

Year 3 Computing

Key Vocabulary

Digital Literacy		
National Curriculum Principles	Objectives	Knowledge and key Vocabulary
Understand the opportunities [networks] offer for communication and collaboration	<ul style="list-style-type: none"> To be able to collaborate using a variety of systems. 	<ul style="list-style-type: none"> I can use Pages, Keynote and Numbers to collaborate with my peers. I can use Google docs to collaborate with my peers.
Be discerning in evaluating digital content	<ul style="list-style-type: none"> To be aware that not everything you read online is true. 	<ul style="list-style-type: none"> Use a range of online news reports BBC Teach
Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact	<ul style="list-style-type: none"> To be aware of the pros and cons of using the internet. To know that cyber bullying is wrong. 	<ul style="list-style-type: none"> I can discuss why using the internet is good/bad and give justified reasons. I can discuss what acceptable behaviour is online and how this affects people.

Information Technology
<p>What's the big picture? To develop the children's skills with understanding how the world of technology works and how we can use technology for a vast variety of purposes.</p>
<p>National Curriculum Principles</p> <ul style="list-style-type: none"> - understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration - use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content - select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information

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- use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact

The National Curriculum objectives are delivered through the use of Barefoot Computing Curriculum and all resources and planning can be found at www.barefootcomputing.org

Objectives

To understand computer networks, including the internet.
To use search technologies effectively.
To use a variety of internet services.

Lesson	Knowledge and key Vocabulary
1	<p><u>Network Hunt</u></p> <p>Write ‘computer network’ on the board and discuss with the pupils what this means? Do they know of any other networks?</p> <p>Generate a discussion to explain that computers in the school are all linked together, creating a ‘network’. Explain that other devices can also be included in the network. Tell the pupils they will be going on a hunt to look for the devices.</p> <p>Explain to the pupils that they will be creating a sketch map of their school on which they will record the devices they find. Model this by showing the slides.</p> <p>Groups of children to be given a copy of the ‘What devices can you discover?’ Resource as well as paper and clip boards for the hunt. Spend 20 mins hunting around school for all devices they can find and record them on the map.</p> <p>Once back in class, share some of the maps with the class and discuss where the devices where they were found and what they are used for. Explain that we are going to look at the roles of these devices.</p> <p>This can be done in different ways:</p> <ul style="list-style-type: none">- pupils could complete a matching activity- Pupils conduct web-based research on each device <p>Plenary:</p>

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	Recap the answers from the matching activity and discuss the different roles of the devices. Children could create a clips video to explain the different devices and their roles as an extension.
2	<p><u>To understand how to use the internet effectively.</u></p> <p>Recap a computer network is a group of computers which are connected together to allow communication and shared services between them. The internet is an international network of computers connected together with copper cables, optical fibres and satellites.</p> <p>Students given opportunities to use the internet to research, explaining about using a search engine to find what they are looking for.</p> <p>Direct pupils towards 'Google' and explain that this is a common search engine that helps you to find what you are looking for using keywords.</p> <p>Explain how the search engine works and how it ranks the searches in order of best fit depending on how many times the keywords are used.</p> <p>Using a topic, direct students to research something.</p>
3	<p>Students use the internet to collect information and research using a given website.</p> <p>Students can use Notes and Pages to design and create different documents.</p> <p>Students can use keywords when searching the web and have the opportunity to use a search engine (e.g Google).</p> <p>Students download an image from a web page. Upload the image to Notes or Pages and use editing tools to manipulate and improve the image.</p>

Computer Science

National Curriculum Principles:

- Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by

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decomposing them into smaller parts.

- Use sequence, selection, and repetition in programs.
- Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.
- Understand computer networks including the internet; how they can provide multiple services, such as the World Wide Web. Appreciate how [search] results are selected and ranked.

These National Curriculum objectives are delivered through the use of Everyone Can Code ([Get started with Code 2](#)). The lessons have been designed to develop and build on skills. The structure of each lesson should follow: introduction, activity, practise and reflection/ journal.

Children in Year 3 will use the app Tynker.

Lesson	Objectives	Knowledge and key Vocabulary
Pre-lesson	<ul style="list-style-type: none">- Introduce the concept of coding- Understand the goals of this class- Learn how to use the apps	<p><u>Introduction:</u> Discuss with the class what the words 'Coding' and 'developer' mean. Explain that we are going to think like a developer and code together.</p> <p><u>Activity:</u> Think about what we would design if we were developers? Discuss ideas and collect them together. Using the 'Notes' app to explore ideas of what we could design. What app or game would you make?</p> <p>Get the class to share their ideas they have sketched on 'Notes'. What type of audience would enjoy their app or game? What purpose does it have? Discuss what might the next steps be to designing the app or game?</p> <p><u>Practise:</u> Direct students to the app 'Tynker'. (Teachers need to create an account and student accounts online) see pg 11)</p> <p>Show students that they can scroll left and right to see different coding games. Tell them that for this session, they'll be using Dragon Spells!</p> <p>Open Dragon Spells and show students that they can switch back and forth between Tynker's visual blocks and Swift blocks as they solve puzzles. Explain that all the coding they'll be doing with Tynker</p>

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		<p>translates to real coding languages that programmers use.</p> <p>Encourage students to go to the 'Community' part in the app and choose a game that is their favourite. (Students need time to explore the games)</p> <p><u>Journal:</u> Explain to students at the end of each session, we will document what we have learnt using the app 'Seesaw'. Get students to upload a photo of their favourite game from Tynker and annotate it with why it is their favourite.</p>
1	<ul style="list-style-type: none">- Understand an algorithm as a set of instructions to solve a problem- Identify algorithms in everyday life- Solve coding puzzles using algorithms	<p><u>Introduction:</u> Introduce the 'Commander' game to the children. The Commander will say a set of instructions for the students to follow (see pg 15). Discuss the words 'Command' and 'instruction' and explain that these words are used in computing.</p> <p>In computing, a command is an instruction that we give to a computer. Computers need clear, understandable instructions that need to be precise to get a specific result.</p> <p>Choose a student to be a Commander and they need to give clear instructions to perform a task.</p> <p>Explain to students that they've been communicating an algorithm for carrying out the task that the Command Bot has been given. An algorithm is a step-by-step set of instructions to perform a task or solve a problem.</p> <p><u>Activity:</u> Give students a set of instructions to follow to perform a task e.g Make a sandwich. Children create their own algorithm to perform the action.</p> <p>Using the Keynote template provided (pg 16), ask the students to make a sandwich by dragging their choice of fillings into the sandwich template. Ask them to give their signature sandwich a name.</p> <p>On a new slide, have them write an algorithm for their signature sandwich so that classmates can follow it to re-create the super chef signature sandwich.</p>

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		<p>Students swap instructions, and using the Keynote template, see if they can make each other's sandwich using the instructions provided.</p> <p>Discuss the different instructions and if they were successful. Did students successfully re-create the sandwich? Do they have the right sequence of steps? Is anything missing from their instructions? Are they complete? Are they clear?</p> <p><u>Practise:</u> Students to complete all puzzles in Dragon Spells Lesson 1 in the Tynker app.</p> <p><u>Reflection:</u> Using Seesaw, students reflect on their time on Tynker using the following questions:</p> <ul style="list-style-type: none">- How many steps did their longest algorithm have?- How did they figure out the algorithms they needed to use to solve the puzzles?- How many commands did it take to make their sandwiches? Can they do it using fewer commands?- Why is it useful to find an algorithm for doing something?
2	<ul style="list-style-type: none">- Understand how to approach debugging a program or algorithm- Identify examples of debugging in real life- Solve coding puzzles	<p><u>Introduction:</u> Play 'Commander' with the students, choosing someone to be the Command Bot. Ask students to look out for and identify errors.</p> <p>In coding, an error in instructions is called a bug. Finding and fixing the error is called debugging. As students learned in the last lesson with their algorithms for the Command Bot, their code has to be very accurate. If there's a bug, the algorithm won't work.</p> <p>Explain the definitions of the words we will be using today: bug, debugging and Pseudocode.</p> <p>Pseudocode is an informal description of code or a concept that's intended for human reading.</p> <p><u>Activity:</u> In small groups, download and use the keynote template provided, children create a solution to the Tunnel Bug game.</p> <p>Ask students to write each line of their pseudocode on a separate slide in Keynote. Each group should</p>

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		<p>test out their algorithm to make sure it works.</p> <p>Then they should mix up the order of their slides and give their Keynote slides to another group who will use the instructions to play the level.</p> <p>With the mixed-up Keynote slides, each group now needs to figure out how to debug the code so they have a correct set of player instructions.</p> <p>They should write down each step of their debugging process. For example, “Move slide 4 up to slide 2.”</p> <p>As a class, each group shares their debugging process. How many steps did it take? Could they have debugged the algorithm in fewer steps?</p> <p><u>Practise:</u> In the Tynker app, students complete all puzzles in Dragon Spells Lesson 2.</p> <p><u>Reflection:</u> On Seesaw students create a video explaining their debugging process.</p>
3	<ul style="list-style-type: none">- Understand how loops help us think more efficiently- Identify loops in everyday life- Solve coding puzzles using loops.	<p><u>Introduction:</u> Introduce the class to a tongue twister and get them to learn it. Once they are able to say it, get the students to say it as many times as they can. Explain that they have just performed a ‘for loop’.</p> <p>Explain that a for loop is an instruction to repeat a set of commands for a certain number of times.</p> <p><u>Activity:</u> Show the keynote slides (pg 28) to the students and discuss the patterns created by for loops.</p> <p>Students to create their own patterns using for loop and the Keynote template. Students to name their pattern and write an algorithm to explain how to create the pattern (Loopy Snake).</p> <p><u>Practise:</u> Let students complete all of the puzzles of Dragon Spells on lesson 3.</p>

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		<p><u>Reflection:</u> Students to think about the following questions:</p> <ul style="list-style-type: none">- How did they use the loops in Tynker?- How did using loops make coding easier?- How did they spot where they could use loops?
4	<ul style="list-style-type: none">- Understand decomposition as a way of solving problems by breaking them down into parts- Identify situations where we use decomposition in everyday life- Solve coding puzzles using decomposition	<p><u>Introduction:</u> Pair students up, and ask each pair to compose a body percussion routine to memorize. The rhythm can be expressed as a list of simple commands or actions—for example: tap, tap, tap, clap.</p> <p>As a class conductor, point at the different pairs and get them to share their percussion with the rest of the class. Bringing the percussions together to create a rhythm.</p> <p>Creating something more complex from simple parts is called composition. Think about a painting of a landscape or your favorite song—these are formed by bringing smaller pieces together.</p> <p>Explain that the opposite of composition is decomposition. Decomposition is breaking something down into smaller parts in order to solve a problem.</p> <p>In coding, we put together smaller pieces of code to create a more complex program through composition. We use decomposition to break down a problem into smaller pieces that we can deal with one by one</p> <p><u>Activity:</u> Students learn to execute a complex maneuver by breaking it down into parts.</p> <p>Show students the Cup Song video (pg 34) and ask them to try doing the routine just from watching the video.</p> <p>Students should now work in small groups to learn the routine by breaking it into smaller parts. Share the video with the class using AirDrop. Get the students to open the movie up into iMovie and split up the clips into smaller parts. Then ask students to add the movie clips from their iPad Camera Roll into Notes.</p> <p>In Notes, ask them to transcribe the commands for each section of the Cup Song. This will help them</p>

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		<p>form an algorithm for performing the routine.</p> <p>Explain that they're using decomposition to create an algorithm for solving a problem. Now ask the groups to perform the Cup Song for the class and explain their process of breaking down the routine into smaller parts. Did they get the same algorithm as the original?</p> <p><u>Practise:</u> Students complete all puzzles in Dragon Spells for lesson 4.</p> <p><u>Reflection:</u> Discuss with the students what the differences between composition and decomposition is. Students think about the different ways we use both in our daily lives, make a class list.</p>
5	<ul style="list-style-type: none">- Understand abstraction as a way of making it easier to think about problems- Identify situations where we use abstraction in everyday life- Solve coding puzzles using abstraction	<p><u>Introduction:</u> Introduce sorting and categorising with the students. Play the 'Guess the rule' game called 'Picky Picnic' with the students. Explain that the commander will start the game by explaining what they will take on a picnic. Each student will take it in turns to choose one item to bring to the picnic. The commander will answer yes or no to what they suggest. From this the students need to guess the rule for the picnic (see pg 39)</p> <p>Discuss with the students, they needed notice what was similar about the things that were acceptable for the picnic, figuring out what those things had in common.</p> <p>This is called abstraction—we're abstracting from what's different about the things, and focusing on what they have in common.</p> <p><u>Activity:</u> Students to classify objects into sets and justify using abstraction.</p> <p>Students are given the Keynote template to identify the different silly sets of objects which have been grouped using a common theme.</p> <p>Students use the Keynote template to create their own groups and create a descriptive title to explain their sorting.</p>

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		<p>They don't have to include all the objects in their sets, and they can use one object in several sets, but they should have at least three objects in each of their two sets.</p> <p>Ask students to discuss in groups their sets.</p> <p><u>Practise:</u> Students to complete the puzzles and open-ended project in Dragon Spells lesson 5</p> <p><u>Journal:</u> Students think about the following questions as a group:</p> <ul style="list-style-type: none">- How do they use abstraction in the app?- How did abstraction help you solve the puzzles?
6	<ul style="list-style-type: none">- Understand how functions help us think more efficiently- Identify functions in everyday life- Solve coding puzzles using functions	<p><u>Introduction:</u> Recap lesson 1 with the students about the Command game and giving a set of instructions to a Command Bot.</p> <p>Sometimes we had to give the Command Bot a lot of instructions to do a task. We can make it easier by giving the set of instructions for each task a name. If we give the Command Bot a name for those instructions, like "Get book" or "Do cartwheel," then any time we want the Command Bot to perform the task, we can just use the name.</p> <p>Now we have a smart way of giving the Command Bot instructions.</p> <p>When we code, we create functions—a set of commands that has been given a name. Just like with the Command Bot, it makes coding easier and more efficient. We can just call that function by its name whenever we need it.</p> <p><u>Activity:</u> Using functions create a routine for the Command Bot.</p> <p>Students work in small groups and choose something that you can perform or do (e.g cartwheel, a dance, a Cup song etc)</p> <p>Students use composition to breakdown the function they have chosen into steps (See Keynote pg 46).</p>

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		<p>Using a presentation app Keynote, students collaborate to create one routine made up of at least three different moves that they'll use to program the Command Bot.</p> <p>Then, ask your students to take photos of each step of the routine and upload them to their presentation. In the presentation, they should provide the instructions to perform their routine. Using their composition and decomposition skills, they should create and label functions in their presentation.</p> <p>Once students have finished their presentation, ask them to swap it with another group and perform each other's routine. Did they perform the routine correctly?</p> <p>As a class, analyze the algorithms the groups created for the Command Bot's routines. Where could they improve? Could the moves be broken down even more to form more functions?</p> <p><u>Practise:</u> Complete all puzzles in Dragon Spell in lesson 6.</p> <p><u>Reflection:</u> Students think and discuss as a class the following questions:</p> <ul style="list-style-type: none">- How did they create functions in the app?- How did using functions make a difference in their coding?- How did they decide which sets of instructions to name as a function?
7	<ul style="list-style-type: none">- Understand conditional statements as a way of handling different situations- Identify situations where we use conditional statements in everyday life- Solve coding puzzles using conditional statements	<p><u>Introduction:</u> Sing the song 'If you're happy and you know it...' with students.</p> <p>Explain that in this song we have been using 'If statements'. An if statement tells us what to do if something is true. A condition is something we can check to tell if the statement is true or false.</p> <p>"If you're happy, then clap your hands" is a conditional statement. What do we do if we're not happy? With code, each command needs to be very precise. With conditional statements, if the condition isn't true, you just carry on: If you're not happy, then don't clap your hands. But we can also decide to be more precise by using an if-else statement:</p>

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		<p>If you're happy, clap your hands, else make a sad face.</p> <p>In coding, conditional statements like if statements and if-else statements give instructions for what to do in particular situations.</p> <p><u>Activity:</u> Discuss with the students that if they could go on a special holiday where would they go? Ask them to think about some conditions which will help them choose a destination. For example the destination needs to be warm etc. Ask the students to brainstorm five conditions on Notes.</p> <p>Ask students to think of different destinations, such as Paris or New York, and find out if each destination fits their conditions. They can use Safari to research the destinations or even ask Siri questions like, "What's the weather like today in the Grand Canyon?"</p> <p>Get the students to test the destinations by checking each condition and labelling it with 'True' or 'False'.</p> <p>Students open Maps and find the destination which was chosen and tested. They need to take a screenshot of this destination.</p> <p>Students open Pages and choose the Photo Card template to make a postcard, uploading the screenshot of their destination. The postcard needs to include If statements to explain how they decided on a destination. Encourage students to use the else statements too.</p> <p><u>Practise:</u> Complete all puzzles in Dragon Spells lesson 7</p> <p><u>Reflection:</u> Students to discuss as a class the following questions: How did we use conditions on the app? What did If statements enable them to do when coding?</p>
8	- Understand while loops as a way of handling	<p><u>Introduction:</u> Explain to the students we are going to use what we have learnt so far to code the following</p>

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	<p>conditions that stay the same</p> <ul style="list-style-type: none">- Understand nested loops as an efficient way of handling actions that contain other repeating actions- Identify situations where we use while loops and nested loops in everyday life- Solve coding puzzles using while loops and nested loops	<p>Gymnastics routine for a Command Bot. Show the instructions to the students.</p> <p>Walk onto the mat. If the audience applauds, bow. Twirl 3 times. While the jazzy introduction plays, do jumps. Then perform a double twirl 3 times. If the applause is loud, repeat the double twirl. Do a back flip.</p> <p>Using for loops, if statements and functions can the students create a code for the steps? What about the jumps?</p> <p>Explain that the for loop can't help for the jumps, because we don't know how many jumps there will be. Instead we use a while loop, the instruction to just keep doing jumps, as long as the jazzy introduction is playing. A while loop tells us to repeat a set of commands while a condition is true. When the condition is no longer true, we stop.</p> <p>Explain that in the line, "Then perform a double twirl 3 times," there is a for loop to do a double twirl 3 times. But a double twirl is a loop also by itself. So there is a loop inside a loop, which is called a nested loop. This is one way we can combine the concepts we've learned so far to create complex programs in a very efficient way.</p> <p><u>Activity:</u> Students to practise using 'While loops' and 'Nested loops'.</p> <p>Explain that students have been asked to manage a Donut stand with the help of a Donut Bot.</p> <p>To start the day, the Donut Bot's job is to ice donuts. Using Keynote (see pg 59), ask students to work in groups and create a virtual store that includes pseudocode for the steps needed to ice four packs of donuts. Each pack of donuts has five donuts.</p> <p>The Donut Bot has succeeded in icing four packs, each with five donuts. Twenty donuts are ready! But more customers still wait. How can we revise our pseudocode so that the Donut Bot keeps icing as long as there are customers? Students should then identify what coding concepts they've used in their pseudocode. Where did they</p>
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		<p>use functions, algorithms, or for, while, and nested loops?</p> <p>As a class, discuss whether all groups came up with the same pseudocode. Which group had the most efficient pseudocode? Most interesting?”</p> <p><u>Practise:</u> Practise using While Loops and Nested Loops while completing all puzzles on Dragon Spells in lesson 8.</p> <p><u>Reflection:</u> Discuss with the students how they used the While Loops and Nested Loops on the app.</p>
9	<ul style="list-style-type: none">- “Understand variables as a way of working with changing values- Understand input as information that’s received, and output as information that’s given back- Identify situations where we use variables, input, and output in everyday life- Solve coding puzzles using variables	<p><u>Introduction:</u> Play a multiplication recall game with the students asking them a times table to say the answer to within five seconds. Record the score in a tally chart on the board.</p> <p>Explain to the students the score is a variable as it changes throughout the game. The input is each new point we add, and the output is the final number they score.</p> <p>Variables hold values like numbers, words, and other types of data. You use variables when the values in a program are changing. They’re useful because coders can write the code without knowing exactly what number or word will be used.</p> <p><u>Activity:</u> To create a short poem using variables.</p> <p>On Pages, students write four lines of a poem and include two variables (for example see keynote on pg 65)</p> <p>Students perform the poem choosing different students to use the variables on and provide inputs.</p> <p>Students repeat to achieve a poem with several verses.</p> <p><u>Practise:</u> Students complete puzzles in Dragon Spells for lesson 9.</p>

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		<p><u>Reflection:</u> Discuss how variables were used in the app as a class.</p>
10	<ul style="list-style-type: none">- Understand UI and UX design as fundamental to the user experience.- Identify examples of good UI and UX design in everyday life- Use code to design own puzzle level	<p><u>Introduction:</u> Discuss with the students their favourite apps, which they use on a daily basis. What makes a good app? Are there parts of the app that are confusing?</p> <p>Explain that a User Interface (UI) is the screen that students see as they work through the app.</p> <p>Discuss what it's like to use the app. Which parts of the app do they use most or least often? Is there a reason for this? Here they're thinking about the experience that the user has of the app, or User Experience (UX).</p> <p>Now ask them to think about what makes the app easy or difficult to use. Can they easily find their way around the app? Here they're learning about navigation, which is how the user moves through an app.</p> <p><u>Activity:</u> Students develop understanding of UI and UX</p> <p>Show the keynote template with the signs on to the students and discuss what each sign means? What makes each sign easy to understand?</p> <p>Explore the use of colour, text, layout and image with the students</p> <p>Explain to the students that they are going to create a sign for school. In small groups using Notes get the students to brainstorm ideas for a school sign. Using the different tools (colour, text, layout and image)</p> <p>Using Pages, get the students to draw their sign making sure it is noticeable, attractive and easy to understand.</p> <p>Students present their signs to the rest of the class and the class have to try and guess what the sign is for. What made it easy?</p>

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		<p><u>Practise:</u> Students complete lesson 10 on Dragon Spells. They will create their own UI for a game.</p> <p><u>Reflection:</u> Students discuss the following as a class:</p> <ul style="list-style-type: none">- What elements did they design in Dragon Spells?- How did they make their design decisions? <p>Think about everyday examples of signs that are difficult to understand. What if they were in a foreign language, but the image was clear?</p>
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Glossary	
Algorithm	An algorithm is a set of step-by-step rules or instructions.
Bug	A bug is an error in your code.
Coding	Coding is telling a computer what to do.
Command	A command is a specific action.
Conditional statement or action	Conditional statements or actions occur only under certain conditions.
Debugging	Debugging is the process of identifying and fixing errors.
Developer	Developers write code to build their own apps and games.
Event	An event is an action that causes something else to happen.
Loop	A loop is an instruction to repeat a set of commands for a specific number of times.
Sequence	A sequence is the order in which things happen, like patterns and events.

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