

Tackling the Technology Gender Gap Together:

What's your Mindset?

Level - Second Level

Subject area/s – Computing Science and Health and Wellbeing



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Level - Second Level

Subject area/s – Technologies – Computing Science
Health and Wellbeing – Mental Health and Social Health

Experiences and Outcomes –

- I understand the operation of a process and its outcome. I can structure related items of information. (TCH 2-13a)
- I can explain core programming language concepts in appropriate technical language. (TCH 2-14a)
- I can create, develop and evaluate computing solutions in response to a design challenge. (TCH 2-15a)

Benchmarks –

Understanding and analysing computing technology

- Identifies algorithms/instructions that include repeat groups of instructions a fixed number of times and/or loops until a condition is met.
- Uses a recognised set of instructions/algorithm to sort real worlds objects for examples, books in a library or trading cards.

Understanding and analysing computing technology

- Explains the meaning of individual instructions (including variables and conditional repetition) in a visual programming language.
- Predicts what a complete program in a visual programming language will do when it runs, including how the properties of objects for example, position, direction and appearance change as the program runs through each instruction.
- Explains and predict how parallel activities interact.

Designing, building and testing computing solutions

- Creates programs in a visual programming language including variables and conditional repetition.
- Identify any mismatches between the task description and the programmed solution, and indicate how to fix them.

Duration of time – 4 Hours

- 2 x 1.5 hr Lessons for Computing Science activities
- 1x 1hr Lessons for Health and Wellbeing input and activities

Computing Science Concepts and Approaches – (Definitions from [Barefoot Computing](#) – Computational Thinking Resources.)

Concepts

Algorithms – Making steps and rules

Logic - Predicting and analysing

Patterns – Spotting and using similarities
Decomposition – Breaking down into parts
Abstraction – Removing unnecessary detail
Evaluation – Making Judgements

Approaches

Creating – Designing and making
Debugging – Finding & fixing errors
Persevering – Keeping going

Resources required

- Demonstration of completed program outlined in plan can be viewed at <https://scratch.mit.edu/projects/151407075/>.
- Video demonstration is available on Glow and on [You Tube](#)
- <https://scratch.mit.edu>
- <http://barefootcas.org.uk>
- <https://ideas.classdojo.com/b/growth-mindset>
- <https://www.mindsetkit.org>
- <https://www.khanacademy.org/resources/parents-mentors-1/helping-your-child/a/growth-mindset-lesson-plan>
- The Power of Yet – Sesame Street Musical
- Growth Mindset Cards PDF

Overview of learning

This lesson is based on learners extending and deepening their understanding of computing science via a visual programming language, in this case they should use Scratch.

Learners will also be gaining a greater awareness of what Growth Mindset is through a range of teacher led activities which will demonstrate how working independently and challenging ourselves, our brain becomes stronger when working to learn new concepts and strategies in all areas of school and life. This resilience is the responsibility of all within Health and Wellbeing. The learners who create the algorithm for their quiz which identifies if a user has a growthmindset yet, can then be used with peers of all ages across their school.

Using a multiple choice framework, learners will design and build a quiz within Scratch where they must create a program which identifies if the user currently has Growth Mindset through the use of loops, variables and conditions which encourage the participant completing their What's Your Mindset? Challenge.

In addition, as learners build their own program, it will enhance their understanding of the concepts of broadcast and receive within the quiz as they develop their problem solving and critical thinking when they debug and test their solution as they go.

Pupil Objectives

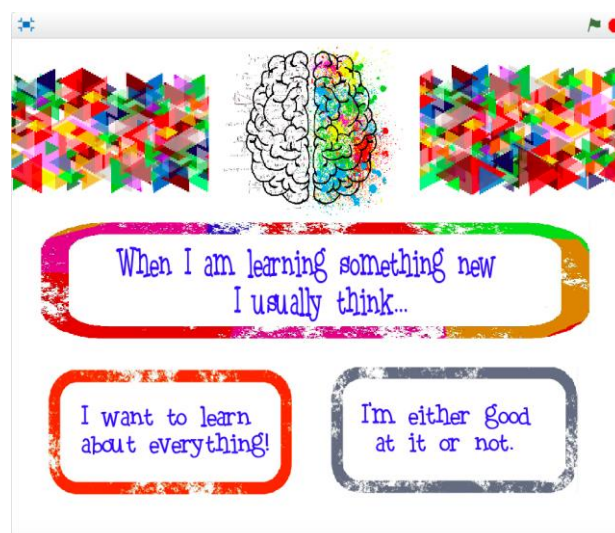
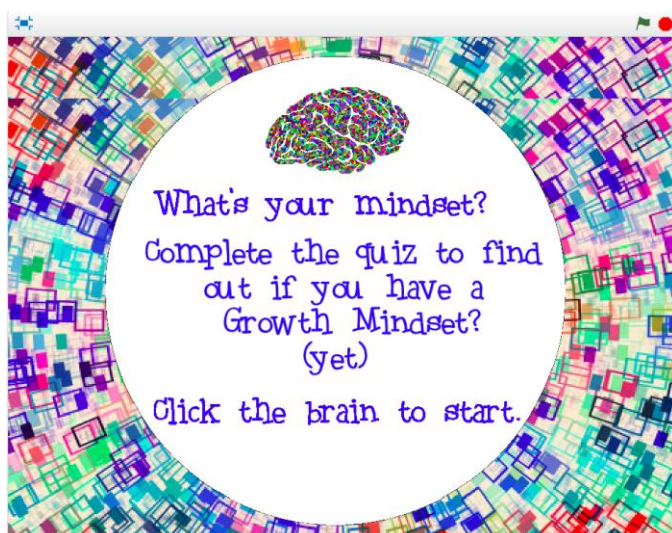
- I can create a simple program using algorithms, variables and conditions to create a quiz
- I can identify how my program communicates messages between sprites using broadcast and receive and link this to control within my quiz.
- I can apply my understanding of the difference between growth and fixed mindsets when using decomposition to categorise answers within my quiz.
- I can debug my program and identify any mismatches between my challenge and the solution.

Introduction

Introduce the topic of Growth Mindset with learners. Explain that they will be learning about how they can make their brains stronger and more resilient. Growth Mindset is not about knowing everything but seeing that learning new, increasingly challenging things can be achieved with perseverance and creativity, the emphasis is on **'yet'**. There are several web links which provide information about Growth Mindset that can be found in the 'resources' section of this plan.

This **computing science** activity is designed to be used as a way to reinforce the topic of Growth Mindset as part of an initial input or the learners can use their completed quiz as a way to self-assess their mindset at the end of focused Mental and Social Health and Wellbeing lesson, the results of which will allow the learner and their teachers to see if the pupils mindsets have progressed from fixed to growth.

Learners will complete their own version of the quiz using **computing science**, they will apply strategies which naturally encourage growth mindset such as creativity, finding an alternative, problem solving and perseverance. Demonstrate the example created to accompany this lesson plan which can be found at <https://scratch.mit.edu/projects/151407075/> whilst reinforcing that pupils can identify their own questions and layout as they design their **algorithm**.



Prior to looking at the **code** used to create the game being demonstrated, ask learners to identify key components of the **computing science** activity which they will be required to build into their **program** e.g. **loops**, **algorithms**, **variables** in the form of counters (which may be hidden). The viewing of this online example will also allow

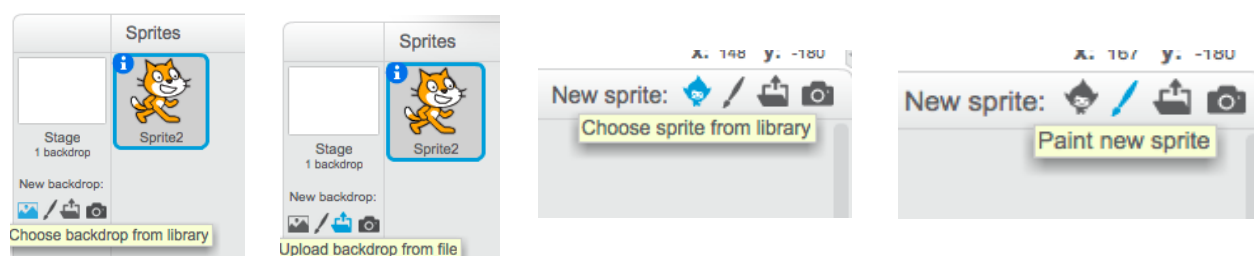
learners to identify their own prior knowledge with Technologies and Health and Wellbeing and what next steps in their learning they may have in both curricular areas.

Main Activity

Learners should have the opportunity to discuss and investigate what it means to be resilient and what the terms Growth Mindset and Fixed Mindset mean through a variety of scenario based learning activities. Teachers may also wish to encourage pupils to create a visual sketchnote on what they are exploring and learning whilst carrying out research, role-play and discussion activities to deepen their knowledge of mental and social health focusing on Growth Mindset and strategies which support it. This will be used to guide them as they create their computing science activity and can be used as a form of assessment for the learning in Health and Wellbeing (HWB) which is taken place.

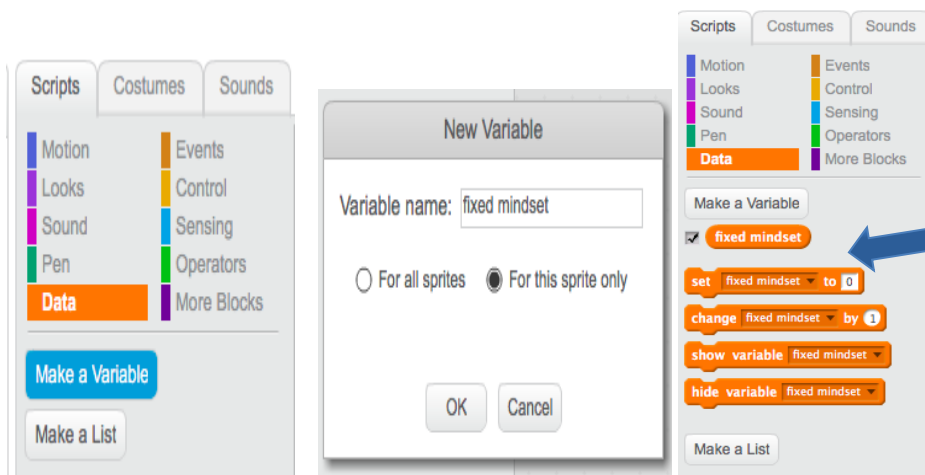
Using their own knowledge and notes, learners should create an **algorithm** which will form the basis of their quiz and will demonstrate their understanding of the difference between Growth and Fixed Mindsets as well as programming skills. Having completed their research and **algorithm**, they will now use **Scratch** to create their self-assessing quiz.

Learners should create a **Stage** or **import** an existing two from the **backdrops** resources built into the program and they should then select a **sprite** to use as the start button in the quiz. Alternatively, they can amend an existing **sprite** or give it an alternative **costume** or paint/type a brand new **sprite** to act as button of their own design.



The quiz will allow the user to select from one of multiple answers; in this case they have two choices. To initiate the quiz the user must click the sprite they created as a button, on the introductory page, this will ensure that the background changes and the first question is displayed by using the '**Looks**' code blocks of **switch backdrop to** and **show**, this allows the user see the first page of questions.

At this stage, learners should also identify that they are required to create two **variables** via the **data script** category. These **variables** will count the total clicks which each **sprite** receives based on with the answer being either a fixed or growth mindset response. Learners will also need to ensure the user taking part in the quiz does not see the counter as this could influence their answers. To place the **variables** out of view, they should add the **hide code block** from the '**Looks**' scripts. The **variable** with the larger number will determine which final backdrop a user sees.



The **variable** allows the counter to be seen on screen by ticking the box and **setting** the amount the score will raise by.

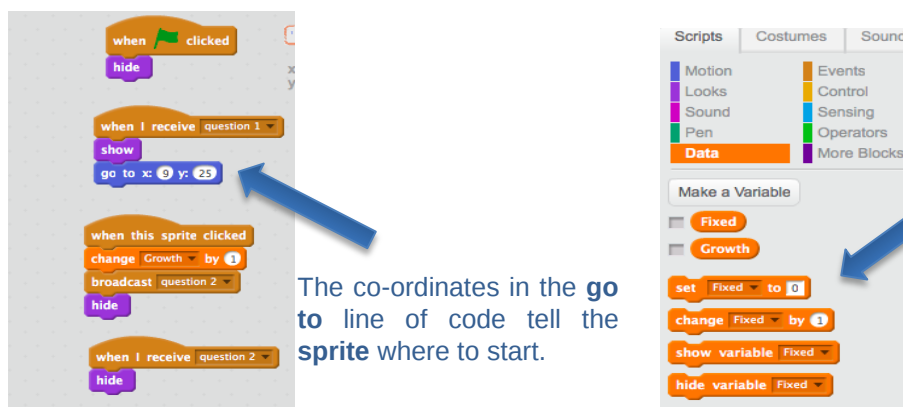


It is important to point out that the name given to their **variable** in the **New Variable** pop up window will determine the name it is found by in the **code blocks**.

Explain to the learners that a **variable** is like a box or container which they can create to store any **data** (information) such as numbers or words, for this game we will be storing numbers to count our quiz score which determines the mindset of the user. Discuss where variables, such as the ones shown in the example activity can be found or used e.g. online surveys and how concepts such as Boolean logic (answers of true or false) could fit into this process .

Scratch will require the pupil to identify and use the **x-y coordinates** of where the learner wants their **sprite** to be placed on the stage. This location is identified by the mouse moving to the preferred location to identify these **coordinates** and then including them in the algorithm for each button, question or answer.

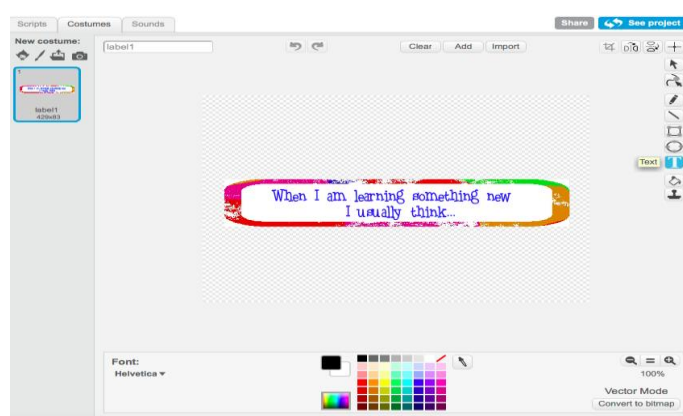
The learner will now be required to create a **sprite** for each question and answer which they will use in his or her quiz. These groups of **sprites** will each be given a **stage** of their own to be displayed on and using the '**Events**' **code blocks** they will be introduced to the concepts of **Broadcast and Receive**.



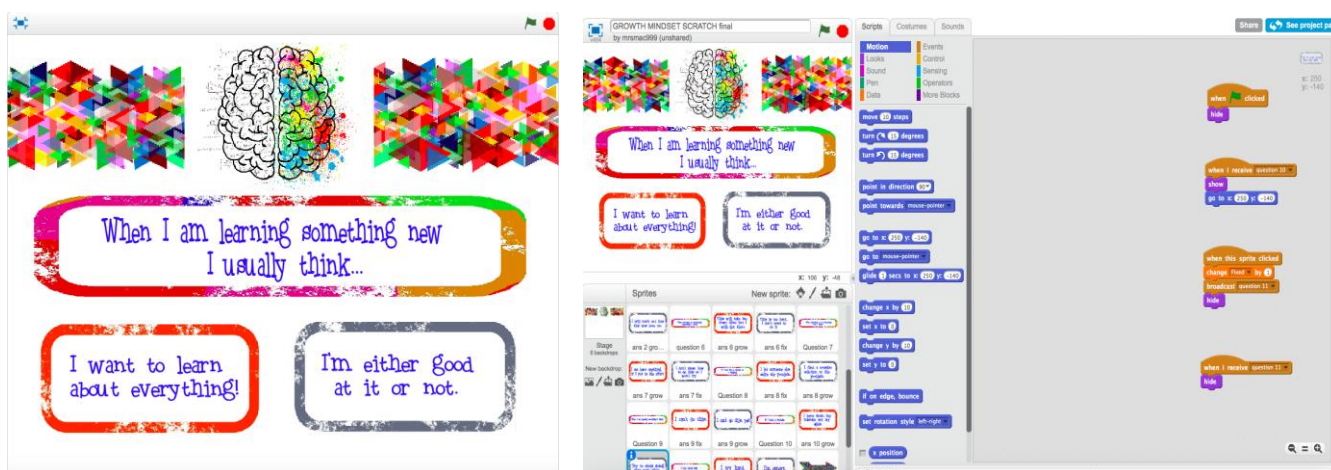
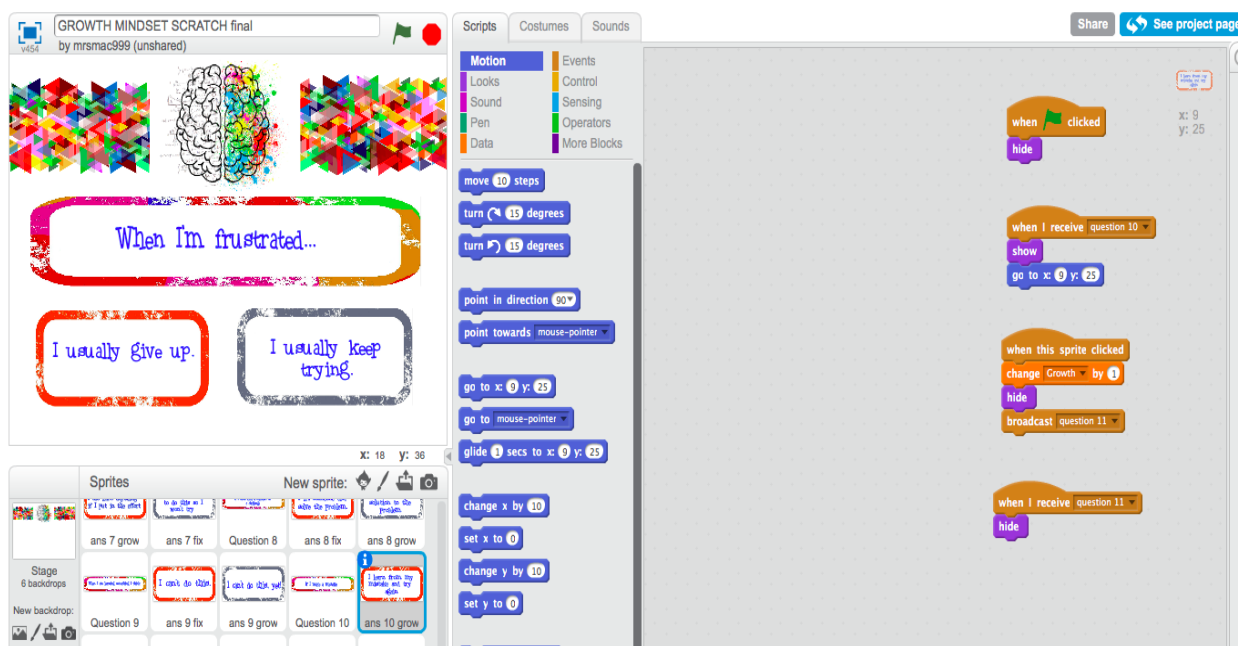
When a **sprite** displaying an answer is clicked this will **broadcast** a message to the next set of **sprites** telling them to launch a new **stage** and set of questions to be shown and the current **stage** and questions to be hidden when the message is **received**. The use of the **variables** means that the **program** adds a point to the growth or fixed mindset **variable** at this point too.

It is crucial that learners understand that in this program messages are being **broadcast** and that these communicate with particular parts of our **script**, in this case a broadcast **controls sprites** and **stages** and when these objects receive a **broadcast** message it triggers the **sprites** and **stages** to be replaced with the different ones. It is possible to have a **broadcast** communicate with any other line of **code** which has a corresponding **receive script**.

Learners should add a **sprite** to represent each question and individual answer either by drawing it, sourcing a border from the internet following usage rules of any images they select and in which they can type or alternatively, teachers can provide them with images included those in this resource pack. Once each question or answer **sprite** is added, learners will use the **coding blocks** to build up their **algorithm** in the **script** area at the right of the screen.



This process is repeated for each set of questions being displayed. Learners should be encouraged to use an odd number of questions to ensure that their **variable** score clearly identifies the Growth or Fixed Mindset.

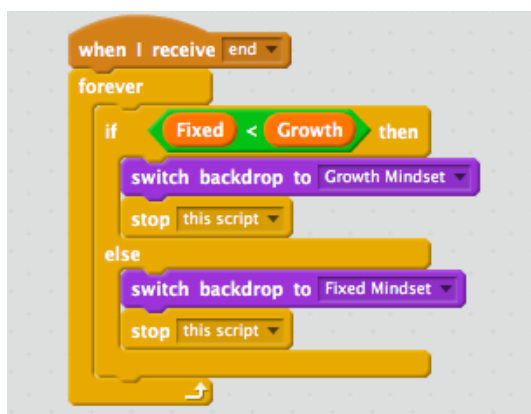


Recap using the learners' sketchnotes and the cards in the Growth Mindset PDF resource to identify responses which fall into the growth or fixed mindsets and which learners should use as **sprites**. Learners will create an **algorithm** to identify which mindset each item belongs to, this may can be done by creating an **unplugged** copy of each **algorithm** they use to extend their sketchnote or role play activities as this is a guide for life not just their **program**.

Upon adding all the required question and answer **sprites** and their **code**, learners should now return to the opening page of their quiz by selecting that **backdrop** or clicking the flag to reset the **program**.

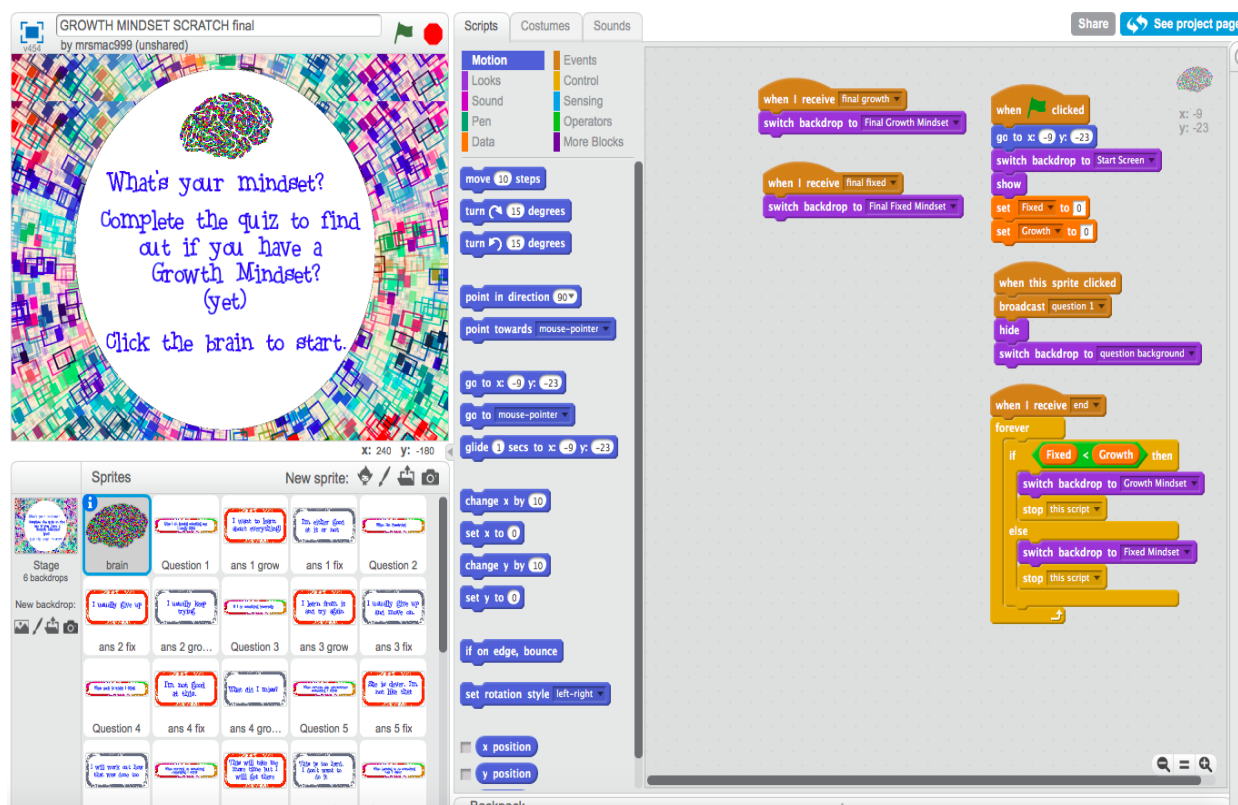
Encourage learners to identify the **pattern** and **decomposition** within their **algorithm** as this process is repeated for all questions and answers being used as **sprites**. It is also important for learners to **debug** their program as they build it, removing any incorrect or corrupt **code** and amend any glitches before saving their work at regular intervals.

Learners should now be introduced to the concept of a **loop** which will be added on the first backdrop and stage.



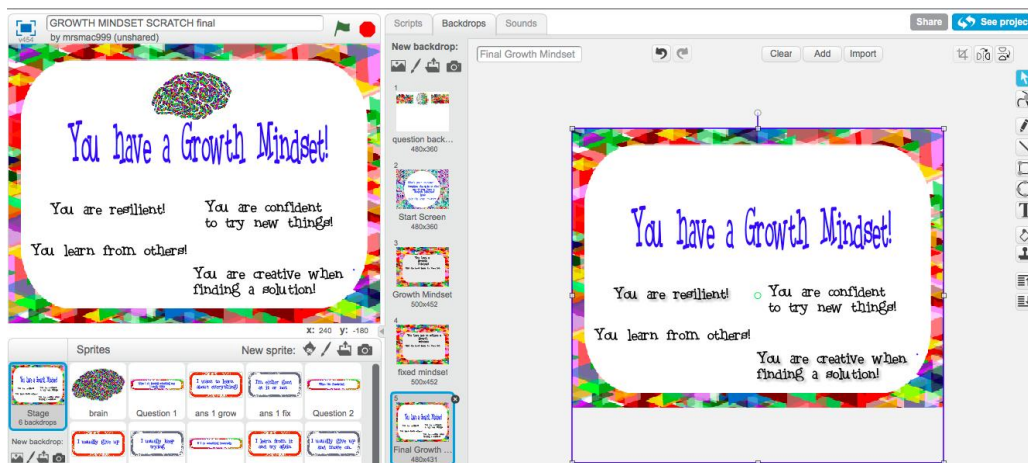
Using **loops** ensures that when the user reaches the end of their quiz they will always be shown a new **backdrop** based on their **score** which is being added up by the **variables**.

In this activity, we add in an **if / then / else** loop inside our **forever** loop. This means that the algorithm is always (**forever**) looking to see **if** the *fixed* mindset **variable** score is less than the *growth* mindset **variable** score then the user will be shown the *growth* information backdrop on the stage. The **algorithm** tells the **program** that **if** this is not true then it will read the code in the **else** section of the **loop** and show the *fixed* information **backdrop** on the **stage**.



Using their original 'welcome and introduction' **backdrop** in order to add a **forever** loop underneath a new **broadcast code block**. This means that when the last question is answered, that sprite will broadcast 'end' and the loop attached to the '**when I receive end**' will trigger everything within that forever loop to run automatically.

Learners will be required to add a backdrop which will be shown when this loop runs. Depending on the the result of the quiz this will either display information on how to develop a growth mindset further or how to develop one as the pupil may not yet be identifying as having one.



Plenary

At the end of each **Computing Science** lesson discuss with the learners;

- which of the **concepts** and **approaches** they have used and what impact that had on their work?
- did anyone have to make changes to their original **algorithm**? If so, how and why?
- how did **decomposition** play a role in their **algorithm** and completed **program**?
- ask learners to identify further real world applications for **programs** similar to this and use these to develop extension activities and challenges for future learning.
- did any pupil find any issues when they were **debugging** their **program**, if so how did they resolve this?
- ask pupils to build any new information gained as they researched questions and strategies to use within their program to their sketchnote to complete the Health and Wellbeing aspects of their work.

Differentiation

Learners can be encouraged to design as many of the stage **backdrops** and **sprites** as possible and develop their understanding of the **design process** and **vector images** and incorporating skills and tools from a range of linked **programs** which may create the desired look for their questions and answers.

Learners experiences can be extended by asking learners to add different **variables** of their choice into the **program** e.g. timers. This project could also be extended by asking learners to change how each item changes in appearance when the **broadcast / receive** and **variable** processes are altered.

Higher – achieving learners could add new lines of code using blocks of script which they create using the **‘more blocks’** script. This allow learners to create additional algorithms when used in conjunction with **loops**, **sense** or **data coding blocks**.

Learners could be asked to sort the statements on the Growth Mindset Cards PDF using different criteria / **algorithm**.

Assessment Opportunities

- Review and discuss learners understanding of each mindset and the the importance of Growth Mindset.
- Observe and review if learners have created a successful algorithm using unplugged and plugged methods. This work can be evidenced with either photographs and screenshots.
- Learners to create sketchnotes on the HWB and CS concepts that they have been learning. These could be used to compile a Say, Make, Do, Look display ensuring that their voice is heard and that they can explain, in their own terms, the variables and conditionals being using in their program.
- Learners could create a video guide to each mindset, showcasing their program and the computing science they used. This would also allow them to develop their digital literacy skills and ensure that pupils who have strengths in areas such as drama and literacy can use these to demonstrate learning through storyboarded dramas or roleplays which would be filmed.
- The completed program and accurate movement of sprites within it will demonstrate that they understand how the x-y axis of the stage works and that they can successfully interpret this information.
- The completed program and smooth transition between each set of questions and answers will demonstrate pupils understanding of the broadcast and receive process.

Curriculum Links

Health and Wellbeing - Mental Health

- I know that we all experience a variety of thoughts and emotions that affect how we feel and behave and I am learning ways of managing them. **HWB 0-02a / HWB 1-02a / HWB 2-02a / HWB 3-02a / HWB 4-02a**
- I understand that my feelings and reactions can change depending upon what is happening within and around me. This helps me to understand my own behaviour and the way others behave. **HWB 0-04a / HWB 1-04a / HWB 2-04a / HWB 3-04aHWB 4-04a**
- I understand the importance of mental wellbeing and that this can be fostered and strengthened through personal coping skills and positive relationships. I know that it is not always possible to enjoy good mental health and that if this happens there is support available. **HWB 0-06a / HWB 1-06a / HWB 2-06a / HWB 3-06a / HWB 4-06a**
- I am learning skills and strategies which will support me in challenging times, particularly in relation to change and loss. **HWB 0-07a / HWB 1-07a / HWB 2-07a / HWB 3-07a / HWB 4-07a**

Health and Wellbeing – Social Health

- I recognise that each individual has a unique blend of abilities and needs. I contribute to making my school community one which values individuals equally and is a welcoming place for all. **HWB 0-10a / HWB 1-10a / HWB 2-10a / HWB 3-10a / HWB 4-10a**
- I make full use of and value the opportunities I am given to improve and manage my learning and, in turn, I can help to encourage learning and confidence in others. **HWB 0-11a / HWB 1-11a / HWB 2-11a / HWB 3-11a / HWB 4-11a**