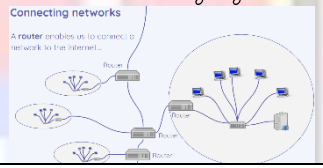
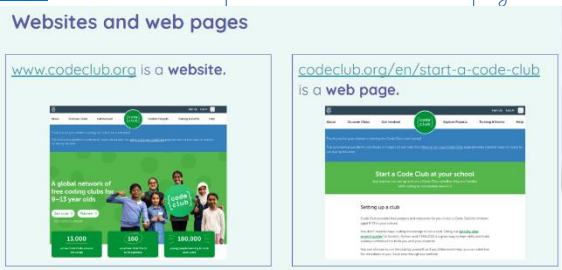
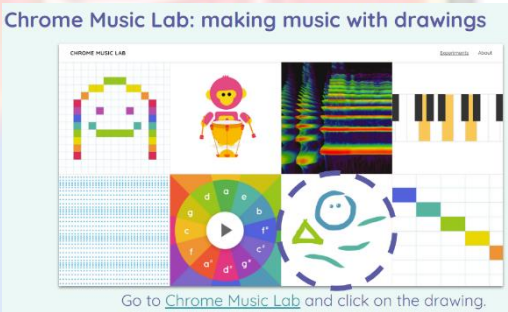
Computing overview- Year 4 Teach Computing

Unit title	Vocabulary	Device needed:
1: Computing systems and networks - Connecting computers - The internet	internet, network, router, security, switch, server, wireless access point (WAP), website, web page, web address, routing, web browser, World Wide Web, content, links, files, use, download, sharing, ownership, permission, information, accurate, honest, content, adverts	Chrome books

Lesson	Learning objectives	Tasks	Prior Knowledge/Subject Knowledge
1 Connecting Networks	To describe how networks physically connect to other networks • I can describe the internet as a network of networks • I can demonstrate how information is shared across the internet • I can discuss why a network needs protecting	Activity 1 - Connecting networks: Guide children through slides 4 and 5. Role-play being a network in table groups using resource worksheet A1 Activity 2 - A network of networks: Expand on the previous task by adding a router so networks can combine. Role-play again but with the addition of a router. Activity 3 - Network security: Show slide 15. Discuss with children why networks need to be kept secure, and why you need to be careful about who can access networks. You can refer to the front door analogy on the slide. Share slide 16 and introduce the next activity. Use a similar structure to the 'Connecting networks' activity, but with the children taking the role of the 'router'. Explain that places such as hospitals, offices, or shops might not like their information to be available to each other, and highlight the need for networks to be secure. Task - Children to role-play a network 	Knowledge of computer networks is required for this lesson. It builds on concepts introduced in the Year 3 - 'Computing systems and networks' unit, in particular, the definition of a network, which is covered in Lesson 4.
2 What is the internet made of?	To recognise how networked devices make up the internet • I can describe networked devices and how they connect • I can explain that the internet is used to provide many services • I can recognise that the World Wide Web contains websites and web pages	Activity 1 - Finding routes: Guide children through slides 5-11 and display the Finding routes map on the screen, freeze the screen and then ask children the questions on the second sheet. Children to answer using whiteboards. Activity 2 - Internet services: Use resource worksheet A2, children to list what they can see, hear and do on each of the websites from the worksheet. Activity 3 - Websites and web pages: Guided discussion using slides 17-19 Task - Children to explore websites and web pages and identify their features. 	This lesson builds on the Year 3 - 'Computing systems and networks' unit, in particular Lessons 4 and 5, which covered the parts of a network. You will need an understanding of how data is routed around the internet. Some of the concepts covered in this lesson are explained in a YouTube video, titled 'A Packet's Tale' (youtu.be/ewrBalT_eBM). You will also need a clear understanding that the World Wide Web is part of the internet (bbc.co.uk/newsround/47523993). You will need an understanding of the key terms used in this lesson: network switch: A device that enables multiple devices on a network to be connected with each other server: A computer that manages the network and stores files wireless access point (WAP): A device, connected to a wired network, that sends and receives wireless signals for/from devices with WiFi connectivity router: A device that passes information between two computer networks

Computing overview- Year 4 Teach Computing

3 Sharing information	To outline how websites can be shared via the World Wide Web (WWW) • I can explain the types of media that can be shared on the WWW • I can describe where websites are stored when uploaded to the WWW • I can describe how to access websites on the WWW.	Activity 1 - What can we share on the World Wide Web?: Use whiteboards to answer questions from slides 4-9 Activity 2 - What's in a name?: Guided discussion through slides 10-16 Activity 3 - How can I access the World Wide Web?: Children create a World Wide Web mind map on a whiteboard. What devices connect to the WWW?  Task - Children to identify what is needed to connect to the WWW and what devices connect.	You will need an understanding of where websites are stored – this is also explained in a YouTube video, titled 'A Packet's Tale' (youtube/ewnBalT_eBM). You will also need to apply the previous knowledge of routing to the process of requesting and receiving a web page.
4 What is a website?	To describe how content can be added and accessed on the World Wide Web (WWW) • I can explain what media can be found on websites. • I can recognise that I can add content to the WWW. • I can explain that internet services can be used to create content online.	Activity 1 - The features of a website: Children to use whiteboards to answer the questions on slide 6. No need to print. Activity 2 - Adding your own content to the web: Work through slides 7 and 8 before giving children resource worksheet A2 to work on with a partner. Activity 3 - Creating your own website content: Children to access Chrome Music Lab and explore making sounds.  Task - Create content using a web-based tool.	An understanding of the elements common to many websites, ie. text content, images, video, etc. Knowledge of websites which can be used to generate content on the WWW, in particular Chrome Music Lab
5 Who owns the web?	To recognise how the content of the WWW is created by people • I can explain that websites and their content are created by people • I can suggest who owns the content on websites • I can explain that there are rules to protect content	Activity 1 - Who does this belong to?: Children to answer whether they can view, download or use content as their own for three different scenarios. Complete in pairs using a whiteboard. Activity 2 - Sharing things: Use A2 resource for this task. Children to work in pairs or small groups. Activity 3 - Who owns this? Give children the link to the following web page: www.bbc.co.uk/news/science-environment-49960497 Guide children through slides 11-13 giving them time to answer the questions and discuss their ideas. Task - To explore who owns content on websites and web pages.	You will need to be familiar with the way in which content is licenced, including: A knowledge of copyright and the reasons for it – useful short summary here: www.gov.uk/copyright A knowledge of creative commons licenses – useful guide here: creativecommons.org/licenses/
6 Can I believe what I read?	To evaluate the consequences of unreliable content • I can explain that not everything on the World Wide Web is true • I can explain why some information I find online may not be honest, accurate, or legal	Activity 1 - Is this the best?: Children complete a web search for the best mobile phone 2021. Did they all get the same results? Are they confident in the information? Activity 2 - Read all about it!: Discuss and list ideas in pairs for 'Why do people create fake information?' Take ideas from the children and then use slide 11 to go through the list. Activity 3 - How does information spread?: This is a practical activity which will demonstrate how quickly information can be shared, and how once it is shared, it cannot be unshared. Show slide 12. Give children the handout sheet. Split the class in half. Half of the class will be writing an accurate fact or piece of information in each box (the same one, repeated) and half will be writing an	You will need an awareness of the fact that there is a high volume of inaccurate, misleading, or false content on the internet. You will also need an understanding that search results are influenced by adverts and sponsored content, and an awareness of how

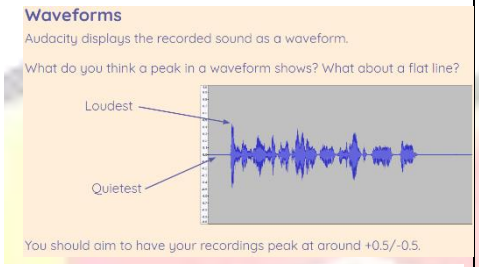
Computing overview- Year 4 Teach Computing

	• I can explain why I need to think carefully before I share or reshare content	inaccurate fact or piece of information. An example is included in the A3 Handout 'How does information spread' child activity sheet with an **inaccurate** piece of information. To make it clear which pieces of information are accurate and inaccurate, different coloured pens or pencils could be used. Show slide 13. The first child should cut their sheet in half (you may need to model this), and pass the two sections to other children. Show slides 14-15. Repeat this process two more times until each sheet is divided into eight pieces. All the accurate and inaccurate facts will now be distributed around the room. Share slide 16. Choose one child who began with an inaccurate fact and ask them to find out where all the pieces have ended up (without help from other children). Repeat this process with two to three other children. Ask why it is difficult to track down their facts and how this could relate to inaccurate information on the World Wide Web, where information can be shared very quickly with billions of people, not just in one room. Task - Discussion about unreliable content and the possible consequences of it.	information spreads quickly around the World Wide Web.

Unit title	Vocabulary	Device needed:
2: Creating Media - Audio production	audio, microphone, speaker, headphones, input device, output device, sound, podcast, edit, trim, align, layer, import, record, playback, selection, load, save, export, MP3, evaluate, feedback.	Laptop for Audacity Wavacity wavacity.com

Lesson	Learning objectives	Tasks	Prior Knowledge/Subject Knowledge
1 Recording sound	To identify that sound can be recorded • I can identify the input and output devices used to record and play sound • I can use a computer to record audio • I can explain that the person who records the sound can say who is allowed to use it	Activity 1 - Sound recording and playback: Children to use A1 resource and complete the task in pairs. Use slide 3-6 to support. Activity 2 - Your first recording: Introduce to whatever recording app you are going to be using (Audacity recommended) Children to record their own voice. Activity 3 - Answer 'What makes a good recording?' use whiteboards and slide 11 to support. Possible responses may include: • Having a clear voice • Avoiding filler words such as 'um' and 'ah' • Not coughing or sneezing • One person speaking at a time • Not too near or too from the microphone • No background noise • Not playing or fiddling with the microphone or anything around it Task - I can record audio on a computer.	You will need to be familiar with the location of built-in microphones if children are using laptops. You should be familiar with using Audacity to record sound. You should consider how children can record sound with minimal interference from other children, and how this can be managed in the classroom. Possible options include: Using additional rooms or areas within the school Working outside the classroom Having an allocated time slot for each group to record their sound Turning children' tables on their sides and placing them close to a wall, with children sitting between the table and the wall, which helps to reduce sound interference Whatever options are chosen, appropriate safeguarding policies, along with health and safety guidance, should be followed carefully to ensure children' well-being.
2 Editing audio	To explain that audio recordings can be edited • I can re-record my voice to improve my recording	Activity 1 - Recording audio: Children are going to record their voices, review what has been recorded and either keep or delete.	You will need to be familiar with using Audacity to record audio, including how to delete individual tracks. You will also need to be able to trim and align audio. You need to consider how children can record sound with minimal interference from other children, and how this can be managed in the classroom. Possible options include:

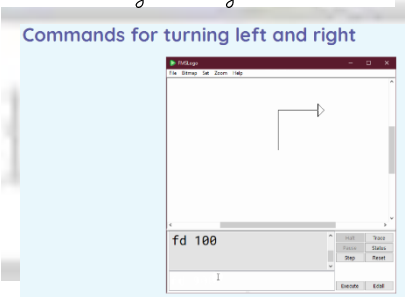
Computing overview- Year 4 Teach Computing

	• I can inspect the soundwave view to know where to trim my recording • I can discuss what sounds can be added to a podcast	Activity 2 - Editing audio: Using slides 6-8, guide children through editing their voice recordings. Activity 3 - Alignment: Using slides 9-10 show children how audio clips can be re-ordered. Task - I can record voice audio and make edits. 	Using additional rooms or areas within the school Working outside Having an allocated time slot for each group to record their sound Turning children' tables on their sides and placing them close to a wall, with children sitting between the table and the wall, which helps reduce sound interference Whatever options are chosen, appropriate safeguarding policies, along with health and safety guidance, should be followed carefully to ensure the well-being of children.
3 Planning a podcast	To recognise the different parts of creating a podcast project • I can explain how sounds can be combined to make a podcast more engaging • I can save my project so the different parts remain editable • I can plan appropriate content for a podcast	Activity 1 - Layering voices and sound effects: Use slides 5-7 to show children how to import an audio file and then move the file to change the composition. Activity 2 - Saving recordings: Show children how to save their work so they can access the file at a later date. Activity 3 - Show slide 9. Explain to children that they are now going to begin producing their own one-minute podcast on a specific topic, which could be a subject studied in class or a topic of interest to them. Children to use A£ resource to begin their plans. Task - Children can explore layering voices and sounds within an audio recording.	You will need to be familiar with importing audio into Audacity as well as how to save an Audacity project.
4 Creating a podcast	To apply audio editing skills independently • I can record content following my plan • I can review the quality of my recordings • I can improve my voice recordings	Activity 1 - Recording voice tracks: Remind children how to record their voices by demonstrating record, play, and delete in Audacity. Tell children the start and end of recordings can easily be removed after, and therefore they only need to re-record if there are other quality issues (covered in slide 7). Remind children how to record additional voice tracks by modelling the process in Audacity. Stress to children the need to mute previous tracks when recording new ones. Alternatively, talk through the process using the screen recording on slide 6 as a visual guide. Activity 2 - Reviewing your recordings: Children should listen carefully to each track and decide if there are ways they could improve the quality. For example, there might be quiet sections at the start or end of track or overly long pauses in the middle. Children should note down anything they think they can change to make the recording better. Pupils should also ensure that they have recorded all the voice parts listed in their plan. Activity 3 - Children to make any changes that they noted in their review. Ensure children save their work. Task - Children can record tracks and apply their editing skills to said tracks.	You will need to be familiar with using Audacity to record sound, edit audio, and adjust the volume of tracks.
5 Combining audio	To combine audio to enhance my podcast project • I can open my project to continue working on it • I can arrange multiple sounds to create the effect I want	Activity 1 - Adding sounds: Demonstrate how to load a saved project in Audacity. Alternatively show slide 5 and talk through the screen recording. Show slide 6. Tell children that their next task is to import additional audio. Ask children to think, pair, and share the steps you need to go through to import, edit, and align a piece of audio. Demonstrate the process in Audacity. Activity 2 - Reviewing recordings: Children need to listen through their recordings to ensure all sounds are aligned correctly Activity 3 - Saving and exporting: Show slide 12. Tell children that their podcast now needs to be saved as an mp3 file because this type of file can be played on a range of digital devices. Explain	You will need to: • be familiar with loading a saved Audacity project and importing audio files • be able to copy and paste audio within a track • be able to export an Audacity project as an mp3 file

Computing overview- Year 4 Teach Computing

	• I can explain the difference between saving a project and exporting an audio file	that to do this in Audacity they need to export their project. Once they have exported their project from Audacity it becomes just one track and can then not be easily edited. Talk children through the process of exporting from Audacity and then allow them time to do this. Task - Children to combine audio and sounds to enhance their podcast projects.	Note: You may wish to help children fade music in or out. To create fades in Audacity, select the section to fade – often this is the first or last second or two of a track. Then go to the effects menu and choose fade in or fade out.
6 Evaluating podcasts	To evaluate the effective use of audio • I can listen to an audio recording to identify its strengths • I can suggest improvements to an audio recording • I can choose appropriate edits to improve my podcast	Activity 1 - Evaluating podcasts: Use A1 resource. Show slide 3. Tell children that being able to listen carefully is an important skill. Ask them to listen very carefully to the recording you're going to play. The recording is the same one they listened to at the end of the previous lesson. As they listen, children need to count how many times they hear the word "so". Tell them it's less than five so they can keep count on their fingers. When the recording finishes, gather answers from children. Show slide 4, which contains a transcript of the recording, and highlight that "so" is said twice. Tell children that during the lesson they will listen to their podcast as well as podcasts by one or two other groups. Explain that they will be evaluating each podcast and it's important that they are active listeners. Activity 2 - Final tweaks: Use any notes you have made to make any final changes. Activity 3 - Exporting your recordings: All podcasts to be saved as MP3 files. Task - I can evaluate a podcast, giving written feedback.	You will need to be familiar with using Audacity to export audio recordings.

Unit title	Vocabulary	Device needed:
3: Programming A - Repetition in shapes	Logo (programming environment), program, turtle, commands, code snippet, algorithm, design, debug, pattern, repeat, repetition, count-controlled loop, value, trace, decompose, procedure.	https://turtleacademy.com/playground chrome book or Logotacular for iPad

Lesson	Learning objectives	Tasks	Prior Knowledge/Subject Knowledge
1 Programming a screen turtle	To identify that accuracy in programming is important • I can program a computer by typing commands • I can explain the effect of changing a value of a command • I can create a code snippet for a given purpose	Activity 1 - Basic commands in Logo: Give children a copy of the glossary. Work through slides 4-11 pausing for the children to complete smaller tasks along the way. Activity 2 - Creating a code snippet: Explain to children that a code snippet is a chunk of commands. Give children a code snippet and ask them what this code creates? Can they then create their own code snippet that will code one of the numbers on slide 13? Task - I can follow and test basic commands in Logo and record the answer of what happens. 	You will need to be able to access and demonstrate the version of Logo that you are using. You will need to be aware of the Logo commands introduced in this lesson. You can find these in the 'Glossary' handout.

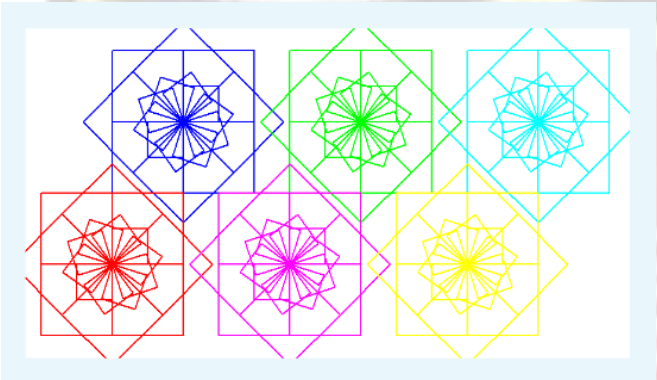
Computing overview- Year 4 Teach Computing

2 Programming letters	To create a program in a text-based language • I can use a template to draw what I want my program to do • I can write an algorithm to produce a given outcome • I can test my algorithm in a text-based language	Activity 1 - Drawing initials: Draw a selection of digital letters on a flipchart. Challenge children to create an algorithm for one of the letters. Activity 2 - Demonstrating an annotated drawing: Show children the difference between fd 10 and fd 100. Discuss which letters may be easier (only 90 degree turns) Use scrap paper to map out each stage of their code - do they think it will work? Activity 3 - Implementing algorithms in Logo: Children to use their algorithm, did it work? If not, what went wrong? Debug any issues they have. Task - I can write an algorithm and debug any issues I may have had.	You will need to be able to access and demonstrate the version of Logo that you are using. You will need to be aware of the Logo commands introduced in this lesson. You can find these in the 'Glossary' handout. Debugging: Debugging is the process of finding and correcting errors in your code. In this lesson, pupils will look at examples of incorrect Logo commands and find the errors in the commands and fix them. Some errors are in the syntax of the commands, where commands have been typed incorrectly, and some are in the logic of the commands, where what has been typed doesn't make sense. Algorithms: The algorithm is the part of the design of the program that is a set of precise instructions. Here, the algorithm takes the form of an annotated drawing. The instructions will later be implemented as code in Logo. Levels of abstraction: In this lesson, pupils will move between the design and code levels of the project – in creating their algorithms, they are working at the design level, and in programming in Logo, they are working at the code level. This is highlighted throughout the outline plan. You can find more information about levels of abstraction in the unit overview.
3 Patterns and repeats	To explain what 'repeat' means • I can identify repetition in everyday tasks • I can identify patterns in a sequence • I can use a count-controlled loop to produce a given outcome	Activity 1 - Repeating patterns: Use A1 resource - can children identify the repeating patterns? Activity 2 - Writing algorithms for squares and programming in Logo: Children to work with a partner to complete A2 resource sheet. Children then to program their algorithm using Logo Activity 3 - Programming a square using the repeat command: Introduce children to the repeat command. Show children how to enter this. Can children explore how this command can be used? **Using the repeat command** Try using the **REPEAT** command below to program a square. `REPEAT 4 [FD 100 RT 90]` Investigate which of the 3 values (in **bold**) in this code snippet you can change, whilst still drawing a square. **Tip:** Change one value at a time to see what effect it has on the turtle drawing. Task - I can explain 'repeated' patterns and write an algorithm to move and rotate a square.	You will need to be able to access and demonstrate the version of Logo that you are using. You will need to be aware of the Logo commands introduced in this lesson. You can find these in the 'Glossary' handout. This lesson introduces repetition, where actions or commands in programming are repeated. The repeating commands can also be referred to as a 'loop'. Loops can be repeated indefinitely, or a set number of times – the latter are called 'count-controlled loops'.

Computing overview- Year 4 Teach Computing

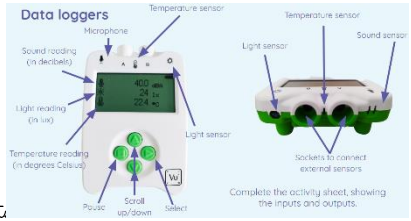
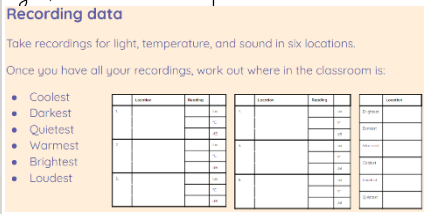
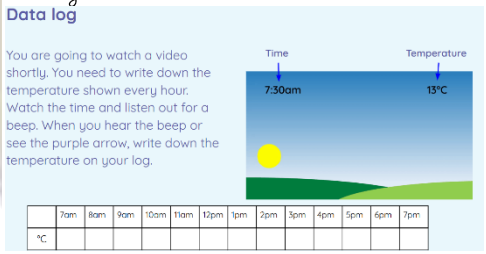
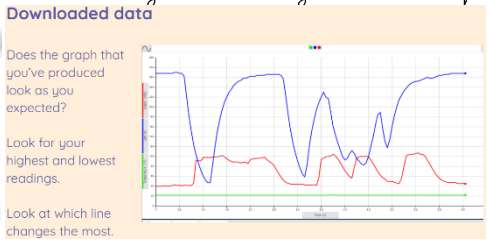
4 Using loops to create shapes	To modify a count-controlled loop to produce a given outcome • I can identify the effect of changing the number of times a task is repeated • I can predict the outcome of a program containing a count-controlled loop • I can choose which values to change in a loop	Activity 1 - Predicting shapes: Using whiteboards children should follow the slides and see if they can work out what shape is being shown in code. Activity 2 - Writing code for shapes: Using A2 resource sheet, can children investigate and explore the code needed to draw the shapes listed on the sheet. Children can work with a partner or independently.  Activity 3 - Creating shapes: Can children apply their knowledge from activity 2 and create an algorithm for an Octagon? Nonagon? Etc... Task -I can write an algorithm to draw a shape with a specified number of sides and/or degrees.	You will need to be able to access and demonstrate the version of Logo that you are using. You will need to be aware of the Logo commands used in this lesson. You can find these in the 'Glossary' handout. In this lesson, pupils will continue to learn about repetition, where actions or commands in programming are repeated. The repeating commands can also be referred to as a 'loop'. Loops can be repeated indefinitely, or a set number of times – the latter are called 'count-controlled loops', and will be used in this lesson. In the 'Predicting shapes' activity, pupils will trace code for shapes. Tracing code requires them to consider the code snippet one part at a time, and draw what they think will happen at each point. It is a useful tool for checking that their commands are correct before programming them. Exterior angles: In Logo, the exterior angle is used when calculating the turn required to create different shapes. Exterior angles in a shape must all add up to 360°. To work out the exterior angle of a regular shape, divide 360 by the number of sides or angles that the shape has; eg for a triangle, it would be 360/3=120°.
5 Breaking things down	To decompose a task into small steps • I can identify 'chunks' of actions in the real world • I can use a procedure in a program • I can explain that a computer can repeatedly call a procedure	Activity 1 - Decomposing everyday real-world tasks: Using slide 5, break down the task into it's steps. Use a whiteboard and work with a partner. Activity 2 - Creating procedures in logo: Explore how to make a procedure and how this can be helpful. Allow children to use A2 resource sheet and see if they can input the correct code and create a procedure. Activity 3 - Using a procedure in a program: Task - I can write algorithms for several shapes to move one after the other.	A subroutine is a sequence of commands to perform a specific task with an identifiable name. In programming there are a number of constructs which are variations of a subroutine; these include subprogram, procedures and functions. You will need to be able to access and demonstrate the version of Logo that you are using. You will need to be aware of the Logo commands used in this lesson. You can find these in the 'Glossary' handout. Parson's Problems are programming puzzles where the pupil is given the correct code, but the commands have been broken up and mixed.
6 Creating a program	To create a program that uses count-controlled loops to produce a given outcome • I can design a program that includes count-controlled loops • I can make use of my design to write a program	Activity 1 - Designing patterns - project brief: Explain that in this lesson, pupils will be planning and programming a design for wrapping paper. The wrapping paper must be designed using more than one shape with a count-controlled loop, e.g. square, triangle, hexagon. They could also use the same shape in different sizes, e.g. a large square and a small square. Activity 2 - Programming in Logo: Children to create their designs using the commands taught in previous sessions. They can also include the use of procedures. Activity 3 - Evaluating: Display slide 12. Explain that pupils are going to evaluate their work, referring back to the original program objectives. Hand out the	You will need to be able to access and demonstrate the version of Logo that you are using. You will need to be aware of the Logo commands used in this lesson. You can find these in the 'Glossary' handout.

Computing overview- Year 4 Teach Computing

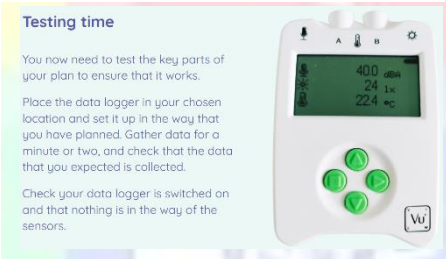
	• I can develop my program by debugging it	'Evaluating' activity sheet and ask pupils to use it to evaluate their program, including reflecting on the strategies that they used for debugging (such as those on slide 11).  Task - To design and create wrapping paper by coding an algorithm to produce a repeating shape pattern.	

Unit title 4: Data and Information - Data logging		Vocabulary data, table, layout, input device, sensor, logger, logging, data point, interval, analyse, dataset, import, export, logged, collection, review, conclusion.	Device needed: Data logger and associated software
Lesson	**Learning objectives**	**Tasks...**	**Prior Knowledge/Subject Knowledge**
1 Answering questions	To explain that data gathered over time can be used to answer questions • I can choose a data set to answer a given question • I can suggest questions that can be answered using a given data set • I can identify data that can be gathered over time	Activity 1 - Data tables: Give children A resource sheet, can they work in pairs to answer the questions on the sheet? Activity 2 - Classroom data: Using slides 7 and 8 as a starting point could children then create some questions that they could ask around a classroom environment? Activity 3 - Collecting data: Children will now watch a video, give each child a specific thing to watch for. Ask children watch again and on whiteboards ask them to tally the information from slide 11. Can all questions be answered? Activity 4 - Data gathered over time - people: Show children that data is regularly collected. Can they think of any examples of data being collected on a regular basis? Make a list on their whiteboard.	You should be familiar with different types of data that are collected over time. Understanding why and how data is collected over time will be useful background knowledge for the lesson. 'Data' is information, usually numerical, that is collected and stored in a form suitable for processing. A 'data set' is a collection of related information, usually linked to one subject or time frame.

Computing overview- Year 4 Teach Computing

		Task - Children can answer questions based on a set of data.	
2 Data collection	To use a digital device to collect data automatically • I can explain what data can be collected using sensors • I can use data from a sensor to answer a given question • I can identify that data from sensors can be recorded	Activity 1 - Data loggers: Children discuss and slides 6 and 7 with the teacher and then complete A1 resource sheet.  Activity 2 - Recording data: Children to take readings from the classroom for light, sound and temperature. Record their findings on A2 resource sheet.  Activity 3 - Recording data automatically: Use EasySense2 and connect data loggers follow the slides 10-14 Task - I can use a digital device to collect data automatically.	A data logger is a digital device that can collect data over time and store it. Data loggers designed for education will usually have built-in sensors for light, temperature, and sound, as well as the option to connect external sensors. You should be aware that input devices allow data to be entered into a computer. Keyboards, mice, and microphones are all input devices. A sensor is a type of input designed to allow computers to capture data from the physical environment. Sensors can be connected to a computer to capture data about temperature, light, sound, humidity, pressure, and so on. A microphone can be used to record audio onto a computer, or it can be used as a sound sensor. You should be familiar with the operation and layout of the school data loggers. Suppliers of data loggers designed for education will often have user guides available on their websites.
3 Logging	To explain that a data logger collects 'data points' from sensors over time • I can recognise that a data logger collects data at given points • I can identify the intervals used to collect data • I can talk about the data that I have captured	Activity 1 - Data log: Using slides -12, children work in pairs to complete the first activity. Children will need A1 resource sheet.  Activity 2 - Downloading data from the data logger: Using slides 13-17, guide children through downloading the data and question and discuss the steps.  Task - Children to explain that a data logger collects 'data points' from sensors over time. Children to watch a video, record temperature and compile a data set.	You should be aware that data loggers capture data at given time intervals. The interval is a regular time period between each data capture, and can vary according to the experiment. For example, if data is being logged for a week, the interval might be every hour. When using the Vu+ data logger, the interval is automatically adjusted according to the entire duration that data is logged. Each capture of data is a 'data point'. (Note: This is also known as 'sampling', but that terminology is not introduced in this lesson.) Each captured data point can be displayed in a line graph representing change over time.

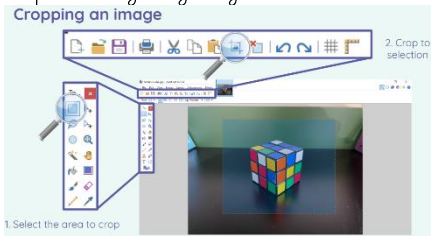
Computing overview- Year 4 Teach Computing

4 Analysing data	To recognise how a computer can help us analyse data • I can view data at different levels of detail • I can sort data to find information • I can explain that there are different ways to view data	Activity 1 - Importing data: Complete as a whole class with the teacher doing the experiment but involving the children as much as possible (Due to boiling water) Record the results on A1 resource for the class book. Activity 2 - Finding information: Children to use a data logger to monitor light intensity. Complete A2 resource sheet in pairs. Activity 3 - Viewing data: Children to have access to A3 resource on a Chromebook and follow the steps on the slides (14-16) Task - Input data into a computer and explore how graphs are used to analyse it.	The data file for this lesson records the cooling curve of a cup of hot water. You should be able to show children how to access data files stored on the school network or computer. You should be familiar with the data logging software and the filtering tools in a spreadsheet.
5 Data for answers	To identify the data needed to answer questions • I can propose a question that can be answered using logged data • I can plan how to collect data using a data logger • I can use a data logger to collect data	Activity 1 - Asking questions: T to use slides 4-5. Children work in pairs to think of questions. Use their whiteboards to record any ideas. Activity 2 - Data collection plan: Use A2 resource to plan how you will collect your data. Is it safe, practical and sensible? Record ideas and information on the resource sheet. Activity 3 - Testing time: Use the data loggers to collect data and answer the question children have posed. Task -I can ask questions and then use data loggers to answer the question using the data they collect. 	You should be aware of questions that could be answered using a data logger in school. The data loggers should be used to log data over time, rather than being used to take individual readings. Children will think of questions that may be able to be answered using logged data, and those questions will require filtering to ensure that they are achievable. You should be aware of how and where data loggers can be set up. Note: In this lesson, children will set up experiments to collect data by Lesson 6. Ensure that children can collect data between lessons in accordance with their data collection plan; some management of devices and time will be required to allow children to collect data at their chosen times.
6 Answering my question	To use data from sensors to answer questions • I can interpret data that has been collected using a data logger • I can draw conclusions from the data that I have collected • I can explain the benefits of using a data logger	Activity 1 - Review your collected data: analyse the data that they have gathered since the previous lesson, using the data loggers. children may need to download the data from the logger, or load it from a central location if it has been downloaded for them. Ask children to spend a few minutes looking at their data using the logger software. Use slide 6 to remind children how to hide data that isn't relevant. The slide also shows how to zoom in and look at a specific area of data.	You should be familiar with downloading data from the data logger. To help with managing hardware, you may wish to download some of the data files and save them so that they can be accessed in this lesson without needing the logger. You should be confident with the data logging software and be able to access the features shown in the slides.

Computing overview- Year 4 Teach Computing

		Activity 2 - Writing a report: Show children the example report on slide 8. Then, hand out the 'Data collection report' activity sheet and tell children to complete their own report. In their report, they will include their question, which they decided during the previous lesson, what they thought would happen, how they set the data logger up, and what they found out. Task - Children to analyse data and write a report. 	

Unit title	Vocabulary	Device needed:
5: Creating Media - Photo editing	image, edit, digital, crop, rotate, undo, save, adjustments, effects, colours, hue, saturation, sepia, vignette, image, retouch, clone, select, combine, made up, real, composite, cut, copy, paste, alter, background, foreground, zoom, undo, font.	Paint.net - on I-Pads Photopea- on chrome books https://www.photopea.com/

Lesson	Learning objectives	Tasks	Prior Knowledge/Subject Knowledge
1 Changing digital images	To explain that the composition of digital images can be changed • I can improve an image by rotating it • I can explain why I might crop an image • I can use photo editing software to crop an image • I understand that editing images can be unethical	Activity 1 - Improving photos and fixing mistakes: Share the folder A1 and ask children how they could fix the mistakes. Work through the slides together to give children the knowledge they need to edit the photos confidently. Activity 2 - Cropping images: Work together through slides 17-23, give out a selection of the images from A2 folder and ask children to physically crop the picture. Where would you crop it and how? Note that the most popular shape for a cropped image would be rectangular. Activity 3 - Cropping images on a computer: Use slides 24-27 and model how to crop an image digitally. Give children time to crop an image.  Task - I can change the composition of some digital images and resave them.	You will need to be familiar with the crop and rotate tools in your chosen image editor, and know how to save a new version from within the editor. You can find a guide to all tools in paint.net at www.getpaint.net/doc/latest/index.html. You will need to be familiar with the effect that cropping can have on an image – support is provided in the slides.
2 Recolouring	To explain that colours can be changed in digital images • I can explain that different colour effects make you think and feel different things	Activity 1 - Changing how a photo makes someone think or feel: Children to use whiteboards to explain the effect the changes have had on the image. Activity 2 - Editing an image using colour and light: Children to watch videos of the features in paint.net	You will need to be familiar with how to make image adjustments and change effects in paint.net, or your chosen image editor – there is a video in the lesson for support if you need it.

Computing overview- Year 4 Teach Computing

	• I can experiment with different colour effects • I can explain why I chose certain colour effects	Activity 3 - Change the image for a different purpose: Use pictures in the A3 folder. Apply their knowledge of different colour filters/tools to edit the photos. Can they explain the changes they have made and why? Task - I can change the colours within a digital image and explain my choices.	
3 Cloning	To explain how cloning can be used in photo editing • I can add to the composition of an image by cloning • I can identify how a photo edit can be improved • I can remove parts of an image using cloning	Activity 1 - Hanging image composition: Discuss the images in detail and how the changes have altered how you may feel about the picture. Show children how to use tools to remove part of an image and how to add to an image. Children to have a go at cloning and removing part of an image. Activity 2 - Retouching images - is that obvious?: Compare slide 12 and 3. What has changed? Introduce retouching on slide 14. Then, show some examples on slides 15-18 what is the problem? Activity 3 - Retouching using the editor: Model how to use the clone tool (see slide 19) and then give children the opportunity to have a go. See selection of images for children to use (A3) Task - I can use the cloning tool to retouch a digital image and compare the original and edited one.	You will need to be familiar with the tools used in this lesson in paint.net or your chosen image editor. For more information about tools in paint.net, visit the following websites: Guide to all tools in paint.net: www.getpaint.net/doc/latest/index.html The 'clone stamp': www.getpaint.net/doc/latest/CloneStamp.html
4 Combining	To explain that images can be combined • I can experiment with tools to select and copy part of an image • I can use a range of tools to copy between images • I can explain why photos might be edited	Activity 1 - Selecting: Demonstrate the different tools on paint.net for selecting (choosing) things. Use slides 7-11 to guide children through the processes. Slide 12 shows how to copy and paste. Slide 13 how to select a limited area to work with. Activity 2 - Working with two images: Demonstrate how to open two images in paint.net and how to copy one to another. See slides for guidance (14-15) Activity 3 - Is it ok to edit images?: Work through slides 16-21 discussing and taking feedback from children. Give out resource A3 and ask children to order the statements from the ones they most agree with to the ones they least agree with. Task - I can combine parts of an image together and compare the original. I understand it is difficult to know if an image has been edited just be looking at it.	You will need to be familiar with the tools used in this lesson in paint.net or your chosen image editor. See slides 13, 14, and 15 for the specific skills required. For more information about tools in paint.net, visit the following website: Guide to all tools in paint.net: www.getpaint.net/doc/latest/index.html
5 Creating	To combine images for a purpose • I can describe the image I want to create • I can choose suitable images for my project	Activity 1 - Setting the task: Plan how to blend two images together that fit their chosen theme. Follow slides 5-9. Activity 2 - Opening images: Recap how to open images with the children and give them time to open their chosen images. Activity 3 - Combining images: Once children have downloaded their images, explain that the next step is to combine them. Remind children of the skills they have learnt in previous lessons:	You will need to be familiar with the tools used in this lesson in paint.net or your chosen image editor.

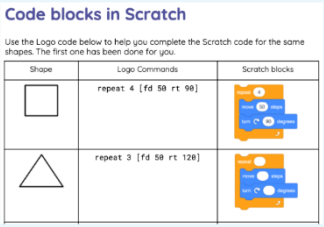
Computing overview- Year 4 Teach Computing

	• I can create a project that is a combination of other images	• Rotate • Crop • Clone • Select • Copy • Paste Children should work individually at computers. Once children have combined their images, they can use any of the tools within paint.net (or your chosen image editor) to further edit the image to suit their scenes. Ask children to save their edited images, ready for use in Lesson 6. Task - I can combine different images to create a new digital image.	
6 Evaluating	To evaluate how changes can improve an image • I can review images against a given criteria • I can use feedback to guide making changes • I can combine text and my image to complete the project	Activity 1 - Evaluating images: Review your image from last week and your partner's image. Answer: • How well has the image been edited together? • How suitable are the original images? • How effective is the final effect? • How well does the image suit the project title? • What do you like most about the image? • If you could change one thing, what would it be? Activity 2 - Making changes: Give children a short amount of time to make any final tweaks to their image. Think about all the tools and skills you have developed over the last few weeks. Activity 3 - Add your title: Demonstrate (or use slide 6 to demonstrate) how to add text to an image. Explain to children that they will need to carefully choose the size, colour, and position of the text they add to complete their image. Show slide 7 to remind children of the publication titles they chose from in the previous lesson. Task - I can look at a previously created image and evaluate how changes can improve it.	You will need to be familiar with the tools used in this lesson in paint.net or your chosen image editor. For more information about text in paint.net, visit www.getpaint.net/doc/latest/TextShapeTools.html or see slide 6.

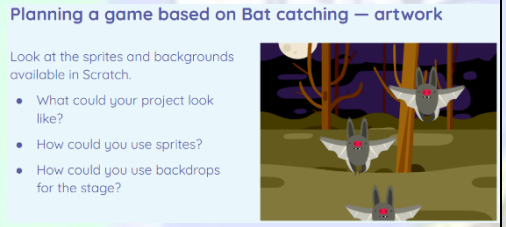
Unit title	Vocabulary	Device needed:
6: Programming B - Repetition in games	Scratch, programming, sprite, blocks, code, loop, repeat, value, infinite loop, count-controlled loop, costume, repetition, forever, animate, event block, duplicate, modify, design, algorithm, debug, refine, evaluate.	Scratch- chrome books scratch.mit.edu

Lesson	Learning objectives	Tasks	Prior Knowledge/Subject Knowledge
1 Using loops to create shapes	To develop the use of count-controlled loops in a different programming environment • I can list an everyday task as a set of instructions including repetition • I can predict the outcome of a snippet of code	Activity 1 - Code blocks in Scratch: Recap on the code children learnt during the earlier programming topic. Show children how this looks in Scratch. Challenge children to work through how they can draw other shapes within Scratch. Have resource A1 ready to support children. Activity 2 - Modifying code: Children will now be working through to debug and recode the algorithm in order for the Scratch Sprite to draw selected shapes.	You will need to be familiar with the Scratch programming environment. If you are new to Scratch, there are some useful tutorials within Scratch, or you could register on the course 'Teaching programming in primary schools' (ncce.io/PrimaryProgramming). For this lesson, you will need to be aware of the basic screen architecture, including using the pen tool, which can be found in the extension blocks at the bottom left-hand side of the Scratch environment. Please note that the pen blocks in previous versions of Scratch were not extension blocks. This lesson focuses on repetition, where actions or commands in programming are repeated. Repeating commands can also be referred to as a 'loop'. Loops

Computing overview- Year 4 Teach Computing

	• I can modify a snippet of code to create a given outcome	**Code blocks in Scratch** Use the Logo code snippets on the 'Code blocks in Scratch' worksheet to help you complete the Scratch code snippets.  **Code blocks in Scratch** Use the Logo code below to help you complete the Scratch code for the same shapes. The first one has been done for you. Shape | Logo Commands | Scratch blocks repeat 4 [fd 50 rt 90] repeat 3 [fd 50 rt 120] Task -I can write an algorithm to draw shapes within a program.	can be repeated indefinitely, or for a set number of times. The latter are called 'count-controlled loops' and are the loops used in this lesson. You will need an awareness of how to draw a square in Scratch. A video demonstrating this can be found in the lesson folder. In this lesson, the project has been set up so that it starts in the same way every time it is run. This setup process relates to the computing term 'initialisation'. Initialisation is the process of setting starting values (variables) for a program, so that the program starts in the same way each time. In the context of this project, initialisation means setting the variables for the start position of the cat sprite, and clearing any existing lines on the screen. This ensures that the project works in the same way every time it is run. Typically, in Scratch, projects are initialised (set up) using the when green flag clicked block, and it is good practice for this block not be used for any other purpose. Where children create their own shapes, they use different keys to run each code snippet, e.g. they use when t key pressed to draw a triangle.
2 Different loops	To explain that in programming there are infinite loops and count-controlled loops • I can modify loops to produce a given outcome • I can choose when to use a count-controlled and an infinite loop • I can recognise that some programming languages enable more than one process to be run at once	Activity 1 - Different types of repeats: Use the link to the Scratch file for the dancing dinosaurs. Children should explore the difference between an infinite loop and a count-controlled loop. Activity 2 - Modifying the dinosaur code: Using slides 12-14, children to edit the blocks of code so that they have both dinosaurs doing an infinite loop. Activity 3 - Which loop would you use?: Can children think of when an infinite loop would be good and when a count-controlled loop would be useful. Task - I can write an algorithm to make the Sprite move and change direction.	You will need to be familiar with the Scratch programming environment. This lesson focuses on repetition, where actions or commands in programming are repeated. The repeating commands can also be referred to as a 'loop'. Loops can be repeated continually, and these are known as 'infinite' loops. Loops can also run a set number of times, and these are known as 'count-controlled loops'. In this lesson, sprites change costumes. Costumes are alternative appearances of a sprite, which can be named, edited, created, and deleted. Here, they are used as part of the animation, where the sprite moves from one costume to the next. There is a help video on changing costumes at: A2 Resource: Costumes. In this lesson, children will move between the 'design' and 'code' levels of the project. This is highlighted throughout the plan below. More information about Levels of abstraction is included in the 'Unit overview'.
3 Animate your name	To develop a design that includes two or more loops which run at the same time • I can choose which action will be repeated for each object • I can explain what the outcome of the repeated action should be • I can evaluate the effectiveness of the repeated sequences used in my program	Activity 1 - Designing animations: Children to complete resource sheet A1, T to guide children through and model. **Designing your animations** Today you will be animating the letters in your names. This is an example of an animated name project in Scratch.  Activity 2 - Programming animations including repetition: Play the video for children before they begin to input their code. Activity 3 - Evaluating effectiveness of work: Children to work through their evaluation. A3 sheet.	You will need to be familiar with the Scratch programming environment. For this lesson, you will need to have an understanding of sprites in Scratch, including attributes and costumes. Costumes are alternative appearances of a sprite, which can be named, edited, created, and deleted. In this lesson they are used as part of the animation, where the sprite moves from one costume to the next. This lesson focuses on repetition, where actions or commands in programming are repeated. A set of repeating commands can be referred to as a 'loop'. Loops can be repeated without an end point (these are known as 'infinite loops'). Loops can also run for a set number of times (these are known as 'count-controlled loops'). In this lesson, children will move between the 'design', 'code' and 'running the code' levels of the project. This is highlighted throughout the plan below. More information about Levels of abstraction is included in the unit guide

Computing overview- Year 4 Teach Computing

		Task - I can write an algorithm to animate the letters in my name. I can program these animations within Scratch using code.	
4 Modifying a game	To modify an infinite loop in a given program • I can identify which parts of a loop can be changed • I can explain the effect of my changes • I can re-use existing code snippets on new sprites	Activity 1 - Spotting parts of the design: Show slide 4. Load the Scratch project 'Catch the shark' and run the game, demonstrating how to catch the sharks by clicking on them. Ask the children what elements are included in the game. Children use A1 resource sheet. Activity 2 - Modifying a game: Children to modify the shark game. Look at infinite to count-controlled loops and using 'wait' blocks. Activity 3 - Adding code from a design: Show slide 8. Explain to the children that the Scratch game needs to be completed. They will need to look at the 'Project design' handout and add the remaining aspects to meet the design. As a class, look at the 'Project design' handout. Ask the children to identify which parts have not yet been implemented in the code. Show slide 9. Explain that the children will use the 'Project design' worksheet to complete the game. They will need to: • Add a new sea creature sprite • Reuse the code snippet from the shark by dragging it over to the new sprite • Choose the appropriate sound from the design (when the creature is imported, it will come with a sound, which can be viewed by clicking on the **sounds** tab on the sprite) • Edit the wait times so that the new sprite appears at a different time to the other sprites Task - I can modify code to change Sprite colour and position. I can record changes I have made.	You will need to be familiar with the Scratch programming environment. This lesson focuses on repetition, where actions or commands in programming are repeated. The repeating commands can also be referred to as a 'loop'. Loops can be repeated without an end, and these are known as 'infinite loops'. Loops can also run for a set number of times, and these are known as 'count-controlled loops'. In this lesson, children will move between the 'design' and 'code' levels of the project. This is highlighted throughout the plan below. More information about Levels of abstraction is included in the 'Unit overview'. In the 'Adding code from the design' activity, children copy code between sprites, by dragging the code from an existing sprite on top of the new sprite to transfer it. For support with copying code see Resource A3
5 Designing a game	To design a project that includes repetition • I can evaluate the use of repetition in a project • I can select key parts of a given project to use in my own design • I can develop my own design explaining what my project will do	Activity 1 - Creating designs and writing the algorithm: Design a game based on the bat game. Use A1 resource. Show slide 6. Ask the children to consider what their game algorithm might include: • How do you want your game to start? • How do you want the sprites to move? • What else could the sprites do? • How will their actions be repeated? Activity 2 - Sharing and reflecting: Allow the children to show their designs and to give peer feedback.  Task - I can write an algorithm to create a game where a Sprite appears, moves and disappears.	You will need to be familiar with the Scratch programming environment. In this lesson, children will be working between the 'task' and 'design' levels of the project. This is highlighted throughout the plan below. More information about Levels of abstraction is included in the 'Unit overview'.
6 Creating your games	To create a project that includes repetition • I can refine the algorithm in my design • I can build a program that follows my design • I can evaluate the steps I followed when building my project	Activity 1 - Creating the game - adding one sprite and background: Guide children through slides 4-7, children to begin to code their game design from the previous session. Activity 2 - Adding more sprites and copying code: Show slide 8. When they have tested and debugged the code for one sprite, give the children time to add and code the remaining sprites. Show children the video, or demonstrate in Scratch, how to copy code between sprites. Remind them to check their designs to see whether they planned to make any of the code different in the other sprites, eg they might have planned to change the **wait** times so that all their sprites don't appear together. Show slide 9. Ask the children to do a final test of their project, and debug if necessary.	You will need to be familiar with the Scratch programming environment. In this lesson, children will be working between the 'design', 'code', and 'running the code' levels of their projects. This is highlighted throughout the plan below. More information about Levels of abstraction is included in the 'Unit overview'.

		Children should save their work. Projects can be saved on local devices using the 'Save to your computer' option, or saved online with the use of a teacher account. Guidance on setting up teacher accounts is included in the 'Unit overview'. Activity 3 - Evaluating the game: Children to complete evaluation sheet A3. Task - I can rewrite an algorithm to develop my game and evaluate it.	