

What are Computers?

Unit Overview

Target year group: Year 7

Projected Duration: 6 lessons

This scheme of work will give learners an understanding of the key components that make up a computer system, including inputs and outputs and hardware. In addition they will be introduced to binary and how to convert between binary and denary numbers and will gain a basic understanding of computer networks and operating systems. They will also look at health and safety issues surrounding the use of computers.

Relevant Prior Knowledge

Learners will be familiar with using computers but will probably not have an in-depth understanding of how computers work.

New Language for Learning

- | | |
|-------------------|--------------------|
| ↘ Peripheral | ↘ RSI |
| ↘ Input | ↘ Eye strain |
| ↘ Process | ↘ Legislation |
| ↘ Output | ↘ LAN & WAN |
| ↘ Sensor | ↘ Wireless |
| ↘ Motherboard | ↘ Network |
| ↘ Processor (CPU) | ↘ Topology |
| ↘ Memory (RAM) | ↘ Operating system |
| ↘ Hard disk drive | ↘ Kernel |
| ↘ Binary | ↘ Applications |
| ↘ Machine code | ↘ GUI |
| ↘ ASCII | |

Resources

- ✓ Teacher's PowerPoint
- ✓ Lesson 2 – Hardware mat and cut-outs
- ✓ Lesson 3 – Binary Help Sheet
- ✓ Lesson 3 – Extra Secret Messages
- ✓ Lesson 5 – Networking Worksheet
- ✓ Lesson 5 – Network Simulation Tool
- ✓ Homework worksheet

Homework

Project on up-coming computer technology that is being used in different scenarios.

Cross-Curricular Links

Numeracy:

- ↘ Performing mathematical equations to convert between binary and denary numbers.

Literacy:

- ↘ Writing a magazine review of an operating system (use of PEE will be highlighted here).

Assessment

Assessment is based on the [Progression Pathways Assessment Framework](#) from Computing at School.

Pathway: Hardware & Processing

- | | |
|----------------|--|
| Level 3 | ✓ Knows that computers collect data from various input devices, including sensors and application software. |
| | ✓ Understands the difference between hardware and application software and their roles within a computer system. |
| Level 4 | ✓ Understands why and when computers are used. |
| | ✓ Understands the main function of the operating system. |
| | ✓ Knows the difference between physical, wireless and mobile networks. |
| Level 5 | ✓ Recognises and understands the function of the main internal parts of basic computer architecture. |
| | ✓ Knows that there is a range of operating systems and application software for the same hardware. |

Support and Extension

Less able learners should still be able to access all lessons although the rate of progress may be slower than that of other learners. Teachers may exceed the projected duration if they feel this would be more suitable for the classes they are teaching.

A range of extension activities have been embedded into each lesson to enable **more able learners** to be pushed within their skills and knowledge.

Lesson 1

Activities:

- ↘ Introduce learning objective, outcomes and keywords.
- ↘ Explain how a computer system is built on inputs processes and outputs and question learners on what is meant by the term 'peripheral'.
- ↘ Show a range of peripherals in sequence, with learners identifying whether they are input or output devices.
- ↘ Hold a discussion around whether a sensor is an input or output and the different types available.
- ↘ Learners create a table to identify whether a range of peripherals are inputs or outputs and function of each one.
- ↘ **Plenary:** Quick questions on topics covered in the lesson (learners may provide written answers or answer as part of a class discussion).

Extension:

- ↘ Learners should explain how a range of sensors are used and in which everyday objects.

Lesson 2

Activities:

- ↘ Introduce learning objective, outcomes and keywords.
- ↘ Go through the different parts of a computer, making comparisons to the human body.
- ↘ Arrange learners into groups of 3 or 4 and assign the roles on the slide to the various group members.
- ↘ Each group should take apart a computer, one-by-one they should place each component onto the mat provided, matching it to the description and taking a photo.
- ↘ Learners should also find an additional component, write its name, human equivalent (if applicable) and a description using the empty tiles provided.
- ↘ Computers should be put back together at the end.
- ↘ **Plenary:** Quick questions on topics covered in the lesson (learners may provide written answers or answer as part of a class discussion).

Extension:

- ★ In the unlikely event that some groups finish all tasks early they may play hangman using the key words on the white board.

Lesson 3

Activities:

- ↘ Introduce learning objective, outcomes and keywords.
- ↘ Discuss how computers might "talk" to one another – learners should agree that they use ones and zeroes (binary/machine code).
- ↘ Explain how binary is written and converted to denary.
- ↘ Split the class into two halves with a volunteer from each half to play the Cisco binary game (link in the PowerPoint).
- ↘ Give learners time in teams to play the game against one another.
- ↘ Explain how numbers can be converted to letters using ASCII.
- ↘ Learners should use the worksheet containing a secret message, the help on the worksheet should be enough for them to decode the message.
- ↘ **Plenary:** Quick questions on topics covered in the last two lessons (learners may provide written answers or answer as part of a class discussion).

Extension:

- ★ Learners should play the Binary game themselves (prizes could be allocated for top scorers).

Learning Objective:

Understand the differences between input and output devices and recognise where sensors are used in everyday objects.

Learning Outcomes:

- ✓ **GOOD:** Identify whether each device is an input or output and briefly explain its function.
- ✓ **BETTER:** Accurately describe the functionality of each device.
- ✓ **BEST:** Identify and explain how sensors are used in everyday items.

Learning Objective:

Be able to recognise the key components that make up a computer and identify their functionality.

Learning Outcomes:

- ✓ **GOOD:** Work with a group to take apart a computer.
- ✓ **BETTER:** Work effectively in a group to label and photograph each part of the computer.
- ✓ **BEST:** As a group, find, label and photograph an additional computer component and find out what it does.

Learning Objective:

Understand how to decode binary numbers and convert them to letters using ASCII.

Learning Outcomes:

- ✓ **GOOD:** Decode decimal numbers to and from binary.
- ✓ **BETTER:** Use an ASCII table to decipher an encoded message written in binary.
- ✓ **BEST:** Play the binary game online to decoded binary numbers.

Lesson 4

Activities:

- ↘ In pairs learners should write down three health problems they think could occur from using computers regularly.
- ↘ Discuss and question learners on the words they come up with.
- ↘ Introduce learning objective, outcomes and keywords.
- ↘ Go through the various health risks and ways to avoid them.
- ↘ Explain the purpose of the Health and Safety at Work Act and where it is used.
- ↘ Learners should create a Health and Safety Fact Sheet that could be given to local business to make them aware of the issues when working with computers.
- ↘ **Plenary:** Quick questions on topics covered in the lesson (learners may provide written answers or answer as part of a class discussion).

Extension:

- ★ Learners should create a poster to be displayed in the classroom informing students of one of the health and safety risks and how it can be avoided.

Lesson 5

Activities:

- ↘ Introduce learning objective, outcomes and keywords.
- ↘ Explain the different types of computer network along with wireless and mobile networks.
- ↘ Learners should complete the Networking Research worksheet.
- ↘ **Plenary:** Quick questions on topics covered in the lesson (learners may provide written answers or answer as part of a class discussion).

Extension:

- ★ Learners should use the Network Simulation Tool and follow the step-by-step instructions to learn how to create a computer network.

Lesson 6

Activities:

- ↘ Introduce learning objective, outcomes and keywords.
- ↘ Identify the main operating systems available and what it does.
- ↘ Learners should write a magazine-style review of a smartphone operating system, the review should begin by explaining what an operating system is.
- ↘ **Plenary:** Quick questions on topics covered in the lesson (learners may provide written answers or answer as part of a class discussion).

Extension:

- ★ Learners should create a comparison table to compare all four of the given operating systems using the headings provided.

Learning Objective:

Be able to identify how to keep safe when using computers and recognise the legal requirements for businesses.

Learning Outcomes:

- ✓ **GOOD:** A basic leaflet highlighting safety risks when using computers regularly.
- ✓ **BETTER:** Detailed leaflet explaining the risks and how to minimise them.
- ✓ **BEST:** A suitable poster to inform students of one of the risks and how it can be avoided.

Learning Objective:

Be able to recognise the different types of networks and where they are used.

Learning Outcomes:

- ✓ **GOOD:** Correctly identify where each type of network is used and explain advantages and disadvantages of networks.
- ✓ **BETTER:** Identify different networking topologies.
- ✓ **BEST:** Create a network using the Network Simulation Tool.

Learning Objective:

Understand the role played by operating systems.

Learning Outcomes:

- ✓ **GOOD:** A basic magazine-style review of a smartphone operating system.
- ✓ **BETTER:** A detailed, well-written, review covering technical features of the chosen operating system.
- ✓ **BEST:** A comparison table to compare all four mobile operating systems.