Year 4	Topic Title: KAPOW- E-Safety	Key Vocabulary
National Curriculum Objectives: Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.	• **<u>To describe how to search for information within a wide group of technologies and make a judgement about the probable accuracy.</u>** ▪ Discuss with the children how being online allows us to search for many things. Ask: what types of things can you search for online? In pairs, give children time to develop a range of suggestions. Allow the children to feedback to the class. ***<u>Key question</u>*** • What does the word 'online' mean? • What does the word 'search' mean? • What types of things can you search for online? ▪ Tell the children they are going to be researching for a family holiday. This will be achieved by searching for 'best U.K. holidays for families' across multiple platforms (e.g. search engines, social media, video and image platforms). Show the children how 'search engines' provide a quick and efficient way to search for items online. In an internet browser, such as Chrome or Internet Explorer, go to a 'search engine' such as 'Google' or 'Kiddle', and type in 'Best UK holidays for families'. ▪ Show the children how advertisements usually appear at the top of a search. Explain that we know it is an advertisement as it will be signposted with either 'Ad' or 'Sponsored', depending on the search engine or site you are on. Give children time to discuss whether the first results displayed are an accurate representation of the best U.K. holiday destinations. ▪ After advertisements, some search engines may then show a 'snippet'. A featured snippet provides a quick answer or summary. These are usually present if the search results have been requested by a question. More information on how Google uses snippets can be found on the link: 'Google Support' - https://support.google.com/websearch/answer/9351707?p=featured_snippets&hl=en-GB&visit_id=637435428636100105-3425814464&rd=1 Again, ask the children if this information is more reliable. Discuss how this may be more reliable than the advertisements, but children still need to check the website for bias and authenticity. ▪ Explain to the children that after the advertisements and snippets, the rest of the search results are displayed. Again, discuss how children should not assume that everything they read is reliable and that they need to check the source. If you wish to, you could live demonstrate searching on a search engine for something, say the current topic you are studying with your class, and see if the children can identify the different results shown. ▪ Explain how social media sites also have their own in-built search features. Point out to the children how the results from a search in a social media app or own site will only provide search results that they store rather than from everywhere. ▪ Hand out the *Activity: How accurate are my results?* and introduce the task to the children. Tell them that Billy has been searching for 'best running trainers for an eight-year-old boy'. Look at the content closely from each platform and highlight the areas that may not show true accuracy in the results. ▪ Remind the children to think about all the teaching points from the lesson: • Advertisements/ sponsorships • Snippets • Reliability of information shown • Social Media limitation of search results • Fake images ***<u>Key questions</u>*** • Why would a company pay for an advertisement?	Search results, Trustworthy, Reliable, Advertisements, Sponsored, Snippets, Accuracy, Distractions, Screen time, Hashtag, Safe, Respect, Respectful, Online behaviour, Live streaming, Gaming

	• Does it mean this product is better than others? • Is the snippet reliable? • Should we believe everything we read? • Why might someone choose to alter an image or video? ▪ Give the children time to share back their responses about Billy's information searching. ***Key questions*** • Do you think all the information Billy found was reliable? • What do you need to be aware of when searching for information across different platforms? • **To explain how technology can be a distraction and identify when I might need to limit the amount of time spent using technology.** ▪ Ask the children to discuss how they use technology at home. Use the images as discussion prompts if needed. Suggestions may include playing games online, playing games with friends, communicating with friends via text messages or social media, helping with homework, listening to music, streaming videos. Make notes on the children's different uses of technology for later in the lesson. ***Key question*** • What ways do you use technology at home? ▪ Focus on some of the positive aspects of using technology. Refer back to some of the activities the children mentioned to support this activity. ▪ For example, listening to music questions include: • Why do you choose to listen to music? • How does it make you feel? • Is this something you do alone or with others? • Are you able to complete other tasks whilst doing this? ▪ Encourage children to discuss the positive aspects of listening to music such as improving mood, a distraction from other things, dancing or singing with friends and family. In this particular activity, children's views may differ on whether other activities such as doing homework can be completed at the same time as listening to music. If so, highlight that for some people it would be better to get rid of the distraction and then listen once they have completed the task they need to do. Discuss a few other activities the children discussed earlier. ▪ Discuss some of the distractions technology may lead to, for example: Playing games online questions include: • Why do you choose to play games? • How does it make you feel? • Is this something you do alone or with others? • Are you able to complete other tasks whilst doing this? ▪ Encourage children to think of the negative aspects associated with gaming such as struggling to switch off, unable to complete other tasks at the same time, choosing to game over other physical activities. Discuss whether this is an activity people do on their own, or with friends including that people can play with online (with both friends and strangers) as well as in person. Discuss the negative impacts of always playing online rather than socialising physically with friends. ▪ Introduce the first task to the children. Tell them they are going to read about a typical day for James and Lauren. Hand out the *Activity: scenario cards – James and Lauren* to the children and give children time to read through them. Ask them to highlight	

	where James and Lauren use technology in their lives. Get the children to think about how much technology they use and if they are using it in a positive or negative way. ▪ James – Give children time to feedback their responses regarding how James uses technology. Discuss the positive distractions it gives him and how he uses technology with his family as well rather than on his own all the time. ▪ Lauren – Give children time to feedback their responses regarding how Lauren uses technology. Discuss how much time Lauren spends on her devices and the negative impacts it may be causing her. ▪ **D**iscuss with the children how it is important to have a balance when using technology. Recap some of the positive and negative effects and distractions of using technology. Pose the question: What does your #techtimetable look like? Tell the children they are going to create their own techtimetable based on a typical school weekday. For ease, the children could think about what they did yesterday – if that was a weekend, then choose a specific day from last week. You may also want to model this yourself to show how much tech you have used in a day. ***Key questions*** • Why do we go online? • How does it make you feel? • How can technology help us? • What could Lily do to help her sleep better at night? • How much time do you think you spend on technology? • Do you think all of this is positive? ▪ Once the children have completed, encourage them to share with others and discuss ways they could reduce some of their #techtime if needed. ▪ Finish with the children all coming up with one way of how they are either going to swap a negative distraction to a positive or a way to reduce some of their screen time. ***Key questions*** • What small change could you make? • How might that make you feel better? • How could you involve your family more? • **To understand how to be safe and respectful online.** ▪ Ask the children what we mean when we say 'safe'? Discuss with children ways that they feel safe. What does being 'respectful' mean? Get children to share some examples of where they might show respect. Is this different online to offline? Using the examples of feeling safe or showing respect, discuss these in terms of being online. Do the same things apply? ***Key questions?*** • How do you keep yourself safe? • Is this different online? • How do you show respect to others? • Why might people choose to be disrespectful? • Is it easier to be disrespectful online? ▪ Give each group of children a particular colour to think about it. Ask the children: • Will this happen online, offline or both? • How might this activity be unsafe?	

	• What could be done to make this child safer? ▪ Give time for the children to feedback their responses to the class. Take each scenario in turn and discuss with the children. Ask them if this shows respectful or disrespectful behaviour. If it is disrespectful, then share how this should have been responded to. ▪ Explain to the class that live streaming is the live broadcasting of video. This could be someone sharing a video of them planting some flowers, playing a game or generally just talking. The children may have even seen you live stream if you have done any live online teaching! Give children time to share if they have watched any live streaming before or even done any themselves. ▪ Discuss with the children how people may react differently online to offline. For example, Pupils may not feel safe or nervous speaking to the whole class or talking to strangers, but they might feel different online. If children fall out with their friends in person or do not like something, they may react differently than when they are online. For example, would you say unkind words to your mum? Have you done this online? Emphasise the importance of being safe and respectful online and strategies to ensure this happens. ▪ Introduce the task to the children and hand out the *Activity: Scenario cards – Dear Kapow Primary*. Explain that some children have written to Kapow Primary with some of their worries and concerns. The pupils' task is to help the children out, thinking of ways to help the situation be safer. **Key questions** • Will this happen online, offline or both? • How might this activity be unsafe? • What could be done to make this child safer? • Is this behaviour disrespectful? • What should they have done? • How do you think that child felt? • Have you ever been disrespectful online? ▪ Give children to share their responses with their class. Create a list together of ways children can help keep themselves safe and be respectful online. ***Key questions*** • How can we help keep ourselves safe online? • How are we going to make sure we are respectful? • Do you need to change any of your online behaviours?	
	Previous Learning Experiences: FSU, Year 1, 2 and 3 Previous E-Safety lessons.	
Possible Community Links/trips	**Future Learning Experiences**: Children will continue to develop and enhance their knowledge of E-Safety and staying safe online as they move through the school.	

Year 4	Topic Title: Collaborative learning	Key Vocabulary
National Curriculum Objectives: 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 technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact. 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.	• **To understand that software can be used collaboratively online to work as a team.** ▪ Focus on the term 'teamwork' In order to test this, hand out a piece of A5 paper to each child and ask them to fold the paper into three sections. They then draw the head of a magical creature or monster in the top section and write their name in the top right-hand corner. Explain that they should not share their picture with anyone else- it must remain a secret! They then pass their drawings around to other people on their tables to complete their drawings. There should be lots of weird and wonderful monsters, but the point we are making here is that without discussion, no one knew exactly what to draw. Without being able to see what the other person had drawn; we had no idea where to go next. This is true for any work we do with other people, it's important to see what they're doing to make sure that everyone is working on the same thing. We call this collaborative work and with the ease of access to the internet, collaboration is now easier than ever. ▪ Tell the children to log into their 365 accounts; They should see a shared doc in their email. Tell them to open it but not to type anything yet. Pick one child and ask them to write their favourite colour in the document. Ask the rest of the class to look at their own screens while their classmate is typing and ask them to tell you what they see. They should say that they should that they can see what their peer is typing and the cursor flashes up the name of the person typing so that they can see who is writing to . You may find that some children cannot resist joining in; If so, remind them that it is not their turn yet. ▪ Ask the children what they think the value of sharing and collaborating on a document might be. This is a good opportunity to discuss what an online identity is and why this is important for collaboration. Explain that online identity is how the world perceives you on the Internet. The person may have an online identity that is really collaborative and considerate nature went online but offline they may be shy and not as collaborative. State that people maybe behave differently to others online compared to when dealing with them offline and may be a factor of being behind a screen that can make people feel more protected than not. ▪ Move the discussion under the positive and negative ways people can interact with others online. Steered the conversation towards the notion that positive interactions online will make others perceive them in a better light than negative interactions. Get children to keep this in mind as they are online with their computers or their devices. The next part of this session may seem quite chaotic, but don't worry it's a valuable learning point. Ask all of the children in the class to type something into the document. As this is their first time using one drive documents collaboratively, expect children to lose their place, to delete each others work and so on. Once they have started to get frustrated, stop them and ask what is going on. They will probably express that people were not being considered about space, about where they were typing and what they were typing. This will illustrate that we need to establish a set of ground rules for working collaboratively. ▪ Within the class come up with a set of rules when using a document collaboratively. ▪ Using the class rules for collaborative learning that you've written, the children are going to write a story as a class. Go around the room asking children to add an additional sentence to the story before reading it back to them. • **To understand how to contribute to someone else's work effectively.** ▪ Ask the children what they can remember from the previous session. Get them to discuss it in pairs and feedback to their class. what does the word collaboration mean? ▪ State to the children that this lesson they will be using Google classroom ask them what they think Google Classroom is used for? ▪ Explain that they are going to be looking at some of the more advanced collaboration tools available in OneDrive collaboration. Ask the children to type up a paragraph of work from a recent literacy lesson. They don't need to worry too	Collaborate, Comment, E-Document, Edit, Email, Icon, Insert, Link, Presentation Software, Presentation, Reply, Reviewing Comments, Share, Spreadsheet, Transition

	much about the spelling as that's one of the things will be helping each other with during the lesson. You could ask them to turn off spellcheck if you want to. Once people have typed their paragraph, they need to share their work with their partner. A photographic walkthrough of this session is available in the printed lesson handouts in the year Four KAPOW lessons folder. ▪ Children will review the comments they have been left by their partners. Remind them they don't need to accept suggestions if they don't agree with them. Discuss how commenting and suggesting make it easier to collaborate on a document. • **To understand how to create effective presentations.** ▪ As a starter, explained to the class that they're going to talk about their favourite TV show or film for one minute when you will give them a few minutes to prepare first. Once you have heard from some of the children, ask the class if they can think of a way to make it easier to remember what they wanted to say. Having paper notes might help, but people often use a computer presentation to help them to remember what to say and to make the talk more interesting for people to listen to. It might include bullet points and pictures. ▪ The children will need to be shown Microsoft PowerPoint of photographic walkthrough of this session is available in the year Four lesson slides folder. ▪ Explain to the children that they need to create a presentation about something related to their current topic in another subject; For example, in music, art or history in their pairs. You may want each group to work on a different area of the curriculum or all on the same topic. ▪ Remind pupils of the rules for collaborative learning that were created in lesson 1. Suggest splitting the topic into sections and handling a page of information in each. They could do this by emailing each other their ideas or sitting down with their partner to split their presentation up into individual sections. Explained that when making a presentation, it's important to not push too do not put too much information on each page. Try to keep it to around three or four bullet points otherwise it's overwhelming for the reader. Point out that the presentation should be a reminder for the presenter and not a script. They should be prepared to talk around the bullet points and not just read what they say. ▪ Warn children that although transitions and themes are great, if you use too many different ones the overall effect is not good. ▪ Once the children have completed their presentations and have uploaded them onto the one drive they can be shared with the class. If you can, allow as many children as possible to present their presentations to their class. • **To understand how to create and share Google Forms.** ▪ Ask children to log in to their email accounts and cheque for any emails from you. Depending on whether you have emailed them to survey or put it into her shared drive folder, they navigate to the survey and fill it in. Once children have completed the survey, ask them to think about why it might be useful for them to fill it in. What could you be using the survey for? They will hopefully suggest that you are finding out whether they are confident with the subject and whether they like a certain subject at school, etc. ▪ explain to people that they will be creating a survey that will be used in the next lesson to analyse data using a spreadsheet. In pairs, they will complete a survey about exercise during the week and then analyse the data next week. Discuss what might be useful information to ask their classmates, who walks to school? Takes the bus? Cycles? Whether they take part in any sports outside of school and how frequently. They could even ask questions about playground games that the children take part in that involve exercise: Playing football, tag or skipping. Allow children the time to discuss the questions that they want to ask and provide them with whiteboards and pens or paper and pencils to make notes.	

	▪ Once children have a rough idea of the questions they want to ask, open up Google forms by Googling Google forms and demonstrate navigating how to create a new Google form. ▪ Explain it is important to give that former title and demonstrate how to click and change the title then click on the paint palette in the top right to show pupils how to alter the theme of their survey. Explained that you can use different types of questions that can be selected by clicking on the arrow next to the currently selected questions. Multiple choice or short answer. ▪ Encourage children to ask at least five questions that will give them both text and numerical answers, this will be helpful in the next lesson. ▪ Once children have finished writing the surveys comic show them the survey that you shared with them at the beginning of the lesson and explained that as the creator of the survey, you can navigate to the responses panel. Show them that Google forms creates pie charts and bar graphs of the information shared then asked pupils which form of data representation they like best. • **To understand how to use a shared spreadsheet to explore data.** ▪ In the previous session, and the children worked in pairs to create a Google form that they've sent to their classmates. Give the children time to respond to these forms that they've been sent. This may mean that they answer the same question 15 times, but it's important that every group has dated to work with. Each pair of pupils should have at least 20 to 30 responses on their survey, based on the class size. This is a reasonable set of data to explore. ▪ There is a visual walkthrough of this lesson in the year 4 Kapow lesson folder. ▪ Ask the children to discuss what they now know about using spreadsheet formats what have they been able to find out about their data by using conditional formatting and calculations? Ask them to share their findings with the class. For example, what is the most common method people use for travelling to school? What is the average journey time of people in the class?	
	Previous Learning Experiences:	
Possible Community Links/trips	**Future Learning Experiences:**	
	Future computing experiences and lessons throughout the school from Years 5-6.	

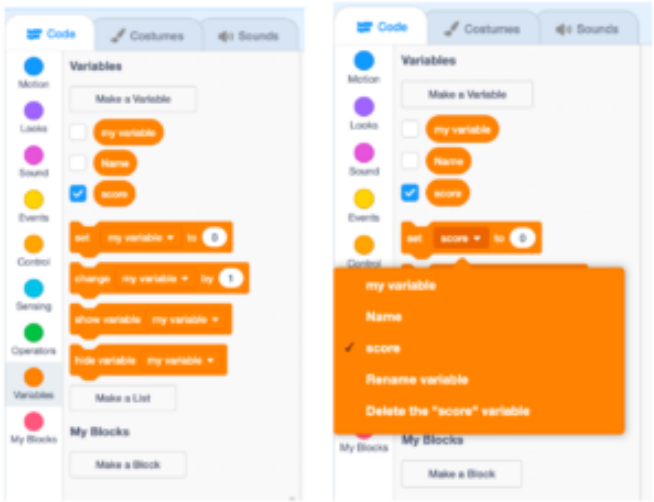
Year 4	Topic Title: Further Coding with Scratch	Key Vocabulary
National Curriculum Objectives: Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts. Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs. Use sequence, selection and repetition in programs; work with variables and various	**To recall the key features of Scratch** • Share the link for this scratch project (scratch.mit.edu/projects/207764195) with your class and let them play it for a few minutes, without any input from you concerning the nature of it. • Ask the children what happens within the game – they will probably be focused on their scores but bring their attention to what each sprite does. You are looking for them to discuss that the unicorn follows your mouse, that the wizard is controlled by keys and that when the wizard touches the unicorn, the game ends. Your more able students might also notice that there is a timer counting up in the top left and that at the end of the game you are told how long it took to catch the unicorn. ***Key questions*** • Can you remember what 'Scratch' is and why we might use it? • What is going on in the project? • What happens within the game? • What does the wizard do? • What does the unicorn do? • State to the pupils that today, we're going to learn a little bit about sprite positioning and orientation. Ask if they can figure out what the numbers with 'x' and 'y' next to them mean. Explain that the numbers represent coordinates as they've probably looked at them in Maths. However, in Scratch, 0, 0 is in the middle of the screen and coordinates can become negative numbers. Show that if you move a sprite to a different place on the stage, the coordinates will change to represent its current position. Ask the children what they think the number next to 'direction' represents. When you click on it, it brings up a dial, that goes from 0 to 180 then 0 to -180. Where else have we seen the number 180? 180 represents 180 degrees; the number tells us the angle that our sprite is facing. Show children the three icons underneath the direction dial – ask them to discuss with the person next to them what they think the three icons represent (expect some outlandish suggestions) • The first icon allows the sprite to rotate fully, meaning it can go upside down and can face any angle. The second prevents rotation but allows the sprite to mirror and face forwards and backwards. The third icon prevents any movement in direction at all; the sprite will always face in the same direction. • Ask them to explain to the person next to them what they think the script does. • Explain that children are going to either work in pairs or independently to make a sprite that can be controlled by the keyboard. This is the key on a computer keyboard that you press to produce all capital letters when you type until you turn it off again….You have given them the start of the script, but can they figure out the rest. Can they make sure their sprite can only mirror and doesn't go upside down? Don't let children spend too long choosing a sprite and background. Once children have managed to create their sprite, let them play around and demonstrate what they are already capable of doing within Scratch. ***Key questions*** • Can you figure out what the numbers with x and y next to them mean? • What do you think the number next to 'direction' represents? • Where else have we seen the number 180? • What do you think the three icons represent? • What do you think the script does? • Can you make sure your sprite can only mirror and doesn't go upside down?	Code, Code Block, Conditional Statement, Decompose, Direction, Feature, Icon, Orientation, Position, Program Verb, Project, Scratch, Sprite, Stage, Tinker, Variable

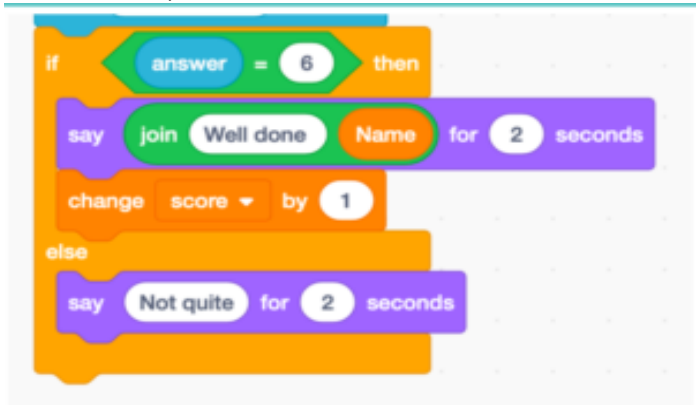
forms of input and output.	• Ask pupils to discuss what they have created in the lesson and see if they can explain what they have made and what blocks helped them. • Ask them what they think the script does – the blue block at the top puts the sprite at specific coordinates. The rest of the script are the blocks that ensure the unicorn follows the mouse (without the forever loop) A loop is a command in programming that tells the computer to complete the instruction more than once. Kapow Primary's computing scheme of work covers loops in years 2, 3, 5, and 6. Loops are also a concept in music and explored in our music scheme of work in years 4 and 5….(the sprite would move once and that's it) and then makes the program stop running when the unicorn touches the end of the wizard's wand. • Give pupils the link to the Scratch quiz. ***Key questions*** • What have you created and come up with? • What do you think the script does? **To understand how a Scratch game works by using decomposition to identify key features.** • Share with your class the link to 'Scratch Ice Kingdom' (scratch.mit.edu/projects/419857898) which is a quiz game, or your own version of it if you have remixed it for your class (watch the *Teacher video: Editing your sprite in Scratch* for instructions on how to do this). • Let them play through the game a couple of times and ask them to explain to the person next to them what the game does. They will probably talk about the questions and talk about what scores they achieved. • Encourage them to think about how the game works and what the different features are. **Key questions** • What is happening in the game? • How does the game work? • What are the different features in this game? • What does each sprite do? • Ask the children if they have heard of the word 'decomposition' – they may be familiar with it from completing previous units earlier in the year. Remind them that 'decomposition' means breaking a problem into smaller pieces to try and solve the problem. • Explain that for a game to work, the computer needs to be told to perform several different actions. For example, in this game, when we click on the penguin, it gets bigger and the little boy starts to speak and ask us a question about penguins. That means that there is a script running that tells the penguin to grow when it is clicked on and also tells the little boy to 'speak'. • Tell the children that for the remainder of the lesson, they are going to decompose the quiz game into its parts to try and figure out what scripts might have been used. We need to think carefully about everything that is happening in the game and try out different possible answers to the questions, including getting them wrong. On the *Activity: 'Scratch Ice Kingdom'* worksheet, ask the pupils to work in pairs to identify each of the actions that the sprites perform. Ask the children to think about which Scratch blocks the sprites might need to achieve a specific action. ***Key questions*** • Have you heard of the word 'decomposition'? • What does decomposition mean? • How does the game work? • What blocks do you think have been used?	

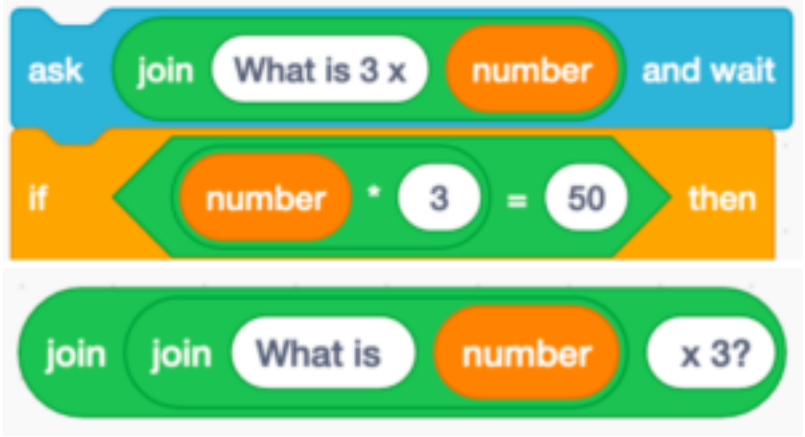
	• Ask children what they have written as their answers. Show them a part of the code inside the Scratch Ice Kingdom game and discuss what the blocks do. Ask children what they think the 'broadcast block does? Answer: It allows sprites to communicate with one another – in this project it lets the little boy know to ask a question about penguins when the penguin is clicked. **Key questions** • What have you written as your answers? • What do you think the 'broadcast' block does? **<u>To understand what a variable is and how to make one</u>** • Give the children whiteboards and pens and ask them to write the word 'animal' at the top of their whiteboard. Next, ask them to travel around the room asking different children to name an animal. Each time they get a different answer, they will need to clear off their whiteboard and write the new answer under the word animal. • After the children have done this a few times, stop and put this sentence on the board: "Last time, we went to the zoo, a mummy accidentally took home _(animal)_ instead of her child" • The children must read the sentence and use whatever word is written on their whiteboard to fill in the gap. Select a few children to read their sentences aloud. • Next, ask your children to repeat the activity, this time naming a food and putting the word 'food' at the top of their board. Your next sentence to display is: "From now on, the only food you are allowed to eat is _(food)_ ." • Explain to the children that their whiteboard is acting like a 'variable' would in a computer program – the contents of the variable might change regularly, but as long as a variable is named, in this case it was first named 'animal' then named 'food', we can use it in our code and the program will use whatever is currently saved within it, just like we did with our whiteboards. • 'Variables' can store lots of different types of data – it is often used for words or numbers and sometimes for True or False statements too. **Key questions** • How often did you have to rub off your whiteboard? • How easy was it to change your answer? • Does it matter what answer the person you asked gives you? • Was there a limit to the number of times you could change the word on your whiteboard? • Explain that in Scratch we can use variables to make our projects more interactive. The simplest way to do this is to 'ask' a question by using a blue 'ask' box. • Show the children the first variables project and get them to explain to the person next to them what the project is doing – https://scratch.mit.edu/projects/375853808/ • The project uses an ask block to 'ask' your name then replies with your name later in the code. This is because the program saves your answer to a variable called 'answer' – if we use an 'answer' block it will display the most recent answer from anything that was asked. • Ask the children to have a go at programming a simple script that asks their name and repeats it back – remind them that 'ask' blocks can be found in the blue sensing section. • Now, explain that by using a 'join' block, we can put our answer directly into a sentence (the technical term for this is concatenation, but it's not necessary to explain that to your children). You may find that the word 'Hello' and the 'answer' are joined together and this is because you need to add in a 'space' at the end of the word 'hello' as the program wouldn't put one in automatically. Give them time to adjust their script to include a 'join' block, if they'd like.	

	• Now that we've figured out how to ask a simple question, we can think about using a term called a 'conditional statement' – which is when the program reacts differently depending on which conditions are met – depending on the answer so that, like with the quiz game last lesson, we can cause a reaction depending on our response. • The easiest way to do that is to ask a question that we know has a simple answer, so we're going to ask a simple maths sum. • Show the children the second variables project called 'Scratch Variables Part 2' - https://scratch.mit.edu/projects/375854753/ and once again get them to explain to the person next to them what is going on. Make sure you model both getting the question correct and getting it incorrect. • This time the program asks us a maths question and uses an 'if/else' block to decide whether or not the answer is correct. Again, we call this a 'conditional statement' – the program reacts differently depending on which conditions are met. • Model deliberately putting an incorrect answer into their script e.g. if the answer = 7. Explain that if we run the program, the text displayed will ask 'What is 3 x 2?', but the program doesn't actually know what the question asked for is. It is just looking for the answer 7, as written in the program. So, if we input 6, which is the actual correct answer for this sum, the program will feedback on the screen with 'not quite'. Discuss the advantages and disadvantages of this as a class. • Move on to giving the children time to add to their code to ask a simple maths question and evaluate whether or not the answer is correct by tinkering. If needs be, stop the class for a mini plenary on what 'tinkering' is and why it is important in coding. • Ask children to swap around and try each other's quizzes to check that the code works. Discuss any issues that children found in each other's code and how we can help solve their issues. • Explain that with an answer block, the information stored changes as soon as a new question is asked, and sometimes we want to 'save' an answer – for example, we may want to remember the player's name and use it at the end of our program after asking our maths question. • Demonstrate 'Scratch Variables Part 3' - https://scratch.mit.edu/projects/420125305/ and explain that in the next lesson we are going to learn about how to create our variables to store information. ***Key questions*** • What issues did you find in each other's code? • How might we be able to solve these issues? **To understand how to make a variable in Scratch** • Share both Scratch projects with children and ask them to spot the difference 'Scratch Variables Part 2' 'Scratch Variables Part 3' • In the second project, the sprite 'remembers' the name you give at the beginning and says it back to you. That is because we've created a new variable to store the name – unsurprisingly, we've called it 'name'. • Ask pupils to explain a variable as best they can – hopefully they will be able to identify that a variable is a place to store temporary information within a program and that the information written in it can be changed as the program runs. ***Key questions*** • What is similar and what is the same? • What is a variable? • How have we used variables in the last lesson? • In this lesson, we're going to make a start on creating a simple maths quiz for our classmates. To make it more interesting, we're going to use variables to both remember their name and keep score. • Take a look inside the second project: 'Scratch Variables Part 3'. Point out the dark orange blocks 'set name to 'answer'' and explain that this is linked to a variable called 'name'. Demonstrate how to create a variable in Scratch and show pupils information around the variables panel. For example, how to set a variable to 0 or increase it by 1.	

- Explain to the children that we're going to build on their simple, one-question maths problem from the last lesson and this time we're going to think about asking lots of questions and also about how to keep score.
- Demonstrate creating a variable called score and explain that at the beginning of our script we need to make sure the score is always set to zero. Open up the variables panel and ask children to suggest how they think they could do this. (They will need to put 'set score to 0' at the beginning of their script, remembering to make sure the correct variable is selected from the drop-down menu)



	• Refer back to the script they wrote in the previous week with an 'if/else' conditional statement in it to check whether the answer is correct and explain that I want my score to increase 'if' I get the question correct – where do they think the 'change 'score' by 1' block ought to go? (within the conditional statement 'if' the answer is correct).  • For the next two lessons, the children are going to work on a multiplication game to challenge their classmates using variables to calculate a score. • You may have students who want to start with a new sprite, make sure you watch the video for how to copy code from one sprite to another. • Ask children to swap seats with a partner and try out their quiz so far. Explain that no one is expecting a finished quiz as it's a work in progress, but it's important that we are able to identify positives and also to suggest improvements. • Encourage children to explain what they like about a project they have tried out and also to suggest any improvements to consider for next week. **<u>To use knowledge of how variables work to create a quiz</u>** • In this lesson, pupils are going to continue to develop their multiplication quiz, building on skills from last week. • Ask key questions about what they can recall about Scratch thus far in this unit. • In Scratch, the green blocks are called 'operators' and they allow us to evaluate maths values and join variables together. In text-based programming languages, a variable can either be a number or text (or True or False) and you have to use lines of code to switch between them as numbers and text are handled differently. • Encourage pupils to think about ways to make their quiz more interesting. For example, they could use an 'ask' block and a variable to get the player to select a multiplier. • The following blocks may come in useful:	

<table>
<tr><td></td><td>


Then, allow them the remainder of the lesson to really ‘tinker’ with their times table project and allow them to be creative and imaginative within the remits and parameters of the end goal they need to achieve.

Key questions

What is a sprite?
If you set your sprite coordinates to x = 0 and y = 0, where would your sprite be?
Which of these options will ensure your sprite doesn’t go upside down when it faces in the opposite direction?
Describe what you think a coordinate block does?
What is a variable?
Which of these is not an example of a variable?

Give children some time to play each other’s games and ask them to think about ways they could improve their own project from looking at each other’s. Give them a bit of time to alter their own and fill out the topic evaluation sheet.

</td><td></td></tr>
<tr><td></td><td colspan="2">Previous Learning Experiences:</td></tr>
<tr><td></td><td colspan="2">Children will have come across scratch in previous year groups.</td></tr>
<tr><td>Possible Community Links/trips</td><td colspan="2">Future Learning Experiences:</td></tr>
<tr><td></td><td colspan="2">Future computing experiences and lessons throughout the school from Years 5-6.</td></tr>
</table>

Year 4	Topic Title: Computational Thinking	Key Vocabulary
National Curriculum Objectives: Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.	• **<u>To understand that computational thinking is made up of four key strands</u>** ▪ Explain that we're going to start the lesson with a simple maths problem. Make a big deal about how easy the problem is and because it's so easy they're not allowed to use a pen and paper, they have to do all of the calculations in their head. ▪ The maths problem you'd like them to solve is this: **Add up all of the numbers between 1 and 200 so 1 + 2 + 3 etc…** ▪ After a minute, they can use a whiteboard and pen to make some notes if they'd like. Stop the children after a further minute. ▪ Ask who has solved the problem – you may find some children give you a silly answer. It's unlikely that any will have the correct answer (which is 20,100) but if they do, ask them to hold off explaining how they calculated it until the end of the lesson. ▪ Ask the children how far they got to in working it out. Did anyone start off adding them but got lost part way through? Who gave up early on? Did anyone not try at all? ***<u>Key questions</u>*** • Did anyone start by adding the numbers together but get lost part way through? • Who gave up early on? • Did anyone not try at all? ▪ Explain that when faced with a difficult problem like this, it can be overwhelming and we may want to give up. However, a process called computational thinking can be used to help simplify problems and make them easier to solve. ▪ Tell them that the word 'computer' refers to performing a calculation or figuring something out and that's what we do when we thinking computationally. ▪ Computational thinking can also help us when we come to create algorithms and write code as computers need information presented in a simple way. ▪ There are four skills or aspects to computational thinking, which we will look at throughout this topic: • Decomposition • Pattern Recognition • Abstraction • Algorithm • Set up a carousel of unplugged activities which relate to these four aspects of computational thinking for children to complete in groups and rotate around: • **Abstraction action** (pictionary activity) – print *Activity: Abstraction action cards.* Pupils work in pairs or small groups and follow the instructions. Ask them which clues made it obvious what the person was trying to draw and draw their attention to the key features of the drawings. • **Decompose demolition** – print *Activity: Decomposition demolition*, showing different tangram images. Ask: what shapes were used to make the drawing? Colour in all of the triangles red, the squares blue etc.? • **Pattern recognition** – put out the *Activity: Pattern recognition ribbons ,* bead strings, beads and ask pupils to: complete the bead threading and to make up their own bead pattern for their partner to complete. • **Alien algorithms** – put out *Activity: Alien algorithms,* whiteboards and pens or paper and pencil. Pupils write a set of instructions to enable their partner to draw an alien that they have created using just 2D shapes e.g. triangles and squares ▪ Ask children what they did in each activity. Explain how each of the activities relate to computational thinking: • **Decomposition** breaking a problem down into smaller parts • **Pattern recognition** identifying patterns and familiar outcomes	Abstraction, Algorithm Design, Code, Code Blocks, Computational Thinking, Computer, Decompose, Pattern Recognition, Problem, Sequence

- **Abstraction** identifying the important detail and ignoring irrelevant information, i.e. shape, size or colour
- **Algorithm design** taking all of the information you have collected to create a recipe for success.
    - Make sure pupils understand that computational thinking doesn't necessarily require a computer!
    - Recap the maths problem from the beginning of the lesson. Then, write on the board: 1 + 2 + 3 + ….. + 198 + 199 + 200
    - Show the *Maths problem* slides and talk through each stage. Firstly, explain that you have broken down, or **decomposed,** the problem. Then ask if they **recognise** any **patterns.** Hopefully they will spot that if you add pairs from either end of the numbers you always make 201 (1 + 200, 2 + 199, 3 + 198) or that you can make bonds up to 100.
    - Now that we've recognised the pattern, we need to **abstract** the important detail of how many times 201 is repeated. It is repeated 100 times so we can create an **algorithm** to calculate the total amount (201 x 100).
    - Using computational thinking, we can make a difficult sum a lot easier!
    - **NB. An alternate method would be to make 200 (200+0, 199+1) and then have 100 left in the middle so add it on at the end.**

- **<u>To understand what decomposition is and how to apply it to solve problems</u>**
    - Put on some music and tell the children that they're going to learn a dance/clapping sequence. Quickly, show them you've prepared a sequence and then ask them to perform it back to you.
    - Explain that it's extremely difficult to learn the sequence as it was given to them all in one go. Decomposition breaks the problem down into smaller parts.
    - Show the children a small section of the dance and draw a rough icon on the board to represent that section. Ask the children to repeat it back to you a few times until they're comfortable. Now demonstrate the next section and draw another image to represent it on the board. Keep going until you've drawn a rough sequence for the entire dance.
    - Explain that what you did was to decompose the problem into smaller parts to make it easier to learn. Decomposition can be used to help break any problem down into smaller parts and make it easier to solve.

<u>Key questions</u>

- How can you make it easier to learn the dance?
- Can you think of a problem that you could break into smaller parts to make easier e.g. tidying your room or learning a song?
- Tell children that they will be looking at problems in Scratch programs, decomposing them to try and figure out what they do.
- Look at the *Activity: Scratch code sheet*. The first page shows some code. Ask pupils to discuss with a partner what they think each script does. Ask them if they can break down the different parts of the code to figure out what they do.
- Now, ask them to imagine that they are making a game in Scratch, where a character navigates a map and is controlled by the mouse. This problem must be broken down into the parts.
- Show the children the 'Scratch game – Bug Hunt' - https://scratch.mit.edu/projects/244851847/#player game, on the board and then ask them to use the *Activity: Decomposing the problem* sheet with a partner to decide what the different parts of the game are.
- Challenge pupils to make a version of the game themselves. Ask them to work in pairs on the computer and try and create this in Scratch.The background and characters can look however they want, but the essence of the game should be the same for all.

<u>Key questions</u>

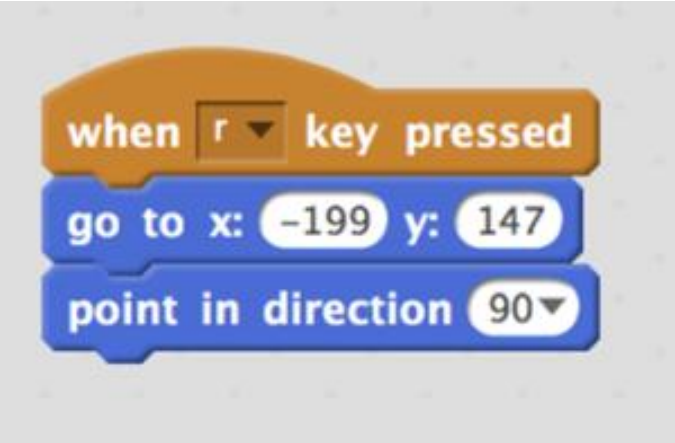
- What do you think each script does?
- Can you break down the different parts of the code to figure out what you need to do?

Show the children the code behind the example game by clicking 'See inside'.

- Ask if anyone coded it differently. Does their game work? Does it matter if their code is different?

- Explain that it doesn't matter at all if it's different- as long as it works in the way they want it to,
- Ask children to explain the steps that they used to work out their code. Reiterate that they used decomposition to break the problem into smaller parts and used this to help solve it.

Show the children this section of code:



- Ask them what they think it does. Do they think this script is important and might need to feature in their game?
- This script is a reset code. It places the sprite at its start coordinates and makes it face forwards again.
- They might want something similar in their code, but it's unlikely that they will need exactly the same code as in the example program. Explain that identifying the important features and ignoring the unimportant things is called **abstraction** which is another one of our computational thinking areas.

Key questions

- Did anyone code theirs differently?
- Does your game work?
- Does it matter if your code is different?
- What do you think it does?
- Do you think this script is important and might need to feature in your game?
- **To understand what pattern recognition and abstraction mean.**
  - Ask if anyone remembers what abstraction means from the first lesson.
  - Get children to work in pairs or small groups (of 3 or 4) and hand out a ball of plasticine and set of *Abstraction cards* to each.
  - Give children time to make models of their chosen card while their partner or group guesses what they are making. Discuss what the things that gave away the answer were? Were some of the cards more difficult?

Key questions

- Can you remember what abstraction means?
- How did you know what the person was making?
- What was the important information that helped you to realise what it was?
- Did it matter what colour the plasticine was?
- Did it matter how big the piece of plasticine was?

	▪ Show the children this 'Scratch's Pattern Recognition' - https://scratch.mit.edu/projects/244962910/#player game on the board. ▪ Send them the link via your chosen method e.g. email, Google Classroom. ▪ Ask them to spend some time testing out the game and trying to figure out the pattern, but stress that they're not allowed to 'look inside' the game to see the code behind it. ▪ They may quickly realise that the number on the first dice roll corresponds to an animal, and the number on the second dice to a type of food. ▪ Making sure your screen is not displayed on the board, click 'look inside' to see the code and find the script that is not connected to the main program within the Abby sprite. Attach this to the main program, so that the sprite explains the game for the audience and return to the project page, making sure the children don't see the code inside yet. ▪ Show the game on the board now that the extra script has been attached and go through it to see the change it has made (Abby explains what happens). ▪ Now that the children understand how the game works, click 'look inside' to show them the code. Give them five minutes on their own computers to try and figure out how the code works, especially how the code knows to show each animal depending on the number typed into the question box. ▪ If none of them correctly figure out the code, explain that you have used costumes and broadcasts to change the animal depending on the number.	

- Here you can see that the animal sprite has six costumes added to it.

- You can see that each broadcast of a number causes a different costume to show as well as setting a variable called animal to the name of the animal. (Don't worry too much about variables for now.)
- Ask the children to create their own copy of the Scratch project and modify the code so that different objects appear instead of the current animals.

	▪ What needs to be changed? Make sure they don't **delete** the current sprite as this will delete their code, instead, they need to **edit** the existing code. Explain that professional programmers often use existing code and edit it to suit their purpose too. ***Key question*** • What needs to be changed? ▪ Once children have spent some time altering their project, remind them about two terms that are the focus of the lesson: **abstraction** and **pattern recognition**. ▪ Ask them whether they spotted any patterns which helped them to figure out how the game worked. Hopefully, they noticed that each time they input a certain number, a certain animal appeared. ▪ When they altered the code, they would've needed to use abstraction to understand that it doesn't matter which costume appears, just that each number corresponds to both a word and a costume. They can then spot the repeating pattern that each number on the dice causes the same thing to happen, but with a different costume and word each time. ▪ Allow children time to play each other's games and discuss what they like about the changes. ***Key question*** • Did you spot any patterns which helped you to figure out how the game worked? • **To understand how to create an algorithm and what it can be used for.** ▪ Hand out the *Activity: Sudoku challenges* – explain that the challenge is to ensure that the numbers one to four appear in every row, column and square without duplication. ▪ There are some trickier challenges available for those who are already familiar with Sudoku. ▪ Tell children that they are going to work in pairs to complete the challenges, but that they have to take it in turns to fill in a number each. Before each number is placed, they must explain in detail and justify why they think a number goes in each location and their partner must agree with their explanation. ▪ Once the children have filled in their sudoku sheets, explain that they have used something called logical reasoning to complete the task. Logical reasoning is what we call the process of using computational thinking to solve a problem. ***Key questions*** • What information did you need to share to explain your reasoning? • Why did you choose to put a number there? • What if the grid was bigger? ▪ In this lesson, pupils are going to use computational thinking to design an algorithm that draws 2D shapes, first on paper and then using Scratch.Give pupils the *Activity: Design a square* and ask them to try to design an algorithm which explains how to draw a square. Then ask them to apply the same reasoning to Scratch to draw a square. ▪ Show children the 'Scratch's Square' - https://scratch.mit.edu/projects/245362186/#player program and ask them to talk with their partner about how they think the algorithm is constructed. They can make notes on their whiteboards about how they might construct their shape. ▪ Once children have an idea for their algorithm, explain that they will be using the pen tool in Scratch. Demonstrate how to use the different functions within it, such as pen colour, width and pen size. ▪ Explain that they need to ensure that the algorithm they construct includes 'pen down' at the start and 'pen up' at the end, otherwise our sprite will continue drawing lines whenever it moves! For information about using the pen tool, check out the teacher video for this lesson. ▪ Children work in pairs to make their own square drawing program using their algorithm that they've recorded on a whiteboard. ▪ Once they've drawn a square, ask them to draw a triangle, hexagon and star using the same technique of planning on a whiteboard before creating their algorithm.	

- For reference, in order to draw an equilateral triangle, they will need to turn 120 degrees rather than 60. Encourage the children to use trial and error to figure out the angle then point out that there are three angles in the shape and three times 120 is 360, which is a full turn!
- Encourage children to consider different shapes and patterns that they could make. Can they make an irregular hexagon rather than all of the sides being the same length?

Key question

- Can you make an irregular hexagon rather than all of the sides being the same length?

- In this lesson, we've constructed algorithms to help us to draw a shape. Show the code behind the original 'Scratch's Square' program and ask children if their script was similar or different? Most of them probably won't have used a loop.
- Draw attention to loop and explain that sometimes we can use loops to make our code more efficient, especially when actions are repeated. Sometimes we might use a forever loop to make something keep happening forever, just like in the second lesson when we made the beetle follow the mouse forever!
- Ask children to modify their code to include at least one loop.

Key question

- Was your script similar or different?

- **To combine computational thinking skills to solve a problem**
  - If you have time, set children the challenge of 'BBC Bitesize's Introduction to Computational Thinking' to get an idea of what they have learned.
  - Hand out some 'Bebras Primary Challenge Cards' to each table and ask pupils to work in pairs to solve each challenge. The cards are in order of difficulty, so you may want to give more attaining pupils harder cards or else provide a selection of cards for each table. https://challenge.bebras.uk/index.php?action=user_competitions
  - Explain that children will need to use all of their computational thinking skills to solve the problems. When they've finished, ask them to discuss which of the key skills they used for each question.

Key questions

- Which of the cards you looked at needed abstraction?
- Can you find a card where decomposition came in useful?
- How many of the cards used pattern recognition?
- Did you need to construct any algorithms to solve your problem?

- Start by explaining that the 'Bebras Computing Challenge' introduces computational thinking to children in over 40 countries across the world and are designed to excite people about computing. Organise children into pairs and share the link to the 'Bebras past challenges'.
- As a class, choose which of the 'castor' challenges, which are aimed at Years 4 and 5, they would like to try. Make sure that children are all doing the same past paper. The children will 'self mark' the challenge at the end of the task.

NB. You may find that you need to use private browsing/incognito mode if pupils are using the same computer to complete the test a second time and you are not using individual logins. Otherwise, the challenge will go into 'review' mode as it thinks you are looking at the test again.

- Explain to pupils that before they move on to the next question, if there is a 'save' icon, they must click on it otherwise their answer will be lost.
- Explain that the scoring system means they will lose points if they make any mistakes in the later questions so they must think carefully about their answers:

	<table><tr><th>Difficulty</th><th>Correct</th><th>Incorrect</th><th>Unanswered</th></tr><tr><td>A</td><td>+6 points</td><td>0 points</td><td>0 points</td></tr><tr><td>B</td><td>+9 points</td><td>-2 points</td><td>0 points</td></tr><tr><td>C</td><td>+12 points</td><td>-4 points</td><td>0 points</td></tr></table> ▪ The challenge allows them up to 40 minutes to work through the questions so encourage children to discuss with their partner and decide how to try and solve it. Also, stress the importance of using the four strands of computational thinking when working through them. ▪ Ask pupils to discuss with another pair which of the questions they found difficult. Did they get any questions wrong? What problems did they face? ***Key questions*** • Did you get any questions wrong? • What problems did you face?	
	Previous Learning Experiences:	
	Children will have experienced working with Scratch in previous units and year groups.	
Possible Community Links/trips	**Future Learning Experiences:**	
	Future computing experiences and lessons throughout the school from Years 5-6.	

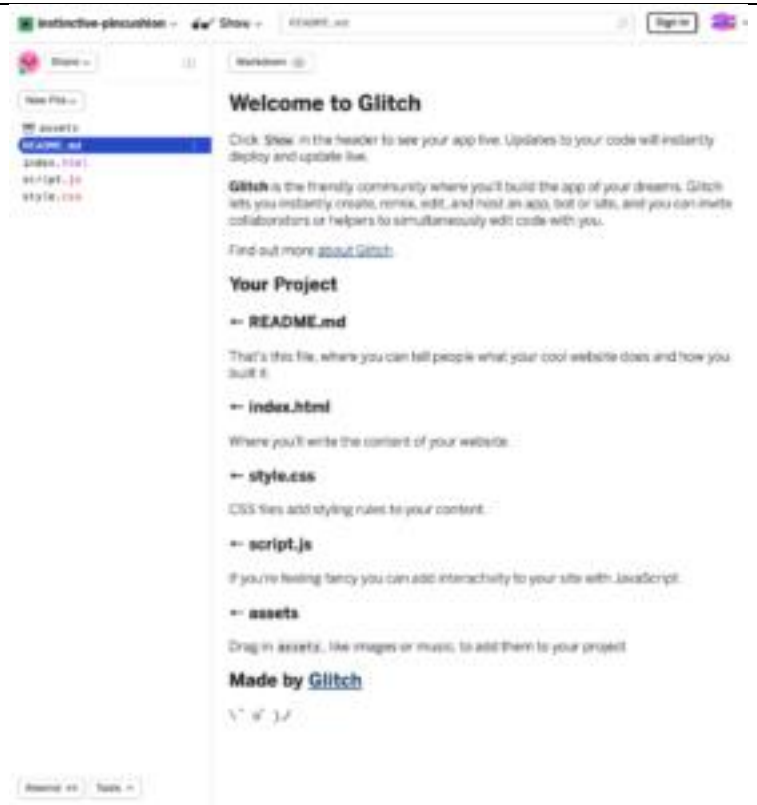
Year 4	Topic Title: Investigating Weather	Key Vocabulary
National Curriculum Objectives: Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content Select, use and combine a variety of software (including internet services) on 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 sequence, selection, and repetition in programs; work with variables and	• **<u>To log data taken from online sources within a spreadsheet</u>**. ▪ Begin by asking the children to talk about the weather with their partner. Then they will share their ideas to. They expect answers such as rain, cold, warmth, sunshine, wind etc. Explain that over the next series of lessons they will explore how to predict and record the weather. Tell the children that one of the most important factors in predicting the weather is calculating the temperature accurately as this determines how much water there is in the atmosphere. Show the Met Office video to help them understand why this is important, how the water cycle works and as a result, how rain is created. ▪ Ask children to name some cities in the world which they would expect to be hot, then cities they would expect to be cold. Explain that climate refers to the weather you would normally expect in a location. For example, you would not expect it to rain in the city of Cairo in Egypt, as it's a desert city. However, he would be surprised if it did not snow in Tromso, which is a city near the North Pole in Norway. Ask peoples which city could be the hottest on earth. Then, model searching online for the answer. Explain why you are selecting particular results and why they look more reliable. Say that you want to know which cities that artist on earth right now! Show how the results tell you that some cities are in the middle of the night and others might be having a heatwave comment so you cannot find out the answer to this question immediately. ▪ Ask children to search the web for current, real time temperatures of cities around the world. You can either: put the class into six groups and give them a continent each so they can choose cities within that continent and then find and record their temperatures in a spreadsheet. The name of the city should be recorded in the first column and the temperature (number only) should be recorded in the second column. Or, you can handout the world map resource and ask them to label the temperatures on there. ▪ Once every child or group has recorded at least five cities, demonstrate how to order the results on the spreadsheet to find the hottest city by selecting data from the toolbar, then sort and then changing the order from smallest to largest. ▪ Ask each child or group to call out their hotter city and put these in an Excel document. Then sort the results to find out the hottest city that you found. Explained that if we all work together, we get more data, which makes our answer more reliable, because we can analyse more data more quickly. Show children the time and date website which can display the data for more than 450 cities in the world. Most importantly, it can sort the data so we can see which city is most likely the hottest on earth right now. Discuss if anyone in the class got close to the answer. • **<u>To design a weather station.</u>** ▪ Before starting this session you will need to have a range of materials ready for the children to create their weather stations: recycled materials, such as plastic packaging, bottles, park Cardboard packaging , card, paper, scissors, tape, pens, pencil's, split pins, pipecleaners, plastic or paper straws. ▪ Remind children that computers use different forms of input to sense the world around them, so that they are able to record and respond to data. Explain that in this lesson, they will need to consider how a device would be able to say what the weather was like. Start by getting them to think about how they know what weather is like, for example, they can see that it's very bright or not, they can feel or see the rain. Ask children for suggestions on the different types of weather a device could sense and record, for example rain , wind, temperature, sunshine. ▪ Ask them to consider what units of measurement different types of weather could be measured in: rain in millimetres, wind in mph, temperature in degrees Celsius. Sunshine is slightly more complicated to measure. It could either be measured in hours using a Campbell Stokes recorder using solar panels to convert it to electricity in measuring him wats, or by using a prep rooms light metre to measure omega's how bright is it in Lux. These don't need to be anything like the instruments or units of measurement used in real life, but it's important to get children thinking about how different data can be collected and how it would be measured.	algorithm, automated machine, calculate, climate, device, forecast, log data, predict, record, sensor, source, spreadsheet, temperature, weather.

various forms of input and output. Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts	▪ Ask pupils to get into groups of three or four. Explain that they're going to be building a model where the station. Recap the discussion from the attention grabber about what devices could send some measure and explain that their weather stations should record rain, wind, temperature and light all sunshine. As these will just be models, they will not actually record this data forced up give children a range of materials to build their weather stations from. Stressed that their ability to talk through their model and explain how it would send and record the data is just as important as the model itself. If any groups are struggling for ideas, you could suggest: measuring jugs or cylinders to measure rainfall, pinwheels to measures wind speed, thermometer to measure temperature, black card of the grid drawn on them represents solar panels to measure sunshine. Encourage children to discuss how effective their weather station would be and what they could do to make it more accurate. Once they have finished, ask each group to present their model and explain its different parts. ▪ Visit the BBC weather site and search for your local town or city and discuss how accurate the information is. Point out the forecast section explained that information needs to be gathered to allow forecasters to predict what the weather might be like. In the UK, is in particularly important to take data from buoys in the Atlantic Ocean, because much of our weather is affected by the flow of warm water which reaches our island from the Caribbean Atlantic Ocean Gulfstream current. So, information on air and water temperatures, even hundreds of miles out in the ocean, can help us to forecast the weather. The data from these buoys needs to be transmitted to a range of sources around the world who used their data to help predict the weather. The data is transmitted in the by radio, or by satellite link depending on how remote the buoy is. • **<u>To design an automated machine to respond to sensor data.</u>** ▪ Tell people that it's really difficult to predict where lightning might strike. The closest we have is a lightning map. Show the class the predicting lightning strikes to show how it works. Explain that sensors detect the strikes through a radio antenna, tune to the frequency which is most disrupted by a Bolt of lightning. When one strikes, it causes huge disruption in the radio frequency and as radio waves travel far, it's possible for the disruption in normal radio patterns to be spotted hundreds, thousands of miles away. Ask children what are the types of dangerous or extreme weather they can think of? Floods blizzards heat waves or hurricanes etc. ▪ ask them to think back to the previous lesson and come up with ideas of how devices could be created to detect the early warning signs of any of those extreme types of weather. Explain that at the moment, if warning signals are detected, people in the affected areas are notified so that they can take appropriate action. However, their challenge for today is to design A machine that will use the sensor data to trigger a response. In pairs people draw and label a design for an automated machine to help prevent or minimise the damage or disruption caused by extreme weather. Encourage them to use their searching skills to find out more about the early warning signs of their chosen extreme form of web there as well as find out what people should do to prepare for them. ▪ Explain that these devices will need to use selection, this means that they follow the algorithm only when something happens. For example, there is no point cooling down public buildings and opening large outdoor shades, if no early signs of heat waves have been detected. Recap on the word algorithm. Their design may include flood sensors which, if triggered, cause flood barriers to be raised automatically. It may involve a thermometer which, if going below a certain temperature, triggers the release of a great dispensing vehicle to make roads safer. ▪ For inspiration, show doctor tornado video of how scientists gather information about tornadoes. Watch tornado alert video, about company who plans to sell a tornado alarm Clock that wakes you up with a tornado or lightning storm in your area. ▪ Ask pupils to use digital drawing software, such as sketch pad to draw and annotate their designs and note down an algorithm showing how it would work. An algorithm is a set of instructions. ▪ Ask the children to share their ideas and discuss with their partners what the pros and cons of having these automated machines would be. Encourage them to share their ideas and create a class pros and cons list.	

	• **<u>To understand how weather forecasts are made.</u>** ▪ Discuss these key questions: why would a weather forecast need an astronaut, what could go wrong if the weather forecast is not accurate? Then show a video on how are weather forecasts made. Explain to the children how ground stations are used for recording data, which then allows meteorologists to spot patterns and predict the weather. ▪ Point out the weather satellites and explain that they need to: at heat sensor, a camera, a telescope, a scan mirror. These can tell forecasters information such as the speed and direction of clouds which helps them to predict the weather around the world. ▪ Ask children where they are in the world , in the UK, which County, closest town etc. Then get them to use a laptop desktop computer or tablet to search for what the weather will be like the day after tomorrow. They may also like the 1st result and end up with the same information, but point out that there are different websites which predict what the weather will be like. Ask them to list what kind of information it gives them: temperature, wind speed, chance of rain, general weather. ▪ Using your preferred spreadsheet software, Excel, ask pupils to put column headings for each of these four points, leaving the first column free for now. Then come and ask them to put the name of their weather forecast source, from the beginning of the activity, into the first available row. Asking them to put in all the relevant information from the forecast, according to the headings they have created. ▪ Explain that weather forecast from different sources don't always agree. Challenge them to find as many different forecasts as possible and record the data in their spreadsheet. Ask questions such as coma which are you inclined to believe? Why? ▪ Ask them to look at their data and draw conclusions from looking at a range of sources. Explain that sometimes weather forecasts are all very similar, suggesting that the weather is more stable and certain, however sometimes they differ hugely, suggesting that it is unpredictable. ▪ Discuss how having lots of different forecast information could help to get a more accurate prediction. Explain that as the amount of data is growing all the time, weather forecasters think it is going to be very important to collaborate together, so that they can deliver accurate weather forecasts to people who need them. • **<u>To use green screen technology in a video to present a weather forecast.</u>** ▪ Ask people to get into groups of three or four. Explain it they're going to film their own weather forecast for a city or town of their choice. They then research this on the Internet and discuss and write down what the weather will be like include in: the temperature, rainfall and wind speed. ▪ Ask the children if they've seen a weather forecast on television. Show them a weather forecast video and it asked pupils how the forecasts are filmed. Point out the changing background and ask the children how they think it works. ▪ Explain that often in films and on television, the landscapes that the actors and presenters are in aren't actually real and this process is achieved by a brightly coloured backdrop and a process called Chroma Key, also known as a green screen as the backdrops are typically green. ▪ Chroma keying allows you to separate the green screen background from the person standing in front of it and replace the background with pretty much anything. The colour green is most commonly used because it gives the greatest contrast to human skin tone. Show a video on how a green screen works. Use a green background and demonstrate how to film a person or object on a green screen . Discuss which areas of the classroom work best because the lighting and where the person filming should be so that they are not too close or far away, then each group films their forecast, ensuring that all members of the group are involved in the process. Once they have filmed their forecasts, they will use show shot cuts or other green screen software an import their video to it. Demonstrate how to double click the green screen image and still like this chroma keying option to get rid of a green background.	

	Show how you can then play an image or video alongside the original video to show through as the background, it needs to last for the whole duration of the weather forecast. Watch a shot cut video for children for a demonstration. ▪ pupils then edit their videos, regularly watching them back to review and refine. When complete, watch some of the children's videos as a class and discuss what they found difficult or easy and if there is anything they would do differently next time. ▪ Recap the importance of being able to collect and analyse where the data accurately, as it can save peoples lives, as well as make a difference to their day to day lives. Asked pupils if they can think of something they could create or develop that would make use of the kind of weather dates of explored through this topic.	
	Previous Learning Experiences:	
	Children have studied the weather in previous years and looked at a variety of different types.	
Possible Community Links/trips	**Future Learning Experiences:**	
	Future computing experiences and lessons throughout the school from Years 5-6.	

Year 4	Topic Title: HTML	Key Vocabulary
National Curriculum Objectives: Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.	**<u>To understand that web pages are built using different programming languages, and one of them is HTML. To understand and identify examples of HTML tags.</u>** • Explain to pupils that when you're looking at websites, you are using an internet browser, such Microsoft Internet Explorer, Google Chrome, Opera, Firefox, or Safari. • HTML (hypertext markup language) is the computer language that's used to structure documents on the web. HTML documents contain HTML tags. So a web browser looks at the HTML tags on a site and translates those tags into what you then see on the web page. • HTML tags are basically instructions that tell your browser what to show and where to show it on a web page. They break up your document into basic sections. All tags start with a < (left arrow) and end with a > (right arrow). • Hand out sets of the *Activity: HTML Tag Cards* to pairs or small groups of pupils. Explain that all but one, are in pairs with the exception of the <!DOCTYPE html> card. • Ask children to look at the cards and in their pairs/groups discuss whether they have seen these symbols before? • Ask pupils to feedback to the class and discuss their responses. Clarify that each of the symbols on the cards are HTML tags, which can alter the format of text and images on a web page. • **<h1>, <h2>, <h3>, <h4>, <h5>** and **<h6>** refer to different 'heading' sizes, with **<h1>** being the largest and **<h6>** the smallest. • **<p>** refers to a new paragraph • **<img>** refers to images • **<head>** tag will include the title of the document along with a description of the document • **<body>** is the main section of text • **<title> refers to the title of the page** • **<!DOCTYPE html>** is telling the browser that the following file is an HTML file • **<html>** every document starts and ends with these tags and it tells the browsers that the document is an html file. Pupils may also mention tags such as **<b>** for bold or **<i>** for italics. ***<u>Key questions</u>*** • Do you understand any of these symbols? • Have they seen these symbols before? • Can you predict what the different tags do, eg: <img>? • Did you spot any tags we hadn't mentioned? • What do you think they do? • **Introduction to HTML on Glitch** • Glitch is a simple tool for creating web pages. Ask pupils to locate the following keys on their keyboard: **<, > and /** • Ask them to open up 'www.glitch.com/create' and select '*New Project*' tab in the top right-hand corner, then select '*hello-webpage*' from the dropdown options which will take them to a 'Welcome to Glitch' webpage similar to this:	Code, Content, Copyright, CSS, Hacker, Hex Code, HTML, Internet Browser, Permission, Script, URL, Web Page



Select 'index.html', on the left hand side and you will see the following text:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Hello!</title>
<meta charset="utf-8">
<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initial-scale=1">
<!– import the webpage's stylesheet –>
<link rel="stylesheet" href="/style.css">
<!– import the webpage's javascript file –>
<script src="/script.js" defer></script>
</head>
<body>
```

	Hi there! I'm your cool new webpage. Made with Glitch! <!– include the Glitch button to show what the webpage is about and to make it easier for folks to view source and remix –> <script src="https://button.glitch.me/button.js"></script> </body> </html> • Clarify that: The first line lets the computer know that it's reading HTML code • The second line signifies the beginning of the HTML code and the language being used (lang="en" means English language). Notice that it says **</html>** at the end of the script – this is the closing tag which signifies the end of the code. • The information between **<head>** and **</head>** is information about the document rather than anything that affects the actual site you're creating – it's similar to a background title and some basic setup information. • Between the two **<body>** and **</body>** tags you will find the actual website text – you can see that "Hi there!" is sandwiched between the h1 tags meaning it appears as a large heading in the output window to the right. • ** ** is used to define a new paragraph. • Working independently, pupils explore changing the text in between the headings tags: , and the paragraph tags , • **Exploring HTML of a webpage -**All Internet browsers allow you to view the HTML code of any webpage. Tell pupils to open 'BBC Newsround' webpage. If pupils are using Google Chrome, to view the HTML code on the page they right-click on a blank part of the webpage and select **View page source** from the pop-up menu that appears. • **HTML Tag Treasure Hunt -**Give each pair of pupils a copy of the *Activity: HTML tag treasure hunt* resource and challenge them to find as many of the HTML tags as they can on a webpage of their choice using the method they explored above. • Bring the class back together and ask: • How many tags did they spot on their treasure hunt? • Did they spot any other tags and can they think what they are used for? • Return to the tag cards from the start of the lesson. Can they now order the cards so that the tags are together and that the doctype card is at the top? ***Key questions*** • How many tags did they spot on their treasure hunt? • Did they spot any other tags and can they think what they are used for? • Can they now order the cards so that the tags are together and that the doctype card is at the top? • **To Change the HTML -** Share the 'Trinket – HTML Wanted Poster Project' – trinket.io/html/58318bee1f webpage with the class. • Ask pupils which of the HTML tags they remember learning about in the previous lesson and what they refer to on the web page. Recap the fact that you always need an opening and closing tag. • Ask the children what you would need to change in the HTML to alter the title of the poster?	

- Ask them to predict what they think would happen if you change the tags to h5 in this section:

<h3>Have you seen this robot?</h3>

to

<h5>Have you seen this robot?</h5>

- Challenge more able pupils to 'remix' the Style.CSS sheet to change the border of the poster and its alignment.

Key questions

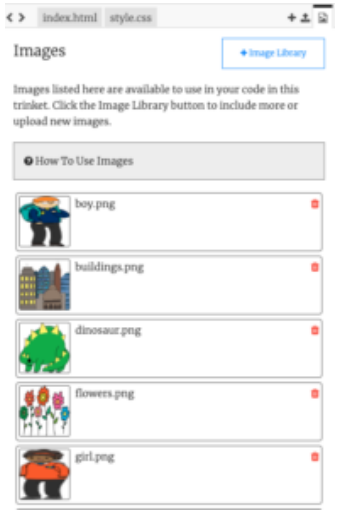
- What does HTML stand for? (Hypertext Markup Language)
- Which HTML tags can you remember?
- What would you need to change in the HTML to alter the title of the poster?
- If you have an <h1> tag, what tag needs to be at the end? </h1>
- Can you identify any tags from the code?
- What would happen if you changed an <h3> tag to an <h5> tag? (It would change to a smaller sized heading.)
- What does CSS do to a webpage?
- What new skills have you learnt?
- What could you teach others about HTML?
- **Div Class-** The pupils may notice the   tags on the Wanted Poster page. Explain that 'Div' – stands for division and is a way of grouping sections of a website so that it can be styled separately to other parts of the page.
- The divisions are styled using CSS – 'Cascading Style Sheets'.
- **CSS-** Show pupils the CSS file on the top left tab of the Wanted Poster called 'Style.CSS'. Explain that most websites have a 'style.css' sheet which defines the basic look of the site. This contains all the information that's used to style the look of the Wanted Poster, such as the text alignment and the thickness of the border.
- Consolidate the meanings of HTML and CSS.
- Explain to pupils that the best way to understand HTML is to 'remix' it. Pupils are going to work independently or in pairs (depending on your hardware available) to undertake one of two challenges:
- 1. Alter, or 'remix' the Wanted Poster to create a Missing Poster for a lost kitten.
- 2. Alter, or 'remix' the Wanted Poster to create a Lost Poster for an avatar from a computer game.
- Ask some pupils to share their work with the rest of the class, explaining what changes they made to the HTML to achieve their desired outcome.
- Ask the children to save a copy of their work either by taking a screen capture image of it, or, by selecting the menu button (which is called the burger menu by web developers as it looks like a burger bun with a burger inside it!) and selecting 'Download' and saving it.

To change the HTML and CSS to alter the appearance of an object on the web

- Explain that in the last lesson, we focused on the HTML code, whereas in this lesson we will predominantly be using the 'style.css' tab,
- Recap the difference between HTML and CSS. Ask pupils: What does CSS stand for? CSS refers to Cascading Style Sheet and it changes how an object looks on the page. Ask pupils: What elements do you think you can alter within the CSS?
- Give pupils a copy of the *Activity: Crack the CSS code* (one per pupil or pair of pupils) and challenge them to work out what the code refers to. They then feedback to the class.
- If they are struggling, remind them about the HTML they learnt and whether they can draw any similarities from it.

Key questions

- What does px mean? (Pixels)
- What does CSS stand for? (Cascading Style Sheet)
- How can we develop our story further?
- How could we add an additional text or images to our story?
- Navigate to the 'Trinket – My Story' - https://trinket.io/html/8083cfebb3 activity. Refer back to the 'Index.html' tab and remind pupils that this shows the elements that make up the design of the page and the order in which they will appear.
- In the previous lesson, the pupils remixed the existing elements to create their own 'wanted' posters. This time they will be using a combination of the 'Index.html' tab (to order and create their object) and the 'style.css' tab (to edit the size and colour of the ingredients).
- On the 'style.css' tab, draw their attention to the unit of measurement px (pixels) rather than mm or cm for describing images. So by changing the pixel number you can alter the size of the image.
- Demonstrate with the 'border' (line 13) how you can edit the number and it will change the thickness of the border.
- The website updates in real time, so every change you make will adjust the image instantly. Demonstrate adding an image from the image tab.
- **Pupils take on the challenge** - Pupils are going to create their own storyboard by altering the text and image in the first box and then adding two or three further boxes. The content of the storyboards can be anything you're currently teaching across other subject areas.
- Begin by asking the children to explore the code and see what happens when they make changes to the sun image.
- After a few minutes, stop the children and ask how we can develop the story further. Clarify that they will need to add additional boxes with text and images. Ask pupils how they think this is done. Then model copying and pasting the code for the sun image box code and adding a new image on the 'index.html' page (see below). If you have more confident learners, they may not need this modelling and can be challenged to work it out for themselves.
- Look for the image tab and then you will see these options:



Then, go back to the 'index.html' tab and copy this part of the code (slide 8):

<img src="sun.png">

It was a beautiful day…

You need to leave a line space between the closing tag of the previous box: before the opening tag of the next box:
Change the image to “boy.png” or any other image you may want to use and the text you want to include to tell your story will go in between the two paragraph tags: :

<img src=“boy.png”>
Tom, who is 8 years old, was on his way into school when he saw a dinosaur.

Once you have modelled this to the children they can then work on their storyboards independently.

- If you want a record of their work, they could write down when they discover what each element of code does or they can download their project – see below for guidance.
- Pupils can save their work either by taking a screen capture image of it, or, by selecting the menu button:

- Which is called the burger menu by web developers as it looks like a burger bun with a burger inside it! Then selecting ‘Download’ and saving it. Ask the pupils, if they have found any interesting patterns or anything they noticed or did to help them develop their story code.

To understand and explore more complex components of a webpage

- Ask pupils to discuss in pairs the following questions: What does the word ‘fake’ mean? (Not genuine; imitation or counterfeit) What does the word ‘news’ mean? (Newly received or noteworthy information, especially about recent events)
- Ask pupils if they’ve heard of ‘fake news’. Clarify that it means false stories that appear to be news, spread on the internet or using other media.
- Watch the video ‘BBC Newsround’s Can you spot a fake news story?’ and as a class, read the article from ThinkUKnow.co.uk called ‘Fact or Fake News? Can you trust everything you read online?.
- Afterwards, ask the pupils the following questions: Why do you think people make up fake news? Do you think you could spot a fake news story? What tips did you learn as to how to spot fake news stories? What problems do you think fake news stories create? Why is fake news important to know about?

Key questions

- What does the word ‘fake’ mean?
- What does the word ‘news’ mean?
- What does the phrase ‘fake news’ mean to you?
- Why do you think people make up fake news?
- Do you think you could spot a fake news story?
- What tips did you learn as to how to spot fake news stories?
- What problems do you think fake news stories create?
- Why is fake news important to know about?

- Ask pupils about the different components found within a webpage? (The logo, images, headings, text boxes, search etc.) As a class, use the Newsround website to locate some of these.
- Ask pupils to choose a website such as 'Kiddle', 'Disney', 'Nasa' and in pairs, identify some of the different elements of the web page.
- Explain to the children that over the course of this topic, we've looked at the information behind a webpage and in this lesson we're going to alter the headings and text of a live website, by editing their relevant tags in the code.
- Model visiting the web page: 'BBC Newsround's Can you spot a fake news story?', highlighting the title then right-clicking and selecting 'Inspect'.

- You will then see the code that generates the headline: <h1 class="gel-trafalgar-bold gs-u-mb" data-reactid=".13jjvppo0qy.1.2.1.0.0.1.0">Can you spot a fake news story?</h1>
- Demonstrate how altering the information within the <h1 and </h1> tags is reflected on the website. If you make a mistake, refresh the page to return to the original version.
- Model adapting the heading, title and text on one of the following websites: 'Kiddle', 'Disney', 'Nasa'.
- Pupils then choose one of these websites to create a 'fake version' of a web page by altering the code. Web pages with plenty of text and images works best for this activity as the HTML tags around video can get a bit confusing to read.
- By editing the code the children won't actually be changing the site because as soon as they refresh the page, it will revert back to the original version. Pupils can take a screenshot of their web page when they have finished.

Key questions

- What components make up a webpage?
- What HTML code tags can you remember?
- Have you changed their website forever?
- What do the different HTML tags mean?
- What do you need at the end of an HTML tag?
- What changes did you make using your Inspect Elements tool?
- Bring the class back together and share the different stories they created. Ask pupils to explain what they changed in the HTML code, e.g. size of headings as well as the content of the text.

	• Set pupils the challenge of remixing a website at home and trying to fool their families with a fake news story to impress them when they reveal that they 'hacked'/remixed the code. • Explain that in the next lesson they will move on to altering images within a web page too. **<u>To alter key elements on a webpage including text and images</u>** • Ask the children to activate their prior knowledge about the previous lesson. In pairs get them to discuss and feedback on what they did in the previous lesson. • Clarify that they learnt about fake news, inspect elements tool, hacking/remixing, changing headlines and text. • Go to the 'BBC Newsround' website and choose an article, or use the 'BBC Newsround: Article Example'. • Ask the children how to change the headline of an article by highlighting it and right-clicking to use the 'Inspect' elements tool. • Then, go through the process of altering the headline to develop an alternative headline relevant to the image. • Ask the class the following questions: Why is it useful to be able to alter text on a webpage? Are the changes you make permanent? What else could we alter on a webpage that we haven't? • Explain to the children that they are going to be learning how to change the images on a webpage. Ask pupils: Why is adding or changing images on a webpage important? Get them to discuss in pairs and feedback to the class. • Then, ask the children if we're able to use any images we find online. Introduce the concept of copyright and explain that some images are owned by the person who: drew them; took the photograph; or published them. We need to seek permission for using them. • Explain that we need to use an image that is free and that we have permission to use them. The 'Creative Commons' website lists suitable image library websites. Further information about it can be found here. • When using images from the web we need to reference where they are from – this is called the 'image source'. When copying the image, select 'copy image address'. If this option does not come up, then it is unlikely to be licensed for use. • To use Creative Commons, simply search for an image you want and then copy or make a note of the URL address attached to the image. • Now model how to replace an image on a website using the same technique you have previously used to edit text, so highlighting the element on the webpage, then, right-clicking to use the 'Inspect' elements tool. You will then see the image code in the coding panel. • To change an image that has an <img> tag, for example: <img src="ichef.bbci.co.uk/news/270/cpsprodpb/BA8A/production/_100245774_i-squirrels.jpg" Find the <img src and replace everything within the inverted commas (this will generally end in .jpg) then replace that section with the image source URL. If you paste the URL for another image within an <img> tag, the web page will change to display the new image. An alternative to Creative Commons is Google image search, where you can find the URL of an image by right clicking and selecting 'copy image location'. • **Independent Activity- P**upils are going to edit an online news story. This works best on a page with a good mix of images and text so that there is a lot of scope for change. Offer them a selection of websites to choose from, such as your school website, their favourite sports team, 'First News', 'NASA', or 'National Geographic'. • They should plan their news story beforehand, thinking about the who, what, where when and how and remind them to look for relevant, high quality images. • More able pupils should look to edit longer stories and with more images. • Troubleshooting – as they are working, children may encounter the following: Not copying the image address properly – maybe selecting 'copy' or 'save image'. Not pasting the image address into the correct place – it must be between the inverted commas after 'src' as that is explaining where the source of the image is coming from on the web. Pupils can take a screenshot of their finished work.	

	Key questions • Why do you have to 'copy image address' and not just copy? (So the image can be located from its existing location on the web) • How do you know where to paste the image address? (Look for img src or src and paste between the inverted commas) • Why would you not use low resolution images or cartoons? (It's poor quality) • Bring the class back together and ask volunteers to share their work. Recap with pupils that they had to remember to: Copy the image address, Look for the <img src in the HTML code, Paste the image address in between the inverted commas ***Key questions*** • What have you enjoyed? • What challenges have you encountered?	
	Previous Learning Experiences:	
	Children will have used websites before and looked at them in previous lessons and year groups, The accessing the HTML content will be new to the children.	
Possible Community Links/trips	**Future Learning Experiences:**	
	Future computing experiences and lessons throughout the school from Years 5-6.	