

National Curriculum

Pupils:

- use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies.
- 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.

Vocabulary

Internet, website, e-safety, online, tools, icons, navigate, technology, algorithm, program, debug, guide, route, turtle, cursor, instructions,

Snapshot overview

Introduction to algorithms. What is an algorithm and how do we use it? BBC bitesize site – explains it very easily.

Give verbal algorithms to guide an adult/friend around a classroom route, reinforcing the need for the instruction- the algorithm to be very specific.

Use the BBC bitesize robot algorithm game to give instructions to guide the robot on a specific route.

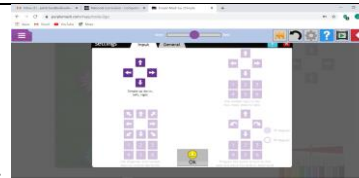
Making an algorithm to program a floor robot- a beebot around a specific route. Use cards with arrows and numbers on to make your algorithm then program it into the floor robot and see if it was correct. Introduce the term debugging and debug any erroneous algorithm to fix the floor robots program.

Explore using Purple mash 2Go to create algorithms to guide a turtle around a map in the computer program. Recap debugging. Use the proforma to record your proposed algorithm, test it on 2Go then debug any errors and record you amended algorithm on the proforma table.

Continue to develop programming with algorithm skills using Purple mash -2Go. Load different backgrounds from the starter menu. Create algorithms and record on the proforma to guide the turtle around the map, this time adding an extra step so they will be 2 step algorithm, extending to multiple step algorithms.

	Learning Objectives	Input	Task including differentiation and scaffold	What and how will the learning be assessed?
1	I can talk about algorithms and give simple instructions.	<p>Starter: key question – we’re about to look at a video on the internet – who can tell me what we need to be careful of when selecting videos or other media on the internet?</p> <p>BBC Bitesize - https://www.bbc.co.uk/bitesize/topics/z3tbwmn/articles/z3whpv4 This is an introduction to Algorithms- giving a set of instructions. Watch this video then get into pairs. Adult to model giving the TA simple instructions e.g. stand up, walk forward 2 steps, turn left, sit down. Children to split into pairs then follow this activity. What happens when we say the wrong instruction? What do we need to think about when giving instructions? Remind all chn that algorithms need to be specific - can’t just say go over there. Need accurate and specific instructions.</p> <p>BBC Bitesize- How to program a robot (this is not video, click the pictures) https://www.bbc.co.uk/bitesize/topics/z3tbwmn/articles/zqnc4wx Robots are machines. There are lots of types of robots. They move in different ways and do all kinds of jobs. Because a robot is a machine we have to program it to do things. It only does what we tell it to do.</p> <p>Class T to model - Play the ‘Robot routes’ game on the above BBC program a robot site. Follow on screen instruction and choose the correct commands to manouver the robot where you want it to go. What happens when we say the wrong instruction? What do we need to think about when giving instructions? Remind all chn that algorithms need to be specific - can’t just say go over there. Need accurate and specific instructions. Chn then go and play the bitesize game on laptops in small groups.</p> <p>Plenary - what do we know about algorithms?</p>	Mixed ability groups. Adults lapping and feeding back to support where necessary	Adult observations.

2	<p>I can create an algorithm I can debug an algorithm.</p>	<p>Key question starter -five minute discussion = who can I talk to when playing games on the internet?</p> <p>Recap algorithms - what is an algorithm, what does it do? Discuss that they need to be very specific.</p> <p>Model making an algorithm to program a floor robot. We need to get the beebot from point a (e.g. chair) to point b. What will your algorithm be? Model where the beebot will be facing when you have followed each directional card (e.g. turns right will then be facing different direction) What language do you need to use to direct the robot?</p> <p>Children to use cards with arrows and numbers on to make an algorithm to get the robot/beebot where they want it.</p> <p>Test out your algorithm. Did it work, was it correct? Introduce the term debugging - fixing an algorithm that is incorrect. What do they need to change to fix it/ debug it? e.g forward 3 steps instead of 5.</p> <p>Children to debug their algorithms and retest by programming the beebot.</p> <p>Plenary: go through one as a class - point C to point D - can the class help give the algorithm to get the bee bot to the destination?</p>	<p>Mixed ability groups. Adults lapping and feeding back to support where necessary</p> <p>Support - work with LSA in small group and act out algorithm before testing. use sheet with grids on to count movements.</p> <p>All chn to use beebot grids (these may have to be made by T) to enable accurate instructions.</p> <p>Challenge: What is the longest route you can take from A to B? What is the shortest route from A to B? Can you now get from A to B via C?</p>	
3	<p>I can create an algorithm I can debug an algorithm</p> <p>I can use the 2Go program to move the turtle around the map.</p> <ul style="list-style-type: none"> ● ● * left arrow ● * right arrow ● * forwards arrow ● * backwards arrow ● * coloured pens ● * thickness control 	<p>Starter: key question Why do adults have passwords and why shouldn't we use them?</p> <p>Programming- Recap what an algorithm is and why we would use it. Load Purple Mash 2GO.</p> <p>Ask children what buttons I need to use to guide the turtle(bee) around the map. Reinforce that this is creating an algorithm – a set of instructions that tells a digital device what to do. What will your algorithm be? What can I do if I give the wrong instructions,make the algorithm incorrectly?</p> <p>Model using the undo arrow button. Also Model the << restart button to start again. Can you remember what fixing an algorithm is called?</p> <p>Now we are going to make it harder – we need to make our algorithm more specific. Model using the setting cog wheel icon to change the arrow</p>	<p>Support - To start with the most basic arrows and move on as appropriate.</p> <p>Challenge: Can you tell a partner an algorithm to use to navigate the turtle (bee) from To Then make it. Were you correct? Did it work?</p> <p>Can you debug this example algorithm?</p>	Adult observations.



pad to include the number of steps needed.



- Children to create an algorithm using the arrows and the numbers. How will your turtle (bee) get to the ...? (pink, blue flower) How many steps does your turtle (bee) need to go to get to the...? What direction does it need to go in?

Chn to be given a pro forma with different questions. Chn to use the cards from yesterday and copy the symbols in the correct order to get the turtle to the correct place. chn then use this to test the route and change the algorithm in a different colour if needed.

	Algorithm	Accurate? Changes?Debug
Get the turtle from the white flower to the blue flower	chn draw symbols in here	chn make changes as required here
x4 examples		

- Children to discuss and analyse their route e.g. was it the fastest/shortest way? Evaluate: could they make it more direct?

Plenary: ask chn to share what they did and how they knew they were accurate

Can you think of any other algorithms that you may give to technology you use at home? (games, microwave, toy cars - electronic ones)

Can you try using the diagonal arrows to reach a flower?

<p>4</p>	<p>I can create an algorithm I can debug an algorithm</p> <p>I can use the 2Go program to move the car around the map.</p> <ul style="list-style-type: none"> * left arrow * right arrow * forwards arrow * backwards arrow * coloured pens * thickness control 	<p>Starter: key question - should we talk to people we don't know on the internet?</p> <p>Recap previous learning – what is an algorithm? Why do we need them? Load Purple mash 2Go. Model how to change the background and the turtle. Select the map background and navigate around the map by giving the turtle algorithms to follow.</p> <p>Consider where the children got to yesterday and group them accordingly. Those able to access challenge yesterday should be starting on Ext activity today - with more stop off points and more questions about shortest/longest route. e.g. Sup: Can you move the car to the bank? Core: Can you visit the pet shop and then the bank? Ext: The car should visit the bank, hospital and the pet shop, what is the quickest route to visit all three? Prove it. How do you know?</p> <p>Based on these groups Chn to be given a pro forma with different questions. These need to be differentiated based on ability (e.g ext have more stops on the way and find longest/shortest/number of different routes). Chn to use the proforma and record the symbols in the correct order to get the turtle to the correct place on the map. Chn then use this to test the route and change the algorithm in a different colour if needed.</p> <table border="1" data-bbox="669 975 1503 1235"> <thead> <tr> <th></th> <th>Algorithm</th> <th>Accurate? Changes?Debug</th> </tr> </thead> <tbody> <tr> <td>Get the turtle from the car to the bank</td> <td>chn draw symbols in here</td> <td>chn make changes as required here</td> </tr> <tr> <td>x4 examples</td> <td></td> <td></td> </tr> </tbody> </table> <p>Plenary: chn from the differentiated groups share what they have been doing and what they found out.</p>		Algorithm	Accurate? Changes?Debug	Get the turtle from the car to the bank	chn draw symbols in here	chn make changes as required here	x4 examples			<p>Support - To start with the most basic arrows and move on as appropriate. Start with the most simple challenges and move on as appropriate.</p> <p>Chn to be grouped by ability based on yesterday.</p> <p>Challenge: Explain the controls they used to complete their challenge. Ext to justify why their route was the quickest. Can you debug this example algorithm?</p> <p>Challenge: Use the cog settings button , go to general and chose 'allow programming' Then enter your algorithm directly into the program before testing it.</p> <p>Challenge – big step. In the start menu where you change the background, select 'Challenge' and complete the challenges. The grids get smaller.</p>	<p>adult observations.</p>
	Algorithm	Accurate? Changes?Debug											
Get the turtle from the car to the bank	chn draw symbols in here	chn make changes as required here											
x4 examples													

Impact statements-

- To be able to understand what a simple algorithm is (specific set of instructions)
- To be able to understand how you can use a simple algorithm to make something happen
- To be able to create a simple algorithm for a specific purpose
- To test and debug a simple algorithm