COMPUTING SUMMER 1 KNOWLEDGE ORGANISERS

Overview

Learners develop their understanding of computer systems and how information is transferred between systems and devices. Learners consider small-scale systems as well as large-scale systems. They explain the input, output, and process aspects of a variety of different real-world systems. Learners discover how information is found on the World Wide Web, through learning how search engines work (including how they select and rank results) and what influences searching, and through comparing different search engines.

Lesson 1: Systems

Learners are introduced to the concept of a system. They begin to understand that components can work together to perform a task. Finally, learners explore how digital systems can work and learn about physical and electronic connections.

To explain that computers can be connected together to form systems
- I can explain that systems are built using a number of parts
- I can describe the input, process, and output of a digital system
- I can explain that computer systems communicate with other devices

Lesson 2: Computer systems and us

Learners consider how larger computer systems work. They see how devices and processes are connected, and reflect on how computer systems can help them.

To recognise the role of computer systems in our lives
- I can identify tasks that are managed by computer systems
- I can identify the human elements of a computer system
- I can explain the benefits of a given computer system

Lesson 3: Searching the web

Learners are introduced to a range of search engines. They are given the opportunity to explain how to search, before they write and test instructions. Next, they learn that searches do not always return the results that someone is looking for, and refine their searches accordingly. Finally, learners are introduced to the two most common methods of searching: using a search engine and using the address bar.

To experiment with search engines
- I can make use of a web search to find specific information
- I can refine my web search
- I can compare results from different search engines

Lesson 4: Selecting search results

Learners gain an understanding of why search engines are necessary to help them find things on the World Wide Web. They conduct their own searches and break down, in detail, the steps needed to find things on the web. Learners then emulate web crawlers to create an index of their own classroom. Finally, they consider why some searches return more results than others.

To describe how search engines select results
- I can explain why we need tools to find things online
- I can recognise the role of web crawlers in creating an index
- I can relate a search term to the search engine's index

Lesson 5: How search results are ranked

Learners take part in an unplugged activity to find out about how a webpage's content can influence where it is ranked in search results. In groups, learners create paper-based webpages on a topic that they are familiar with. They then discover how their webpages would rank when searching for keywords relating to their content.

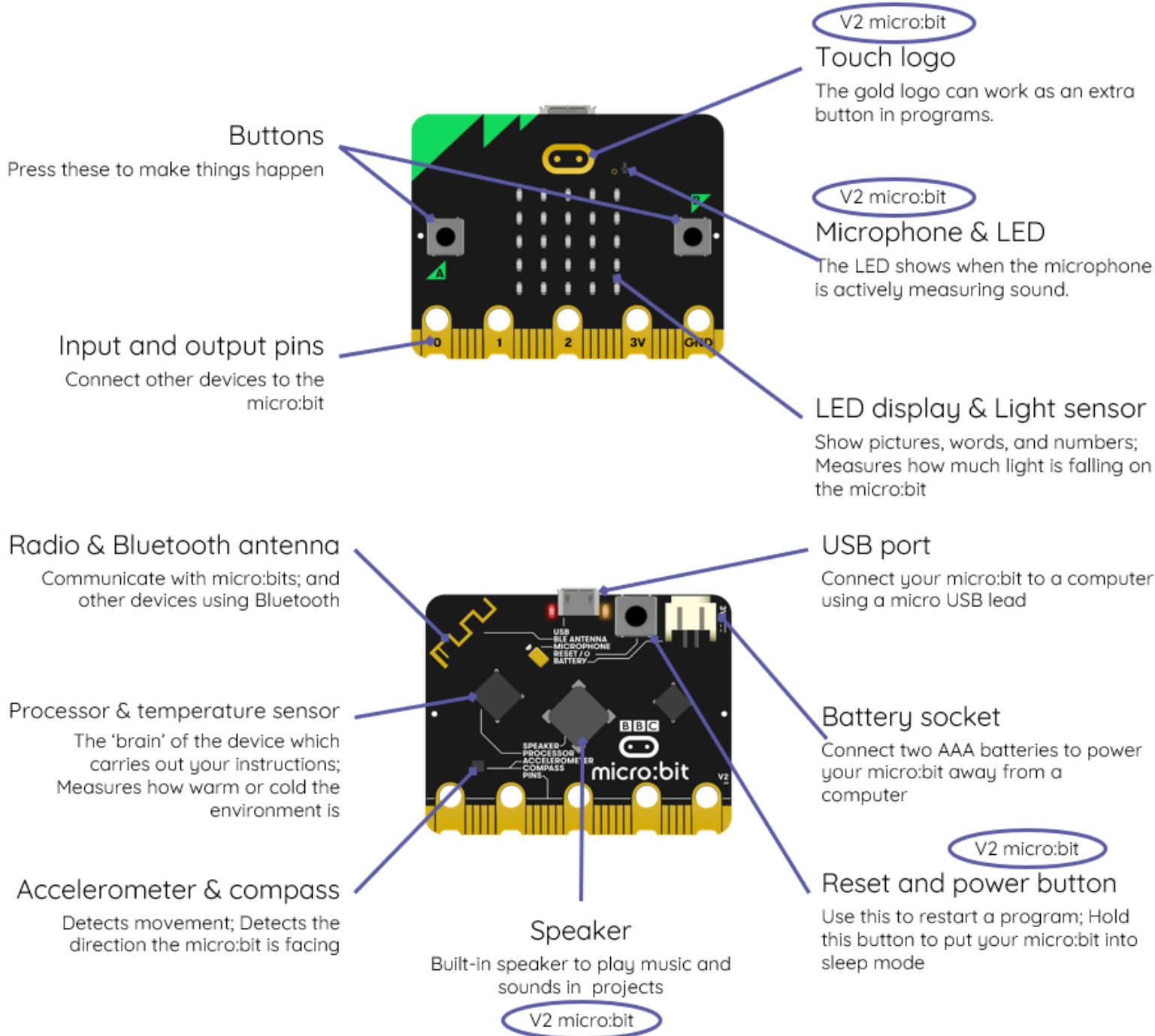To explain how search results are ranked
- I can order a list by rank
- I can explain that a search engine follows rules to rank results
- I can give examples of criteria used by search engines to rank results

Lesson 6: How are searches influenced?

Learners explore how someone performing a web search can influence the results that are returned, and how content creators can optimise their sites for searching. They also explore some of the limitations of searching and discuss what cannot be searched.

To recognise why the order of results is important, and to whom
- I can describe some of the ways that search results can be influenced
- I can recognise some of the limitations of search engines
- I can explain how search engines make money

Buttons
Press these to make things happen

Input and output pins
Connect other devices to the micro:bit

Touch logo
V2 micro:bit

The gold logo can work as an extra button in programs.

Microphone & LED
V2 micro:bit

The LED shows when the microphone is actively measuring sound.

LED display & Light sensor
Show pictures, words, and numbers; Measures how much light is falling on the micro:bit

Radio & Bluetooth antenna
Communicate with micro:bits; and other devices using Bluetooth

Processor & temperature sensor
The 'brain' of the device which carries out your instructions; Measures how warm or cold the environment is

Accelerometer & compass
Detects movement; Detects the direction the micro:bit is facing

Speaker
Built-in speaker to play music and sounds in projects

V2 micro:bit

USB port
Connect your micro:bit to a computer using a micro USB lead

Battery socket
Connect two AAA batteries to power your micro:bit away from a computer

Reset and power button
V2 micro:bit

Use this to restart a program; Hold this button to put your micro:bit into sleep mode

OVERVIEW

The BBC micro:bit is a pocket-sized computer that introduces you to how software and hardware work together. It has an LED light display, buttons, sensors and many input/output features that, when programmed, let it interact with you and your world.

KEY VOCABULARY

When you type on your laptop or touch the screen on your phone, you're using an **input** device. Inputs allow computers to sense things happening in the real world, so they can act on this and make something happen, usually on an **output** like a screen or headphones.

In between the input and the output, there is the **processor**. This takes information from inputs like buttons, and makes something happen on outputs, like playing a song in your headphones.

MODELLING DATA – SPREADSHEETS

Data and **information** are not the same.
- **Data**: facts and figures in their raw form
- **Information**: data that has been given structure or meaning

For example:
Data—10, 2107, 18
Information—Time 10am, date 21st July, temperature 18°

The tool bar ribbon at the top allows for **formatting** of the data. Changing colour, size, style etc

There is a **sort** and **filter** tool that allows for data to be arranged in ways that is most useful for the user e.g. alphabetical, highest, lowest etc.

Conditional formatting can be set to allow the cell **formatting** to **automatically** change if certain criteria is met. For example a cell might turn red if there was a negative number

Cell reference G7

Formula bar

Column— runs down a sheet assigned a letter

Row— runs across the sheet assigned a number

sheets—Individual pages in a workbook

In order to complete calculations spreadsheets make use of **formula**.
A formula uses the following basic symbols
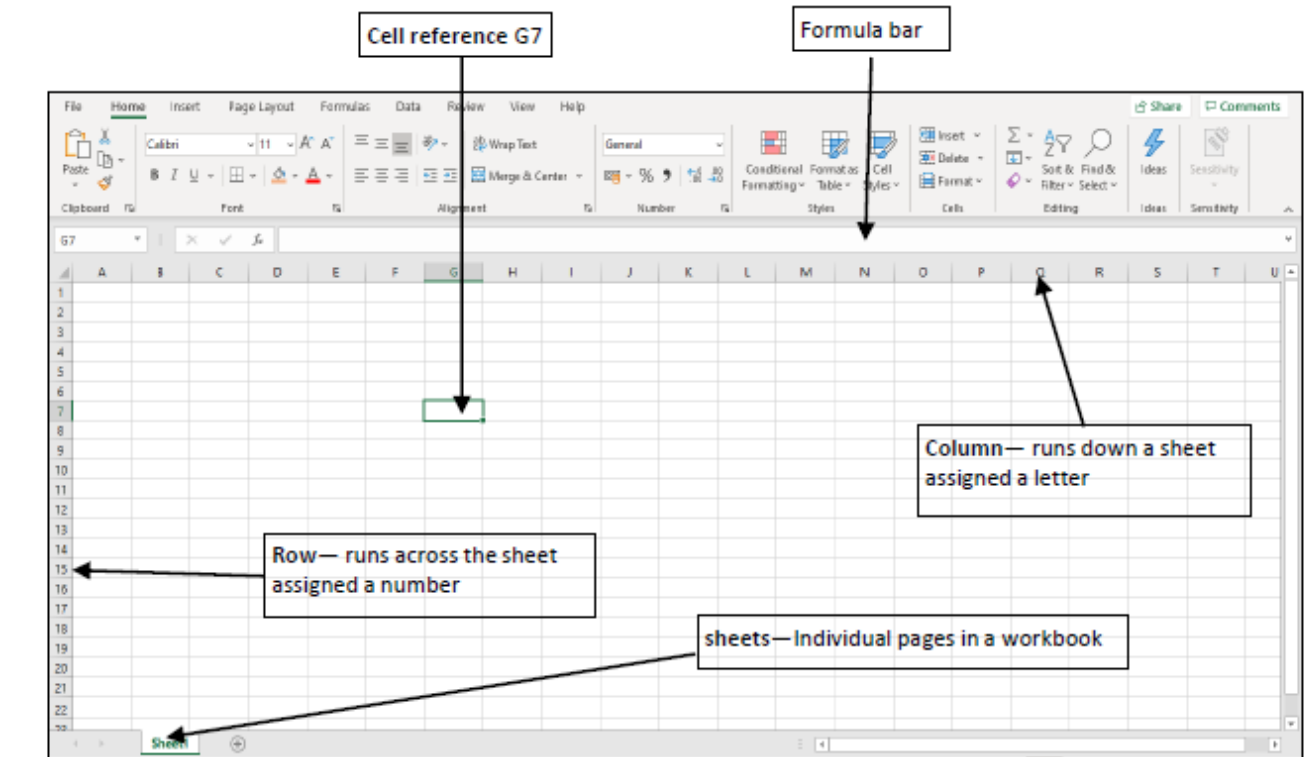The = symbol is always at the start of a formula
The + symbol is used for addition
The - symbol is used for subtraction
The * symbol is used for multiply
The / symbol is used for divide

Functions are also used which are predefined formula.

Common **functions** are
SUM—adds a range of cells
MAX—returns the largest value from selected cells
MIN—returns the smallest value from selected cells
AVERAGE—provides the arithmetic mean (average) of selected cells
COUNTIF—counts the number of cells in a range that meet the given criteria
IF— allows logical comparisons
COUNTA—counts cells that are not empty

Data can be gathered from different sources
- **Primary** source: collecting data yourself
- **Secondary** source: someone else collects the data

Each box on a spreadsheet is called a **cell** and they hold data.
Each **cell** has a unique **cell reference** to identify its location.

The **main memory** is the component that **stores** the programs and data **currently in use**. Memory is **volatile**: its contents are lost when the power is off.

Terminology: The main memory is commonly referred to as **RAM** (random-access memory).

- This is what the main memory looks like in desktops and laptops.
- Sometimes, memory is integrated with other components, rather than being a separate component.

The **processor** is the component that **executes** program instructions. An instruction may:

- Perform arithmetic or logic operations on data
- Perform input/output of data
- Control program flow

Terminology: Commonly referred to as the **CPU** (central processing unit).

- This is what the processor looks like in desktops and laptops.
- Sometimes, the processor is integrated with other components, rather than being a separate component.

How it works with other components

- Instructions are **fetched** one by one from memory into the processor, along with any required data.
- The processor **decodes** and **executes** each instruction.
- Any resulting data is moved into memory.

The **operating system** is a set of programs that controls the operation* of a computing system.

- Program execution
- Memory management
- File system organisation
- Input and output
- Communication
- Graphical user interface

There are three fundamental logical operations:

- not (inversion)
- and (conjunction)
- or (disjunction)

Logical operations operate on statements that are **true** or **false**.

A and B ○——— logical expression

statement operator statement
(true or false)   (true or false)
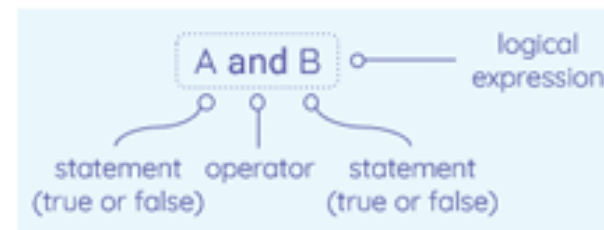
What is **artificial intelligence**?

- Any machine that performs tasks that typically require intelligence in humans

Applications of AI	Moral considerations
Self-driving cars	Who is responsible in an accident? (Accountability)
Medical diagnosis	How can decisions be explained? (Transparency)
Banking Detecting fraud Approving loan & mortgage applications	How can we guarantee that machine training does not lead to discrimination? (Bias) How can decisions be explained? (Transparency)
Automation Performing tasks instead of humans	How will humans handle lower demand for labour? How will the benefits of AI be fairly distributed?