Master is used because it adds consistency to your presentation.

- 9 What are speaker notes and how can they be used by a presenter?

Speaker notes are additional notes used by the presenter while presenting, to remind them of key points that they may want to say when presenting.

- 10 Give ONE reason why you would want to automatically time your presentation.

You would want to time your presentation automatically when you want the presentation to run automatically without interference from the presenter through mouse clicking.

Create a 10-slide presentation on one of the following topics

- 1 Safety during carnival time
- 2 Dangers of drinking and driving
- 3 Balanced diet and healthy lifestyles
- 4 Pollution in our community
- 5 Movies affect our perception of how things really are.
- 6 Peer pressure: How does it affect us?
- 7 How piracy is affecting our local artists
- 8 Certain types of music influence our behaviour. Choose a position for or against and produce a PowerPoint presentation to support your viewpoint.
- 9 How HIV and AIDS is affecting our lives
- 10 Safety on the internet
- 11 Our sedentary lifestyles are now blamed on computers and computer games.
- 12 Choose a new or emerging technology and explain how you think it would affect our lives in the future.
- 13 Computers have changed how we do things.
- 14 The pros and cons of wearing a school uniform
- 15 Literary devices (for example, simile, metaphor): their definitions and examples of how they are used
- 16 The benefits of playing sports
- 17 Projects that my peers and I can undertake to benefit my community
- 18 Hurricane preparedness
- 19 Poverty in my community
- 20 What my community is doing to help in the fight against cancer
- 21 Helping a needy family
- 22 Teenage driving is the cause of most major road accidents. Agree or disagree?

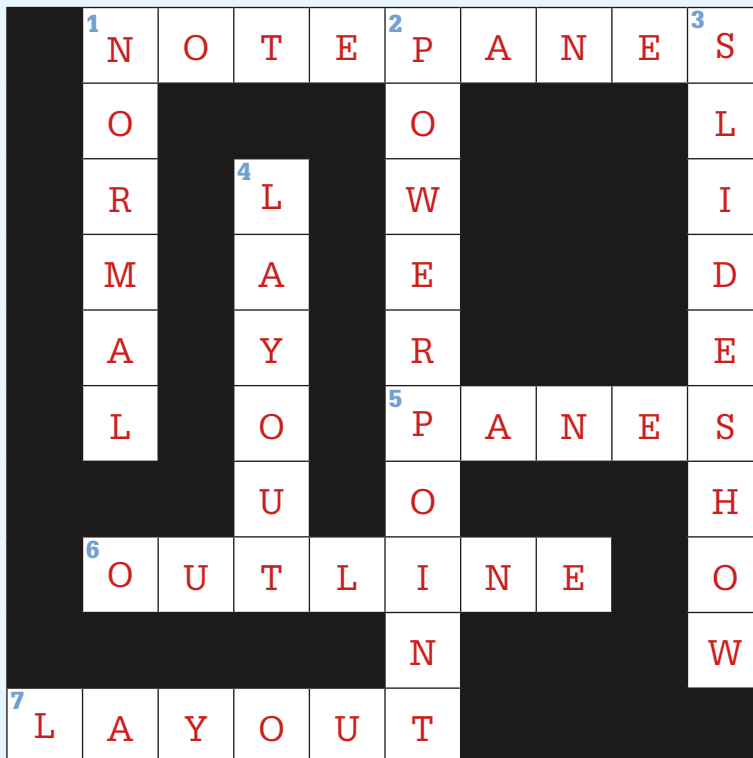
- 23** A friend of yours has been trying to influence you to smoke 'weed', marijuana. His argument is that it makes you mellow, not violent, and that it gives you a great high, helping you to forget all your problems. He says that many successful people think there are benefits to smoking marijuana. Present the facts to your class showing the ill effects of smoking marijuana.

Students' 10-slide presentations will vary.

Have students stuck to their topic and thought it through logically?

Do they understand the steps to take when preparing a presentation?

Crossword 1



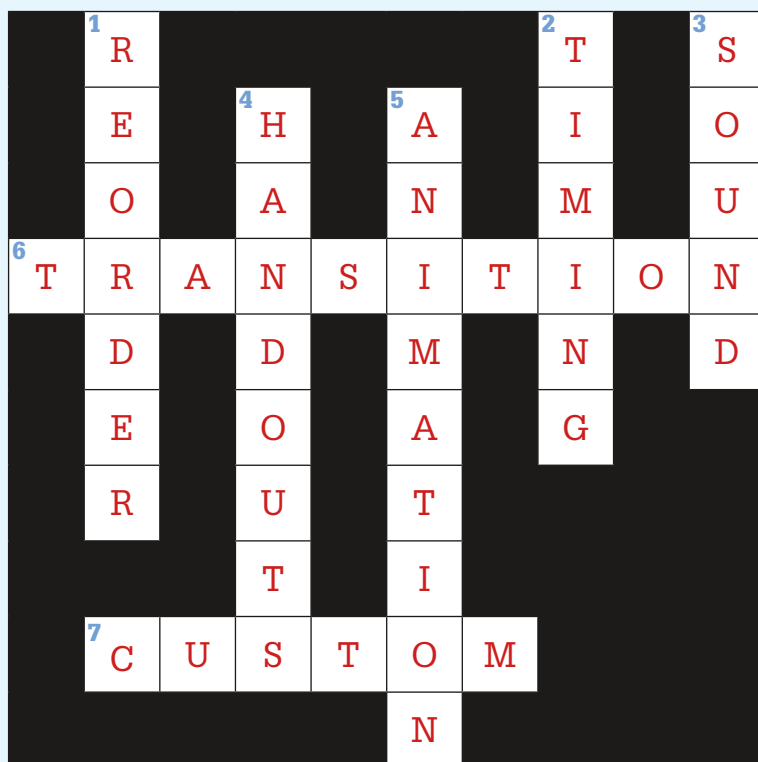
Across

- 1** Is used to assist the presenter when making a presentation (two words) (9)
- 5** Normal view has three of these (5)
- 6** The view that allows you to develop text (7)
- 7** Refers to the format of a slide (6)

Down

- 1** This is the default view (6)
- 2** The name of an application software package that allows you to create, print and show presentations (10)
- 3** An on-screen production of your presentation (two words) (9)
- 4** The menu that allows you to choose the Slide layout (6)

Crossword 2



Across

- 6** A special effect to introduce a slide (10)
7 Animating more than one object on a slide involves a _____ animation (6)

Down

- 1** What you do when you change the sequence of your animation (7)
2 This specifies how long a slide will remain on the screen (6)
3 You can attach this to your objects (5)
4 You can print a number of slides on one page by selecting this from the 'Print' dialog box (8)
5 You can add this to your presentation to make an impact (9)

Questions and answers 13

Fill in the blanks

Text or graphics that appears on the top and bottom margins of every page of a document is called

header and **footer**. The **footer** appears in the bottom margin and the **header** appears in the top margin. An **endnote** is placed at the end of the document or the end of a section and a **footnote** is placed at the end of a page. They give additional information to explain, comment on or give reference to a word, sentence or text within the document with the use of **reference marks**.

True or False?

- 1 You can reverse an undo action by clicking 'Redo'. **True**
- 2 You cannot ignore a suggestion given by Word to say you should correct a spelling error. **False**
- 3 When the OVR on the status bar is dimmed it indicates that you can type over the text. **True**
- 4 You can only view a document in two views: 'Print Layout' view and 'Outline' view. **False**
- 5 When you select text the area becomes highlighted. **True**
- 6 The default setting for page margins can be changed. **True**
- 7 To move text from one place to another, you need to copy and paste. **False**
- 8 Endnotes are placed at the end of a page. **False**
- 9 Page numbering can be placed in the header or footer area of a document. **True**
- 10 There are a number of ways in which text can be wrapped around a graphic. **True**

Multiple-choice questions

- From which menu would you be able to find 'Columns'?
- Which of the following is not considered a formatting feature?
- Which of the following is involved in creating a document?
- Which of these sequences of actions allows you to double underline a piece of text in your document?
- The difference between copy and paste and cut and paste is that:
- Footnotes refer to and expand on text within a document; they are placed:
- Mail merge allows you to create multiple copies of a single document, such as a letter, so that it is partly personalised for a number of different recipients. You need to have the main document and a:

8 Which menu would most likely allow you to adjust your line spacing?

- a Edit
- b File
- c Format**
- d Insert

9 Which key allows you to type over text?

- a Backspace
- b Insert**
- c Caps Lock
- d Num Lock

10 Which of the following is not a type of tab?

- a Full Justify**
- b Decimal
- c Right
- d Left

Short-answer questions

1 Explain what mail merge is and state ONE way in which a small T-shirt supply company can use mail merge.

Mail merge is a Microsoft Word feature that allows you to create a set of documents, such as a personalised letter, an email, etc. that is sent to many customers. The T-shirt company could use it to send one email to thousands of existing and potential customers for marketing purposes.

2 Give TWO advantages of using a word processor over a traditional typewriter.

Microsoft Word is faster and easier to use than a typewriter and it allows you to save your work, which a typewriter cannot do.

3 Name THREE important features that a word processor provides for a newspaper journalist.

Three important features that a word processor provides for a newspaper journalist are: Columns, Header/Footer and Adding Pictures.

4 Name THREE features of a word processor that allow you to present information that is difficult or impossible to do manually or using a traditional typewriter.

Three features of a word processor that allow you to present information that is difficult or impossible to do manually or using a traditional typewriter are: Documents with Columns, Mail Merge and Documents with Pictures/Graphics.

5 Give TWO ways in which word-processing software can be used by individuals in the following jobs:

a Teachers

b Musicians

c Construction workers

d Police officers

e Caterers

Two ways in which word-processing software can be used by individuals in the following jobs:

Teachers – To create handouts and compile letters to parents.

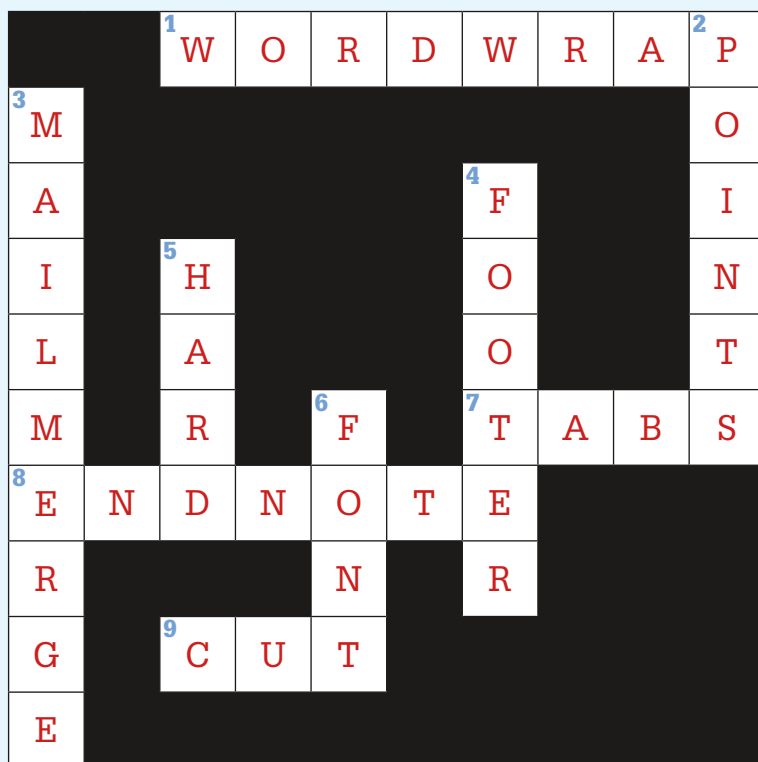
Musicians – To create musical notes and music videos.

Construction workers – To make simple sketches and draft a field/inspection report.

Police officers – To write accident reports and create fillable forms to capture arrest details.

Caterers – To create menus/pricelists and brochures to advertise the business.

Crossword



Across

- 1** A feature that will allow you to go automatically to the next line without pressing the 'Enter' key (two words) (8)
- 7** Used to place text or numbers in a predetermined position in a document (4)
- 8** A reference to text in a document, which is placed at the end of the document (7)
- 9** Remove text from its original position (3)

Down

- 2** The unit used to measure the size of a character (6)
- 3** The process of creating personalised mailing letters for a number of individuals (two words) (9)
- 4** Text that appears at the bottom of every page (6)
- 5** A type of page break that is inserted before the actual end of the page (4)
- 6** Another word for the typeface (4)

Questions and answers 14

Fill in the blanks

- 1 A spreadsheet package is an **accounting** package that enables you to carry out numerical work easily and flexibly.
- 2 **Automatic** re-calculation is one of the most important features of a spreadsheet.
- 3 A spreadsheet package is a flexible **modelling** tool that can be used in any job that involves repetitive numerical calculations.
- 4 When you save an Excel file it is given the file extension **.xls or .xlsx**.
- 5 Excel is one of the applications in the **Microsoft Office** suite.
- 6 A workbook initially contains **three** worksheets, which are saved in a single file.
- 7 In Excel the rows run up and down and are **numbered**, whereas the columns run left to right and are **lettered**.
- 8 The intersection of a row and a column is called a **cell**.
- 9 Each cell in the spreadsheet can be identified by its **cell reference**.
- 10 A cell can contain one of three types of information: label, value or **formula**.

True or False?

- 1 In Excel, all the basic commands such as Open, New, Close, Save and Save As work in the same way as they do in Word. **True**
- 2 The Status bar identifies the various worksheets in a workbook. **False**
- 3 The Name box identifies the active cell. **True**
- 4 A typical screen display of Excel may contain 39 rows and 29 columns. **True**
- 5 The active cell is the cell in which any information entered from the keyboard will be stored. **True**

Multiple-choice questions

- 1 Text entered into a spreadsheet is left aligned by default. Which of the following refers to textual data?

a Value c Function	b Label d Formula
-------------------------------------	------------------------------------
- 2 Which of the following is an example of a correct function in Excel?

a SUM(A1 to A5) c =SUM(A1+A5)	b +SUM(A1:A5) d =SUM(A1:A5)\
--	---
- 3 Which of the following is the default font type in Excel?

a Times New Roman c Calibri	b Arial d Cambria
--	------------------------------------
- 4 A group of adjoining cells treated as a unit is a:

a range. c group.	b record. d function.
------------------------------------	--
- 5 How is a number formatted in Excel when the accounting option is selected?

a No specific number format is applied b Decimal places and negative c Represent monetary values (for example, \$589.54)	d Lines up currency symbols and decimal points
---	---

Worksheet questions

- 1** A student receives an allowance of \$100.00 a day. Table 14.9 shows how he spends the money from Monday to Friday.

Create a worksheet to:

- Calculate the total money spent each day.
- Calculate the total money spent on each item for the five days.
- Calculate his total expenses for the five days.
- Calculate the amount left from his allowance.
- Format the worksheet with \$ signs.
- Centre all headings.
- Save the worksheet as 'Allowance'.

	Monday	Tuesday	Wednesday	Thursday	Friday
Travelling	10	10	10	10	10
Lunch	15	25	20	15	25
Snacks	12	15	14	15	20
Games World	0	0	25	0	40

▲ Table 14.9 How a student spends his allowance

Check that students were able to:

- create a worksheet to calculate the money in parts (a) to (d) correctly.
- format the worksheet with \$ signs.
- centre all the headings in the worksheet.
- save the worksheet as 'Allowance'.

- 2** Currency conversion: the rates of exchange against the United States (US) dollar for some islands in the Caribbean in 2018 were as follows:

US \$1 = TT \$6.80 (Trinidad and Tobago dollars)

US \$1 = BDS \$2.00 (Barbados dollars)

US \$1 = EC \$2.70 (Eastern Caribbean currency)

US \$1 = J\$134.56 (Jamaica dollars)

- Create a spreadsheet to convert the following amounts of Trinidad and Tobago dollars – 1, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 – to Barbados, Eastern Caribbean and Jamaican dollars. Save the worksheet as 'Currency'.
- Create a currency converter, to convert the United States (US) currency to the currency of the following countries Trinidad and Tobago, Barbados, Eastern Caribbean and Jamaican dollars. The user has to enter the amount of US dollars and the name of the currency he or she would like. The currency converter would convert the amount of US entered to the currency of the country requested.

Check that students were able to:

- a
 - create a spreadsheet to correctly convert the amounts of Trinidad and Tobago dollars to Barbados, Eastern Caribbean and Jamaican dollars.
 - save the worksheet as 'Currency'.
- b
 - create a currency converter that would allow her or him to enter the amount of US dollars and the name of the currency.
 - correctly convert the United States (US) currency to the currency of Trinidad and Tobago, Barbados, Eastern Caribbean and Jamaican dollars.

- 3 Calculate the square, square root, cube, and the cube minus twice the number itself, for each of the following numbers – 1, 5, 7, 9, 12, 16, 20, 25, 36, 40, 64, 80.

- a Format the square root to TWO decimal places.
- b Centre all labels and numbers.
- c Add THREE numbers of your own to the table.
- d Save the worksheet as 'Numbers'.

Check that students were able to:

- calculate the square, square root, cube, and the cube minus twice the number itself, for all the numbers given, then:
- a format the square root to TWO decimal places.
- b centre all the labels and numbers.
- c add THREE numbers of their own to the table.
- d save the worksheet as 'Numbers'.

- 4 The worksheet in Figure 14.88 shows the item code, name, quantity and unit price for seven different items bought from LowPrice Retailers. A discount of 12% is given on all purchases.

- a Calculate the total cost of each item.
- b Calculate the discount for each item.
- c Calculate the discounted price of each item.
- d Centre-justify all headings.
- e Modify the numbers in the Unit Price, Cost, Discount and Discounted Price columns to show dollar (\$) values and TWO decimal places.
- f Save the worksheet as 'Purchases'.

	A	B	C	D	E	F
1			LowPrice Retailers			
2						
3	Item code	Name	Quantity	Unit cost	Discount	Discounted price
4	AA123	Underarm Deodorant	24	15		
5	AA128	Superior Cologne	15	65		
6	AB200	Dew Drop Perfume	20	95		
7	AC456	Gloss Powder	56	24		
8	CD231	Nail polish	65	10		
9	CF145	Mouthwash	50	35		
10	MN767	Dental Floss	96	8		

▲ Figure 14.88 Worksheet for items bought from LowPrice Retailers

Check that students were able to:

- calculate the total cost of each item.
- calculate the discount for each item.
- calculate the discounted price of each item.
- centre-justify all the headings.
- modify the numbers in the Unit Price, Cost, Discount and Discounted Price columns to show dollar (\$) values and TWO decimal places.
- save the worksheet as 'Purchases'.

- 5 Figure 14.89 shows the names of students and their marks in six subjects. Enter the data into a worksheet as shown.

Complete the worksheet by carrying out the following tasks:

- Enter a blank row between row 3 and row 4.
- Calculate the total marks obtained by each student.
- Calculate the average mark for each student.
- Using a built-in function, extract the highest (maximum) mark and lowest (minimum) mark for each subject.
- Calculate and display the mean mark for the class, correct to TWO decimal places.
- Centre all headings.
- Delete Melissa Cardinal and all her data from the worksheet.
- Insert the name and marks for this student into the worksheet:
Ishana Jyoti, Maths 75, Chemistry 85, English 71, Biology 80, Physics 60.
- Move to an appropriate part of the worksheet and extract the highest total and lowest total.
- Save the worksheet as 'School report'.

	A	B	C	D	E	F	G	H	I	J
1				RB College Jamaica						
2										
3				Form 3.1 Mark Sheet						
4	Surname	First Name	Mathematics	Biology	Chemistry	Physics	English	History	Total	Average
5	Bishop	Victoria	67	76	45	55	73	45		
6	Eastman	Renee	76	42	45	57	85	78		
7	Omar	Ravi	58	67	42	61	75	65		
8	Cardinal	Melissa	79	56	67	84	74	68		
9	Chen	Jason	87	43	64	83	85	84		
10	Fredericks	gary	65	67	38	76	78	67		
11	Vaughn	Shimona	61	65	56	65	82	71		
12										
13	Subject		Highest Mark	Lowest Mark						
14	Mathematics									
15	Biology									
16	Chemistry									
17	Physics									
18	English									

▲ Figure 14.89 Student marks in six subjects

Check that students were able to complete the worksheet correctly. They should have:

- a entered a blank row between row 3 and row 4.
- b calculated the total marks obtained by each student.
- c calculated the average mark for each student.
- d used a built-in function to extract the highest (maximum) mark and lowest (minimum) mark for each subject.
- e calculated and displayed the mean mark for the class, correct to TWO decimal places.
- f centred all headings.
- g deleted Melissa Cardinal and all her data from the worksheet.
- h inserted the following name and marks of Ishana Jyoti into the worksheet.
- i moved to an appropriate part of the worksheet and extracted the highest and lowest totals.
- j saved the worksheet as 'School report'.

- 6 The Superior Car Company sells five different models of foreign used cars: the Vx5, Chameleon, Rhino, Speed Star and Pinnacle. The advertised car price is called the showroom price. The buyer also has to pay a 20% government tax on the showroom price and a fixed licence fee of \$15 000. The final price is the price on the road. Table 14.10 shows how many of each model the company sold for the month of June.

The manager of the company wants to know the following information:

- a The tax paid on each model of car
- b The price including tax for each model
- c The cost of each car on the road
- d The total monthly sales value (\$) for each model
- e The average price of a car on the road
- f The maximum sales total among the different models
- g The minimum sales total among the different models
- h On a graph, the comparative total monthly sales for each model.

Design and appropriately format a worksheet to show this information.

Model	Quantity	Showroom Price
Chameleon	5	\$25 550
Pinnacle	7	\$20 500
Rhino	4	\$45 500
Speed Star	9	\$17 850
Vx5	3	\$50 450

▲ Table 14.10 Cars sold by the Superior Car Company

Check that students were able to:

- find all the information required in parts (a) to (h).
- design and appropriately format a worksheet to show the information.

7 The Repeaters' College is a full-time school for students wishing to repeat their CSEC examination in various subject areas. The college has the following fee structure for each academic, which the student registers and the additional fee for each Lab subject. However, a student doing five or more subjects gets a 10% reduction in the total fee. A student is allowed three payments to complete the total payment of fees. The owners of the college need to know how much money each student listed in Table 14.11 has to pay, how much is received and how much is outstanding.

a Create a worksheet to satisfy the requests of the owners, using the data in the table.

b Format the worksheet as follows:

- Centre all labels and values.
- Set the discount given, total fees and balance to TWO decimal places.
- Set total fees, payments and balance to currency.

c Edit the worksheet as follows:

- Delete all information pertaining to Ian Sobers
- Insert the names of two students of your choice along with the number of subjects and Lab subjects for which they wish to register
- Sort the worksheet on the names in descending order.

d Save the worksheet as 'Payments'.

e Select all the students who are doing three or fewer subjects.

f Change the Lab fee from \$100 to \$150 and the Subject fee from \$650 to \$675.

g What is the maximum fee paid?

h What is the minimum fee paid?

i What is the average number of subjects being taken by students in the school?

Student's name	Total number of subjects	Number of Lab subjects
Carter, Daryl	4	1
Ali, Feroze	6	3
Brown, Michelle	3	1
Simmons, Pat	5	2
Simmons, Brandon	7	3
Foster, James	3	1
Maharaj, Rudy	4	2
Sobers, Ian	5	2
Roberts, Carl	6	3
Taylor, Petal	5	2

▲ Table 14.11 Subjects taken by Repeaters' College students

Were students able to help the owners of the college find out how much money each student has to pay, how much is received and how much is outstanding? In order to do this, they would have had to look at the table provided and:

- a create a worksheet using the data in the table.
- b format the worksheet, i.e. centre all labels and values; set the discount given, total fees and balance to TWO decimal places; set total fees, payments and balance to currency.
- c edit the worksheet, i.e. delete all information pertaining to Ian Sobers; insert the names of two students of their choice along with the number of subjects and Lab subjects for which they wish to register; sort the worksheet on the names in descending order.
- d save the worksheet as 'Payments'.
- e select all students doing three or fewer subjects.
- f change the Lab fee from \$100 to \$150 and the Subject fee from \$650 to \$675.
- g & h find out the maximum fee paid and the minimum fee paid.
- i find out the average number of subjects being taken by students in the school.

- 8 The owner of a small contracting firm has 12 employees, divided into two categories: skilled and unskilled. Each worker is contracted to work a 40-hour week at a set rate, and for any time worked above 40 hours is paid an overtime rate of 1.5 times the regular rate. The set rate for an unskilled worker is \$20 per hour and a skilled worker gets \$30 per hour. The rates of pay are subject to change over time. The names of the employees, category and the total number of hours worked for four weeks for the month of July 2019 are shown in Table 14.12.

Employee	Category	Hours worked			
		Week 1	Week 2	Week 3	Week 4
Jason Agard	Skilled	45	56	45	40
Ralf Brown	Skilled	56	45	50	68
Anslem Douglas	Skilled	40	45	40	55
Brian Despot	Skilled	40	40	45	56
Larry James	Unskilled	40	40	56	60
Rolston Granger	Unskilled	35	40	67	40
Rudy Maraj	Unskilled	40	55	43	55
Gerry Parker	Unskilled	56	45	76	45
Richard Bobart	Unskilled	65	45	45	57
Luke Thompson	Unskilled	70	45	34	45
Moses Fredricks	Unskilled	30	40	56	35
Vernon Johnson	Unskilled	40	40	64	62

▲ Table 14.12 Employees' categories and hours worked for four weeks

- a** Create a worksheet that will show the employee's name, category, a weekly number of hours worked and a weekly salary. It should also include the total number of hours worked and the total salary for all the employees for the month.
- b** Calculate and display:
 - The average weekly salary
 - The minimum salary for the week
 - The maximum salary for the week.
- c** Format the salary with '\$' and TWO decimal places.
- d** Format the worksheet so that all column labels are centre-justified.
- e** Sort the spreadsheet on name in ascending order.
- f** Select all the unskilled workers who work more than 200 hours for the four weeks.
- g** Save the spreadsheet as 'July wages'.
- h** Delete all information pertaining to Richard Bobart.
- i** Add the following data to the worksheet:
Employee – Wesley Taylor
Category – unskilled
Hours worked – week 1: 50; week 2: 60;
week 3: 45; week 4: 40.
- j** Change the rate of pay for unskilled workers from \$20 to \$25 and for skilled workers from \$30 to \$40.
- k** Save the worksheet as 'July wages1'.
- l** Prepare an appropriately labelled bar graph to show the total weekly wages for the four weeks. Save the graph as 'Wage1'.
- m** Prepare an appropriately labelled pie chart to show the total number of hours worked for each week for the month of July. Save the chart as 'Hours'.

Did students follow the instructions as required? Were they able to:

- create a worksheet to show the employee's name, category, a weekly number of hours worked and a weekly salary, as well as the total number of hours worked and the total salary for all employees for the month?
- do the calculating, formatting, sorting, selecting and other tasks, as required in parts (b) to (m)?

- 9** Figure 14.90 shows a Wholesaler's spreadsheet of the produce the company sold to countries around the world. Using a spreadsheet, you are required to do the following:
 - i** Create a PivotTable to show the total amount of each product sold.
 - ii** Sort the list from highest to lowest.
 - iii** Display the total amount of each item exported.

	A	B	C	D	E	F
1	Order ID	Product	Category	Cost	Date	Country
2	1	Grapes	Fruit	\$250 000,00	5/12/2020	Chile
3	2	Apples	Fruit	\$300 000,00	6/14/2020	Barbados
4	3	Pears	Fruit	\$150 000,00	6/17/2020	Jamaica
5	4	Peaches	Fruit	\$120 000,00	6/23/2020	Trinidad and Tobago
6	5	Bananas	Fruit	\$300 000,00	6/28/2020	St. Vincent
7	6	Sweet potatoes	Ground provision	\$85 000,00	7/5/2020	St. Vincent
8	7	Carrots	Vegetable	\$230 000,00	7/8/2020	China
9	8	Broccoli	Vegetable	\$156 000,00	7/9/2020	Canada
10	9	Red beans	Grain	\$450 000,00	7/10/2020	United States
11	10	Lentils	Grain	\$230 000,00	7/10/2020	United States
12	11	Yams	Ground provision	\$80 000,00	7/12/2020	St. Vincent
13	12	Dasheens	Ground provision	\$12 000,00	7/14/2020	St. Vincent
14	13	Grapes	Fruit	\$340 000,00	7/15/2020	Canada
15	14	Apples	Fruit	\$340 000,00	7/18/2020	United
16	15	Grapes	Fruit	\$230 000,00	7/19/2020	St. Lucia
17	16	Apples	Fruit	\$120 000,00	8/12/2020	St. Vincent
18	17	Pears	Fruit	\$300 000,00	8/14/2020	St. Vincent
19	18	Peaches	Fruit	\$85 000,00	8/17/2020	China
20	19	Bananas	Fruit	\$230 000,00	8/23/2020	Canada
21	20	Sweet potatoes	Ground provision	\$156 000,00	8/28/2020	United States
22	21	Carrots	Vegetable	\$450 000,00	9/5/2020	United States
23	22	Broccoli	Vegetable	\$230 000,00	9/8/2020	St. Vincent
24	23	Red beans	Grain	\$80 000,00	9/9/2020	St. Vincent
25	24	Lentils	Grain	\$12 000,00	9/10/2020	Canada
26	25	Yams	Ground provision	\$340 000,00	10/10/2020	United Kingdom
27	26	Dasheens	Ground provision	\$340 000,00	10/12/2020	St. Lucia

▲ Figure 14.90 Worksheet for question 9

Did students follow the instructions as required? Were they able to:

- create a PivotTable to show the total amount of each product sold?
- sort the list from highest to lowest?
- display the total amount of each item exported?

Research questions

- 1 Using the Web to conduct research suggest ways a spreadsheet package can be used in a bank.
- 2 Using the Web to conduct research, suggest ways a spreadsheet can be used in a school by the administrative staff in the office and by the classroom teachers.

Students' research for the questions will vary.

- 1 Did students' research help them to suggest ways in which a spreadsheet package can be used in a bank?
- 2 Were students able to find information to enable them to suggest ways in which a spreadsheet can be used in a school by the administrative staff in the office and by the classroom teachers?

Questions and answers 15

Short-answer questions

- 1** List THREE capabilities of computerised databases.

Capabilities of a computerised database:

- Information can be accessed quickly and easily with little probability of it being lost.
- Related files can be linked – once one is updated, the related file(s) will also automatically be updated.
- Information need not be duplicated; it can be stored only once and accessed in several different ways.
- It is easy to update or change records and their structure in computerised databases.
- Data being entered can easily be validated, thereby preventing mistakes on entry (for example, the computer can tell you that you are entering an impossible date, such as '13' for the month).
- It is easy to store backup copies of the database 'offsite'.

(Any three)

- 2** What is a relational database?

A relational database is a database that links logically related data stored in several files or tables.

- 3** What is a database package?

A **database package** is a piece of software that is used to create and manage a computerised database. A database package has many built-in features that operate as one unit by allowing you to manipulate your data and extract information using a number of objects.

- 4** What is a database object? List FOUR of these objects.

A **database object** is an option you can select and manipulate.

Database objects include:

- | | |
|-----------|------------|
| ▪ tables | ▪ forms |
| ▪ queries | ▪ reports |
| ▪ macros | ▪ modules. |

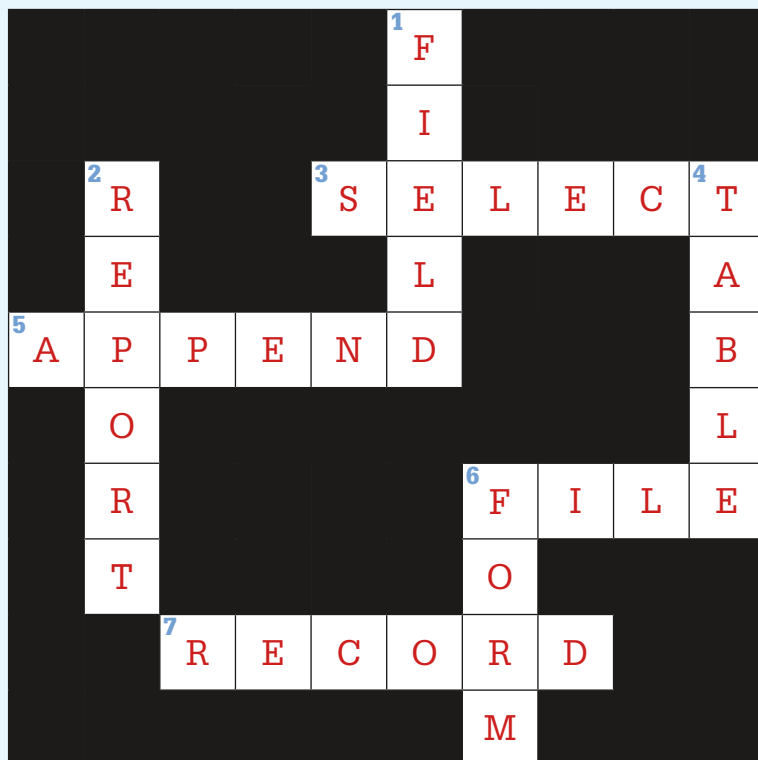
(Any four)

- 5** Give TWO reasons for limiting the size of a field.

Two reasons for limiting the size of a field:

- It saves disk space
- prevents data entry error in that a person cannot go over the stated limit even when it is by mistake.

Crossword



Across

- 3** Extracts data from tables based on a criterion or specific value (6)
- 5** Adds groups of records from one or more tables to the end of one or more tables (6)
- 6** A database _____ is an entire database (4)
- 7** A group of related data belonging to one person, place or thing (6)

Down

- 1** An area in a table reserved for a specific piece of data (5)
- 2** A graphically pleasing display for information for online viewing or to print data from the database (6)
- 4** The basic unit of a database (5)
- 6** A graphical representation of a table (4)

Project

You are asked to design and create a database with at least TWO tables to organise the items in your family's bakery catering business. Your family's bakery sells in bulk to a number of businesses in the area, therefore you need to keep track of what your bakery sells and the businesses you sell to.

Students' project will vary.

Were students able to design and create a database with at least two tables to organise the items in the catering business?

Did their projects indicate that they understood what they were taught in this chapter?

Questions and answers 16

Fill in the blanks

- 1 If the data source of a mail merge is an Access table, the 'Select Table' dialog box displays the **Mail Merge Recipients**.
- 2 If the data source of a mail merge is an Excel table, the 'Select Table' dialog box displays the **sheets from the workbook**.
- 3 The 'Mail Merge Recipients' dialog box displays all the **records** in the table.
- 4 The Mail Merge 'Write your letter' dialog box allows you to view the **fields** for the document.
- 5 Moving data and graphs from an Excel spreadsheet to a Word document involves copying or cutting and **pasting**.
- 6 To convert an Excel table into an Access table, the first row of the spreadsheet should contain the **field names** or **row headings**.

True or False?

- 1 A mail merge can be performed with a table created in Access as the data source. **True**
- 2 The first step in performing a mail merge is selecting the document type. **True**
- 3 Labels cannot be used as a document type in a mail merge. **False**
- 4 The starting document in a mail merge must be an existing document only. **False**
- 5 The 'Select Recipients' dialog box allows you to indicate the location of the recipients. **True**
- 6 The Mail Merge 'Write your letter' dialog box allows you to view the fields for the document. **True**
- 7 The 'Preview your letters' dialog box allows you to preview the merged letters. **True**
- 8 Moving data and graphs from an Excel spreadsheet to a Word document involves copying, cutting and pasting. **True**
- 9 An Access object such as a table cannot be imported into a Word document. **False**
- 10 To move an Excel table into an Access table you must ensure that the first row of the spreadsheet contains the field names or row headings. **True**

Short-answer questions

- 1 Describe the steps to perform a mail merge if the data file is an Access table.

Mail merge in Word (using an Access or Excel table as the data source)

- 1 Select the Mailings tab.
- 2 Click on Start Mail Merge.
- 3 Select Step By Step Mail Merge Wizard.
- 4 The 'Mail Merge Wizard' dialog box shown in Figure 16.1 appears on the right side of the Word document you are working on.
- 5 Follow the steps as shown in the Wizard.

Steps for a mail merge using Access

Step 1 – Selecting the document type

The first step in performing a mail merge is to select the document type. You can perform a mail merge using: letters, email messages, envelopes, labels, directory

- For our purposes, check the 'Letters' radio button.
- Click on Next: Starting document at the bottom of the dialog box to move to the next step.

Step 2 – Selecting the starting document

The 'Select starting document' pane gives you three options to choose from to select the main document. You can: use the current document; start from a template; start from an existing document.

- Select the starting document by checking the appropriate radio button, for example, 'Use the current document'.
- Click on Next: Select recipients at the bottom of the dialog box to move to the next step.

Step 3 – Selecting recipients

- In the 'Select recipients' pane, you have to indicate the location of the recipients (the data source).
- Since our data file will be coming from Access or Excel, you need to check the radio button for the option Use an existing list and then select Browse.
- The 'Select Data Source' dialog box appears. Select the location of the data source from the 'Organise' pane. Select the data source and click Open.
- Using an Access table as the data source: When the data source file is opened, the 'Select Table' dialog box is displayed. Select the table that will be used as the data source and click OK. The 'Mail Merge Recipients' dialog box displaying all the records in the table will be displayed.
- Click OK to accept the records. The 'Mail Merge Select recipients' dialog box appears again, displaying the name of the table and the name of the database from which it is being taken.
- To continue the mail merge process, click on Next: Write your letter to go to step 4.

Step 4 – Writing your letter

- The 'Mail Merge Write your letter' pane is displayed. This option allows you to view the fields for the document. Open your Word document and click a location in the document where you would like to place a particular field. Then click 'More items'. The 'Insert Merge Field' dialog box appears.
- Select the field from the 'Fields' Combo box and click Insert. The field will be inserted in the position selected. Repeat the process for each field.
- When all the fields you require have been inserted, click Next: Preview your letters.

Step 5 – Previewing your letters

- The 'Preview your letters' pane appears. This dialog box allows you to preview the merged letters. At this point, you can still make changes to the recipient list if you wish.
- If you agree with the contents of the merged letters then click Next: Complete the merge to move to the next step.

Step 6 – Completing the merge

- The 'Complete the merge' pane appears. To display all the merged letters, click on 'Edit individual letters'.
- The 'Merge to New Document' dialog box appears. If you want to select all the records check the 'All' radio button, otherwise, input the appropriate range and click OK.

- 2** Describe the steps to perform a mail merge if the data file is an Excel table.

Mail merge in Word (using an Access or Excel table as the data source)

- 1 Select the Mailings tab.
- 2 Click on Start Mail Merge.
- 3 Select Step By Step Mail Merge Wizard.
- 4 The 'Mail Merge Wizard' dialog box shown in Figure 16.1 appears on the right side of the Word document you are working on.
- 5 Follow the steps as shown in the Wizard.

Steps for a mail merge using Excel

Step 1 – Selecting the document type

The first step in performing a mail merge is to select the document type. You can perform a mail merge using: letters, email messages, envelopes, labels, directory

- For our purposes, check the 'Letters' radio button.
- Click on Next: Starting document at the bottom of the dialog box to move to the next step.

Step 2 – Selecting the starting document

The 'Select starting document' pane gives you three options to choose from to select the main document. You can: use the current document; start from a template; start from an existing document.

- Select the starting document by checking the appropriate radio button, for example, 'Use the current document'.
- Click on Next: Select recipients at the bottom of the dialog box to move to the next step.

Step 3 – Selecting recipients

- In the 'Select recipients' pane, you have to indicate the location of the recipients (the data source).
- Since our data file will be coming from Excel, you need to check the radio button for the option Use an existing list and then select Browse.
- The 'Select Data Source' dialog box appears. Select the location of the data source from the 'Organise' pane. Select the data source and click Open.
- Using an Excel table as the data source: When the data source file is opened, the 'Select Table' dialog box is displayed, showing all the sheets from the workbook selected.
- Select the sheet containing the data source and click OK. The 'Mail Merge Recipients' dialog box displaying all the records in the table is displayed.
- Click OK to accept the data.
- The 'Select recipients' mail merge dialog box displaying the name of the worksheet and workbook is displayed again.
- To continue the mail merge process, click on Next: Write your letter to go to step 4.

Step 4 – Writing your letter

- The 'Mail Merge Write your letter' pane is displayed. This option allows you to view the fields for the document. Open your Word document and click a location in the document where you would like to place a particular field. Then click 'More items'. The 'Insert Merge Field' dialog box appears.
- Select the field from the 'Fields' Combo box and click Insert. The field will be inserted in the position selected. Repeat the process for each field.
- When all the fields you require have been inserted, click Next: Preview your letters.

Step 5 – Previewing your letters

- The 'Preview your letters' pane appears. This dialog box allows you to preview the merged letters. At this point, you can still make changes to the recipient list if you wish.
- If you agree with the contents of the merged letters then click Next: Complete the merge to move to the next step.

Step 6 – Completing the merge

- The 'Complete the merge' pane appears. To display all the merged letters, click on 'Edit individual letters'.
- The 'Merge to New Document' dialog box appears. If you want to select all the records check the 'All' radio button, otherwise, input the appropriate range and click OK.

- 3** Explain ONE reason for moving data and charts from an Excel spreadsheet to a Word document.

Moving data and charts from an Excel spreadsheet to a Word document is necessary if one document was prepared in Microsoft Word to include a chart or graph done in Excel. Copying or cutting the chart from Excel to Word would be necessary to complete the document done in Microsoft Word.

- 4** Explain the steps involved in importing a spreadsheet table or chart into a word processing document.

The steps involved in importing a spreadsheet table or chart into a word processing document:

- Open the Word document.
- Open the Excel workbook.
- Click the appropriate worksheet and select the data/chart required.
- Select Copy, then click the Word document on the taskbar to make it active.
- Position the cursor in the Word document where you would like to begin to insert the data or chart and click on the Paste icon.

- 5** Describe the steps involved in publishing an Access object to a Word document.

The steps involved in publishing/exporting an Access object to a Word document are as follows.

- 1** Open the source Access database.
- 2** In the Navigation Pane, select the object that contains the data you want to export. You can export a table, query, form or report.
- 3** Select the External data tab.
- 4** Go to the Export group and select More.
- 5** Select Word from the drop-down menu.
- 6** The Export – RTF File Wizard opens.
 - a** In the Export – RTF File Wizard, specify the name of the destination file.
 - b** The Wizard always exports formatted data. If you want to view the Word document after the export operation is complete, select the 'Open the destination file after the export operation is complete' checkbox.

- 7 If you selected the records that you want to export before you started the export operation, you can select the 'Export only the selected records' checkbox. However, if you want to export all the records in the view, leave the checkbox cleared. (Note: This checkbox appears unavailable (dimmed) if no records are selected.)
- 8 Click OK.
- 9 If the destination document exists, you are prompted to click Yes to overwrite the file. Click No to change the name of the destination file, and then click OK again.

The object will be published in a new Word document. To move the object to the document you are working on, you can copy or cut it, and paste it.

- 6 State ONE reason why you might want to export an Access table into Excel.

A reason for exporting an Access table into Excel is because it is easier to work on calculations in Excel, rather than Access.

- 7 Describe the steps involved in exporting an Access table into Excel.

The steps involved in moving an Access table into Excel are as follows.

- 1 Open the database file.
- 2 Click on the object.
- 3 Select the table, query, report, and so on.
- 4 Select the External data tab.
- 5 Go to the Export group and select Excel.
- 6 The Export – Excel Spreadsheet Wizard opens.
 - a In the Excel Spreadsheet Wizard, specify the name of the destination file.
 - b You can change the file format of the Excel worksheet by clicking the down arrow in the File format Combo box and selecting from the displayed options. If you want to view the Excel document after the export operation is complete, select the 'Open the destination file after the export operation is complete' checkbox.
- 7 If you selected the records that you want to export before you started the export operation, you can select the 'Export only the selected records' checkbox. However, if you want to export all the records in the view, leave the checkbox cleared. (Note: This checkbox appears unavailable (dimmed) if no records are selected.)
- 8 Click OK. The object will be published in a new Excel worksheet.

8 Describe the process of importing an Excel table into an Access database.

The steps in importing data from Excel to Access are as follows.

Importing an Excel spreadsheet into Access will be easier if you take some time to prepare and clean your data:

- Convert cells that contain multiple values in one cell to multiple columns. For example, a cell in Excel may contain an individual's first name, middle name and surname. Separate this into columns that each contain only one name (First name, Middle name and Surname).
- Remove non-printing characters.
- Find and fix spelling and punctuation errors.
- Remove duplicate rows or duplicate fields.
- Ensure that columns of data do not contain mixed formats, especially numbers formatted as text or dates formatted as numbers.

Then:

Use the Access Wizard to import a spreadsheet into Access.

- 1 Open the Access program on your computer.
- 2 Open a new blank Access database to import the Excel sheet into it.
- 3 Choose 'Blank desktop database' to create a new database within the Access program. (Give it a new name if you wish).
- 4 Click Create.
- 5 Select the Excel option from the Import & Link group in the 'External Data' tab. The 'Get External Data – Excel Spreadsheet' dialog box appears.
- 6 Click Browse to find your Excel sheet on your computer. Leave the box checked that says: 'Import the source data into a new table in the current database.' It will be checked by default.
- 7 When you find the Excel spreadsheet you want to import onto your computer, click on it. Click OK. This will take you into the 'Import Spreadsheet Wizard'.
- 8 Choose the worksheet within the Excel spreadsheet that you want to import. If there are multiple pages within a single Excel spreadsheet, you need to tell the Access wizard which spreadsheet you are choosing. Click Next.
- 9 The next page has a box asking if the first row in the Excel sheet has column headings (such as First name, Surname, and so on). Check 'Yes' that the first row contains column headings. Click Next.
- 10 The next page in the Wizard will ask if you want to identify a primary key. (You do not have to do this, but you can if you wish.)
- 11 The final screen in the Wizard has a space providing a default name. You can change the name of the Excel sheet you are importing (it will become a 'table' in Access on the left side of the page when you finish importing it).
- 12 Click Finish.
- 13 Click Close. You will see your table on the left side of the screen. It is now imported within Access.

9 State ONE advantage of importing an Excel table into a database.

One advantage of importing an Excel table into a database is that it allows you to perform more in-depth queries on the spreadsheet data.

Questions and answers 17

Fill in the blanks

- 1 A **systems analyst** looks at the operations of a manual or computerised system in an organisation or company and tries to find solutions to specific end-user problems.
- 2 The **computer operator** monitors and controls a computer system by operating the central console.
- 3 A **web-page designer** creates web pages that contain information such as text and graphics.
- 4 The **information systems (ICT or data processing) manager** is responsible for planning, coordinating, managing and staffing of the information systems department of a large organisation.
- 5 A **database administrator** is responsible for the administration and management of a company's database.
- 6 A **computer engineer** designs, develops, tests and supervises the manufacture of components (such as new computer chips or circuit boards) and peripheral devices.
- 7 A **computer sales representative** explains the specifications of the different hardware and software products sold by their company to customers.
- 8 The **data control clerk** screens, edits and validates the input and output for a data processing unit.
- 9 A **data-entry operator** enters data into a system in a form that is suitable for processing.
- 10 A **file librarian** is responsible for keeping a company's data files and software organised and up to date.
- 11 An **application programmer** writes software to meet end-user requirements.
- 12 A **systems programmer** writes programs to monitor and control peripheral devices.
- 13 **Network administrators** are responsible for the creation, administration and security of computer networks.
- 14 A **data security analyst** looks after the protection of a company's computer-based information banks, and is responsible for keeping information safe from floods, fire, power outages, fraud, theft, invasion of privacy and viruses.
- 15 A **computer consultant** is contracted to provide technical assistance to an organisation in the formation or upgrading of a data processing department.
- 16 **Electronic data processing (EDP) auditors** ensure that all aspects of a company's information systems perform in the manner stated in the design.

True or false questions

- 1 The ICT manager plays an important role in the technological direction of the organisation. **True**
- 2 A database administrator is responsible for the effective and efficient storage, retrieval, customisation and archiving of data. **True**
- 3 A systems analyst selects and maintains database management software. **False**
- 4 A programmer plans and conducts studies to determine if the existing system needs to be upgraded or if a new system has to be put in place. **False**
- 5 Programmers update, repair, modify and expand existing programs. **True**
- 6 The network administrator oversees the installation of the network's hardware and software. **True**
- 7 The network administrator is responsible for creating security policies for the network and for ensuring compliance by its users. **True**
- 8 The operations manager supervises the use and maintenance of equipment. **True**
- 9 The computer operator can work from home. **False**
- 10 Performing routine equipment maintenance, such as cleaning drive-heads, is not one of the functions of a computer operator. **False**
- 11 A computer operator is responsible for transcribing data from a variety of source documents into the computer. **False**
- 12 A file librarian is responsible for transcribing data from a variety of source documents into the computer. **False**
- 13 A file librarian keeps records of the disks and magnetic tapes stored. **True**
- 14 A data security analyst conducts 'raids' on the system to try to expose security loopholes. **True**
- 15 A computer consultant holds discussions with users to identify and clarify their information needs. **True**
- 16 Electronic data processing auditors make recommendations for changes to ensure system integrity and accuracy. **True**
- 17 Experience in graphic art is never needed to become a good web page designer. **False**
- 18 A webmaster may be responsible for the maintenance, expansion and improvement of existing websites. **True**
- 19 Computer engineers are not responsible for maintaining and repairing computer hardware sold to clients. **False**
- 20 Computer sales representatives are only responsible for selling computer products and services. **True**

Multiple-choice questions

- 1** The ICT manager is responsible for:
 - a** preparing budget projections for the department.
 - b** reading reports on the system's performance and developing strategies to improve it.
 - c** planning, coordinating, managing, and staffing of the data processing department.
 - d all of the above.**
- 2** A database administrator:
 - a interacts with managers and users to ensure that the database is accomplishing what they need.**
 - b** conducts a feasibility study.
 - c** helps install new equipment.
 - d** has in-depth knowledge of operating systems and networking technology.
- 3** A systems analyst:
 - a tests and debugs the new system.**
 - b** develops a visually stimulating website.
 - c** maintains and protects the company's programs and data.
 - d** performs routine equipment maintenance, such as cleaning drive-heads.
- 4** Computer programmers:
 - a** discuss program specifications with the systems analyst.
 - b** write programs.
 - c** test programs for correct operation and intended results.
 - d all of the above.**
- 5** Network administrators are responsible for:
 - a** inspecting programs, systems, operational procedures, documentation, control techniques, disaster plans, insurance protection and fire protection.
 - b monitoring the network's performance to ensure it is working at its optimum.**
 - c** identifying and evaluating potential hardware and software.
 - d** all of the above.

Short-answer questions

- 1** List THREE duties of a data processing (or ICT) manager.

Duties of a **data processing (or ICT) manager**:

- Plan, coordinate, manage and staff the data processing department
- Communicate with, motivate and lead a number of highly-skilled employees
- Be aware of the latest developments in the ICT field
- Read reports on the system's performance and develop strategies to improve it
- Meet users and members of other departments to discuss problems encountered with the system or new projects for computerisation
- Prepare budget projections for the department, including the cost of new hardware and software, and the training of employees.

(Any three)

- 2** Describe TWO job functions of each of the following:

- a** Operations manager
- b** Network administrator
- c** Database administrator

Job functions of an **operations manager**:

- Supervise the use and maintenance of equipment
- Supervise data reception and preparation
- Schedule processing activities
- Allocate duties to members under his or her charge
- Consult with the data processing manager on staff issues (problems, training, and recruitment).

(Any two)

Job functions of a **network administrator**:

- Plan and design the network
- Oversee the installation of the network's hardware and software
- Test the network to ensure it is functioning properly
- Set up user accounts and arrangements for access
- Ensure that staff are trained to use the hardware and software that form part of the network
- Monitor the network's performance to ensure that it is working at its optimum
- Troubleshoot and solve problems on the network
- Create security policies for the network
- Set up systems to ensure compliance by users of the network.

(Any two)

Job functions of a **database administrator**:

- Interact with managers and users to ensure that the database is accomplishing what they need
- Meet with users to make modifications to the database whenever there are changes in the company's operation
- Ensure that the database is performing at its optimum at all times to meet the needs of its users
- Develop policies and procedures to ensure the security and integrity of the system
- Select and maintain database management software
- Coordinate database design
- Establish a back-up and recovery procedure in case of failure or loss of data
- Establish a data dictionary that records company-wide data definitions and standards
- Coordinate the data collection and storage needs of users.

(Any two)

- 3** Distinguish between a systems programmer and an application programmer.

Application programmers write software to meet end-user requirements, for example, word processing programs, whereas **systems programmers** write systems software, such as programs to monitor and control peripheral devices.

- 4** List FOUR duties of a systems analyst. What skills do you need to become a good systems analyst?

Duties of a **systems analyst**:

- Plan and conduct studies to determine if the existing system needs to be upgraded or if a new system should be put in place
- Hold discussions with managers and users of the system to determine their exact needs
- Gather facts about, and analyse the basic methods and procedures of, current information systems
- Design new systems, integrate existing procedures into new system specifications as required, and assist in the implementation of new designs
- Make recommendations for the procurement of hardware and software, if necessary
- Test and debug the new system
- Create documentation for the system
- Assist in training employees to use the system
- Evaluate the performance of the system over a period of time to see if it is performing as expected.

(Any four)

Skills required to be a systems analyst:

- analysis/problem-solving skills (must be able to identify and solve problems in many ways),
- good communication skills (meets with managers/users to obtain/present information)
- good business skills (have a strong business background).

- 5** Why do companies that have confidential data stored in databases and accessed through a network need to have a data security analyst?

A **data security analyst** looks after the protection of a company's computer-based information and keeps it safe from fraud, theft, invasion of privacy and viruses, among other things. Skilled hackers from outside an organisation may find it easy to gain access to a company's network and a data security analyst implements systems to prevent this.

- 6** What skills must someone possess to become a web-page designer?

Skills needed to become a **web-page designer**: Background in programming and any form of experience in graphic art.

- 7** Use the World Wide Web or any method available to you to find the job specifications of an e-commerce specialist.

Example of what students might find when they research the job specifications of an **e-commerce specialist**:

- Monitors site activities daily to ensure objectives/targets are met
- Executes the latest digital marketing strategies using social media
- Manages site development/updates for e-business
- Tracks e-commerce marketing efforts.

- 8** List THREE duties of a computer technician.

Duties of a **computer technician**:

- Troubleshoot and diagnose computer problems
- Repair, replace and test computer parts
- Receive and set up hardware
- Communicate and return failed hardware to the vendor
- Maintain and set up servers and networks
- Set up and back up desktop computers and servers.

(Any three)

Questions and answers 18

True or False?

- 1 Virtual reality is a form of artificial intelligence. **True**
- 2 A smart card stores information about your bank account on a magnetic stripe. Your bank card is called a debit card. **False**
- 3 Educational gaming software is known as edutainment software. **True**
- 4 An individual cannot use CAI and CAL software at his or her own pace. **False**
- 5 Simulations allow you to perform dangerous experiments without risk to life or wastage of materials. **True**

Multiple-choice questions

- Which of the following is not a health problem associated with extended use of the computer?
 - Back pain
 - CVS
 - RSI
 - High blood pressure**
- A factor that does not result in RSI is:
 - sitting too close to the screen.**
 - repetitive keystrokes.
 - lack of rest and breaks between computer work.
 - bad posture.
- Information is collected for the purpose of:
 - making tactical and strategic decisions.
 - monitoring, controlling and supervising systems, people and processes.
 - using it as a commodity.
 - all of the above.**
- In the police service, computers are used to do each of the following except:
 - examine forensic evidence.
 - communicate with other departments and agencies.
 - design menus.**
 - provide electronic surveillance.

Short-answer questions

1 What do the following stand for?

- | | |
|--------------|--------------|
| a CAE | b CAL |
| c CAI | d AI |
| e CML | f ATM |
| g NLP | h CBA |

- a CAE** – Computer-aided engineering
b CAL – Computer-assisted learning
c CAI – Computer-aided instruction
d AI – Artificial intelligence
e CML – Computer managed learning
f ATM – Automated Teller Machine
g NLP – Natural language processing
h CBA – Computer-based assessment

2 a Explain the term ‘expert system’.

b List THREE fields in which expert systems are used.

c State ONE advantage and ONE disadvantage of using expert systems.

- a Expert systems** make decisions based on the results of questions put to the user.
b Expert systems are used in, for example, medicine, mathematics and engineering.
c An **advantage** of using expert systems: They provide quicker and more accurate responses.
 A **disadvantage** of using expert systems: They are not able to explain the logic and reasoning behind a decision.

3 Describe TWO applications of CAD and CADD.

- CAD** (computer-aided design)/**CADD** (computer-aided design and drafting) **applications:**
- used in computer engineering for manufacturing, planning and computer aided analysis
 - used in aerospace to create blueprints and designs.

4 Name TWO devices that can be used in CAM systems.

Robots and sensors are two examples of devices that can be used in computer-aided manufacturing (CAM) systems.

- 5** State FOUR ways in which computers and their related technology are used in medicine.

Four ways in which computers and their related technology are used in medicine, for example:

- to monitor patients' vital signs
- to perform research
- to aid in detecting and diagnosing diseases
- to maintain databases of patients, diseases and drugs.

- 6** The Head of the English and Mathematics departments of a school is attempting to convince their staff to use CAI and CAL software. Explain the benefits and limitations of introducing such software.

Examples of **benefits** of CAI/CAL:

- Students learn at their own pace.
- Learning is more interesting.
- This type of learning saves money.

Examples of **limitations** of CAI/CAL:

- Some students may lack the requisite computer skills required to learn effectively.
- You must have your own computer.
- Carpal tunnel syndrome can develop from excessive computer use.

- 7** Describe TWO applications of AI in our homes.

Examples of applications of **AI in the home**:

- smartphones with apps that control the television
- things like fans
- to control the home security system by authorising who enters through facial recognition.

- 8** Your friend is ill but feels that waiting at the doctor's office is too time-consuming. She has found a website where the doctor can diagnose illnesses online and prescribe medication. Discuss the benefits and implications (effects) of practising medicine via the internet, with her.

Benefits and implications (effects) of practising medicine via the internet:

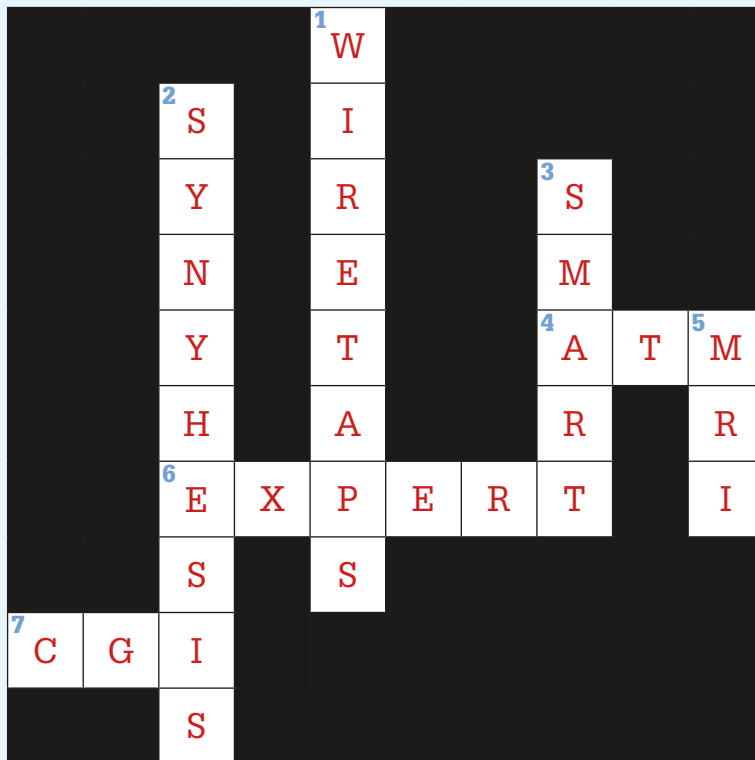
Benefits:

- Doctors can send information to patients or other physicians; they can send X-rays, MRIs and CAT scans to other medical institutions or doctors. The process of sending X-rays, CAT scans and MRIs from one location to another to be shared with other radiologists or doctors is called teleradiology.
- Doctors can even use the internet to collaborate with colleagues on surgery 'live' in different parts of the world. Video and broadband connections may allow a specialist far away from the location of a surgical operation to give advice to the surgeon actually present, and even remotely carry out the surgery, based on what the distant specialist is seeing on the computer screen.

Implications of doctors diagnosing patients' illnesses and prescribing medication online:

- Potential legal problems may occur with this innovation, since it is not always clear who would be responsible if a patient were to worsen as a result of a poor web-based diagnosis. Many medical websites contain disclaimers warning patients that they should seek appropriate medical follow-up by meeting one-on-one with a real doctor.
- The explosion of information on the internet has seen an increase in self-diagnosis by individuals. Self-diagnosis is the process of identifying a medical condition oneself by researching in books and on the internet. This can be extremely useful, as it can provide patients with reassurance and practical advice on how to deal with illness, sometimes meaning they don't need a doctor's visit. However, this also has the potential to be disastrous to the individual, as the information on the internet can be misinterpreted or be unreliable, or both.
- The internet has also made it possible for people to have online access to health care services. In the Caribbean, for example, many institutions offer various degrees of online health care services. These services may include access to medical/patient records, requesting repeat prescriptions, booking appointments or contacting your physician. The challenge that comes with online access is ensuring that the information remains private.

Crossword



Across

- 4** Allows you to perform banking transactions 24 hours a day (3)
6 An _____ system acts as a human advisor or consultant (6)
7 A feature used in making movies (3)

Down

- 1** A form of electronic surveillance (two words) (8)
2 Voice _____ systems produce sounds resembling human speech (9)
3 This card contains a memory chip that holds your banking transaction information (5)
5 Detects strokes and tumours (3)