Overview

In this activity, your child/children will follow an algorithm to draw pictures constructed from 2D shapes. The algorithms they follow will include errors (mistakes) and your child/children will use logical reasoning to detect and correct these.

Items you will need

● 2D Shape drawing worksheet

What will my child learn?

Algorithms – An algorithm is a precise sequence of instructions, or set of rules, for performing a task.

Logical Reasoning – Logical reasoning helps us explain why something happens. Logical reasoning is used throughout the activity as your child/children use their existing knowledge of 2D shape and the information they are given for each step about the shape's size, location, orientation etc. to work out the rule for the algorithm.

Debugging – Bugs are errors or mistakes in algorithms and code. Debugging is the process of finding and fixing these and it can often take much longer than writing the code in the first place.

The behaviours **creating**, **persevering**, **collaborating** and **tinkering** (changing things to see what happens), are approaches to learning that are encouraged throughout this activity.

Getting Started

1. Write the word algorithm and ask your child/children to recap what an algorithm is (an algorithm is a sequence of instructions or a set of rules to get something done) explain there are examples of algorithms in our everyday lives, such as getting dressed in the morning or making toast and jam for breakfast.
2. Explain they will be following algorithms made up of a sequence of instructions. However, these algorithms will include errors (mistakes), and their task is to detect and correct the errors in the algorithm. Explain that this process is called debugging. Give them an example with an error, such as making a sandwich but miss out the butter
3. Explain that your child/children will be using logical reasoning which allows us to 'think through' the steps in algorithms to determine their outcome. We can use logical reasoning to identify where errors might be happening and "debug" them.

Their Turn

1. Look at the 2D shape drawing worksheet and explain that on the left is an algorithm. This algorithm is made up of a sequence of instructions to create a picture of a house. On the right is how you would like the house to look. However, you suspect there might be some mistakes in the algorithm. Your child/children's task is to use logical reasoning to work through this algorithm to detect and correct any errors – to debug it.
2. Explain that to help them detect and correct any errors, they should draw out each step of the algorithm. Encourage them to read each step of the algorithm and draw this on a separate piece of paper.
3. Read the algorithm from the 2D shape drawing worksheet with your child and get them to follow the steps.
4. After drawing each step, ask your child/children to check whether what they have drawn from the algorithm matches the picture. If it does then move on to next step; if it does not then debug the algorithm.

The worksheet algorithm includes errors such as incorrect shapes or locations. Some steps of the algorithm are not precise enough to specify where the shapes should be located on the page or their size relative to the others.

Time to Talk

1. Explain that logical reasoning is concerned with how a problem is solved rather than simply 'knowing' the right answer. It is the journey, rather than the destination that is important.
2. Explain that algorithms are written for a human, rather than for a computer to understand. In this way, algorithms differ from programs.

## More ideas to extend learning

- Can your child/children create a simple drawing made from 2D shapes and then write the algorithm for this drawing? Importantly, they should purposefully include three mistakes in their algorithm for a member of their family to debug.
- Maybe your child/children could have a go at replicating their drawings in Scratch using the pen commands. These can be used to write a program which will trace out a drawing when run. In doing so, they will learn how to implement the algorithms they have written as a program using the commands available. Just follow this link to join the free coding program Scratch: https://scratch.mit.edu/
- My Scratch video tutorials are still available if you would like to have a go at making a game in Scratch.

2D Shape drawing activity worksheet

The algorithm below describes how to draw a house using 2D shapes. Is it correct? Can you debug the algorithm?

Algorithm:

1. Draw a square in the centre of your page.
2. Draw an equilateral triangle with one edge aligned with the top of the square.
3. Draw two triangles inside the square.
4. Draw a square with sides half the length of the first square, inside the first square.
5. Draw a regular hexagon to the left of the square. The bottom of this shape should be in line with the bottom of the square.
6. Draw a regular pentagon to the right of the square.
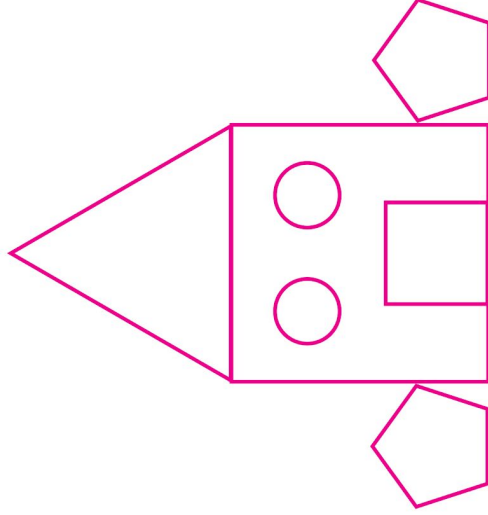
Your Debugged Algorithm:

1. ....
2. ....
3. ....
4. ....
5. ....
6. ....