Y3 Computing

Connecting computers

Overview: The children will develop their understanding of digital devices, with an initial focus on inputs, processes, and outputs. They will also compare digital and non-digital devices.

Number of lessons: 6

R	***What knowledge and skills should children already have? (Forms pre-lesson AfL)*** This unit progresses the children' knowledge and understanding of technology by focusing on digital and non-digital devices, and introducing the concept of computers connected together as a network.
A	***What knowledge and skills will children acquire?*** **Knowledge: Children will be able to:** • Explain that digital devices accept input and produce output. • Explain the difference and similarities between digital and non-digital devices. • Explain how messages are passed through multiple connections. • Recognise that a computer network is made up of a number of devices • Demonstrate how information can be passed between devices ***National Curriculum Links*** **Computing** • Use sequence, selection, and repetition in programs; work with variables and various forms of input and output • Understand computer networks including the internet; how they can provide multiple services, such as the World Wide Web; and the opportunities they offer for communication and collaboration • Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information
D	***How will teachers facilitate children to develop their skills / knowledge?*** • Model networks through the use of animals and roleplay. • Clear definitions of new vocabulary
A	***How will children apply their knowledge / skills?*** Children will apply their knowledge through roleplay and making links with known systems. Children will use their family connects and networks to make links with computer systems.
R	***Notes around what children need to remember.*** **Recap 1:** Look at slide 1- Click through the images on the slide and ask the children which of the digital devices shown on the slide they recognise, and whether some or all of them have anything in common. **Recap 2:** Show an image of a digital camera and ask the class these questions about the device: What is this digital device? What does it do? What is the input? What is the process? What is the output? **Recap 3:** Recap the different output and input devices **Recap 4:** What is a digital activity and what is a non-digital activity? **Recap 5:** Recap the key vocabulary- network, connection, server, wifi, switch

R – Ready	A – Acquire knowledge and skills	D – Develop knowledge	A – Apply knowledge	R - Remember
Detective	Instructor	Facilitator	Mentor	Coach

Coverage within this unit

Computing	Hillfort Specific	**Embody the school's values** Kindness, resilience, challenge		**Health** With children's increased use of technology, we are aware that they are spending more time sat playing e-games, watching a screen or using a range of social media. This in turn, is having an impact on their practical, outdoor and physical activity.	**Multicultural Links** How can we use technology and online learning to allow children to access information, cultures, people and places that they not be able to experience? E.g virtual reality, film, pictures, linking with children in different countries and finding out new information.	
	Computing Concepts	**Keeping children safe online** Learning to balance the benefits offered by technology with an awareness of its effects on ourselves and others.	**The technology Impact** To know that technology is everywhere, be able to identify it, have a growing understanding of how it works and its effect.	**Machines only work when given specific, accurate instructions.** How do machines work? Growing up in a world of AI	**Technology as a tool for creativity** Music production Digital Art Video creation	**Becoming Global Digital Citizens** Safely connecting with others online and contributing to the digital community.
	Computing Skills	**Digital Literacy** Self-image and identity, online relationships, online reputation, online bullying, managing online information, health wellbeing and lifestyles, privacy and security and copyright and ownership.	**Information Technology** Word processing, Data handling, Presentations (web design, e Books), Video creation (animation, Augmented reality and green screen) and Digital Art (photography, sound and art) Links with Digital Literacy (audience and design)	**Computer Science** Using Computational Thinking to solve problems such as sequencing steps (algorithms), implementing the algorithm as code and being able to debug mistakes.		

Overview of lessons

1	Input, process and output
2	Designing a process
3	Comparing art on digital and non-digital pieces of work
4	Understanding a Network
5	Understanding a server
6	Digital literacy

Lesson 1

Overview: In this lesson, the children will be introduced to the concepts of **input**, **process**, and **output**. These concepts are fundamental to all **digital devices**.

New key vocabulary: Digital device, input, process, output

Recap: Look at slide 1- Click through the images on the slide and ask the children which of the digital devices shown on the slide they recognise, and whether some or all of them have anything in common.

Acquire knowledge & skills:
Look at slide 2- Show the children the images of a range of objects, and ask them how they would sort them into two groups. Record their responses and discuss ideas, eg "objects that are the same colour", "objects that have buttons", or "things that you play on".

Show the children one method of sorting the objects. Ask them why they think the objects have been sorted in this way. Explain that:
The objects are grouped into digital and non-digital devices
A digital device processes information digitally, which means that it does something beyond being either on or off

Develop knowledge & skills:
Explain that we can tell whether something is a digital device by applying the 'input, process, output' model.

Use the input/output model to demonstrate how input and output devices work. First, demonstrate a simple process to the children: taking a football or star (an input) and passing it through the machine so that it gets bigger (an output). Ask the children to explain what process the machine is carrying out etc.

Hand out Activity 1- Tell the children that they will now find the inputs, processes, and outputs for the machines on the sheet.

Scaffolding opportunity: Use questioning to ensure that the children understand how the function machines are working. For example, ask the children why they wrote a number, or how they knew what to do. In this activity, the concept is important, rather than mathematical accuracy.

Task:
Provide the children with this SeeSaw activity-
https://app.seesaw.me/pages/shared_activity?prompt_id=prompt.9c0e0321-9b5d-4cdd-a684-3fa86b3b6a16&share_token=bHvadtQ8SVCN2WvYUKFORA

Ask the children to create an 'input, process, output' machine on the sheet. This is an opportunity for the children to demonstrate that they can apply the learning from the previous activities. The children may choose to process images (for example, something becoming larger or smaller) or numbers (any operation).

Resources: Powerpoint, SeeSaw activity

Assess:
Show an image of a digital camera and ask the class these questions about the device:

- What is this digital device?
- What does it do?
- What is the input?
- What is the process?
- What is the output?

Notes to teacher:

Lesson 2

Overview: In Lesson 1, the children looked at the relationship between inputs, processes, and outputs. In this lesson, they will develop that knowledge and apply it to devices and parts of devices that they will be familiar with from their everyday surroundings.

New key vocabulary: Digital device, input, process, output

Recap:

See slide 1- Show an image of a digital camera and ask the class these questions about the device:

- What is this digital device?
- What does it do?
- What is the input?
- What is the process?
- What is the output?

Acquire knowledge & skills:

Using slide 2 (or large hoops, if you have physical devices), show a Venn diagram consisting of circles for 'input' and 'output'. Show the children each devices one by one and ask where these belong in the Venn diagram.

Develop knowledge & skills:

Explain to the children that in this activity, they will match up inputs, digital devices, and outputs. Explain that the items named on the slide have been sorted as they were in the Venn diagram, but this time, they have been arranged into columns, and the children will draw connecting arrows between items in the different columns that match up.

Using the animation on slide 7, give examples of where there is a connection between one input, one digital device, and one or many outputs, each time articulating the whole sentence, eg:

The children should discuss further connections using the activity on SeeSaw:
https://app.seesaw.me/pages/shared_activity?prompt_id=prompt.476d4e95-7906-4f77-9137-9e00a95b3738&share_token=VamV21rvTjiiFYSRgQjmxw

Task: **Invent your own digital device**

Explain to the children that they are now going to use their understanding of inputs and outputs to invent their own digital device. Some ideas are provided on the PowerPoint, but the children can also think up a completely different invention. Tell them that they must consider how their invention will work, including what inputs it will need (for example, it could have a button or a screen), and what its processes will be.

Note: The children can do this activity individually or in pairs.

Resources: PowerPoint, 2x activity sheet (1 on Seesaw)

Assess: Once the children have completed their designs, invite them to share them with other the children, explaining how their devices would work- check their understanding of output, input and process

Notes to teacher:

Lesson 3

Overview: In this lesson, the children will apply their learning from Lessons 1 and 2 by using programs in conjunction with inputs and outputs on a digital device. They will create two pieces of work with the same focus, using digital devices to create one piece of work, and non-digital tools to create the other.

New key vocabulary: Program, digital, non-digital

Recap: Remind the children of Lesson 2. Explain that during this lesson, they will be comparing the use of digital devices and non-digital tools. Show slide 1 and ask the children whether they can identify how the tasks of writing or painting could be accomplished using a digital device, including what the inputs and outputs would be.

Acquire knowledge & skills:
Display slide 2. Remind the children that digital devices are all forms of information technology, and that their purpose is to help us to complete certain tasks. Pick one of the devices on the slide and ask the children what tasks could be completed using this device. When they have suggested a task (eg playing a game), ask them if the task that they have suggested could be completed on any of the other devices.

Develop knowledge & skills:
As a class complete the grid on slide 3. Tasks that can be completed on a digital device have been included on the activity sheet, and additional space has been provided for the children to add their own ideas of tasks.

Task:
Comparing art-based activities using digital devices and non-digital tools

Display slide 4. Explain that they will be producing the same piece of art using physical materials, such as paint, and using a digital device. Show the image of a digitally drawn tree on the slide. You could encourage them to use this image as inspiration for the activity, or you could ask them to create images based on a topic that they are currently studying in class.

Non-digital activity: Explain to the children that whilst producing their pictures, they should consider the process of creating the artwork, eg how they change the colour of their brush or how they rectify mistakes.

Digital activity: Use Paint for this activity. Remind the children of the main tools within the graphics program (for this activity, the 'brush', 'fill', and 'undo' and 'redo' tools will be sufficient). Depending on the children' prior knowledge, you may need to give additional information about art techniques when using digital tools.

Allow the children 15min each to first create a non-digital picture and then 15mins to create a digital pieces of art.

Resources:

Assess: The children should peer assess their work using the 'assess' questions on the last slide.

- How did you feel about doing the activities?
- Which method did you prefer?
- Which bits did you find easier or harder in each activity?
- How did you fix mistakes in each activity?
- What input devices did you use?
- Do you think all artists would use a computer if they had access to one?
- Do you need to be good at using a computer in order to produce good art?

Notes to teacher:

Lesson 4

Overview: This lesson introduces the concept of connections and moving information between connected devices. The children will learn to explain how and why computers are joined together to form networks.

New key vocabulary: Connection, network, network switch

Recap: What is a digital activity and what is a non-digital activity?

Acquire knowledge & skills:

- Introduce the word 'connection' and explain what the word means.

Use the slides to help explain that they will be looking at the connections that they have to other people. Ask them to write their name in the centre of a piece of scrap paper. Then, ask them to add names or drawings of 5 to 10 people that they have a connection to, eg parents, carers, extended family, friends, professionals such as teachers or doctors, etc. Ask them to draw connecting lines between themselves and other people.

- Introduce the word 'network'.

Ask the children to look at the connections that they have drawn so far and to think about whether there could be any additional lines between people, eg between Mum and Dad. Then, ask them to draw lines in a different colour to represent these connections.

Show an example of people that they could be connected to, and explain that this is the **network** of people that they know. Explain that a network is a number of connections linking things with each other, eg people, roads, or computers.

Develop knowledge & skills:

Use the slides explain how the whole class is going to become a computer network. (take some pictures to use as evidence)

Explain to the children that they are now going to represent computers on a network (illustrated on slides 8 to 9) and see whether they can find the best way to send messages around it.

Give each child some squares to use for their messages. Explain that they should write a message (such as "I like chicken nuggets" or "Do you want to play at lunch?") to someone on a different table than their own. Tell them that they can write as many messages as they wish, but for now, they should keep the messages piled on their own table.

Explain that the children are now going to become parts of the network passing these messages around. Explain that networks cannot walk, so they need to stay seated. The children should pass one message at a time, from one person to the next, checking each time who the message is going to and then sending it roughly in that direction.

Discuss:

- Is this a good way to share information?
- How is the network working?
- What is working well?
- What is frustrating?

Some answers that the children might suggest are:

- Messages are going in the correct direction
- It is slow to get messages around
- Some people have more messages to pass than others (people between two tables)

- People are sometimes looking the wrong way

Explain to the class that the network that they have just made is similar to a computer network, although such a network often includes hundreds of devices, in different rooms, all over the building. Explain that it is not practical for all of these devices to connect directly to each other. To illustrate this point, ask the children to imagine one laptop with 50 things plugged into it, which would be impractical.

Task:

Adding a network switch

How could the sharing of messages could be carried out more efficiently?

Explain the function of a switch (or switches) in a network.

Nominate one member of the class to represent the **network switch**. Explain that this person will collect messages from one learner and then distribute them to all of the receivers. Use the slides to model the process

Explain that:

- This is a more efficient way of sending and receiving messages, and it is a representation of how a computer network functions
- A network switch is a device that enables multiple devices on a network to be connected
- When one computer wants to send information to another computer, it can now do so via the network switch; information does not need to go through other computers

Note: Most school networks have one switch, although some larger schools have more, especially if they are split over more than one site.

Practice this with your class network

Resources: Scrap paper, powerpoint

Assess:

- What is a connection?
- How can we share information effectively between connections?
- What does a network switch do?

Notes to teacher:

Lesson 5

Overview: This lesson introduces key network components, including a server and wireless access points. The children will examine each device's functionality and look at the benefits of networking computers.

New key vocabulary: Server, wireless access point

Recap: Use the first 3 slides to recap the new vocabulary from last week.

Acquire knowledge & skills:

Ask the children to role-play the network as it was at the end of Lesson 4, ie a small number of desktop computers (6 to 10) connected to a switch in an arc. Use pieces of string or skipping ropes to represent the connections between the network switch and each of the desktop computers.

Develop knowledge & skills:

Explain that many networks contain a server, which is an important computer that stores files and manages the network.

Use the slide to show where a server is connected to a computer network. Explain that the desktop computers can access the server via the switch.

Ask another child to role-play the server in the network. Give the learner one end of a piece of string, and give the other end to the learner representing the network switch, to represent connecting the server to the network switch.

Demonstrate to the children how we can use our network model to follow the journey of a file. Ask the children to pretend that a teacher using computer 1 creates a file, then saves that file on the server:

1. The learner role-playing computer 1 holds a piece of paper (this represents the file that has just been created)
2. A learner takes the piece of paper (representing the file) from computer 1 and follows the piece of string until they reach the network switch
3. The learner role-playing the network switch points in the direction of the learner role-playing the server
4. The learner carrying the file (the piece of paper) follows the piece of string to the server and passes the file to the server

Ask:

- Where is the file now?
  Answer: Saved on the server.
- Which computers can access a file on the server?
  Answer: Any computers connected to the network.
- Would it matter if computer 1 was now switched off?
  Answer: No, because other computers can still access the file on the server.

Role play this a few more times and encourage the children the use the correct terminology

Task:

Stop the previous activity and select one group of children to remain in their positions. You could add a few more children representing desktop computers to the group too. Explain that some devices in a network are not connected by wires. Ask the children how they think a tablet computer or a laptop computer can connect to the school network. Explain that this connection takes place via wireless networking (Wi-Fi).

Note: A Wi-Fi connection is not an internet connection; it's just a wireless way of connecting to a network. Equally, the children may mention 3G, 4G, or 5G connections, which connect devices (usually smartphones) to the internet and not solely to a network.

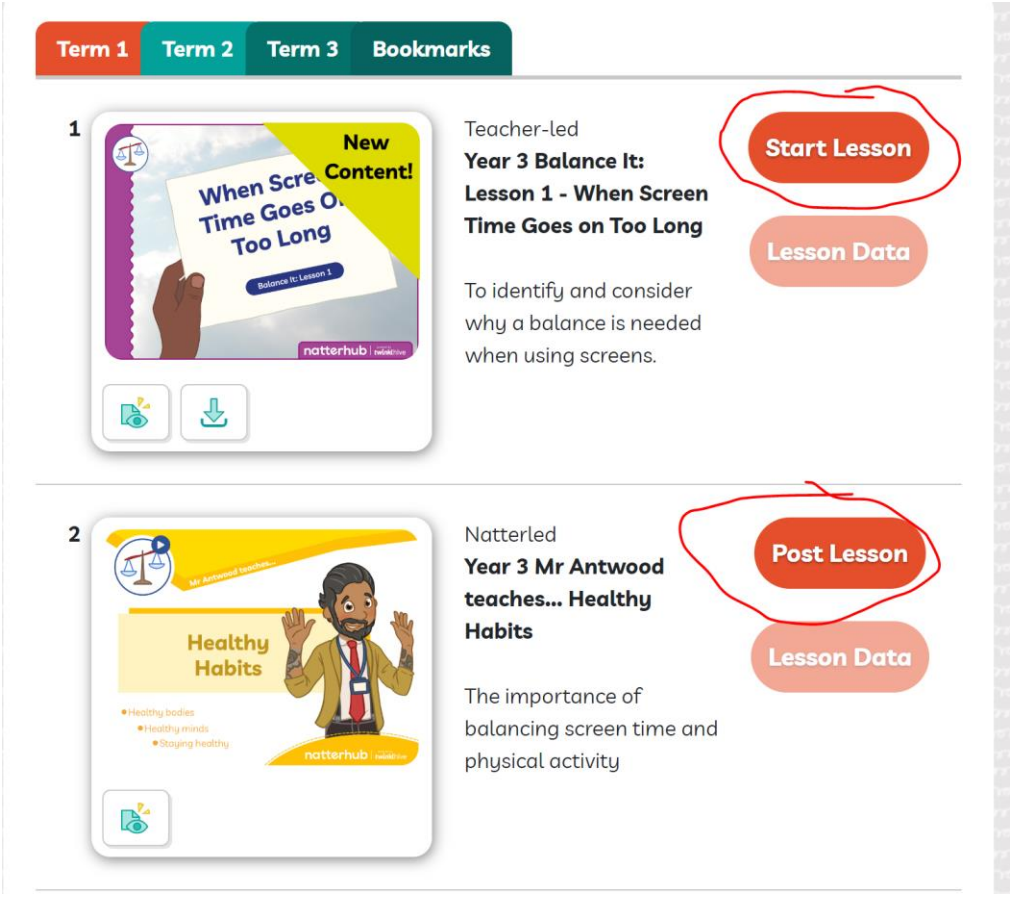
Use the slides to explain to the children that, because wireless devices do not have wires that connect them to the network switch, they need to connect to a device called a **wireless access point (WAP)**, which in turn connects to the network switch. Explain that a wireless access point is a device connected to a wired network via a wire, and that it sends and receives wireless signals for and from devices with wireless connectivity. In most schools, wireless access points will be in every classroom and in communal areas- can they see one?

Role play this-ask approximately 6 the children to role-play wireless devices (this time, not using string)

Ask the children to now demonstrate the journey of a file on the server to a wireless device. Explain that this time, the teacher is using a laptop to open a file, and the file (or the request for the file, at first) will need to move:

1. From a wireless device to the wireless access point
2. To the network switch
3. To the server (the learner should pick up the file)
4. Back to the network switch
5. To the wireless access point

6. To the wireless device (the learner should hand over the file)
Resources: Scrap paper, powerpoint
Assess: What do you need in order to access information on the network via a laptop? *Answer: You need a wireless (Wi-Fi) connection.* *At the end of this lesson, complete the end of unit assessment (see the folder with the forms link)*
Notes to teacher:

Lesson 5- Digital Literacy
Overview: This lesson focuses on 'screen time'
New key vocabulary: Screen time
The children need to log into Natterhub (you can give them some time to create a Natterhub character) As soon as you click 'Start Lesson' you will control what is shown on the children's devices. See the attached lesson plan
Task: Run through lesson 1 with the children and post lesson 2 for the children to complete as a home learning opportunity. 
Resources: Ipads/laptops
Assess: See the assess questions on the interactive screen
Notes to teacher: