



Unit 5E: Modelling Effects on Screen

About this Unit:

Children learn how to write a procedure that 'teaches' the computer a new word and will be asked to write short sequences to produce particular shapes on screen. They understand that screen steps are smaller than floor turtle steps and will be asked to repeat procedures to produce 'crystal flowers' by rotating the screen turtle through 360 degrees.

Children will be able to apply what they have learnt in this unit when working with angles, shapes and space in mathematics.

Where this Unit fits in:

Builds on Unit 2D 'Routes: controlling a floor turtle' and 3F 'Modelling: controlling a screen turtle.'

This unit assumes that children:

- understand numbers larger than 100
- know that degrees measure turns and understand that 90, 180 and 360 degrees are quarter-, half- and full turns.

Vocabulary:

Procedure | sub-procedure | repeat | penup | pendown | clear | turn

Resources:

A version of LOGO that includes the commands clear, penup and pendown, repeat and which allows final results to be printed out | worksheets of sequences | graph paper

Expectations: at the end of this unit,

Most pupils will be able to: create a 'flower' using one shape and rotating it; use the repeat instruction to duplicate the shape; change the angle of turn.

Some pupils will only be able to: work from an example 'flower' and change the procedure to create their own 'flowers'; make mistakes and need to amend their work.

Some pupils will also be able to: create 'flowers' using more than one shape and rotating them; use the repeat instruction to duplicate shapes; investigate more complex shapes and sizes; change the angle of turn.

These units have been adapted from material available on the QCA Schemes of Work website



Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
<p>Setting the Scene</p> <ul style="list-style-type: none">• key idea: that the screen turtle can be programmed to move in a specific way using repeats.• technique: to enter LOGO commands to make the screen turtle move and understand there is a LOGO language.	<ul style="list-style-type: none">• Remind the class how a screen turtle can be programmed to move in a square using 'line by line' commands and write the instructions on the board - forward 40, right 90, forward 40, right 90, forward 40, right 90, forward 40, right 90. Repeat the activity using a repeat loop - repeat 4 [forward 4, right 90]. Discuss with the children the use of repeats to program the turtle's movements more effectively. Again type in the instructions for drawing a square, but use forward 100 instead of 40. Discuss with the children the different step size that a screen turtle uses to a floor turtle.• Introduce the children to the commands to make the screen turtle move. Discuss spaces between command and number, and the use of the return key. Children must realise that correct spelling and accurate use of the spacebar is essential.	<ul style="list-style-type: none">• Recognise that the size of numbers used for distance is different because screen steps are smaller than floor turtle steps.• Use estimation to plot step size for the screen turtle.• Understand that using repeats is a more effective way of programming the screen turtle than always using 'line by line' commands.• Recognise that LOGO has a prescribed language structure.	<ul style="list-style-type: none">• An IWB could be an effective means of demonstrating turtle moves on screen to the whole class for discussion.• Pupil's earlier experience of giving instructions to a screen turtle might have involved the use of direction arrows with preset turtle steps. This may be their first introduction to typing in Logo Commands.• Some children may find typing commands difficult because of the need for accuracy. Lots of LOGO software intended for primary use has preset buttons for the commands. The children click the command then the number of steps. They still use the Logo structured language but it avoids the possibility of keying errors.• Pupils could also be introduced to LOGO shortcuts <i>e.g. forward = fd, right turn = rt etc.</i> These could be printed onto cards and displayed near the computer.

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Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
Short Focused Tasks			
<ul style="list-style-type: none">• key idea: that the screen turtle obeys certain language commands.• technique: to type commands in immediate mode.	<ul style="list-style-type: none">• Prepare a worksheet with a few simple sequences on it. These could include:<ul style="list-style-type: none">• forward 100, right 90, forward 100, left 90, forward 100, right 90; forward 100, left 90, forward 100, right 90, forward 100, left 90;• forward 150, right 90, forward 150, right 90, forward 150, right 90, forward 150, right 90;• right 90, forward 50, left 90, forward 50, left 90, forward 50, right 90, forward 50, right 90, forward 50;• forward 200, right 120, forward 200, right 120, forward 200, right 120.• Ask the children to predict what will appear on screen when these instructions are entered and give them a chance to work in pairs at the computer to test their hypotheses. Remind them to send the turtle 'home' before beginning each set of instructions.	<ul style="list-style-type: none">• Recognise that commands typed in LOGO follow the same language patterns as they used with the floor turtle.• Predict the line the screen turtle will draw when certain instructions are entered.	<ul style="list-style-type: none">• Children will need to consider the screen orientation.• Children will need to know about the correct spacing and spelling of commands. Children may make typing mistakes that result in error messages. They will recognise the frustration in having to repeat all the commands again to achieve their results. LOGO shortcuts might help.• The work could be extended to allow pupils to change the numbers and find out what happens.

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Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
Short Focused Tasks (Cont.)			
<ul style="list-style-type: none">• key ideas: that the screen turtle can be given commands to produce specific shapes on screen.• that the turtle can be moved before it starts drawing.• techniques: to write a list of commands to produce a pre-drawn shape .• to use pendown and penup to move the turtle.• to change the colour of the pen.	<ul style="list-style-type: none">• Provide two examples of letters (eg E or M) that can be drawn with the screen turtle using only 45 or 90 degrees; use graph paper (1cm²) to draw the letters. Show the class how to draw the two letters and explain how each square on the graph paper measures 50 screen turtle steps. Demonstrate how to write instructions to produce the two letters on screen.• Ask children to draw the first letter of their name on a piece of graph paper and get them to write the instructions for the screen turtle. When children have completed their sequences produce the example letters, but use penup and pendown to move the turtle to the left of the screen before doing the first letter and then to the right of the screen to do the second letter. Show the children how to print their work. Divide the children into pairs and ask each pair to create their initials on screen and print the results.	<ul style="list-style-type: none">• Produce two shapes on screen and to move the screen turtle without drawing a line.• Change the colour of the line drawn by the screen turtle.	<ul style="list-style-type: none">• More able pupils could be shown how to change the line style and thickness.

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Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
Short Focused Tasks (Cont.)			
<ul style="list-style-type: none">• key idea: that instructions can be repeated.• technique: to use the repeat command.	<ul style="list-style-type: none">• Prepare a worksheet with a few simple repeat sequences on it. These could include:<ul style="list-style-type: none">repeat 4 [forward 100, left 90];repeat 3 [forward 150, right 120];repeat 6 [forward 100, right 60];repeat 360 [forward 1 right 1];repeat 10 [forward 50, right 36]• Discuss with the children their previous experiences with a repeated sequence and demonstrate the instruction: repeat 5 [forward 80, right 108]. Ask the children how many sides they think the shape will have. Type the instruction into the computer and show the children what happens.• Using the prepared worksheet when the instructions are entered ask the children to predict what will appear on screen and give them a chance to work in pairs at the computer to test their hypotheses.	<ul style="list-style-type: none">• Use the repeat instruction and will predict what will happen.	<ul style="list-style-type: none">• Children will need to be shown how to type in the instructions, for example, where the spaces need to go, which set of brackets to use or how a repeat sequence is put together in the particular version of LOGO being used. The worksheet should reflect the version of LOGO being used in the classroom.• The work could be extended to allow pupils to change the numbers and find out what happens.

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Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
Short Focused Tasks (Cont.)			
<ul style="list-style-type: none">• key idea: that groups of instructions can be named as a procedure.• technique: to use and change a pre-written procedure.	<ul style="list-style-type: none">• Write the following procedures into the computer and save them: square, equilateral triangle, staircase, pentagon. Give the procedures arbitrary names, such as 'Pooh', 'Tigger', 'Eyore' and 'Piglet'. All these sequences have been used in previous lessons.• Show the children the screen turtle drawing a square, without using the procedure you have written. Then move the turtle using penup and pendown and repeat the square. Explain how it would make things easier if the turtle could learn a word to draw a square. Tell the children that you have taught the turtle four new words and demonstrate the one that draws the square. Show them how they could change the numbers in the procedure to make a bigger square. Divide the class into groups and let them test all four procedures. Ask them to try changing the size of the sides and the steps.	<ul style="list-style-type: none">• Understand that sequences of instructions can be named to create procedures and edited.	<ul style="list-style-type: none">• Children should see that the name of a procedure could be anything - they are 'teaching' the computer a new word for the turtle. They should understand that the computer does not know the word 'square', for instance, until the procedure has been written.
<ul style="list-style-type: none">• key idea: that procedures can call other procedures• technique: to write a procedure that uses other procedures to produce a result	<ul style="list-style-type: none">• Use the procedures from the last task to write a new procedure called 'house'. Use the square and the triangle and penup and pendown to draw a simple house. You will need to rotate the turtle by 60 degrees before 'putting' the roof on. Show the children that every time you type 'house', the house appears. Divide the children into pairs and ask them to write their own version of 'house', maybe changing the size of the square and the triangle. When they have done this ask them to use 'house' to create a number of houses and ask them to print their results.	<ul style="list-style-type: none">• Combine procedures to form a new procedure.	<ul style="list-style-type: none">• Children will need to be able to edit their procedures when they make mistakes. Children who find the work difficult may be given a copy of the 'house' to work from. Children who find this easy could be asked to create 'house' for different sized houses.

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Learning Objectives Pupils should learn...	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
Assessment Task			
<ul style="list-style-type: none">• to write repeating procedures to produce a desired outcome.• to use line colour, style and size to complete their patterns. Some children may also use floodfill.	<ul style="list-style-type: none">• Explain to the class that they will create a number of 'crystal flowers' on screen. Tell them that they will need to write a number of procedures, such as square, rectangle, triangle, pentagon, and that they will combine the shapes into a larger procedure; the larger procedure will allow them to rotate the shapes 360 degrees and produce a flower. An example procedure might be: repeat 36 [square, right 10] which would produce 36 squares with a rotation of 10 degrees in between, producing a flower effect.• Ask children to work in pairs to create their own flowers and get them to print out their work. They could colour in their flowers and produce a garden display for the classroom.	<ul style="list-style-type: none">• Write procedures using standard commands.• Combine procedures to produce a desired outcome.• Use line, style, colour size and floodfill for effect.	<ul style="list-style-type: none">• Extension work could include using more than one shape to produce a flower, for example a square and a triangle rotated. Some children may need example 'flowers' to get them started.• Children will need to know that 360 degrees produces a full turn. they will also need to think about the different multiples that give them 360 in order to make complete turns in their flower shapes

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