

# Lesson 2: Technology Foundations – What is a Computer? Facilitator Guide

## Overview

In this lesson students develop a preliminary definition of a computer. To begin the lesson, the class will brainstorm possible definitions for a computer and place the results of this brainstorm on the board. Next, students will work in groups to sort pictures into “is a computer” or “is not a computer” on poster paper.

Groups will place their posters around the room and briefly explain their motivations for choosing some of their most difficult categorisations. The teacher will then introduce a definition of the computer and allow students to revise their posters according to the new definition.

## Purpose

In this lesson, students will consider different types of computers and that these computers input, store, process, and output information as part of the problem solving process. Upcoming lessons will dive much deeper into what an information problem looks like and how computers solve these problems.

## Agenda

### Warm Up (5 min)

- What Problems Do Computers Help You Solve?

### Activity (30 min)

- Computer or Not?
- Present Your Categorizations

### Wrap Up (15 min)

- Reflection
- Career Discussion

## Objectives

Students will be able to:

- Identify a computer as a machine that processes information
- Provide a high level description of the different parts of the Input - Output - Store – Process model of a computer

## Preparation/materials needed for each group

- Print out copies of What is a Computer –
- Activity Guide. Note there are two sets of pictures in the document but each group only needs a single set.
- Scissors (if you will not have time to cut the pictures prior to class)
- Poster paper
- Markers or coloured pencils
- Glue or tape to attach pictures

## Preparation/materials needed for teacher

- What is a Computer? – Graphic
- What is a Computer? – Exemplar work

## Links

- **What Makes a Computer, a Computer? Video:** <https://www.youtube.com/watch?v=xfKn5OjHLqQ>

## Vocabulary

- **Computer** - A device that takes input, stores and processes information, and outputs information (do not reveal this definition to students until they have done the main activity).

# Teaching guide

*This guide includes a suggested script for the session (in orange). However, please feel free to tailor and adapt this accordingly when delivering.*

## Section 1: Warm Up (5 min) What Problems Do Computers Help You Solve?

**Prompt:** There are lots of ways that apps, companies, or governments might collect data. What ways to collect data are you already aware of?

**Discuss:** You could run this conversation as a brainstorm, recording ideas on the board. Note and call out similarities you're seeing the kinds of problems students identified.

**Remarks:** Computers are clearly an important part of our lives and help us solve all kinds of problems. I want to think more about the kinds of problems computers help us solve, but first I want to ask an important question. What is a computer?

*This warm up makes the transition from thinking about problem solving in a generic sense to thinking about how computers help solve certain kinds of problems. While the lesson will eventually reveal that computers are particularly useful at solving information problems, you don't need to make that point during this brainstorm.***Section 2: Main Activity (approx. 30 min) Computer or Not?**

**Group:** Place students in groups of 3 or 4

**Distribute:** Activity Guide of **What is a Computer – Activity Guide** as well as scissors, markers/coloured pencils, poster paper, and glue/tape for making posters.

Give students the following directions:

- Draw a line down the middle of your poster, label one side "Computer" and the other "Not a Computer"
- Discuss as a group which of the objects in your set (from the activity guide) belong in each category
- Once your group agrees, tape your objects to the appropriate side
- Develop a list of characteristics your groups used to determine whether an object is a computer
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*Tape First:* Students will have an opportunity to update their categorizations later in the lesson. For now, they should just tape their objects to their poster or even just place them on the correct side.

**Circulate:** Circle the room as students work to categorise the different images on the activity guide. Encourage groups to talk openly about their ideas and explain why they do or don't think an object should be categorised as a computer. For groups that can't decide on a categorisation, ask members to defend their points of view, and take a majority vote. Assure groups that it is ok if one or two people disagree.

At the end of the time bring the class back together and ask them to place their posters at the front of the room.

## Present Your Categorisations

**Share:** Have each group briefly present their posters, focusing their discussion on the following points

1. What rules or definition did you use to categorise your objects?
2. Which item was most difficult for you to categorise? How did you eventually make the decision of where to place it?

Invite the audience to respectfully question any categorisations if they disagree with the presenting group's decisions.

*Comparing Categorisations:* There are two different sets of objects in the activity guide. The first page of each set is identical while the second pages are different. This will mean all students will see some objects that they categorised already and some that are new. Use this to help drive conversation.

*Again, it's not necessary for everyone to agree on every item on the list. It's more important that the students use discussion of the items to deepen their understanding of what a computer is. It may be impossible to tell from the picture alone whether an item is a computer. Reassure the class that even experts often disagree about what exactly is or is not a computer, and that their understanding will continue to grow as the class continues.*

**Remarks:** As you can see, it's not always clear whether something is a computer, and even experts sometimes have different points of view. Let's have a look at a definition that we'll use throughout this course.

**Display:** Show **What Makes a Computer, a Computer?**: <https://www.youtube.com/watch?v=xfKn5OjHLqQ>

The video presents a computer as a machine that helps with certain kinds of thinking work by processing information. It formally introduces a model of a computer as a machine that inputs, outputs, stores, and processes information. Ask the students questions and leave time for Q&A. Allow students to revise their posters using the definition they have just learned.

**Discuss:** Did any groups change their minds about whether something was a computer? What about the definition convinced you?

## Section 2: Wrap-Up (approx. 15 min)

### Discussion

**Prompt:** Today you've had a chance to look at a definition of a computer that focuses on how the computer solves problems. We've also seen many different types of computers. Think of a problem that a computer can help you to solve.

- What is the problem?
- What information is input to the computer?
- What information does the computer store?
- What information does the computer process?
- What information does the computer output?

**Identifying Information Problems:** Students are still developing an understanding of what information is or what an information problem that a computer could help solve looks like.

### Employability skills reflection:

What employability skills have you developed in this session?

What might your next steps be in learning more and thinking about your career?

The slide outlines multiple employability skills as a prompt for pupils to reflect. Encourage them to pick three and think of three specific examples to support how they have displayed these skills in the session. This is good practice for job applications and interviews - particularly competency based application processes.

### Want to find out more

If you have time you could click on the links provided, or just point the pupils towards these. It should be made clear that the opportunities outlined are just those at PwC, and pupils should be encouraged to look at other opportunities too.

Link for more info: [PwC Podcast - Spotify - A-Z of \(tech\).https://www.pwc.co.uk/issues/intelligent-digital/a-to-z-of-tech-podcast-series.html](https://www.pwc.co.uk/issues/intelligent-digital/a-to-z-of-tech-podcast-series.html)

Link for opportunities in tech:

- Technology Degree Apprenticeships and Data Science Graduate Apprenticeships.  
(<https://www.pwc.co.uk/careers/early-careers/our-programmes/flying-start-degrees/technology.html>)
- School and College Leaver Apprenticeships at PwC  
(<https://www.pwc.co.uk/careers/early-careers/our-programmes/join-us-from-school.html>)

**Some of the Technology Teams at PwC that you could research:** Encourage pupils to complete some independent research into different technology teams at PwC, and other employers.

Here is some info on some of the technology teams at PwC:

**Tech Risk** help clients build trust in their technology, establishing confidence and integrity by creating a business strategy that's fit for the digital age. They implement processes and controls to strengthen clients' technology structure and resilience and minimise risk.

**Cyber Security** help clients reduce their exposure to cyber threats, improve their defences and respond to cyber incidents. They address the legal issues around breaches, data protection and privacy.

**& Analytics** provide assurance that the information and data provided to regulators and third parties is accurate, complete and can be trusted. They work in Big Data, Advanced Analytics, Data Visualization and Data Coding.

**Forensic Data Analytics** analyse data in order to discover meaningful patterns, measure historical events and predict the likelihood of future ones. They use cutting edge technology and advanced statistical tools to analyse vast quantities of electronic data, searching for evidence of fraud or abuse or identifying illegal activity.

**Financial Decisions and Analysis** apply leading edge modelling and analytical techniques to help clients increase the confidence in their deals, provide quantitative insights into the deal process and drive performance transparency and value creation.

## Answers should you wish to go into detail



**A Laptop. Is a Computer** - it has inputs from the user, outputs, it can store and it can process. For example you can input your pictures from your phone, save them, edit them, and then print them.



**A Phone. Is a Computer** - it has inputs from the user, outputs, it can store and it can process. For example you can input your contacts, store and save their names, process add/edit contact by adding pictures or home addresses, and output - send them a message



**Headphones. Are not a Computer** - there are inputs and outputs, but no storage.



**Ipad. Is a Computer** - it has inputs from the user, outputs, it can store and it can process. For example you can input your card details, store and buy an app, it can play/process the app, and the output could be a notification from the app.

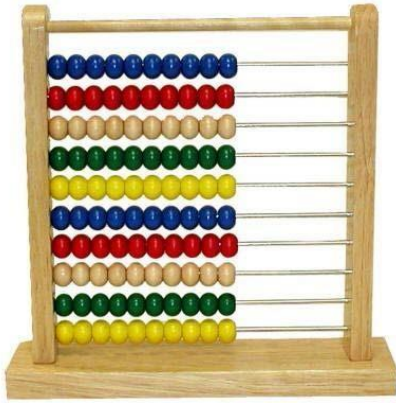


**Printer. Is a Computer** - It has inputs and outputs. It can process what has come from the

computer i.e. do I want black and white or double sided comes from the computer, and usually they can store email addresses or save documents.



**Rot Telephone. Is not a Computer** - It has inputs and outputs, and it can process a number and dial out, but it has no storage.



**Abacus. Is not a Computer** - A person can make an equation and it therefore can have inputs and outputs, but it has no storage.



**Telephone. Is a Computer** - It has inputs and outputs, and it can process a number and dial out, it has got the facility to store voice messages - therefore it is a computer.



**Dishwasher. Is a Computer** - If you set a dishwasher to on, and you put on an extra hot cycle, this is a programme set in it. So the Dishwasher has an input of pressing on, a cycle which is a process, different settings which are stored and the output is the clean dishes.



**USB. Is not a Computer** - It has inputs and outputs, and can save documents and transfer them to other computers, and definitely has storage for these files, yet it can't do anything with them and therefore can't process anything.



**Traffic light. Is a not a Computer** - Yes you could say it has inputs and outputs, from a control centre telling them for example the frequency of how quickly or slowly. But overall they are an output of the control system they are not processing the information themselves, they are simply following what the control centre instructions.



**Car. Is a Computer** - It has inputs and outputs, for example if you go down a gear the car will slow down. The engine can process a great deal for example it can flash and alert and tell you when you are low on engine oil. The car can store information such as knowing how much petrol you have left. Cars are becoming more and more technical and PwC are working towards driverless cars. Listen to the podcast episode 7 [here](#).



**An organ. Is not a Computer** - It has inputs and outputs, if you press a key it will play music, but it can not store information. Ask the class what about an electric organ?





**Hoover. Is a not a Computer** - A Hoover has storage for dirt yes, but not storage of data or information, and therefore is not a computer, it equally does not process anything.



**A Dvd Player. Is not a Computer** - It has inputs and outputs, and can process the dvd but it does not store anything.



**Satellite. Is a Computer** -



**Radio. Is a not Computer** - You can input the volume and the station you want, and the output is the sounds, but there is no storage. Ask the pupils what about a Digital Radio, where you can store your favourite station?



**Remote Control. Is not a Computer** - It has inputs and outputs, and can process to 'pause' live tv for example and follow instructions, but it doesn't store.



**Guitar Amp Speakers. Is not a Computer** - Yes input your guitar and it will output the sound, but there is no process or storage.



**Sweet Dispenser. Is not a Computer** - You put a coin and output sweets, but there is no process or storage of information.



**Old Fashion Car. Is not a Computer** - It has inputs and outputs, for example you can pump the engine and it will start. But there is no storage or processing of information.





**Electric Pencil Sharpener. Is not a Computer** - It has inputs and outputs, but it doesn't process or store anything.



**Thermometer. Is not a Computer** - The data is inputted via the sensor, the process is to read the temperature and the output is to screen showing the temperature. This thermometer does not store data and therefore is not a computer, however high tech hospital monitors which take temperature reading can store data and therefore are computers.



**Microwave. Is a Computer** - A high tech microwave has inputs (e.g. time, wattage) and outputs (cooked/defrosted food), a process and it can store information such as defrost level, or cook level.



**Smoke detector. Is not a Computer** - The input is the smoke and the output is the alarm. The process of the smoke sets off the alarm, but there is no storage.



**TV. Is not a Computer** - It has inputs i.e. channels and outputs the screen, but it cannot store, unlike a modern day TV - which can store recordings - so is a computer.



**Old Fashioned Till. Is not a Computer** - You can manually input numbers and process sums, and can output receipts, but can not store these or recall them.

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