Computing Scheme of Work

Unit 4.5 – Using 2Logo

Contents

Introduction

2Logo is a text-based coding language used to control an on-screen marker to create mathematical patterns. Children were introduced to turtle patterns using 2Go in year 1.

In this unit they will:

- Learn common commands and constructs of the Logo programming language.
- Develop their ability to compose algorithms for drawing mathematical structures and turn these into Logo code.

In the lesson plans, Logo code is written in capital letters to distinguish it from the rest of the text. However, Logo is not case sensitive and lower case can be used as well. There are strong links between Logo and Mathematics, and it might be beneficial to incorporate maths angle and shape work into lessons whilst doing 2Logo work. If children have not used floor turtles or the 2Go program lower down the school, then familiarity with these might be beneficial for some students. Unit 1.5 of the Scheme of Work uses 2Go to develop related concepts on screen.

If your children 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.

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Medium-Term Plan

Lesson	Title	Success Criteria
1	Introduction to 2Logo	• Children know what the common instructions are in 2Logo and how to type them. • Children can follow simple 2Logo instructions to create shapes on paper. • Children can follow simple instructions to create shapes in 2Logo.
2	Creating Letters using 2Logo	• Children can create 2Logo instructions to draw patterns of increasing complexity. • Children understand the pu and pd commands. • Children can write 2Logo instructions for a word of four letters.
3	Using the 'Repeat' Command in 2Logo	• Children can follow 2Logo code to predict the outcome. • Children can create shapes using the Repeat command. • Children can find the most efficient way to draw shapes.
4	Using Procedures	• Children can use the Procedure feature. • Children can create 'flowers' or 'crystals' using 2Logo.

Lesson 1 – Introduction to 2Logo

Aims

- To learn the structure of the language of 2Logo.
- To input simple instructions in 2Logo

Success criteria

- Children know what the common instructions are in 2Logo and how to type them.
- Children can follow simple 2Logo instructions to create shapes on paper.
- Children can follow simple instructions to create shapes in 2Logo.

Resources

- Lesson 1 – Worksheet 1 and 2Logo Commands sheet
- Pencils
- You may also want the children to use a protractor.
- 2Logo tool: This is found in the Tools area of Purple Mash.

Activities

Introduction	Display **slide 2** and outline the lesson aims. Display **slide 3** and outline the success criteria
Opening 2Logo	Display **slide 4**. Introduce the children to 2Logo. Explain that 2Logo is a text-based coding language used to control an on-screen marker to create mathematical patterns. Relate this to work that they have done with floor-turtles and on 2Go.
The 2Logo Menu Buttons	Display **slide 5**. Open 22Logo on the whiteboard in single line mode with the speed set to 'slow'. Click on the slide to reveal the function of the buttons.
Activity 1: Basic 2Logo Commands	Display **slide 6**. Discuss the possible meaning of the following commands: FD, RT, LT, BK. Clicking reveals the meanings.
	Use the suggestions on **slide 7** to begin familiarising the class with 2Logo commands. Clicking reveals suggestions. Include any

	more that you want to show the children at this point.
Activity 2: More 2Logo Commands	Display **slide 8:** You may want to display this slide again when the children work through the tasks.
	Use **slide 9** to review and explain some further aspects. Clicking the icon will open the tool.
Activity 3: Predicting Shapes	Use **slide 10 and** hand out **Lesson 1 - Worksheet 1**.
Activity 4: Creating Shapes	Display **slide 11.** Ask for some children to read out their own instructions and see if the class can work together to draw these shapes.
Extension: Using Pen Up and Pen Down	Display **slide 12.** Can the children use the 'Pen Up' and 'Pen Down' instructions to draw all the shapes from earlier in the lesson on one screen? **Note:** It is possible to drag the turtle to a new starting location on the screen, this makes the use of pu and pd less necessary, however they are important commands to grasp as part of the 2Logo language Earlier in the lesson children learnt that FD 5 RT 90 FD 5 RT 90 FD 5 RT 90 FD 5 RT 90 would make a square shape. Can they use this to work out how they could make a rectangle shape? Perhaps plot first on paper, and then in 2Logo. Example, FD 5 RT 90 FD 10 RT 90 FD 5 RT 90 FD 10 RT 90. Could they add to the code for the 's' shape from earlier in the lesson to complete a figure of 8 shape?
Review Success Criteria	Display **slide 12.** Review the success criteria from **slide 3.** Children could rate how well they achieved this using a show of hands.

Lesson 2 – Creating Letters using 2Logo

Aim

- To use 2Logo to create letter shapes.

Success criteria

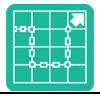
- Children can create 2Logo instructions to draw patterns of increasing complexity.
- Children understand the pu and pd commands.
- Children can write 2Logo instructions for a word of four letters.

Resources

- Squared paper
- Optional; individual whiteboards.
- Lesson 2 – Worksheet 1.
- 2Logo tool: This is found in the Tools area of Purple Mash.

Activities

Introduction	Display **slide 2** and outline the lesson aims. Display **slide 3** and outline the success criteria
Activity 1: Reviewing the Logo Commands	Display **slide 4.** Show the children the command list. Can the children remember what they all do? Click to reveal the answers one-by-one.
Pen Up and Pen Down	Display **slide 5.** Review how to use the 'Pen Up' and 'Pen Down' instructions when you want the pen to be lifted off the screen and then when you want it to be placed back on the screen. Ask the children to predict what they think the given code will do. Children could draw their ideas on an individual whiteboard. Show the video to the children. Were they correct?



Using 2Logo to Draw Letters: Letter E.	Display **slide 6.** Tell the class you are going to draw the letter E in 2Logo **but deliberately make some mistakes** (see the error example). Error Example Logo FD 8 RT 90 FD 4 RT90 PU FD 3 RT 9 PD FD 4 LT 90 FD 4 LT 90 FD4 • When you try to run the code, 2Logo will inform you of an error (no space between RT and 90). • Click on the line of code to copy it back to the command line then correct the first error and run again **but 'forget' to clear the screen first**. When you press play another error will be reported. • Remind the children of how to clear the screen.
Multi Line Mode.	Display **slide 7.** Feign frustration and complain that it's hard to read such a long line of code at once and remember everything. Hopefully, the children will agree with you! Show the children how you can switch to multi-line mode at the top of the screen. Show the code entered in single line and multi-line format. Which is easier to edit? Hopefully, the children will say multi line.
Spotting errors	Display **slide 8.** Show the code in multi-line format. Where are the two errors in the code? Correct the code and so it reads: FD 8 RT 90 FD 4 RT 90 PU FD 4 RT 90 PD FD 4 LT 90 FD 4 LT 90 FD 4
Activity 2: Creating Letters in 2Logo	Display **slide 9.** Hand out **Lesson 2 – Worksheet 1** for children to complete.
Extension: Writing words	**Slide 10** is an extension activity. Children should save their work and then look at finished examples they have created. Have they been successful?
Review Success Criteria	Display **slide 12.** Review the success criteria from **slide 3.** Children could rate how well they achieved this using a show of hands.

Lesson 3 – Using the 'Repeat' Command in 2Logo

Aim

- To use the Repeat command in 2Logo to create shapes.

Success criteria

- Children can follow 2Logo code to predict the outcome.
- Children can create shapes using the Repeat command.
- Children can find the most efficient way to draw shapes.

Resources

- Lesson 3 – Worksheet 1
- Squared paper.
- 2Logo tool: This is found in the Tools area of Purple Mash.

Activities

Introduction	Display **slide 2** and outline the lesson aims. Display **slide 3** and outline the success criteria
Drawing squares.	Use slide 4, clicking reveals information and questions.
Using the 'Repeat' Command.	Display **slide 5.** to introduce the repeat command.
Activity 1 – Predicting Shapes.	Use **slide 6.** and hand out **Lesson 3 – Worksheet 1**. to direct the activity.
Extension: Drawing shapes	**Slide 7** contains an extension task.
Review Success Criteria	Display **slide 8.** Review the success criteria from **slide 3.** Children could rate how well they achieved this using a show of hands.

Lesson 4 – Using Procedures.

Aims

- To use and build procedures in 2Logo.

Success criteria

- Children can use the Procedure feature.
- Children can create 'flowers' or 'crystals' using 2Logo.

Resources

- Lesson 4 – Worksheet 1. You may want to copy this for children or use it for your own reference.
- 2Logo tool: This is found in the Tools area of Purple Mash.

Activities

Introduction	Display **slide 2** and outline the lesson aims. Display **slide 3** and outline the success criteria
Writing Names	Display **slide** 4.and discuss the points.
Writing Procedures	Display **slide 5.** Click to reveal the stages of creating a procedure.
Calling Procedures	Display **slide 6.** Click to reveal the stages of running a procedure.
Drawing Two Squares	Display **slide 7**. Click to reveal answer.
Drawing Squares in a Row	Display **slide 8.** Click to reveal answer.
Activity 1: Writing Procedures	Use **slide 9.**to direct the activity.
2Logo patterns	Use **slide 10.**to direct the activity.
Pen Colour and Pen Size	Use **slide 11.**to direct the activity.
Activity 2: Creating Patterns	Use **slide 12.**to direct the activity. Hand out Lesson 4 – worksheet 1 for examples.
Review Success Criteria	Display **slide 13.** Review the success criteria from **slide 3.** Children could rate how well they achieved this using a show of hands.

Name _____Date _____

Look at the instructions below. What shape do you think the instructions will make?

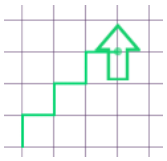
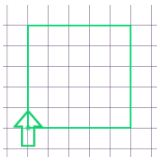
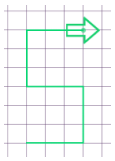
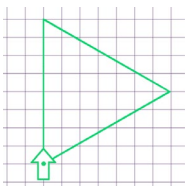
INSTRUCTION	PREDICTION	SHAPE MADE
FD 1 RT 90 FD 1 LT 90 FD 1 RT 90 FD 1 LT 90 FD 1 RT 90 FD 1 LT 90		
FD 5 RT 90 FD 5 RT 90 FD 5 RT 90 FD 5 RT 90		
RT 90 FD 3 LT 90 FD 3 LT 90 FD 3 RT 90 FD 3 RT 90 FD 3		
FD 8 RT 120 FD 8 RT 120 FD 8 RT 120		

Can you think of some more shapes and write some instructions for your friends to follow?

INSTRUCTION	SHAPE

Name _____ Date _____

Look at the instructions below. What shape do you think the instructions will make?

INSTRUCTION	SHAPE
FD 1 RT 90 FD 1 LT 90 FD 1 RT 90 FD 1 LT 90 FD 1 RT 90 FD 1 LT 90	
FD 5 RT 90 FD 5 RT 90 FD 5 RT 90 FD 5 RT 90	
RT 90 FD 3 LT 90 FD 3 LT 90 FD 3 RT 90 FD 3 RT 90 FD 3	
FD 8 RT 120 FD 8 RT 120 FD 8 RT 120	

List of 2Logo Instructions

Instruction	Description	Example
BK	Move backwards a distance of units	BK 50 – Move the turtle back 50 units
FD	Move forward a distance of units	FD 50 – Move the turtle forward 50 units
LT	Turn left a given number of degrees	LT 90 – Turn the turtle 90° to the left
RT	Turn right a given number of degrees	RT 45 – Turn the turtle 45° to the right
REPEAT	Repeat a set of instructions a number of times	REPEAT 4[FD 10 RT 90] – This will draw a square
SETPC	Set pen colour to a value	SETPC 1 – Pen colour is **BLUE**
SETPS	Set pen thickness	SETPC 1 – pen is thin; SETPS 10 – the line is a lot thicker
PU	Lifts the pen off the screen	
PD	Places the pen to begin drawing	

Name _____ Date _____

Write a set of instructions in 2Logo for each of these letters:

Starter

C	
F	
S	

Moving On

M	
W	
O	

Name _____Date _____

Write a set of instructions in 2Logo for each of these letters: NB Children' answers will vary

Starter

C	RT 90 FD 5 BK 5 LT 90 FD 8 RT 90 FD 5
F	FD 8 RT 90 FD 5 BK 5 RT 90 FD 3 LT 90 FD 4
S	RT 90 FD 4 LT 90 FD 4 LT 90 FD 4 RT 90 FD 4 RT 90 FD 4

Moving On

M	FD 8 RT 135 FD 3 LT 90 FD 3 RT 135 FD 8
W	LT 30 FD 6 BK 6 RT 60 FD 6 RT 120 FD 6 LT 120 FD 6
O	FD 2 RT 45 FD 2 RT 45 FD 2 RT 45 FD 2 RT 45 FD 2 RT 45 FD 2 RT 45 FD 2 RT 45

Name _____ Date _____

Look at the instructions below. What shape do you think the instructions will make?

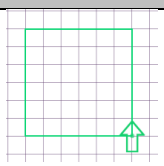
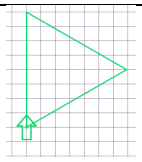
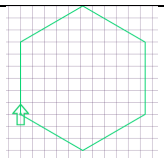
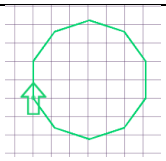
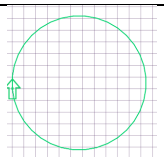
INSTRUCTION	PREDICTION	SHAPE MADE
REPEAT 4 [FD 6 LT 90]		
REPEAT 3 [FD 8 RT 120]		
REPEAT 6 [FD 6 RT 60]		
REPEAT 10 [FD 2 RT 36]		
REPEAT 36 [FD 1 RT 10]		

EXTENSION – Use the Repeat function to find the most effective way to draw these letters:

LETTER	INSTRUCTION
B	
P	

Name _____ Date _____

Look at the instructions below. What shape do you think the instructions will make?

INSTRUCTION	PREDICTION	SHAPE MADE
REPEAT 4 [FD 6 LT 90]		
REPEAT 3 [FD 8 RT 120]		
REPEAT 6 [FD 6 RT 60]		
REPEAT 10 [FD 5 RT 36]		
REPEAT 36 [FD 1 RT 10]		

EXTENSION – Use the Repeat function to find the most effective way to draw these letters:

LETTER	INSTRUCTION
B	REPEAT 4 [FD 4 RT 90] FD 4 REPEAT 4 [FD 4 RT 90]
P	FD 4 REPEAT 4 [FD 4 RT 90]

Name _____ Date _____

Using procedures to create patterns.

Simple shape rotation

Square pattern REPEAT 72 [square RT 5] Instructions for a square are REPEAT 4 [FD 4 RT 90]	Triangle pattern REPEAT 9 [triangle RT 40] Instructions for a triangle are REPEAT 3[fd 3 RT 120]
Hexagon pattern REPEAT 9 [hexagon RT 40] Instructions for a hexagon are REPEAT 6 [FD 6 RT 60]	Circle pattern REPEAT 18 [circle RT 20] Instructions for a circle are REPEAT 36 [FD 0.3 RT 10]

EXTENSION - Can you write some instructions of your own to create patterns?

Assessment Guidance

The unit overview for year 4 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 can 'read' small 2Logo programs and predict the outcome using some logical reasoning although they might not always be correct (Unit 4.5 Lesson 1). Children think about the 2Logo commands that they need in small steps, one or two commands at a time. When their code does not execute as they expect, they can sometimes find the error independently but as the code becomes longer, they need support to do so (Unit 4.5 Lesson 2). They understand that the repeat command makes things happen more than once but might not be able to plan the repeat; they work out a solution using trial-and-error that includes some logic (Unit 4.5 Lesson 3). They can create a procedure but might not realise the full value of creating a procedure to make quality code and save coding the same thing many times over (Unit 4.5 Lesson 4).
Expected	Children can 'read' 2Logo programs with several steps and predict the outcome accurately (Unit 4.5 Lesson 1) & (Unit 4.5 Lesson 3). Children can think about the 2Logo commands that they need steps of two or more commands at a time before executing the code to check the result e.g. fd 4 rt 90 fd 6 rt 90. When their code does not execute as they expect, they can sometimes find the error independently but as the code becomes longer, they need support to do so (Unit 4.5 Lesson 2). They understand the repeat command and can plan simple repeat structures before executing rather than relying on trial-and-error (Unit 4.5 Lesson 3). They experiment with repeating procedures to make more complex patterns (Unit 4.5 Lesson 4). They understand the value of a procedure in making code more efficient and call these procedures appropriately (Unit 4.5 Lesson 4). Most children can manipulate instructions within 2Logo to create common shapes using repeat functions (Unit 4.5. Lesson 3). They can edit instructions to produce shapes created in the most efficient way including using the Procedures function (Unit 4.5. Lesson 4).

Assessment Guidance	
	In (Unit 4.5 Lesson 4), they can use some knowledge of mathematics to understand how the patterns are formed.
Exceeding	Children enjoy and challenge themselves to think about the 2Logo commands that they need in long steps of several commands at a time before executing the code to check the result e.g. fd 4 rt 90 fd 6 rt 90 fd 5 lt 90 fd 9 These commands include repeats alongside sequential steps. They fully understand the value of the pu and pd commands to achieve the effects that they desire (Unit 4.5 Lesson 1). When their code does not execute as they expect, they use logical reasoning and debugging techniques such as running accumulating parts of the code to find the source of the error independently (Unit 4.5 Lesson 2). They create procedures and call these procedures efficiently; they can refine their code to put procedure calls within other procedures (Unit 4.5 Lesson 4). They experiment with repeating procedures to make more complex patterns demonstrating the mathematical understanding behind the patterns (Unit 4.5 Lesson 4). Children can 'read' increasingly complex 2Logo programs with several steps and predict the outcome accurately (Unit 4.5 Lesson 3) including procedures within repeats (Unit 4.5 Lesson 4).