# Year 1 Algorithms through Bee-Bots

> **KS1 Programs of study covered**
>
> Pupils should be taught to:
>
> - understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
> - create and debug simple programs
> - use logical reasoning to predict the behaviour of simple programs
>
> **Computational Thinking**
>
> **Algorithm** is a precise set of instructions or rules to achieve an outcome or solve a problem.

**Using Bee-Bots with KS1 a 5-6 week module which follows guided play activities in reception and which is followed by a 6 week module of algorithmic evaluation in year 2.**



**Before you start the module**

Decide on a context which links to a project you are doing. Geography or local history are popular but it could be anything.

Have pupils had directed play opportunities in reception? If they haven't had these, spend two lessons rotating around these activities. Pupils who haven't had open ended play activities are at a disadvantage when it comes to logical reasoning with the Bee-bot.

**Do you know what every Bee-Bot command does? (1 lesson)**

Can they describe these to a partner?
Students work in pairs to create a short video to explain what each button does on the Bee-bot. Demonstrate what makes a good video first.

Students need to

- Record in good light. Avoid windows as backgrounds as these darken the video foreground.
- Record with the camera person facing towards a wall so no one passes behind their video.
- Keep the recording device (iPad) still. Tripods are available.
- Frame the face and Bee-bot in the picture.

- Keep the iPad close to the person speaking so the sound is clearly picked up.

Students need to avoid

- Demonstrating the Bee-bot moves as this is about explanation not demonstration.
- Recording where it is too noisy.

**Drawing Bee-Bot World (1 lesson)**

Draw a grid of 15cm$^2$ squares across a large sheet of sugar paper before the lesson.

Use the Bee-Bot World slides to help pupils design and create their own world. Use your own theme locations, not the ones of the slides.

Pupils work in pairs to design Bee-bot world.



**From A to B (1 lesson)**

Can students program the Bee-bot to move from A to B on their maps? Pupils are creating an algorithm in their heads before programming the digital device.

One pupil decides on the start and finish point of the route. The other programs this into the Bee-bot. Once the green GO button is pressed no one is allowed to touch the Bee-bot until it stops. This encourages pupils to be more careful in their programming.

Some pupils will move onto A to B to C or A to C avoiding B

**From A to B creating symbol algorithm first (2 lessons)**

Before the lesson make sure you have sets of Bee-bot algorithm cards printed and cut up and that you have your Bee-bot worlds created.

Pupils work in pairs. One pupil creates an algorithm to go from A to B by ordering the cards sequentially. The other pupil converts this algorithm into code by punching the instructions into the Bee-bot.

Instruct pupils to **ONLY** press buttons if there is an algorithm card. Often pupils will press **GO** or **clear** when there is no **GO** or **clear** card in the algorithm.

Some pupils will be ready to move onto more complex challenges such as from **A to B to C** or **A to C avoiding B** other won't.

**Reading out the algorithm cards alongside the bee-bot program**

A really good strategy for making the link between algorithm and programming and to aid debugging is to encourage pupils to read out their cards as the turtle performs its instructions. This makes it much easier for pupils to spot errors called bugs in programming. This is similar to programmers tracing their more complex code to work out what it does before testing it on a digital device.

**Cards on the mat**

Some pupils find it very helpful to place the cards on the route the turtle will take instead of alongside the mat