

2.1.1 ICT systems

Systems

- 1** Main storage in a computer is usually RAM; which loses all the data when the power is turned off; backing storage, usually a hard disk, keeps its data. (3 marks)
- 2** The code, instructions or programs; that are used to make the computer carry out tasks, e.g. a word processor. (2 marks)
- 3** The physical components that can be touched, e.g. a monitor. (2 marks)
- 4** The central processing unit (CPU). (1 mark)

Hardware

- 5** *You must write about both the advantages and the disadvantages to score full marks.*
Advantages: good quality images; can use glossy paper; can print quite fast; (2 marks)
Disadvantages: good quality paper is expensive; ink cartridges do not last long; need replacing often; are expensive; image may be streaked; prints may fade in sunlight or over long periods of time; prints will 'run' if wet. (2 marks)
- 6** Laser printers print very quickly; some can print on both sides of the paper automatically.
Answers just stating 'quicker', 'better' etc. do not score marks. (2 marks)
- 7** Easier and faster to use in a busy restaurant; because they can be used with just the fingers; no mouse is needed; will withstand grease/dirt etc. (2 marks)
- 8** *For all four marks you must choose two devices and give a reason for each – e.g. a camera to capture images/videos to send; a microphone to capture a voice or sound; a monitor to see images/video of the other person; speakers to hear the voice of the other person.* (4 marks)
- 9** *You could choose three devices from the table and explain a use for each. A list on its own will not score any marks.* (6 marks)

Storage and communication devices

- 10** Hard disks can have a much larger capacity; and high-capacity hard disks are cheaper than flash memory. (2 marks)
- 11** Universal serial bus; a type of connection between computers and devices. (2 marks)
- 12** The disks have a very large capacity. (1 mark)
- 13** It is small; and portable; so is easy to carry; it can be used with almost all computer systems; and can have a large capacity. (4 marks)
- 14** **a)** Rewritable medium that allows fast access; so a hard disk or a flash memory stick. (1 mark)
b) Hard disk or flash memory stick, or even a floppy disk. (1 mark)
c) CD-ROM or DVD-ROM. (1 mark)

Software

- 15** *This question does not ask you to describe a GUI so answers about a WIMP are not required. A good answer explains why GUIs are easy to use such as having no need to know all the commands, using images (icons) for choices, being quick to use because menus are provided. The marks would be for identifying three benefits; and then giving explanations.* (6 marks)
- 16** Allows access to all the system, a GUI does not; complex commands can be given to the system; commands can be given in batches to do repetitive tasks, such as adding new users. (3 marks)
- 17** To know what to do with a file when the file is selected, e.g. which software application to load it into; whether to run it or not – it might be a software application. (3 marks)

2.1.2 Exchanging information

Communication services and sharing information

- 18** Three of: the files that can be attached to emails are electronic; can be edited; can be sent back or forwarded to others; the documents can be in colour; have active links to other documents or websites; moving images or video can be sent. (3 marks)
- 19** Email is not very secure but faxes usually are; the fax machine must not be in a public place; faxes must not be left on a machine for anyone to read. (3 marks)
- 20** Address list/book; cc; return receipt; use of attachments; high importance. (5 marks)

Networks

- 21** A hub connects the devices on a network; cables are often used; a router connects one or more networks together; one network could be in a home; the other network could be the internet. (5 marks)
- 22** A set of standards; for connecting mobile phones to networks. (2 marks)
- 23** Wireless networking using radio transmission on frequencies that are available to the public; transmitting on any other frequency is illegal; no licence is needed and no government regulation of the transmissions is needed, so WiFi is commonly used in homes and in public places for accessing a network or the internet; subject to interference from other devices such as microwave ovens or video senders in homes, wireless car keys and locks or other devices that use the same frequencies. (4 marks)

Using the internet to share information

- 24** Two of: the information on the internet may not be true; or even be deliberately misleading, because anyone can place information of a web page; the data may contain malicious code such as viruses or spyware. (2 marks)
- 25** Three of: search engines can be used to find information specifically for the topic using multiple criteria; the information is usually up to date; the information can copied and pasted because it is already in electronic form; the research can be done at any time, not just when a library is open. (3 marks)

- 26** Does not allow the movie company to collect royalties; cannot be controlled so it is easy to make 'pirate' movies. (2 marks)
- 27** FTP has no restriction on file size or types; it is more secure than unencrypted email. (2 marks)
- 28** Four of: back buttons; reload; favourites/bookmarks; store the page off line; a hyperlink to it. (4 marks)

2.1.3 Presenting information

Presenting information using ICT

- 29 a)** Drawing or graphics software. (1 mark)
- b)** Photo-editing or manipulation software. (1 mark)
- c)** DTP software. (1 mark)
- d)** Slideshow software. (1 mark)
- e)** Video-editing software. (1 mark)
- 30** Database software allows sorting; and searching; on more than one field at a time; complex queries can be carried out more easily. (3 marks)

Using data handling software to display information

- 31 a)** Line graph. (1 mark)
- b)** Bar chart. (1 mark)
- c)** Line graph. (1 mark)
- 32** Collect the data; import it into a graphing package or a spreadsheet; select the data to be used; choose the type of chart (in this case a pie chart would be best); add legends to show the numbers and colours used for the segments; add a suitable title. (6 marks)
- 33** Line graphs show the direction of any changes clearly; can be extrapolated to make predictions based on the data already shown. (2 marks)

2.1.4 Manipulating data

Data capture and collection

- 34** It is easier and faster for a person to answer; entering the data into a database can be more accurate. (2 marks)
- 35** The data is collected in exactly the format that is to be entered into a database. (1 mark)
- 36** Email addresses have to be correct so when a user types one into a form on a website a verification check is made; by asking for the email address to be typed twice so the computer system can compare the two entries and report an error if they are different; validation checks are made to ensure that the correct email address format is used; the checks do not make sure that the email address is the correct address for that person. (4 marks)

Data types and checking data entry

- 37** a) Text field. (1 mark)
 b) Date field. (1 mark)
 c) Text field. (1 mark)
 d) Real number field. (1 mark)
- 38** To make sure the data that goes into the database; is the same as that on the data-capture sheet. (2 marks)
- 39** When there is a large quantity of important data to be entered; a good example of when to use double entry is when entering the hours and wages of workers. (2 marks)
- 40** To make sure that sensible data is entered; the data should keep to the rules set out in the validations rules. (2 marks)

Spreadsheets

- 41** a) A7, B1, B9 and C1. (1 mark)
 b) B2 to B5 and B7. (1 mark)
 c) C2 to C5. (1 mark)
 d) C9. (1 mark)
- 42** The contents of each cell can be referenced; and used separately and distinctly from all others. (2 marks)
- 43** When a reference to a cell must not change; always refers to a particular cell when the contents are replicated. (2 marks)
- 44** Three of: the cells always hold numbers; so can be used in calculations; the currency symbol is automatically inserted; the format is usually set to two decimal places. (3 marks)

Databases

- 45** a) Dave Jones; Jasmine Carr; Kathryn Dunmore. Note that Malcolm Jones would not be found – the query asks for those born *before* 12th April 1996. (3 marks)
 b) Gender = 'F'; AND; Date_of_Birth; >; 1st April 1996. Note that Date_of_Birth has underscores in the name in the query. This is because spaces are not allowed in field names but are in the display. (5 marks)
 c) There are only two choices – M or F. (1 mark)

Computer models

- 46** Six of: it allows the shopkeeper to keep records; of the stock on the shelves and in the stock room; and to be able to find (search) for items to check stock levels. The database can be linked to EPOS terminals; at checkouts so that the stock levels are automatically updated. Reports on stock levels or items not selling well (or selling well) can be generated automatically; or the ordering can be automatic by notifying the wholesaler that a delivery is needed. (6 marks)
- 47** Four of: only spreadsheets use formulas/functions for calculations; to predict profit/loss. Spreadsheets can use 'goal seek'; to check that changes to prices or costs; produce the desired results. Graphs or charts; can be generated to see trends in the profit or loss. (4 marks)

2.1.5 Keeping data safe and secure

Backups and archives

- 48** They are cheap; can be used with almost all computers; have reasonably large storage capacity; are small enough to be stored securely. (4 marks)
- 49** Can be lost or stolen easily; backups of whole systems can be very large and will not fit on a memory stick; a USB memory stick has a limit on the number of times it can be used (quite a large number of times but this could be important if backups are taken several times a day). (3 marks)
- 50** The backups could be stolen or destroyed along with the computer if they are kept in the same place or close together. (1 mark)
- 51 a)** Three of: the document and files they are working on; their computer settings; their email contacts; and settings. (3 marks)
- b)** Documents that are not in use but may be needed. (1 mark)

Remember that backups are used to recover data that has been lost, corrupted or damaged. Archives are used to store data that you do not need just now but may want to use later.

Protecting data

- 52** Software/code/program that enters a computer to do harm; without a user's consent or knowledge. (2 marks)
- 53** *Examiners expect you to answer questions like this by explaining what malware does when it installs itself on a computer and how this causes problems for the user. Answers that just list types of malware would score few, if any, marks. A good answer would be:*
Taking no precautions against malware would allow viruses and spyware to enter the computer without the user knowing. Viruses could cause problems by altering or deleting important files used to run the computer so that the computer did not work properly, or files that contain the user's work could be corrupted or lost. Spyware could send details of the user's passwords to others; and these could be used to access email or bank accounts so that emails could be read or lost and money could be stolen from the bank account. (6 marks)
- 54** User IDs; passwords; these can be used to control access to data; the use of firewalls; physical security; encryption. (6 marks)
- 55** Anyone who looks at, uses files or accesses a computer system without the permission of the owner. (1 mark)

2.1.6 Legal, Social, ethical and environmental issues when using ICT

Legal issues with ICT

- 56** The Data Protection Act; states that data must be discarded securely; sending printouts overseas to be burned is not secure; the country to which the data is sent must have the same or better level of data protection as the UK; any country in the EU will have the same level as the UK but others may not; so if the printouts go outside the EU this is breach of the Act. (6 marks)
- 57** The Computer Misuse Act. Creating a virus is not itself illegal, but sending it to others is if the people receiving the virus do not know about it or it is intended to do harm to their systems. (1 mark)

- 58** If permission has not been granted; 'hacking' is commonly taken to mean that an illegal activity is being carried out but this is not always so; it is not illegal if the hacker has permission to do so – for example testing the security of a system.

(2 marks)

Safe and responsible use of ICT

- 59** Having a monitor on the edge of a desk and using a hand to hold it in place; can cause the whole computer system to be unstable. Having a hot drink on a desk; means that there is a possibility of it being spilled, scalding the user or causing electrical problems – even electrocution of the user. An unbalanced chair, or the wrong type with a poor sitting position; puts a user in a precarious position being likely to slip or fall off the chair; the person could get hurt, knock over the computer or spill the drink. A bag not stored properly; could be a tripping hazard. Trailing, tangled wires; could cause a person to trip, to pull the wires and damage them or be electrocuted. An overloaded mains electricity plug socket; can be a fire hazard.

(12 marks)

- 60** Young people should know who they are chatting to; they should not chat to strangers; and not give out contact; or personal details; they should not show photographs of themselves online; if anyone makes inappropriate suggestions or asks to meet up, then the young person should report it to an adult. You will not get marks for listing 'address', 'telephone number', 'mobile phone number' etc. because these are all contact details.

(6 marks)

The quality of life for disabled people

- 61** Specialised hardware and software to input the text of the email and to give the commands to send it; a Braille keyboard; and speech-to-text software would be useful; software to enlarge parts of the screen would also be useful.

(4 marks)

- 62** They can use puff–suck switches to control a computer; a head pointer to tap the keyboard to pick out characters and letters to type emails; and to enter commands; speech-to-text software would allow spoken words and commands to be entered.

(4 marks)

2.1.7 Using ICT systems

How ICT systems are used

- 63** Helps to reduce the risk of health problems; e.g. the correct screen height and resolution will reduce the risk of eyestrain. Adjusting the access rights to files; will help to protect your data from being accessed by unauthorised users.

(4 marks)

- 64** The names do not indicate what the files or folders contain; making finding the documents you want very difficult.

(2 marks)

- 65 a)** Two of: choosing the wrong printer; not having access permission to use a printer; printer is offline; or out of paper.

(2 marks)

- b)** Two of: not having the stick plugged in properly; the file is not on the stick; using the wrong filename; the file has been renamed; the file is corrupted; the stick is faulty.

(2 marks)

- c)** Two of: having no room left on the stick; having the stick write-protected; not having the stick plugged in properly; a file of the same name is already on the stick; the stick is faulty.

(2 marks)

- 66** Four of: typed in the wrong URL; the website has been moved to another URL; or has been removed altogether; the web server is offline; your internet connection is not working; you no longer have permission to view the website.

(4 marks)

2.1.8 Monitoring, measurement and control technology

Sensors and their uses

- 67** The control works like this:

- the required temperature is entered by the user via the keypad into the computer system
- a temperature sensor in the room continuously sends data to the (embedded) computer in the boiler via an ADC
- the computer uses the sensor readings to compare the temperature in the room with the preset values
- if the readings show the temperature to be too low, the computer sends commands to the boiler to make it heat the water and to turn on the pump
- if the readings show the temperature to be too high, the computer sends commands to the boiler to make it stop heating the water and to turn off the pump
- the process is repeated to keep the temperature as close to the preset value as possible.

(6 marks)

Monitoring and control

- 68** Sensors could be used as follows: *1 mark* for each tick correctly placed.

Sensor	Greenhouse environment	Fish tank	Car engine management	Home security system
Light	✓	✓		✓
Temperature	✓	✓	✓	
Pressure			✓	
pH	✓			
CO ₂	✓			
O ₂			✓	
Motion				✓
Humidity	✓			
Sound				✓

- 69** Workers can lose their jobs; because they are not needed anymore; workers might have to retrain to learn new skills; the assembly line will run 24 hours a day so shift working will be affected. Most new factories will be built to use robots from start-up so this type of question is really asking you to consider the overall effects on workers such as fewer manual tasks but more skilled jobs in, for example, maintaining and programming the robots to make the goods.

(4 marks)

- 70** Four of: lower running costs; because fewer staff are needed; manufacturing can go on 24 hours a day; every day; fewer accidents to manufacturing staff so less likely to be sued; the product is more consistent in quality. Do not assume that the product is 'made more accurately' – humans can be very accurate but robotic manufacturing turns out more consistent products.

(4 marks)

- 71** There are two ways of making the turtle draw a square. The simplest is this:
FORWARD 3; RIGHT 90; FORWARD 3; RIGHT 90; FORWARD 3; RIGHT 90; FORWARD 3; RIGHT 90
The final RIGHT 90 is not really needed but it puts the turtle back where it started and pointing in the same direction.
A more efficient way of writing the instructions is:
REPEAT 4 [FORWARD 3, RIGHT 90]; (ENDREPEAT)
Wherever possible, use the most efficient set of instructions. (6 marks)

2.1.9 ICT and modern living

Homeworking

- 72** Cost of fuel; parking; any travel tickets; specialised clothing. (4 marks)
- 73** Can organise their time effectively; motivated to work when unsupervised; able to organise their work around the demands of their family; not be easily distracted from working. (4 marks)
- 74** Space has to be found for working; extra IT equipment will have to be bought; an internet connection will be needed; there may be distractions at home from family, friends or pets. (4 marks)

ICT and e-commerce

- 75** *Advantages:* coat may be cheaper online; there might be more choice; there is no need to go to the shops so the cost of travel is saved.
Disadvantages: three of: can't try the coat on; the size and colour may not be exactly as shown on the website; the coat may not be in stock; it may take a long time to be delivered; returning it might be difficult. (6 marks)
- 76** *Advantages:* three of: bills can be paid without visiting a branch or writing cheques; arrangements can be made to pay bills automatically; financial details are always available even when the banks are closed; details can be checked from anywhere with a secure internet connection.
Disadvantages: three of: accounts can be hacked over the internet; details that are sent may not be secure; there are fewer branches for customers to visit; the customer may feel that the bank is not as personal in its dealings. (6 marks)

B063: ICT in context

Note that the marking points in the sections that follow are for indication purposes only.

For '8 mark' questions – those in which you are asked to 'discuss' something, in which the quality of your communication is also assessed – marks are generally awarded in one of three bands as summarised here.

Poor answer

- The student addresses only some aspects of the technology that would be used.
- The answer is simplistic with little or no relevance to the case study.
- There is little or no use of specialist terms.
- Errors of grammar, punctuation and spelling are intrusive.

Satisfactory answer

- The student addresses all aspects of the question and discusses/considers different aspects of modern technology systems applied to the context, although development of some of the points/ implications/ advantages/ disadvantages/ benefits/ drawbacks of using these techniques is one-sided or limited.
- The student makes specific reference to the case study and, for the most part, the information given is relevant and presented in a structured and coherent format. Specialist terms are used appropriately and mainly correctly.
- There is an attempt to come to a conclusion.
- There are occasional errors in grammar, punctuation and spelling.

Good answer

- The student addresses all aspects of the question and discusses different points/ implications/ advantages/ disadvantages/ benefits/ drawbacks of the systems and techniques applied to the context.
- The issues raised are justified and the student makes full reference to the case study. The information given is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used correctly and appropriately.
- A reasoned conclusion is presented.
- There are few, if any, errors in grammar, punctuation and spelling and the student's answer is easy to read with little effort.

Line of business

- 1 Collecting data on customers is a vital part of any successful business; loyalty cards not only give the company the name and address of customers but track all their buying habits; they also allow the company to set up special offers to encourage customers; to return to the store and generate brand loyalty. *(4 marks)*
- 2 Special offers and advertisements can be broadcast; customers like watching the screens and if placed by the checkouts can make them more content while waiting to pay; new technology means that the whole shop front can be a display screen; and encourage customers even when the shop is closed. *(4 marks)*

Cloud computing

- 3 If you often collaborate with other people on group projects, you are an ideal candidate for using cloud computing. The ability to share and edit documents in real time between multiple users is one of the primary benefits of web-based applications; it also makes collaborating easy. Cloud computing can save money on hardware and software; there's no need to invest in large hard disks or super-fast CPUs; everything is stored and run from the Web; you can cut costs by buying a PC with fewer features. Cloud computing is based on the internet cloud and depends on internet access; if you don't have internet access then you are out of luck. Users without readily

available internet access can't consider a switch to cloud-based computing; the same applies if you have slow internet access. If your documents require confidentiality then you probably don't want to trust them to cloud computing; when security matters, don't take chances.

(8 marks)

Project planning

- 4** Application: Project planning software such as Microsoft Project

Use: Work out the critical path of the project

Application: Twitter

Use: Aid communication and keep the team updated

Application: Word processor

Use: Write up reports about project progress and develop project specifications

(6 marks)

Specialist software

- 5** Off the shelf; specialised; custom-built.

(3 marks)

- 6** The easiest option would be to use off-the-shelf software; staff are likely to have the skills to use spreadsheets and word processors. Specialist software is more likely to be compatible with the business requirements; and will probably link easily to bank accounts etc. If the business has particular needs they may wish to commission a programmer to develop a custom-built solution; this would enable them to control all the functionality of the software.

(6 marks)

3D computing

- 7** You have to be directly in front of the screen; cost is high compared with a normal television; need to wear glasses.

(3 marks)

- 8** 3D printers could allow people to copy physical products; denying the manufacturer's income from their designs; could reduce the number of people employed in the manufacturing sector.

(3 marks)

Expert systems

- 9** Knowledge base; rules base.

(2 marks)

- 10** Expert systems rely on a knowledge base. In the case of a medical database there are many known facts; in art, people have different opinions about what is good and what is not. Expert systems also have to derive answers to questions; in the medical context these are easily defined; in choosing a piece of artwork people might change their views from those previously held; even the liking of a particular artist could change if the artist develops a different style.

(8 marks)

Company websites

- 11** Some people like to try clothing on before they purchase; the company therefore needs a high-street presence. They also need to attract people to the shop and to build customer loyalty; so they will need to use Web 2.0 technologies like social media and podcasts. By putting their clothing on a website they will be able to reach a worldwide audience; even visitors to the shop could try clothes on in the shop then order the correct size online or look online first before visiting the shop when they have found what they are looking for on the website.

(8 marks)

- 12** Allows non-specialists to update a website regularly; because the templates are all in place; you can give different users different access levels; CMSs can use lots of different file types including images, blogs and sound files.

(4 marks)

Social networking and viral marketing

- 13** Need to build customer loyalty; and open up effective communication channels to their existing and potential customers; social networking is ideally placed to do this; if they get it right they could achieve viral marketing; where customers pass on information to other customers. The advantages of social networking are the low price and large number of existing users. A company would want to integrate their own website with social networking sites such as Facebook and Twitter; Twitter would be the easiest way to get to new customers; but Facebook is good for existing customers.

(8 marks)

Working practices

- 14** New technology can change the way people work; it is now possible to work from home and to hot-desk; this is where a company shares desks between lots of employees; this is ideal where people are often out of the office; this reduces the size of the office; and the cost of equipment because employees share computers. It can make people feel less valued; they have nowhere to put their personal things. New technology also allows people to work from home; this saves time and travel costs; people can work when they want; but they have to find a space in their home for an office; and may feel very isolated; they may also find it hard not to be distracted by things to do in the house.

(8 marks)

Ethics, the digital divide and IPR

- 15** Companies spend a large amount of money designing, developing and marketing software; if people copy it then they steal the IPR; and stop the company from making money; this can prevent new games and software being developed.
- 16** It is the gap between the people who can access the technology; and the people who cannot; this could be as simple as a person being able to buy things cheaper online than someone without the technology; but can also refer to countries that have no easy access to the internet and all it offers.

(4 marks)

(4 marks)

Augmented reality

- 17** Virtual reality is completely computer-generated; augmented reality superimposes computer-generated virtual reality objects; and images over a real view.

(3 marks)

Gesture-based controls

- 18** Gaming; mobile phones; to help people with movement disabilities.
- 19** Touch screens and pads are used in mobile phones; Multi-touch, a system in which you can use more than one finger, has opened up a whole new world; the iPhone multi-touch panel was designed to enable control of everything using only the fingers. Accelerometers are used in many laptop and handheld computers to switch off the hard drive if the device is moved; an accelerometer cannot sense the direction the remote is pointing whereas a camera can; proximity sensors can tell where a device is relative to other objects.

(3 marks)

(8 marks)

Mobile technology

- 20** E-commerce is short for 'electronic commerce' and refers to the field of marketing, buying, selling, distributing and servicing different products and/or services over the internet; it aims at using electronic business applications for the purpose of commercial transactions. M-commerce stands for 'mobile commerce' and refers to commercial transactions being conducted over cellular and mobile devices; the methods of payment used in m-commerce are normally calling numbers with premium rates; reducing of the caller's credit and charging the user's bill.

(8 marks)

Convergence

- 21** People used to have to buy lots of separate products such as a watch, music player, camera and phone; due to technological convergence almost all of these are now available in a single handheld device; this makes things less expensive and more portable. The disadvantage is that quality is sometimes lost; and if something goes wrong with the technology you lose all the functions not just one. Mobile phones have become essential to life; and highlight a major increase in the digital divide.

(8 marks)