

Lesson 2:

Lesson summary: The focus of this lesson is the need for **algorithms to be precise and accurate**. Pupils use directional language, linking to age-related numeracy objectives, to guide their partner (who takes on the role of a robot) through a paper maze.

LO Give and follow instructions, including turning movements.

Lesson summary: This is a practical lesson whereby pupils work in pairs and one takes on the role of a robot and the other has to give their robot partner directional commands one at a time to guide their robot (who can not see through their robot mask) around a maze.

Begin the lesson by recapping the previous week's learning, specifically that an **algorithm** can be a sequence of instructions to complete a task. Also recap that algorithms need to be accurate as computers do exactly what they are told!

Explain that this week pupils will be creating (orally) algorithms using **directional language**. Ask pupils to T-P-S examples of words used for directions. Pupils feedback and write up on a piece of flip chart paper and discuss/clarify the meanings of any words they are unsure of e.g Right, left, forward, backward, go, stop. **Note – this section of the lesson acts to elicit the mathematical understanding pupils require to undertake this computing lesson. It may be that if pupils' understanding of directional language is not secure time needs to be spent reinforcing this before completing the rest of this lesson.**

Explain that today they will be tackling a challenge in pairs, whereby they will take turns in one being a robot and the other speaking a series of instructions, **an algorithm**, using directional language to help the robot find a route through a maze.

Partner work: Pupils first make a robot mask to share between them by cutting out the masks below (photocopy the number needed) and attaching a piece of string (or large rubber band which has been cut open) to either side so they can wear it without having to hold it. **(Note – they do not need to cut the eyes out as the point of wearing the mask is that they can then not see and need to rely on the precise algorithm of their partner!)**

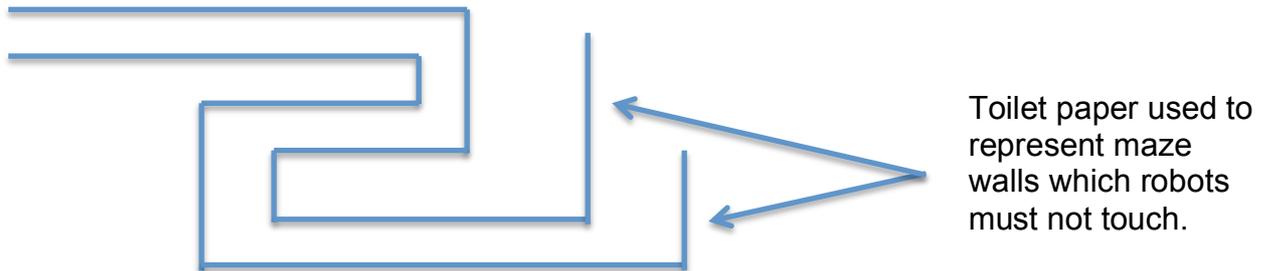
When pupils are completing this activity, please write the instructions up on the board i.e. Cut around mask; attach string etc and highlight that this is an algorithm **(a series of instructions!)**

Note – Once pupils have completed their masks, the rest of this lesson requires a large space such as the school hall (outside is not suitable as the toilet paper used to create the maze (see below) will blow away.

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The next stage of this lesson is to provide pupils with the opportunity to guide their robot partners around a maze set out in the hall. A safe, easy and cheap way to construct the maze is to use a couple of rolls of toilet paper to map out a maze on the floor of the hall. Do this so the toilet roll represents the walls and the pupils have to guide their partners to stay within the walls (see simple diagram below) (**Make all turns 90 degrees**). **Note - Constructing the maze with the class of pupils together (as opposed to setting up before the lesson) also offers the opportunity to reinforce the language of direction.**

It has also been suggested that a similar maze could be drawn on a playground using jumbo chalk.



Before pupils can start guiding their robots, we need to decide what **instructions** we are going to be able to give our robots – remind pupils that computers/robots aren't very clever and we need to be very accurate and clear. Ask pupils to T-P-S and feedback which commands we should be able to give. Feedback commands and finalise a list of commands on a flip chart.

It is likely that commands will be forward, backward, turn left, turn right etc, so lead a discussion so that these are made more precise to:

Forward one step, Turn quarter turn right etc.

Pair work: Pupils now take turns in guiding their Robot partner (who is wearing the robot mask so they can not see) around the maze using the commands you have settled on as a class (have these in big on a flip chart or hall projection screen)

Differentiation:

Stretch: To stretch pupils: **Can pupils think of more effective commands so they have to give fewer commands to guide the robot?** (*Hint: pupils could use: Start walking, stop walking rather than giving one step at a time*)

Support: It is anticipated that some pupils may need support in terms of being reminded about the directions left and right. As such a 'Robot programming card' has been made (which can be photocopied for pupils which need it) and appears below.

Organisation - To aid lesson organisation, there should be space to construct several mazes in a school hall so several pairs can be working on each maze

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at any one time. Pupils don't have to wait for the Robot ahead to complete the maze before they start either. In fact, avoiding wandering robots adds an extra level of challenge to pupils in navigating the maze.

Questions to aid assessment:

What instructions have you given to your robot so far? Why?

What instruction are you going to give next? Why?

What is your algorithm?

How have you made your robot follow the maze?

Which part of the maze was the most difficult to get your robot to follow?

Why?

How could you improve your instructions?

Evidence and assessment: Please record photos of the groups completing this activity in the hall as a record in their books. Please also note down any significant quotes of the discussion between the 'programmer' and 'robot' for evidence against pupils ability to use directional language to write an algorithm and their ability to 'give a sequence of simple instructions'.

