



Giving Directions

Using Algorithms in Python

Resource

Secondary

11-14 years

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Noteable Activities for Schools: Giving Instructions

These resources are a guide for teachers to demonstrate to the whole class or direct individual students as appropriate. The activities below can be directly distributed to pupils.

For instructions on how to install and use Noteable resources, please look at our guides for teachers in GLOW: [GLOW guidance for teachers to start using Noteable](#).

Content and Curriculum links

Level	Context	Indicators
11-14	Using basic algorithms to give instructions	Insert, Markdown, List

Knowledge	Using bullet point lists to give instructions
Curriculum links (England) Computing KS3	<ul style="list-style-type: none">• design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems.• understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem.
Curriculum links Wales)	
Scottish Curriculum for Excellence	Experiences and Outcomes: <ul style="list-style-type: none">• I am developing my understanding of information and can use an information model to describe particular aspects of a real world system. TCH 3-13b Benchmark: <ul style="list-style-type: none">○ Identifies the use of common algorithms such as sorting and searching as part of larger processes.
All: Cross-curricular opportunities	The activities have identified opportunities for Geography and Numeracy.

What is an Algorithm?

An algorithm is like a recipe—a set of step-by-step instructions to solve a problem. In an algorithm, we list each instruction and plan the order in which they should be followed.

If we want a computer to do something, we need to write a computer program that tells it exactly what to do and how to do it, step by step. To do this, we use something called an algorithm, which is like the plan for our program.

Think of computers as being only as good as the instructions they receive. If we give a computer a bad set of instructions (a poor algorithm), we'll get a bad result. That's why we say, "Garbage in, garbage out."

Algorithms are used for all sorts of things, like doing math, processing data, and automating tasks.

When we face a problem, it's essential to plan out how to solve it correctly. We can do this by breaking the problem into smaller parts and figuring out how they should fit together in the right order to solve the whole problem. This planned order of steps is what we call an algorithm. A good algorithm should be easy to understand and have a clear start, finish, and a set of clear instructions in between.

Activity 1

Imagine that in a cold autumn's day, your best friend, Don, decided to play at the pond with his toy boat. After he walked all the way to the pond, he realised that the boat's battery is not working. He doesn't have spare batteries and decides to call you for help, but you have a cold and cannot leave the house. You then decide to send your robot friend to the pond with the batteries for Don. You will need to give your robot clear instructions on how to get to the pond. Remember, your robot has a simple computer brain - it needs to be told exactly how long to walk and where to turn to get to the pond. This process must be broken down into simple tasks for the robot to perform.

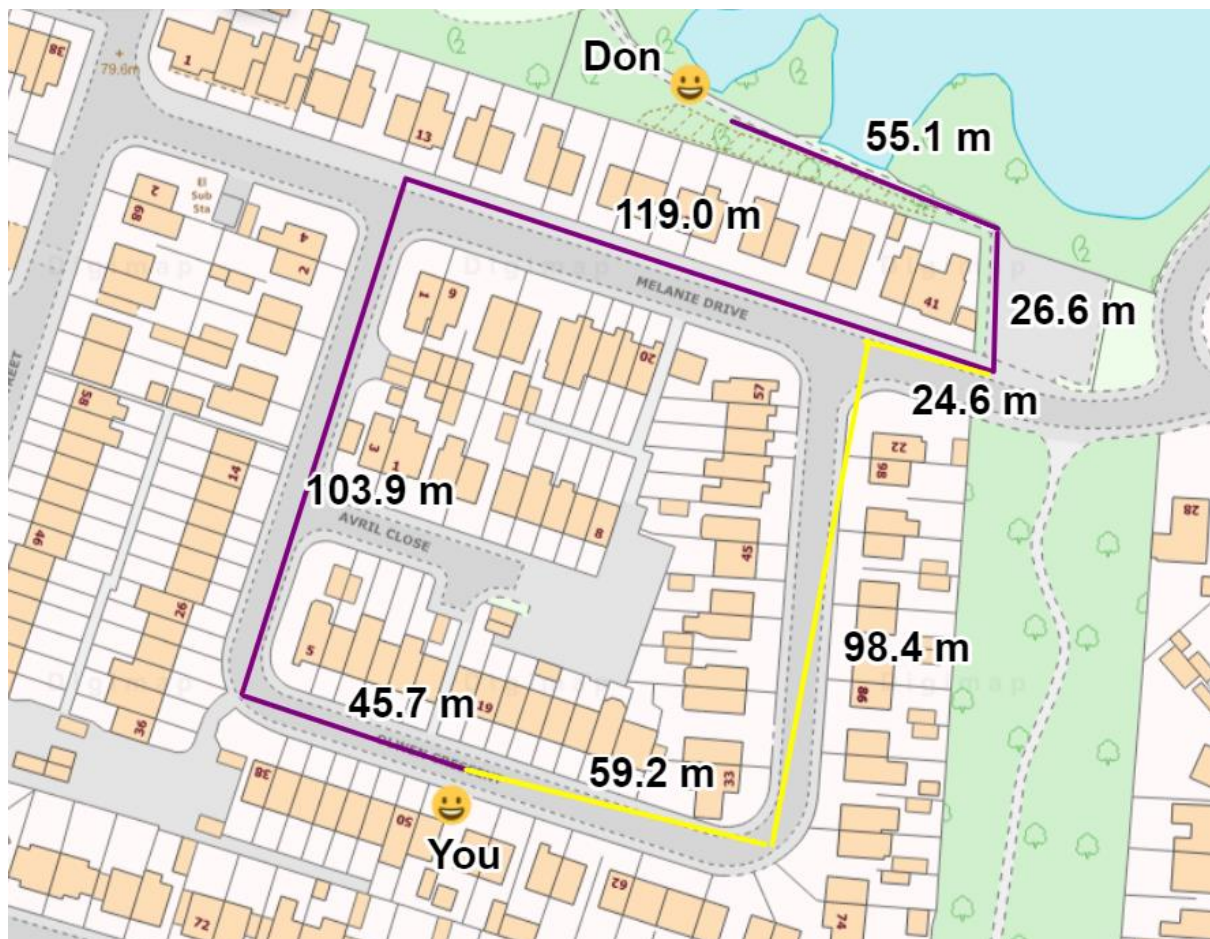


Figure: <https://digimapforschools.edina.ac.uk/roam/map/schools>

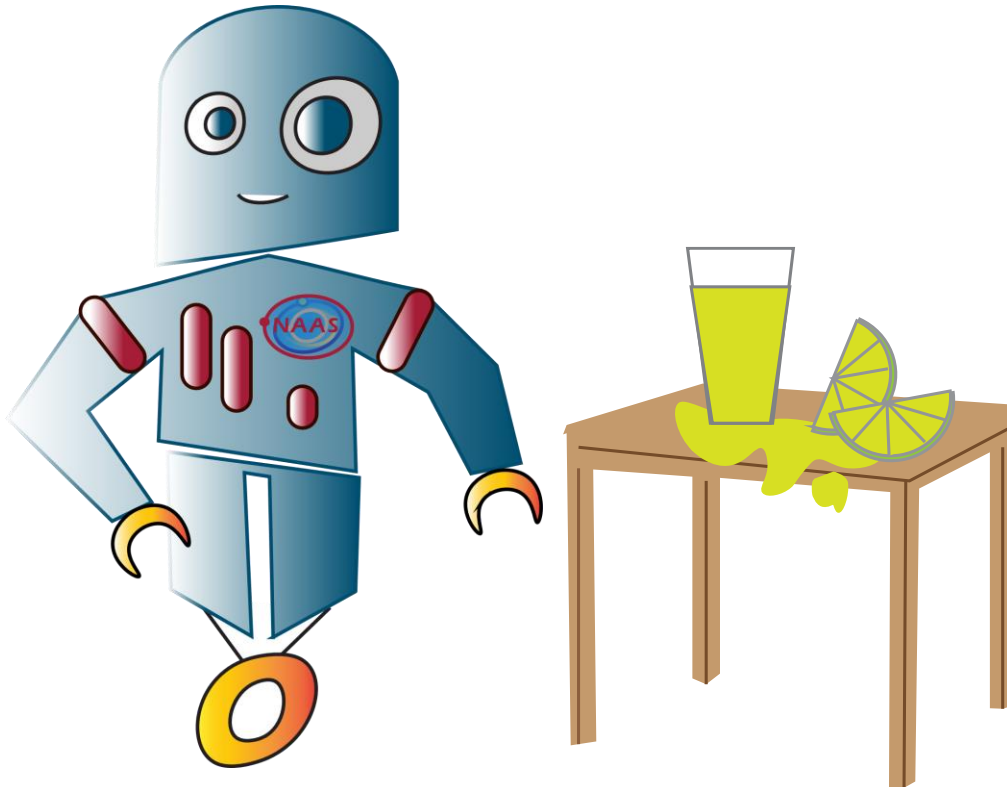
In a new cell in this notebook, write an algorithm (a list of step-by-step instructions) for the robot to get to the pond.

1. Select **Insert** then **Insert Cell Below**.
2. Select the cell type as **Markdown**.
3. Use a number followed by a full stop and a space to create a numbered list (for example **1. Walk 8.2 m**).

Activity 2

It is time to teach your robot friend to do a few things for you.

You want to have a glass of lemonade, but it is too cold for you to stand up. Sitting where you are, type the instructions on how to make a lemonade to your robot friend. Follow the same rules as in activity 1.

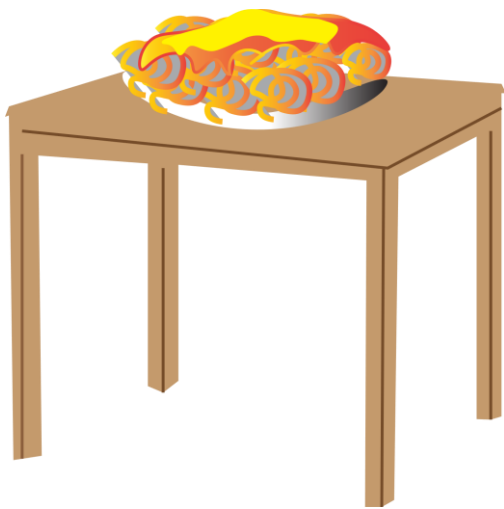


Activity 3

Is your robot up for a challenge?

You want to make some spaghetti.

Your robot will need to cook the spaghetti and the tomato sauce simultaneously and in different cooking pots. Your robot friend will need to cook both separately and then combine them. Do you think he can do it? You will need to give your robot precise step by step instructions.



Cross-curricular opportunities

Geography: You can add an extra challenge to the lesson. Your students can select a map in Digimap for Schools or another mapping tool and create paths and measurements for their peers to create the algorithm.

Numeracy: Depending on what you are teaching in Numeracy and Maths, you can use the algorithm as a starting point, you can create a number of activities. For example, students can discuss which way is longer in total, calculate the difference and between the two ways and calculate the distance if a direct line was used from the 'You' point to the final destination. They can then, display their answer as part of the next coding activity (printing messages and information).

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