Year 2 Programming 5 Moving around to Fix My Factory

(Alternative for tablet users that have legacy app no longer supported - includes self-assessment and PRIMM)

Timing 3 sessions of approximately 40 minutes	**Children will** • Begin to develop / reinforce understanding of the word 'algorithm' through looking at examples and giving instructions to each other instructions to move through an obstacle course • Talk about planning actions as an algorithm then executing them as a program • Self-assess confidence to implement an algorithm as a program • Work through levels 1 – 3 of Lego Fix the Factory to build knowledge and skills with the programming blocks • Talk through algorithms for levels 4 and 5 before 'writing their program/code' • Predict robot movements for level 6 before completing level • Talk about debugging the sequence to achieve each level • Develop the use of programming language; build up a word bank
e-safety links • I am careful with technology devices (R) • I can talk about why it's important to be kind and polite online and in real life	**Objectives** **Programming** • I can give instructions to my friend and physically follow their instructions. • I can tell you the order I need to do things to make something happen and talk about this as an algorithm. • I can program a robot to do a particular task. • I can watch a program execute and spot where it goes wrong so that I can debug it.
Links to other learning **Mathematics:** support problem solving, directions and turns, estimating distance, counting moves, etc.	
Resources Lego Fix the Factory App (no longer available 2020 for iPad and Android) Presentation 'Programming cards' Self-assessment poster	**Preparation** • Download presentation in PowerPoint • Print multiple copies of programming cards – (slide 4 of powerpoint) • Use I Am a Computer Programmer document to support the development of the use of programming language. • Display KS1 Self-assessment poster • Have square paper, small cubes and an object to be picked up for unplugged activity in session 2. • Be ready to set up a course with a hoop for starting point, blocks or bean bags to pick up and a bucket for the end point.

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	Expectations	Activity	Success Criteria
1	**Programming** I can give instructions to my friend *(using forward, backward and turn)* and physically follow their instructions. I can tell you the order I need to do things to make something happen and talk about this as an algorithm.	**Following instructions** • Show the children a range of examples of instructions – packets of seeds, recipe books, etc. What are they? Why do we need them? Discuss how and why we use instructions within life. Establish that they tell us what to do to make something happen. • Introduce the term algorithm to the children. Say and clap the word together. Explain that this describes the sequence of actions you decide is needed to make something happen. Chant algorithm rap (slide 1 of presentation). • Begin to construct a class word bank of programming terms. • Tell the children that you will be giving them some instructions to follow. They will need to follow the instructions that are given. Use terms such as forwards, left, right, turn, quarter, half, etc. Make links to mathematics - position and direction. Children will need to follow the directions that have been given to them. How else can we share instructions? Introduce a pictorial method to the children using the direction cards for the next activity (use forward, left and right turn) or this Smartnotebook or write the instructions onto the board using arrows, etc. • Share the directions again; does this make it easier for the children to follow? • Set up an obstacle course including picking up bean bags or wooden blocks and taking them to place in a bucket at another point in the course. Ask the children what the algorithm would be. What is the order they need to do things? Say the algorithm rap (slide 1). • Draw a set of instructions for children to follow. Ask them in pairs to **predict** what will happen when they follow the instructions and where they will finish. Set a pair of children off to follow instructions with another pair pointing to each instruction in turn for them to follow. In pairs, how close were you to predicting where they finished and the route they took • Split the children into pairs, use blind folds if available/suitable for your class.	Gold: Can I follow a set of instructions? Can I give clear instructions for someone else to follow? Silver: Can I follow instructions and give simple instructions to others? Bronze: Can I follow simple instructions?

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		One partner gives the other directions to follow. Increase difficulty with courses using cones, etc. Allow the children to say their algorithm and then record the programming using words/cards/pictures. • **Support:** Add pictorial clues to the instructions and repeat as necessary. Ensure that the children understand the vocabulary used to give the directions. • **Extend:** Create their own algorithms and pictures to use when representing them. Can they debug when they go wrong?	
2	**Programming** I can program a robot to do a particular task. I can watch a program execute and spot where it goes wrong so that I can debug it.	**Fix the Factory 1** • Share a simple set of instructions (as used in activity 2) with the class eg instruct them to move from where they line-up to the classroom. Can they follow them? Recap the term algorithm to describe what they needed to do and model using the instruction cards. • Children work individually or in pairs using Lego Fix the Factory levels 1, 2 and 3. The rules must include not asking the teacher what to do and talking to their friends to work it out. See Fix the Factory PowerPoint. Encourage the children to keep trying things out and to work out difficulties together. **Emphasise how making mistakes can help us find the solution.** • Use the language of **execute** the program when the children press the green arrow. • **Support:** Use the cards for children to 'act it out'. Children may need support for pick up and put down in level 3. Set out an obstacle course which includes an object to pick up and a bucket to put it down. • **Unplugged activity:** Children could work in pairs using a small cube (their robot) and appropriately sized squared paper with a starting position marked. Give them an object to be picked up and colour in a bin (one square of the paper). Children can colour in obstacles or have objects to be the obstacles. Each pair designs a challenge for another pair**.** Encourage them to talk about what they need to do to solve the challenge as being the algorithm. Tell them to 'write'	Gold: Can I execute a program the robot to move around the factory? Can I debug my program if it doesn't work? Silver: Can I execute a program for the robot to move around a factory and tell you the matching algorithm? Bronze: Can I execute a program?

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		down the program using symbols or cards. Use the words 'execute' the program for them to try it out to see if they can pick up the object to take it to the bin. • Which class routines could we write an algorithm for? Post algorithms to class page of website or blog. Ask the children to talk about them with their family.	
3	**Programming** I can tell you the order I need to do things to make something happen and talk about this as an algorithm. I can watch a program execute and spot where it goes wrong so that I can debug it.	**Fix the Factory 2** Children work 1:1 with device (with expectation of talking to each other about what they are doing) or in pairs. • Look at slide 5 of the Fix the Factory PowerPoint. What is the algorithm to solve the problem? Talk in pairs. • Look at slide 6. Can the children debug the program? Where is the error? What will I need to do to sort it out? Repeat for slide 7. Make sure children have solved level 4. • **Continue to emphasise how making mistakes can help us find the solution.** • Slide 8. What is the algorithm for level 5? Talk in pairs. Expect an overall description – move forward, turn right, move forward a small distance, etc. Remind children or model where necessary the use of KS1 Self-assessment poster to check they are ready to program. 'I don't know what to do yet.' ○ Talk with my friends, can any of the children help you? ○ Act it out, show the children how you can pretend to be Bee-Bot to check out the moves you will need to do. ○ Try something; see what happens; decide that you will have a go. ○ **OR**, 'I know what to do', share their thinking to help someone else, check it works. • Identify the children who may need further support. Where appropriate, encourage confident programmers to become teacher to less confident children. Work with group of children that may need to increase understanding of building	Gold: Can I talk through an algorithm to solve a problem and implement this as a program? Silver: Can I talk through a sequence to solve a problem? Bronze: Can I make a sequence to make something happen?

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		a sequence. • Work in pairs to write the program with symbols with pencil and paper or a wipeable whiteboard and pen. Try out your program. • **Predict:** Slide 9 Ask children to chat in pairs to predict where the robot will stop when it has been programmed. 'Read' through the blocks with the children moving your finger to show where the robot is moving each time. • **Run:** Get the children to add these blocks into to Level 6. Run the program. Does it stop where they predicted. • Slide 10: Ask the children to talk through what else they will need to do to complete this level. • **Modify**: Let the children complete the programming for level 6. Encourage the children to debug their program as needed. • **Emphasise how making mistakes helped us find the solution.** • **Support:** Allow the children to continue using the cards as they work out each step of the route. Lay them down and use them when inputting the final commands. • **Extend:** Challenge them to think of the whole route in one go, enter the directions directly into the tablet or take the shortest/longest possible routes through. Children completing the task early could explore the levels of Kodable App if you have iPads. • Choose some children to model their algorithms and program to the class. Explain how they found their way around the routes. Discuss any misunderstandings or times when children had to debug and try again. • Ask the children to make a poster to explain the vocabulary they have learnt.	

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