



Cambridge IGCSE™ Information & Communication Technology Brochure

**Beyond Basics,
Reset Education**

Marshall Cavendish Education Cambridge IGCSE™ ICT series is a comprehensive two years programme designed to support learners with their study of the Cambridge IGCSE and IGCSE (9-1) ICT syllabuses (0417/0983).

This IGCSE ICT series encapsulates the Cambridge Approach into a suite of accessible and approachable learning materials that support blended learning.

Marshall Cavendish Education Cambridge IGCSE ICT series promotes visual learning and delivers an engaging learning experience. Difficult concepts are scaffolded and broken down to convey bite-sized concepts, with worked examples supports new learners.

To nurture a 21st century practical problem solver, this series includes real-life scenario-based problems and situations for learners to apply scientific and technological concepts learnt to practical aspects beyond the confines of the classroom.

Through engaging chapter openers, the friendly and concise language used, and the visual approach by means of colourful illustrations and infographics to simplify learning concepts, our package delivers an engaging and enjoyable learning experience. This enables learners to develop necessary skills to embrace the rapidly changing technological landscape and become future thinkers and problem solvers.



1 Reduce learning obstacles and achieve proficiency in concepts

2 Build learners' confidence by linking theory to real-life applications

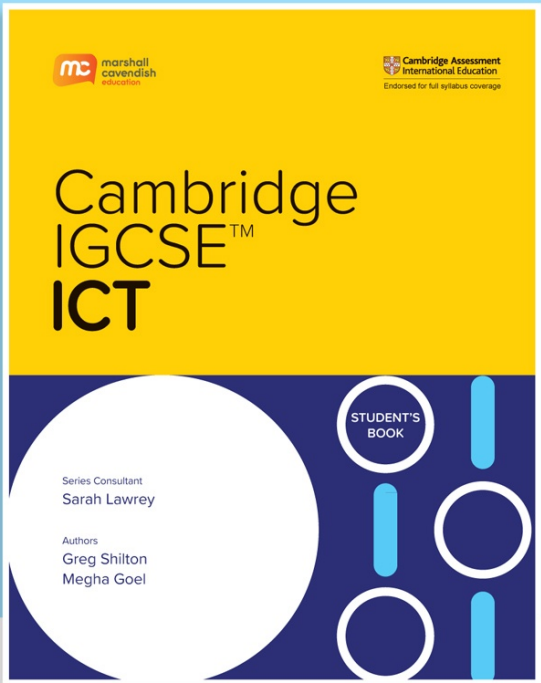
3 Prepare learners for the future by equipping them with 21st century competencies

4 Enhance teaching and learning effectiveness with digital resources

What's in Our Package?

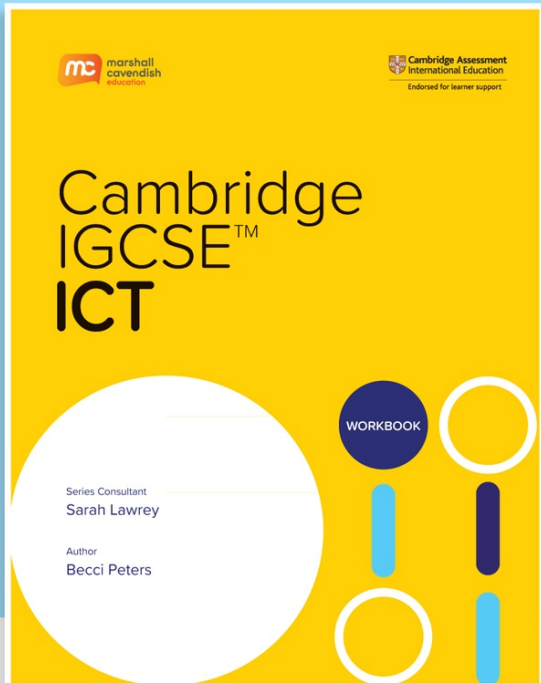
Student's Book

ISBN 9789814941563



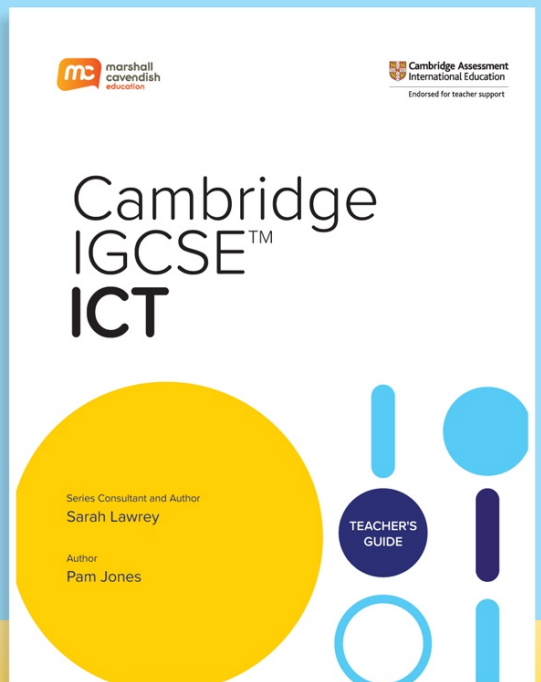
Workbook

ISBN 9789814941570



Teacher's Guide

ISBN 9789814941587



Additional Digital Resources

- Enhanced eBooks
 - Ability to annotate, save and submit work
- Digital Teacher's Guide
- Editable Resources:
 - Scheme of Work*
 - Lesson Plans
 - PowerPoint Slides*
- Source Files with Instructions*

*These resources will not go through the Cambridge International endorsement process.

With its **clear and simple language**, this series cater to learners for whom English may not be the first language. The **highly-visual** and **clearly-organised content** is also designed to guide learners of various learning readiness to master the syllabus. In addition, the use of technology helps to **enrich and enhance learning**.

Clear learning objectives are aligned to the Cambridge syllabus.

CHAPTER 1

Types and Components of Computer Systems

ICT WATCH

Scan the page to watch a clip on what components are inside your PC. Before watching discuss what you expect to see or hear.

QUESTIONS

- What components make up computer systems?
- What types of computer systems do I have and what components do they have?

To understand how to:

- Define hardware as consisting of physical components of a computer system
- Define computer hardware
- Identify internal and external hardware components of a computer system
- Explain the purpose of internal and external components and peripherals
- Define computer software
- Explain the purpose of application and identify examples
- Explain the purpose of system software and identify examples
- Describe the process of converting data to analogue and digital
- Explain the reason for converting data to analogue or digital
- Give examples of when this is done
- Discuss the impact of emerging technologies on everyday life

Chapter 1

Watch Feature with videos and interactives to engage learners and promote ease of learning.

Questions to trigger learners to think about how the topic relates to their daily lives.

Helpful Notes provide important notes and study tips that are useful to learners.

Reflect allows learners to reflect on their learning and their identify gaps in learning which they can work on.

Word Alert provides the commonly used vocabulary in the series.

1.1 Hardware and software

Hardware

Hardware is the physical components that make up the computer system. These are the devices you can touch.

Generally, all hardware devices are classified into internal and external types. Internal devices are those within the system and external devices are visible and on the outside. The table below lists some common hardware devices.

Internal Hardware	External Hardware
Central processing unit (CPU)	Keyboard
Random access memory (RAM)	Printer
Read only memory (ROM)	Mouse
Motherboard	Monitor
Sound card	Touch screen
Graphics card	USB memory stick
Hard disk drives	External hard drive

External storage devices

Portable hard disk drives or solid state drives are used to store data. These devices can usually be inserted into the system, often via a USB port. Examples of external storage devices include USB memory sticks, hard drives and optical disks.

Activity

1 What were or are the uses of these devices?

- USB 2.0
- USB 3.0
- HDMI
- DVI video
- VGA/AVGA
- Firewire

2 How many other types of port can you think of?

3 Internal ports were traditionally used for external ports. Find the data transfer rates for:

- USB 3.0
- SATA bus

Word Alert (A-Z)

Physical Components: A computer part / hardware you can touch

Traditionally: Usually

Types and Components of Computer Systems

Visuals related to real-world examples of the topic.

Bite-sized information to guide learners in learning concepts better.

Activity with real-life scenario for learners to apply the theory they have learnt.

4 Mobile devices tend not to have ports. Some have USB or mini USB sockets. Many have jack sockets for audio and they also have slots for external memory cards.

- What type of memory cards do you know about? Can you name them?
- What are their data transfer speeds? What are their capacities?

5 If mobile devices don't have ports, explain how we can do the following:

- connect to another monitor or TV
- print
- transfer data

Software

Software refers to programs that allow the computer system to function. Without software, the hardware components would be useless. Software allows the processing of electronic data and we use it for doing various things with a computer, for example:

- writing
- creating images
- making presentations
- watching videos
- communicating with others
- browsing the internet

Software can be categorised into application software and system software.

Analogue and Digital data

- Students need to know the characteristics of analogue and digital data
- Differences between analogue and digital data
- The need to convert analogue to digital data so it can be processed by a computer

We know computers understand binary values and that all data must be converted into this for it to be processed. Let's look at how sound is recorded to show the need for converting analogue to digital data.

A microphone is used to record our voice; this is an analogue signal. Analogue signals are pieces of data that continuously change. Therefore, analogue signals need to be converted into digital data so computer systems can process it and store it. A device called an analogue to digital converter (ADC) is used to carry this out.

Original sound wave

Analogue sound wave

Digital sound wave

▲ Differences between digital and analogue data.

The digital sound wave creates the curve digitally after the sound has been sampled at regular intervals. Taking samples more regularly therefore improves the quality of the sound as it will be closer to the original sound wave.

However, at times we need to convert the digital signals back to analogue. For example playing your favourite song on your smart phone into your earphones. This can be done using a digital to analogue converter (DAC). The digital data is stored on your smart phone but would then be translated to analogue so you can hear it.

Activity

1 Draw a comic strip showing how your favourite song is recorded and then uploaded to the Internet.

2 List examples of devices which have a DAC or ADC built in.

LINK

Exercise 1 and 2 in Workbook

Exercise 3 in Workbook

WORD ALERT

Capacities: Amount of data a device can hold/contain

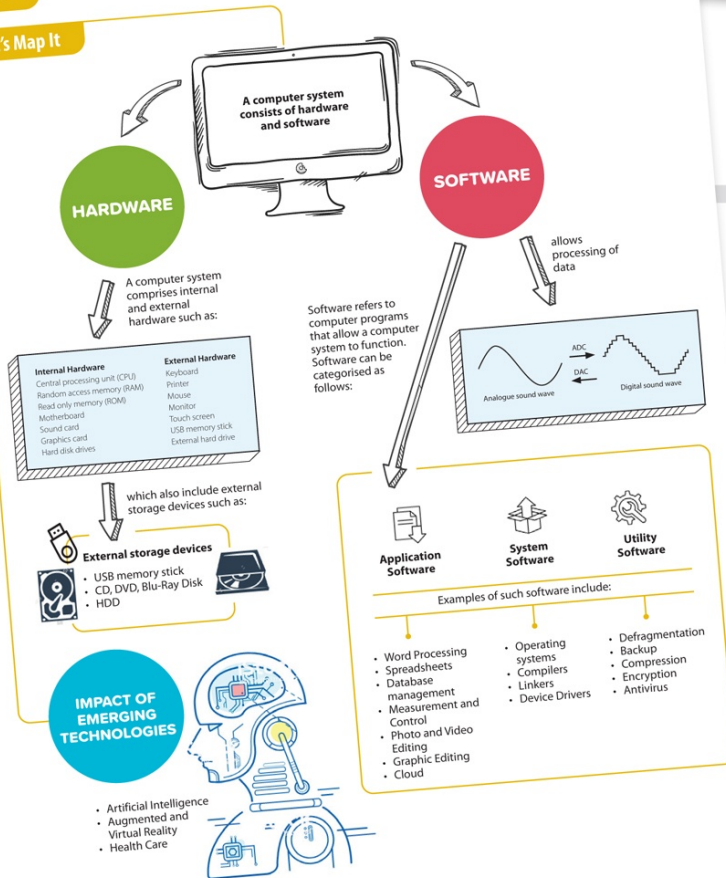
Categorised: Ordered / Sorted

Link to workbook questions at appropriate junctures to reinforce learning.

Enrichment provides suggested activities to encourage learners to relate the concepts learnt to their own lives, promoting deeper understanding.

ENRICHMENT

There are several factors that affect the size and quality of sound files. Can you find out what they are?



Let's Map It provides a quick visual summary of the concepts for each chapter and facilitates learners in their revision.

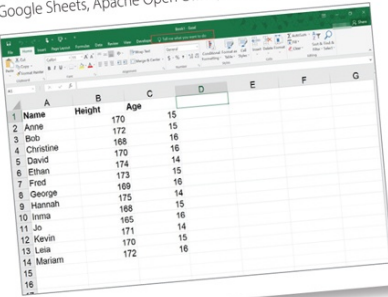
This series create opportunities for learners to **engage** in their learning, as they **make the connection** between the theory they learn in the classroom to real-world scenarios through the various activities in the book.

Practical ICT lessons to train learners on skills necessary for the future.

Spreadsheet
Spreadsheet software is used to organize, analyze and manipulate numerical or text data in a table form. The data are arranged in a table based on a certain numbering format to denote the cells arranged in lettered columns and numbered rows. Spreadsheets use something called formulae to help manipulate and produce data. These formulas allow users to quickly compare and calculate data. Standard features of spreadsheet software include the following:

- inputting and formatting of data
- inserting formula and doing calculations
- sorting and graphing of data

Microsoft Excel is a commonly used example of spreadsheet software. Other programs include Google Sheets, Apache Open Office, and Libre Office.



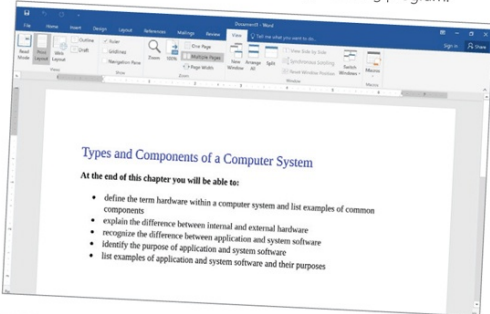
	A	B	C	D	E	F	G
1	Name	Height	Age				
2	Anne	170	15				
3	Bob	172	15				
4	Christine	168	16				
5	David	174	14				
6	Ethan	173	15				
7	Fred	169	16				
8	George	175	14				
9	Hannah	168	15				
10	Ivona	165	16				
11	Jo	171	14				
12	Kevin	170	15				
13	Lara	171	15				
14	Mariam	172	16				
15							
16							

Word processing software

Word processing software is used for creating, editing, formatting, and manipulating text documents. Hardware devices such as a keyboard or a mouse are used for typing and inputting text. Standard features of word processing software include the following:

- inserting, deleting, cutting, pasting, copying, searching and replacing text
- changing the size, colour and types of fonts
- checking spelling and grammar
- importing photos, images, pictures and simple drawing tools

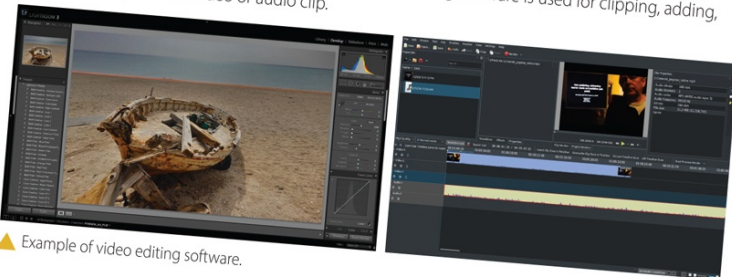
Microsoft Word is a commonly used word processing program.



Example of word processing software.

Photo and video editing software

Photo editing software is used for changing the colour, saturation, and tone of photos, cropping them, and changing features to enhance them. Video editing software is used for clipping, adding, and removing parts of a video or audio clip.



Example of video editing software.

Graphic editing software

Graphic editing software is used for creating and editing illustrations, designs, logos, three-dimensional images, animations, photographs, and other images. It is able to import and export various graphic file formats for example, .jpg.



Example of graphic editing software.

The ICT application also helps develop skills that learners can use to apply in document production, data manipulation, data analysis and website authoring.

Through the **inquiry-based** approach, learners are encouraged to continually ask questions and reflect on their understanding. This encourages **active learning** and promotes **self-directed learning**.

Critical Thinking & Problem Solving encourages learners to have self-awareness of their thought process.

External storage devices

Portable hard disk drives or solid state drives are used to store data. These devices can usually be inserted into the system, often via a USB port. Examples of external storage devices include USB memory sticks, hard drives and optical disks.



Examples of external storage devices.

Curiosity & Digital Literacy

prompts learners to explore concepts further and apply what they have learnt through different modes of digital media.



Activity

Ask students to collaborate in small groups to make posters that display the different types of hardware. For each of the hardware types, they should write a short description of the function and usage in everyday life.

Allow each group to present their posters to other students to practise communication. Get them to discuss the advantages and disadvantages of the types of hardware available.

Creative Thinking

Challenge higher-ability learners to find out more about concepts covered in the classroom.

Challenge higher-ability learners to find out more about other high-level programming languages and how such languages are being used.

Introduce utility software as tools to optimize processes, configure, or maintain a computer and to support the computer infrastructure. Ask students if they have ever performed processes such as defragmentation, backup and compression.

ENRICHMENT

Although Microsoft Word is the most commonly used word processing software, there are other packages. Can you name them?

ENRICHMENT

There are several factors that affect the size and quality of sound files. Can you find out what they are?

Collaboration and Communication

Learners recognise the importance of collaboration to reach an end goal and learn to accept a range of opinions, experiences and insights.

Revision Checklist encourages **active learning** and promotes **self-directed learning**.

Chapter 1

Revision checklist

Types and components of computer systems	Need to revisit	Satisfactory	Confident
I can define hardware and explain the need in a computer system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can identify internal hardware components of a computer system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can identify external hardware components of a computer system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can explain how and why analogue data needs to be converted to digital data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can define software and explain the need in a computer system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can identify internal hardware components of a computer system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can define two types of software – application and system software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can identify examples of system software for specific purposes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can identify examples of emerging technologies and recognise the impact on everyday life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Teachers’ development is supported through the comprehensive Teacher’s Guide to aid in **effective lesson planning and delivery** in the classroom.

Each chapter starts off with a list of **assessment objectives** and its **learning objectives**.

List of inquiry-based approach activities help educators to engage learners actively in a dynamic learning environment and instill good learning habits.

Differentiated Instruction to stretch learners’ abilities further using the **Challenge** teaching prompts and suggestions.

Differentiated Instruction to help learners who need additional scaffolding with the **Support** teaching prompts and suggestions.

CHAPTER 1

Types and components of computer systems

Assessment objectives

AO1: Recall, select and communicate knowledge and understanding of ICT

AO2: Apply knowledge, understanding and skills to produce ICT-based solutions

AO3: Analyse, evaluate, make reasoned judgements and present conclusions

Learning objectives

Define hardware as consisting of physical components of a computer system

Define computer hardware

Identify internal and external hardware components of a computer system

Explain the purpose of internal and external components and peripherals

Define computer software

Explain the purpose of application and identify examples

Explain the purpose of system software and identify examples

Describe the process of converting data to analogue and digital

Explain the reason for converting data to analogue or digital and suggest examples of when this is done

Discuss the impact of emerging technologies on everyday life

1.1 Hardware and software

Warmup

Students will have much experience using a personal computer, laptop, smartphone or any digital device. However, they may not know all the components that go into each of the different types of computers.

Do a quick survey to determine the number of students who own a mobile phone. Ask them what they use their mobile smart phone for. What are some of the tasks the smart phone is capable of?

Ask students what they see and observe around them about computers and computer systems in general, and to list down the things that they can associate with these, such as the computer screen, speakers, graphics, etc.

Also, highlight that some of these things they have listed fall under an umbrella term of 'hardware'. Some of these hardware items are easily identified, but others are harder to see.

Ask students to create an ICT dictionary/notebook that includes the key terms and definitions. This would prove beneficial in the long run as they can take notes and keep this throughout the course.

Hardware

Initiate a conversation by asking students to list as many types of hardware that can be seen or that cannot be seen. Using examples such as a cell phone, ask students if they can name as many types of hardware that are visible and not visible.

Challenge students to think of external hardware that could also be found internally in certain devices and the types of hardware that could be both internal and external. You could have further discussions about the brands in the market, the specifications of the hardware, etc.

Ask students to list important hardware parts of a mobile phone that are common among the different brands out there in the market.

External storage devices

Move on to talk about storage devices that could also be internal or external hardware.

Challenge students to think of where the line between internal and external hardware is blurred, e.g. is a micro-SD card in a phone internal or external hardware?

Support students by asking them to think of a traditional desktop PC. Everything inside the box is internal and everything outside the box is external. Show them photographs or allow them to search on the internet for suitable images to illustrate these concepts. If you have a PC, let them see inside and show them the different components.

Activities with helpful teaching suggestion and activities to facilitate classroom discussion.

Activities to support and stretch learners to explore the subject of interest more deeply.

Wrap-Up activities to link learned concepts and solidify knowledge.

Chapter 1

Encryption

Support students by explaining that PGP (the method used in this diagram) sends a private key to all the people you trust. This key can only open messages and you have another key that can only close messages.

Challenge more able students by explaining different common encryption standards. For example, the Advanced Encryption Standard (AES) is a symmetric encryption algorithm and one of the most secure. AES is comprised of AES-128, AES-192 and AES-256.

Talk about other possible encryption methods, such as the RSA and 3Des. You could also introduce other ways to beef up security, such as the two-factor authentication (2FA). What are the other methods?

Activities

Ask students to reflect on the applications and purpose of system software.

How is it being used in computers and in other hardware?

Note that the need for tight integration of hardware and software provides an excellent user experience. As a discussion point, ask students how good hardware and software integration impacts the user experience.

Are there any positive and/or negative impacts?

How has such application or system software changed our lives?

Workbook

Exercises 4-9

Ask students to complete Exercise 4 in the workbook with the definitions of application and system software.

Exercise 5 is an extension activity for those students who need more challenge.

Question 1 of Exercise 6 is designed to show that the students have understood the basic function of the compiler and how it fits into the computer workflow.

Question 2 is an extension activity for those students who need more challenge.

Exercise 7 is a free activity where students demonstrate their understanding of the role of the linker and a basic understanding of libraries, object files and low-level programming.

Exercises 8-10 revise utility software:

device drivers

defrag software

backup procedure and software

compression software

AO1: Recall, select and communicate knowledge and understanding of ICT

AO3: Analyse, evaluate, make reasoned judgements and present conclusions

Answers

All answers to questions in the Workbook are available at resource.marshallcavendish.com/teacher.

Students can check the answers to Let's Practice at resource.marshallcavendish.com/student. xxxxx xxxxxx

Analogue and Digital Data

Support students by explaining that all computer systems only understand digital data. All files and documents need to be converted to digital data to be used and stored. Help students understand the process of recording sound files and then storing them on their computer. Ask students what do sound waves look like and if they think a computer could replicate that digitally. Describe the process of sampling and how this works – show students a diagram of both an analogue and digital sound wave and look at differences and similarities.

Challenge more able students if they can think of other instances where analogue data may be required to be converted into digital or even the other way round.

Discuss how once an audio file has been saved on the computer system, how it is then played back to the students.

Activity

Students have seen examples of diagrams showing analogue data being converted to digital data. Ask students to create a comic strip showing a musician creating a song and all the steps in between before it reaches their smart phone and their own ears. The focus of this task should be on the conversion between analogue and digital data.

Emerging technologies

Support students by explaining that technology is ever evolving and new devices are being produced that are more advanced. These technologies are being developed to impact human lives but this does not always mean positively. Provide students with a range of positive AI, AR, VR examples of when they have a positive and negative impact on our lives.

Challenge more able students by asking them to carry out research into AI, AR and VR and make a prediction as to what they believe the future holds and if it will benefit everyday life or not.

Activity

Ask students to create a timeline detailing the start of AI in the modern world all the way up to today's devices. Students will require the internet to carry out research but you could also give students a range of devices to look at or start them off.

Wrap Up!

Ask students to think back to the opening unit question (once one has been selected and ask them to explain their answer and provide examples of what they have covered in this unit and how it relates to the question.

What types of computer systems do I know and use and what components do they have?

Ask students to write an appropriate newspaper article that discusses a specific area within the unit. Students could search for facts and real life stories to include or create their own.

Recap and link learning objectives to **workbook** tasks.

Answers to the Workbook can be found.

1. Types and Components of Computer Systems
2. Input and Output Devices
3. Storage Devices and Media
4. Networks and the Effects of Using Them
5. The Effects of Using IT
6. ICT Applications
7. Systems Life Cycle
8. Safety and Security
9. Audiences
10. Communication
11. File management
12. Images
13. Layout
14. Styles
15. Proofing
16. Graphs and Charts
17. Document Production
18. Databases
19. Presentations
20. Spreadsheets
21. Website Authoring