Year 6 Computing

Key Vocabulary

Digital Literacy		
National Curriculum Principles	**Objectives**	**Knowledge and key Vocabulary**
Understand the opportunities [networks] offer for communication and collaboration	• To be able to collaborate using a variety of systems.	• I can use Pages, Keynote and Numbers to collaborate with my peers. • I can use Google docs to collaborate with my peers.
Be discerning in evaluating digital content	• To be aware that not everything you read online is true.	• Use a range of online news reports • BBC Teach
Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact	• To be aware of the pros and cons of using the internet. • To know that cyber bullying is wrong. • To understand how to use social media responsibly.	• I can discuss why using the internet is good/bad and give justified reasons. • I can discuss what acceptable behaviour is online and how this affects people. • I can understand the pros and cons of social media and how to use it responsibly.

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What's the big picture?
To ensure the children are able to use a variety of software and can choose the best application for a specific purpose.

Information Technology	
National Curriculum Principles	
- 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 - use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content - 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 - use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact The National Curriculum objectives are delivered through the use of Barefoot Computing Curriculum and all resources and planning can be found at www.barefootcomputing.org. For lessons 1 - 6 please see other resources in the computing folder on the Google Drive.	
Objectives	
To select, use and combine software on a range of digital devices to create a system to present data and information. To use a range of technology for a specific project	
Lessons	**Knowledge and key Vocabulary**
Pre- Learning	Recap the understanding of computer networks, the internet and the WWW and the opportunists they offer for communication. Barefoot Lesson - Modelling the Internet Introduce the pupils to opening up a favourite web page. What did you do to do this? What happened for this to happen? Discuss with pupils the five slides of the presentation (Slides 3 – 7) describing the computer systems and other devices which make up the internet.

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	Highlight on slide 6 that the WWW is just one of many internet services, and that others include email and online gaming Use a think-pair-share to work through the matching quiz on slide 8 to check pupils' developing understanding of internet devices Explain that we are going to create a simplified human model of the internet. Put pupils into groups of nine and give each child a badge with one part of the internet components on them. Ensure the pupils acting as the servers, client and DNS have the resources required as shown on their badge. Note – the DNS sheet you prepare (see 'Teaching notes' beneath) will indicate which server should hold which web page Get pupils to arrange themselves approximately as shown on slide nine. This only has to be an approximate arrangement, however the DNS should be next to the client. The instructions for the pupils at each stage are: – Step 1: The pupil acting as the client writes a request on a slip of paper 'I would like to view the web page... ' (See 'Teaching notes'). They turn to the DNS server and ask for the IP address of the server holding that web page. The pupil acting as the DNS finds this information from their table. This IP address is written at the top of the slip of paper and the client's own IP address (shown on their badge) is written on the back of the slip of paper – Step 2: Pupils acting as routers pass the request to the server holding the web page. They do this by looking at the IP address on the message so they know which server it needs to be directed to – Step 3: The pupil acting as the server holds up the web page to show they have it. The pupil then cuts the web page into 3 pieces representing it being broken down into packets of data. Each is labelled with the requesting client's IP address. These are passed back to the client via the routers – they may take different routes across the internet – Step 4: The client arranges the pieces of web page on the table in front of them to view it. Explain to pupils that the process that they have just modelled is called a protocol which is a set of rules to govern how data is exchanged between computers. Once you have walked through the steps, groups should be given time to repeat the process for the remaining web pages held by the servers. Pupils should change roles each time. Pupils could make a short video about the process which can be used to teach other pupils in the school about how the internet provides the WWW.
1	***What is a database?*** Before the lesson, Make a copy of the spreadsheet 'My Favourite' in Numbers and add the pupils names into it. Share this with the class.

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	Discuss as a class what a database could be? Explaining that a database is 'a system that makes it easy to search, select and store information. Databases are used in many different places'. Discuss what the word 'data' means with the class. 'Data refers to factual information, it has no meaning itself but becomes information when it is interpreted. Direct pupils to the BBC Bitesize page Using the website to visually show children, discuss and explain the different parts of a database including: search, titles, record and field. Ask the pupils to discuss in groups why might we use databases? Using the website to help them think of different locations that use databases. Open the copy of the spreadsheet 'My favourite' in Numbers and make sure it is shared with pupils. Explain that this is a different kind of document called a spreadsheet that splits the page into cells. Demonstrate how the data in the table can be sorted A-Z. Click on the Food column by clicking on its letter column header. Click 'Column Actions' and choose to sort. Model highlighting the columns with the information and changing the information into a graph by clicking the + at the top right and selecting the Chart icon. Pupils practise highlighting the different data and turning it into a graph. Plenary - Ask pupils to share their understanding of what a database is and check their understanding.
2	***Weather data*** Before the lesson, make a copy of the 'Weather around the World' spreadsheet in Numbers and add all pupil names in the first column. Share this with the pupils. Explain that we are going to be creating a different database, but this time we will need to do some research first to collect the data, which will be done collaboratively. Open the spreadsheet 'Weather around the World' with the pupils and explain that each pupil will take a line of the spreadsheet to

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	complete. www.holiday-weather.com is a great website for finding out about weather data for all these countries. You can use the countries provided (which were the 30 most popular countries searched on the website) or you can choose/add your own. The country names on the spreadsheet are hyperlinked to the correct page on the website which should make it easy for the students to get to the right page for their data. They need to find out: • Average temperature in January (°C) • Average temperature in July (°C) • Hottest month of the year • Average rainfall in January (mm) • Average rainfall in July (mm) • Average Daily hours of sunshine in January • Average Daily hours of sunshine in July Extension - When complete they can also search for **an images of their country's flag** and add it into a new cell in the spreadsheet. **Recap safe searching, appropriate search terms to use and good image searching - not saving thumbnails, deciding on the right size image, the correct aspect (landscape needed for this)** Plenary - Get the class back together to analyse some of the data. Which country has the highest average temperature in July? What could we do to make this easier to answer? Sorting it would make it easier to analyse the data. Can the pupils remember how to do this?
3	***Analysing data from a database*** Recap the learning so far and model answering questions about the data using the sort A-Z tool and other tools to help answer them. Give the pupils the worksheet with questions about the data to analyse and ask them to use the spreadsheet to answer the questions. Which tools would help them?
4	***Turning data into graphs***

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	Today we are going to turn our data into charts. Why might we want to do this? Sometimes looking at data in a chart makes it much easier and quicker to interpret the data. Discuss the different charts that the pupils are familiar with including: line graphs, bar charts and pie charts. We can make any of these charts with Numbers, **but which chart you make depends on the data you have** and what you want to show. For example, we couldn't really show average temperatures in January for the different countries using a line graph as we are not showing a change in a set of data over time, we're just showing a value for lots of different countries, so a bar chart would work best for that. Highlight the data on the spreadsheet that would be needed for the bar chart. Click the + at the top right and select the Chart icon and choose an appropriate graph. From here you can edit the charts features, add titles etc. Ask the pupils to have a go at creating their own graphs from one of the categories in that database. Making sure they add a title and labels to the axes. They can take a screenshot of the graph and create a Pages document where they will add a copy of the graph and write two or three sentences about the graph. Some pupils will be able to create more than one graph. Plenary - What is the difference between bar charts, line graphs and pie charts? When would you use each? **Take a look at your chart:** • **Does the chart accurately represent the data that you have collected?** • **Do you understand it?** • **Will others understand it?** • **Does the chart have a title to explain what the data is showing?**
5	***Collecting data with google forms*** (to be done as a class) Explain to the pupils that databases are only useful when they have data in them, and at some point that data needs collecting. Sometimes we might collect data using technology such as sensors collecting the weather data or traffic counters on roads, other times it might be done by research (as we did with the weather) or if the data is about people then we need to collect that from people, usually by surveys/ questionnaires.

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	Put the children into small groups of about 3 and ask them to think of around 5 suitable questions they could ask people about the weather and countries they have visited, perhaps linked to holidays. Encourage them to try to have some open and some closed questions. They should jot down their ideas on paper or whiteboards. For example: ● Do you prefer snowy or sunny holidays? ● What is the hottest country that you have visited? ● What is the coldest country that you have visited? ● Rate these types of weather on how much you like them: Sun, rain, snow, wind. We've already seen how some web tools, such as Numbers can save us time and effort if we want to collect data from a group, and that method worked well when it was just collecting data from our own class, but it wouldn't really be appropriate if you wanted to collect data from a much larger group, or from people you didn't know such as the general public. Online questionnaires are great for this. Introduce the children to Google forms and explain that this is an online questionnaire, **what are the positives and negatives of collecting data like this?** Positives ● not restricted by time and place, could be sent out globally and respondents could answer it at all different times ● works on most web enabled devices, ● can be sent out to lots of people, ● data easy to manage, ● quick and easy to complete. ● can include media (images and videos) ● users only see the form, not the database Negatives ● needs internet access, ● some people might ignore it ● doesn't give the chance to ask follow up questions. Explain that we are going to make our own Google Form as a class to send it out to the rest of school. Model creating the Google Form with the class explaining the different features and how each of them work. Give the questionnaire a title (depending on what you would like to find out). Show the different choice of questions that can be asked and answer choices, for

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	example: short answers or multiple choices. Choose some of the questions that the pupils came up with about the topic about the weather (this can be done with any topic). Create the form together as a class, when the form is ready to send to the audience click the link option to see a URL that you can give to users to reach your form, this is perfect to put onto Seesaw for all pupils to reach.
6	***Analysing results and presenting findings*** Remind the class about the Google form we created together. Look at the responses that have been received by the rest of the school children. Explain that we are going to analyse the results. If you click on the Responses tab you will see a summary of the answers given, with graphs and charts already created. This view in itself is really useful, but there is also a green button at the top right that will let you transfer the data collected into a spreadsheet. Clicking the green button will create a new spreadsheet in Google sheets. This can then be saved as an .xlsx (Excel file) and copied into Numbers. Share the Numbers spreadsheet with the pupils. Give the pupils a few minutes to look over their responses. In groups of 3, direct pupils to create a new Keynote presentation and add a slide for each question in the form. Each team member should choose a question and slide to work on. On each question slide ask them to add their question in the title box. Then ask them to come up with a conclusion statement(s) for each question they asked. For example “More people prefer sunny holidays to snowy holidays”, or “63% of people preferred sunny holidays to snowy holidays.” and add it to the slide as well. Finally find an image that represents the question or answer being asked by using the Internet safely. Add the image on to the slide using the + at the top right of the screen. Adjust the size to fit the slide. They now need to go back to the spreadsheet and create charts and graphs to be added to their Keynote. In the spreadsheet, highlight the columns of data of the question they want a graph for by clicking the letter header. Click the + at the top right and click the chart icon. Copy and paste or screenshot the graph over to the Keynote presentation and add on to the correct question slide.

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	Plenary - Ask a few groups to present their findings to the class and asking them to choose a slide to talk through the data they collected.

Computer Science		
National Curriculum Principles: - Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts. - Use sequence, selection, and repetition in programs. - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs. - Understand computer networks including the internet; how they can provide multiple services, such as the World Wide Web. Appreciate how [search] results are selected and ranked. These National Curriculum objectives are delivered through the use of Everyone Can Code (**Learn to Code 1 and 2**). The lessons have been designed to develop and build on skills. The structure of each lesson should follow: introduction, activity, practise and reflection/ journal. Children in Year 6 will use the app Swift Playgrounds.		
Lesson	**Objectives**	**Knowledge and key Vocabulary**
7	- Describe what variables are - Demonstrate the use of variables in an everyday situation - Code using variables	Introduction: Discuss what happens when people move houses. Talk to the students about packing all belongings in boxes and labelling the boxes. Explain that the objects can change that are in the boxes however they are sorted so that the objects are easy to find. Explain that in computer programming we do not use boxes we use a variable. A variable is a named container that stores a value. The value can change over time. It is important to remember that a variable has both a name and a value. Discuss with the students the different everyday apps we use with variables.

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		Activity: Explain to the students that we are going to use variables to write short news stories. Discuss the different parts of a news story with the students and ask them to brainstorm the pieces of information they might need. Encourage students to speak in code and how they would communicate this to a computer. Each student chooses a news story or sporting event for a short article. Ask students to brainstorm four to six variables using Pages, and then write two to three sentences using the variables to create a story so a computer can fill in the variables. Then tell students to change the font color of the variable names in the story. Do some names work better than others? Students should test to see if their stories are reusable with different data. Discuss as a class the findings of this. Practise: Students use Swift Playground to complete the puzzles using variables. Encourage higher ability students to complete the puzzles with an * Encourage all students to take photos or videos of the codes they create for their portfolios. Journal: Students upload the coding screens to Seesaw for their portfolios and annotate these to explain what they have learnt about variables.
8	- Describe what types and initialization are - Demonstrate the use of types and initialization in an everyday situation - Code using types and initialization	Introduction: Discuss that we are going to act as an Architect in this next session. Explain that an architect designs building layouts and structures. Brainstorm different types of buildings. What makes a building unique? What typically happens in a building? What are the buildings behaviours? Explain that a Type is a named group of properties (features) and methods (the behaviours) of a kind of data.

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		If we use a computer program to help us construct the building, we have to be very specific. We need to define the type by providing the properties (what we were calling features) and methods (what we were calling the behaviors). In programming, we use many different forms of data to provide these details, such as: String (text): Stores a series for characters, such as "Hello world!" Int (numbers): Stores an integer—a number that has no decimal, such as 10 or -42. Bool (true or false): Stores a value of either true or false. For instance, for the colour of the walls of the building we would use String. For the number of classrooms we would use Int etc. Explain to tyne students that Initialization is the act of creating a new instance of a type, which includes setting initial values for any properties of the type. <u>Activity:</u> Explain to the students we are becoming architects and we are going to create our own buildings using code. Explain that architects use blueprints to plan and illustrate their designs. Show the students the keynote template pg66. On Pages ask students to choose a type of building this can be real or imaginary. Get them to choose five to six variables about the building like the example on the keynote. Add values to the variables, encourage students to explain where they will use String, Int and Bool data types. Ask students to use Notes to finish by drawing the building using the variables and their values. Students are then to work with a partner and to share the text for their building. The partner will change the values for the variables and share this information with their partner. They will both attempt to draw the building. Students discuss the results. Does the building look like it is supposed to? How could we make it look like your partners? <u>Practise:</u>

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		Students will complete the puzzles listed. Encourage higher ability students to complete the puzzles with an * Encourage all students to take photos or videos of the codes they create for their portfolios. <u>Journal:</u> Students upload the coding screens to Seesaw for their portfolios and annotate these to explain what they have learnt about types and initialisation.
9	- Describe what parameters are - Demonstrate the use of parameters in an everyday situation - Code using parameters.	Explain to students we are going to play a game of Simon Says a function. A function is an action. After playing the game explain that some functions may need more information given to them for example, jump may lead to the question how high? Say - Say what? Therefore functions sometimes need Parameters. Parameters are more information that is needed to make something more specific or clear. Say Goodbye. The word 'Say' is the function and the word 'Goodbye' is the parameter. We provide parameters for much of what we do every day. We mostly don't even think about it. But computers need to be told exactly what to do and how to do it. Parameters provide flexibility—create a function like "say" once, and it can do different things depending on what parameter you give it. Not all functions need a parameter. For example, with a function like "sitDown," there may be only one way to sit down. But with a function like "say," you could say any words and you can state the specific words you want with a parameter. <u>Activity:</u> Explain we are going to play a game of SIRI Says. In pages, students write down 5 to 10 commands (functions) in a colour and then write the parameter next to it in another colour. The commands must be doable for the game to work. See keynote template on pg72 for an example. Ask a student to AirDrop their commands and parameters to you and you become SIRI. Play a few rounds of SIRI Says choosing when not to say SIRI says and eliminating players until there is a winner. Discuss with the students what they thought of the game using the commands. Why was it important that we used parameters?

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		<u>Practise:</u> Students will complete the puzzles listed. Encourage higher ability students to complete the puzzles with an * Encourage all students to take photos or videos of the codes they create for their portfolios. <u>Journal:</u> Students upload a screenshot of their Pages file and coding screens to Seesaw for their portfolios and annotate these to explain what they have learnt about Parameters. <u>Optional Activity:</u> Using the Lego Mindstorm Education EV3, try EV3 Animal Rescue. With EV3 Animal Rescue, students will design, engineer, and program a solution to help an injured turtle move and interact with its environment. This lesson will help students broaden their STEM and computational thinking skills as they modify and create different functions using parameters to control and improve their solutions.
10	- Describe what arrays are - Demonstrate the use of arrays in an everyday situation - Code using arrays	<u>Introduction</u>: Walk students through a scenario in which their parents let them invite seven friends to go mini-golfing on Saturday. Their parents can pick everyone up, but students need to determine in what order they should pick them up. Write and number this list of friends on the board; you could also create the list in Notes, then display them using AirPlay: Jacob, Alesha, Alberto, Sang, and Amir. Everyone lives pretty close to each other, so the order seems fine. But we forgot that Alesha is going to be out of town. So we'll erase Alesha and adjust the numbers accordingly, so that Alberto becomes number 2 and so on. We've thought of two more people, Yumi and Danielle. They live closer to the mini-golf place, so let's add them to the list at the bottom as number 5 and number 6. But wait, we should probably also invite Yumi's sister, Blair, so let's add her as number 6 after Yumi. Now let's adjust the number, so we have 7 numbered names. In coding, this is called an array—a collection that stores an ordered list of items. The index is the number that represents the position of an item in an array. So in our list, Jacob is indexed at number 1. You can "append"

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		the list, like we did with Yumi and Danielle by adding them to the bottom. You can also "insert" at index, like we did with Blair at position number 6, and "remove" at index, like we did with Alesha at number 2. <u>Activity:</u> Display the Keynote template to the students with the Fruit salad ingredients. Explain that we are going to use the index to alter a data array. Model altering the array using the instructions on the Keynote with the students help. Explain that in everyday life we start a list with the number 1, however in a data array we start with 0. Give the students the Keynote template that contains five slides: apple, banana, orange, strawberry and peach. Students now need to figure out the steps for changing the slides into the order of their own fruit salad recipes. Have students use Pages to write pseudocode of the steps they took, using the coding terms insert, append, remove, and index. Students discuss how similar was their pseudocode? Did any group do it in fewer moves? <u>Practise:</u> Students will complete the puzzles listed. Encourage higher ability students to complete the puzzles with an * Encourage all students to take photos or videos of the codes they create for their portfolios. In these two chapters, students will be typing more and more code on their own. If they need help with Swift syntax, refer them to the introductions of each chapter in the app. You can also refer them to "A Swift Tour," part of the Swift Programming Language Guide, which provides explanations and examples of Swift syntax. <u>Journal:</u> Students upload a screenshot of their Keynote and Pages files and coding screens to Seesaw for their portfolios and annotate these to explain what they have learnt about Index and Arrays.

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Glossary	
Algorithm	An algorithm is a set of steph-by-step rules or instructions.
Array	Array: A collection that stores an ordered list of items.
Bug	A bug is an error in your code.
Coding	Coding is telling a computer what to do.
Command	A command is a specific action.
Conditional statement or action	Conditional statements or actions occur only under certain conditions.
Debugging	Debugging is the process of identifying and fixing errors.
Developer	Developers write code to build their own apps and games.
Event	An event is an action that causes something else to happen.
Index	Index: The number that represents the position of an item in an array.
Initialisation	Initialization is the act of creating a new instance of a type, which includes setting initial values for any properties of the type.
Loop	A loop is an instruction to repeat a set of commands for a specific number of times.
Parameters	Parameter: Extra information that gets passed to a function.
Sequence	A sequence is the order in which things happen, like patterns and events.
Type	A type is a named grouping of properties (the features) and methods (the behaviors) of a kind of data.
Variable	A variable is a named container that stores a value.