purple mash

Computing

Scheme of Work

Unit 1.4 Lego Builders

Year Group: 1
Number of Lessons: 3

From 2simple

Contents

Year 1 – Medium Term Plan

Key learning point: This unit encourages children to begin to think logically about scenarios. Children will be introduced to the term 'algorithm'. This concept is at the core of coding. The next unit (Maze Explorers), builds upon this, linking logical thought processes to the way that computers are programmed.

Lesson	Aims	Success Criteria
1	To emphasise the importance of following instructions.	• Children know that to achieve the effect they want when building something, they need to follow accurate instructions. • Children know that by following the instructions correctly, they will get the correct result. • Children know that an algorithm is a precise, step-by-step set of instructions used to solve a problem or achieve an objective.
2	To follow and create simple instructions on the computer.	• Children can follow instructions in a computer program. • Children can explain the effect of carrying out a task with no instructions. • Children know that computers need precise instructions to follow. • Children know that an algorithm written for a computer to follow is called a program.
3	To consider how the order of instructions affects the result.	• Children understand how the order in which the steps of a recipe are presented affects the outcome. • Children can organise instructions for a simple recipe. • Children know that correcting errors in an algorithm or program is called 'debugging'.

Please note:

Children who are not familiar with how to log in to Purple Mash and open and save activities will probably need support with this, initially.

These lesson plans make use of the facility within Purple Mash to set activities for pupils that they can then complete and hand in online (2Dos). This enables you to assess their work easily as well as distribute resources to all pupils. If children have not opened 2Dos before, then they will need more detailed instructions about how to do this. If your pupils do not have individual logins for Purple Mash, we can help you with this. Contact your school Purple Mash administrator or email us at support@2simple.com.

A guide to 2Dos can be found in the Teacher section: 2Dos Guide.

Children who are using computers or laptops for the first time rather than tablets will need extra support with the use of mice, touchpads and keyboards.

To force links within this document to open in a new tab, right-click on the link and then select 'Open link in new tab'.

Lesson 1 – Following Instructions

Aim

- To emphasise the importance of following instructions.

Success criteria

- Children know that to achieve the effect they want when building something, they need to follow accurate instructions.
- Children know that by following the instructions correctly, they will get the correct result.
- Children know that an algorithm is a precise, step-by-step set of instructions used to solve a problem or achieve an objective.

Resources

- Two small Lego models and some Lego instructions (ideally for the same model, but not essential). One model should have been assembled by following the instructions correctly and one should not, e.g. in a model car, one could be missing the doors and wheels, or have the windscreen on the roof. In a model tree, one could have the trunk on top.
- If you do not have Lego, then you could use generic coloured cubes such as multilink; one set with a correctly followed repeating pattern and one with errors.
- A selection of Lego (small or Duplo) OR a selection of generic building cubes. Children will be using these to build with.

Activities

1. Talk to children about the instructions for a Lego model. Show the two models and discuss what could have happened to the one built incorrectly. Hopefully, the children will suggest that the instructions were not followed correctly.
2. Choose a volunteer to sit with their back to you beside one of the selections of Lego. You are going to give them some instructions for what to do with the Lego while you also follow your own instructions.
3. Ensure that the rest of the class can see both of you, but that you cannot see each other's model. Give some simple instructions, e.g. 'Take a red rectangular (cuboid) block and place a green square block on top, in the middle of the red block. Place a yellow square block on the top.'
4. Compare models and discuss whether the instructions were clear enough or if anything went wrong.
5. Repeat this, and then get children to volunteer to give the instructions.
6. Now, children could pair off (or play in small groups, depending on the quantity of bricks that you have) and play this game together to get used to the need for precise instructions. Discuss whether the children are getting better at giving precise instructions as they continue to play the game.

7. Bring the class back together and display the word 'Algorithm' on the whiteboard. Read it and practise saying it together. Explain the meaning of the word:

> An 'algorithm' is a precise, step-by-step set of instructions used to solve a problem or achieve an objective.

8. The children have been giving each other the algorithms to build models with the bricks.
9. Can the children give examples of any algorithms that they use during their lives? One example is getting ready for school in the morning: usually, they will follow a correct order for doing things, but what would happen if they put their trousers on before their pants, for example? What about making breakfast; if they poured out the cereal before getting a bowl?

Lesson 2 – Following and Creating Simple Instructions on the Computer

Aim

- To follow and create simple instructions on the computer.

Success criteria

- Children can follow instructions in a computer program.
- Children can explain the effect of carrying out a task with no instructions.
- Children know that computers need precise instructions to follow.
- Children know that an algorithm written for a computer to follow is called a program.

Resources

To preview these activities yourself, right-click on the links below and then click **'open in new tab'** so this plan remains open in this tab.

- Paint projects containing outlines for colouring. There are a few such examples; select those that your class will enjoy. Set one or two as 2Dos for the class. ***Do not use the bird one, as this is used in a different way in this lesson.*** *To set any paint projects as 2Dos go to Tools>Paint Projects and click on the icon to set as a 2do.*

  Some examples:

  Elephant

  Dinosaur

  Butterfly

  Birthday Cake

All other activities/icons can be found on the main page for this unit:

https://www.purplemash.com/#tab/Teachers/computing_sow/computing_sow_y1/computing_sow_y1_unit_1-4

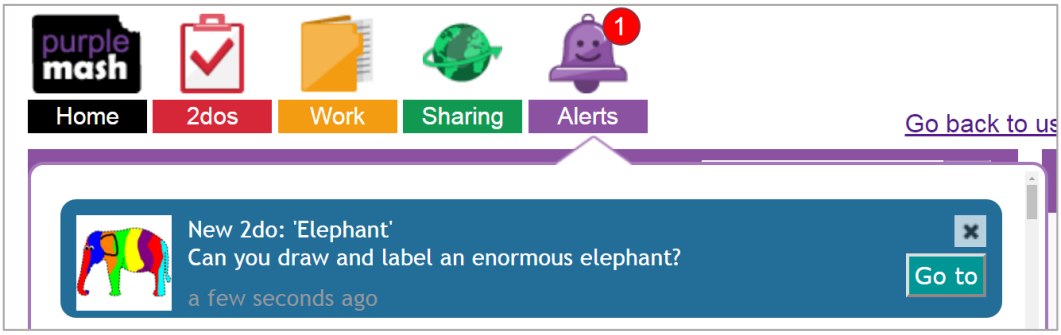
- Bird activity set as a 2Do.
- Paint by Numbers Instructions.
- Paper and coloured pens or pencils.

Activities

1. Revise the meaning of the word 'algorithm'

   An 'algorithm' is a precise, step-by-step set of instructions used to solve a problem or achieve an objective.

2. Show the children how to open one of the 2Dos that you set for them of the outline picture (not the bird). They should all open the same one. They will need to log on and look for the bell at the top of their screen next to their picture:



3. Explain that they should colour in the picture using the paint colours. If they have not used the tools before, you might need to show them how to select a colour and how to alter the pen width.

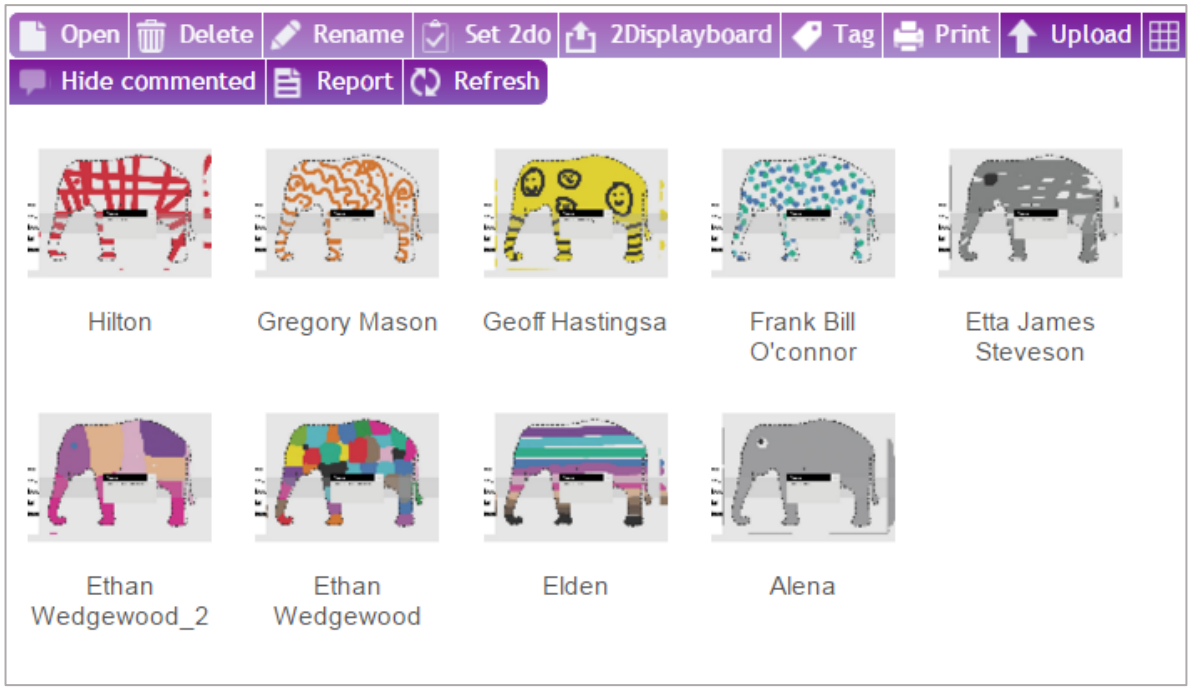
4. Once they have had adequate time to finish this, show them how to:

 save their work,

 exit

and then 'Hand in' their work.

5. Open the handed-in 2Dos (via your own Notifications icon) on the whiteboard.



6. The class will be able to see all their pictures as little thumbnail images. You can double-click on them for a closer look. Emphasise how each picture is unique; hopefully the children will have used different colours

and methods to colour in their animals because you didn't give them any specific instructions about how to do it.

7. Explain that they are going to repeat this exercise, but this time you are going to give them an algorithm for colouring in the animal.
8. Open the bird algorithm on the whiteboard. The algorithm is presented as a key/paint-by-numbers so that literacy levels do not affect the children's ability to complete the exercise. Emphasise how important it is to number the order of the steps because an algorithm is a set of instructions completed in an ordered way. Talk though the algorithm:

Algorithm

Step 1) Paint the beak yellow

Step 2) Paint the head red

Step 3) Paint the tummy dark green

Step 4) Paint the wing dark blue

Step 5) Paint the tail orange

Step 6) Paint the legs yellow

9. Give children time to complete this on their own computers and then 'Save', 'Exit' and 'Hand in' their finished piece.
10. Compare the pieces of work as before. This time the work should all look very similar (if children have followed the algorithm).
11. Explain that when they follow instructions they are behaving like a computer; it cannot think for itself, so we (humans) need to provide very precise instructions so that it can do anything.
12. Introduce and define the word 'Program'.

An algorithm that has been coded into something that can be run by a machine, e.g. a computer or a robot.

13. Now children can play a 'coders and robot' game where they first write the 'program code' on paper for colouring the last 2Do outline using a colour key, e.g. 1) tail = , 2) neck = , etc.
14. Then they give the program to a robot (another child) and take on the role of a robot following someone else's program. Can the coders write good programs for the robots to follow?

Lesson 3 – Follow the Instructions in a Recipe

Aim

- To consider how the order of instructions affects the result.

Success criteria

- Children understand how the order in which the steps of a recipe are presented affects the outcome.
- Children can organise instructions for a simple recipe.
- Children know that correcting errors in an algorithm or program is called 'debugging'.

Resources

- The 'Wrong Sandwich' activity. This can be found on the main page for this unit: https://www.purplemash.com/#tab/Teachers/computing_sow/computing_sow_y1/computing_sow_y1_unit_1-4. This will be completed as a class on the whiteboard.
- Category Instruction Writing. Children can find this in the English section of Purple Mash, or you could set some of the sequencing games as 2Dos for them.
- There are also writing activities within this topic that you could use if you wish the children to write the instructions for the recipes as a follow-up.

Activities

1. Talk about what a recipe is. What is included in a recipe? Why do we need them?
2. Open the 'Wrong Sandwich' activity on the whiteboard. There is a gallery of photos accessed by clicking on the green crosses. The algorithm is not very good, so a robot making the sandwich would probably make some mistakes. Can children suggest which 'wrong' photos could occur?

- Instruction 2 does not say to spread the butter on the bread; there is a photo of the butter spread on the plate.
- Instruction 3 does not say to cut slices of cheese; there is a photo of the whole block of cheese on the bread.
- Instruction 4 does not say to put the top piece of bread butter-side down; there is a photo with the butter-side up on top.
- Instruction 5 does not say how to cut up the sandwich; there is a photo of a haphazardly cut-up sandwich.

3. Now let's 'debug' the algorithm

> When you debug a program, you look for any bugs (problems) in the code and try to fix them.

4. Go through each step, in order, and correct it. Match the correct photos to end up with a much better algorithm.
5. Direct the children to the recipe sequencing games' in the 'Instruction Writing' category.

6. Children should spend some time working through some of these, then come back together to discuss the correct order for the recipes. What could go wrong with each recipe if the algorithm is incorrect?
7. Can the children make up an algorithm for how to make cereal that a robot could follow? Can others debug any errors?

Assessment Guidance

The unit overview for year 1 contains details of national curricula mapped to the Purple Mash Units. The following information is an exemplar of what a child at an expected level would be able to demonstrate when completing this unit with additional exemplars to demonstrate how this would vary for a child with emerging or exceeding achievements.

Assessment Guidance	
Emerging	Children understand that to achieve the effect they want when building something, they need to follow instructions. They can give another child instruction to build a simple model, but their instructions might not anticipate all possibilities. Children know that computers need instructions to operate. Children can attempt to write instructions for a simple recipe but might not include all required steps.
Expected	Children can assimilate a set of simple Lego model instructions and look at the outcomes produced from these instructions. They can state where an error has occurred on one of the models from the instructions given (Unit 1.4. Lesson 1 Point 1). Children understand the effect that accuracy of the instructions has on the outcome. Children can give each other precise simple instructions and follow them to create the desired outcomes for their Lego model (Unit 1.4. Lesson 1 Point 6). They can give another child instruction to build a simple model, anticipating the information that the other child will need to make an accurate replica. Children can compare their digital paintings within 2Paint and show an understanding as to why they are different. They can consider that instructions are needed to give the pictures uniformity and as such are able to follow a set of instructions (Algorithm) to achieve this (Unit 1.4. Lesson 2 Points 6 & 7). Children know that an algorithm is a set of instructions used to solve a problem or achieve an objective. Children know that an algorithm written for a computer to follow is called a program. Children can debug a very simple set of printed instructions for a recipe, the approach they use should entail breaking the instructions into smaller parts to support interpretation. Most children can create a set of written instructions for other children to follow e.g. the 'coders and robot' game (Unit 1.4. Lesson 2 Point 12). Children can confidently debug simple errors in other children's written instructions for recipes (Unit 1.4. Lesson 3). Children understand that very precise instructions need to be given to a computer for it to accurately carry out intended outcomes. These precise instructions can be broken down into smaller parts. Children can demonstrate this by playing a 'coders and robots' game (Unit 1.4. Lesson 2).
Exceeding	Children understand the effect that precise accuracy of the instructions has on the outcome. Children can give instructions that demonstrate they are anticipating the outcome.

Assessment Guidance	
	They can give another child detailed instruction to build a simple model, anticipating the information that the other child will need to make an accurate replica at a more detailed level. Children know that an algorithm is a set of instructions used to solve a problem or achieve an objective. Children know that an algorithm written for a computer to follow is called a program. They can work out what is wrong in an algorithm when the steps are out of order and can debug the algorithm. They can write their own algorithm for a recipe.