UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

**Cambridge ICT Starters
Next Steps**

Scheme of Work

4282
Exploring Control
Stage 2 Module

UNIVERSITY *of* CAMBRIDGE
International Examinations

Introduction

This module builds on the Initial Steps module 'Starting Control'. In this module, students will use the programming language LOGO to control a screen turtle. They will write simple instructions and sets of procedures using standard commands and the repeat function. In working on this module, students have the opportunity to develop both ICT and mathematical concepts. They should begin to see how simple sets of instructions can be combined to produce outcomes such as shapes, or even simple pictures. They will have the experience of 'teaching' the computer new words (i.e. the procedures) defined by the students themselves.

What is Assessed in This Module?

Students will demonstrate how to:

- enter instructions to control a screen turtle
- type commands in immediate mode
- write a list of commands to produce a simple picture or design
- use repeat commands
- create complex shapes with varied angles
- produce, name and run a procedure

To Start This Module You Will Need

- LOGO software which includes the commands 'clear', 'pen up', 'pen down', allows a turtle to rotate 360 degrees and which allows the results to be printed out
- a floor turtle (optional)
- selection of LOGO instructions for simple shapes
- squared paper and angle measurers for students to try out ideas on paper

Underpinning Knowledge

Before commencing this module it is recommended that students know

- that degrees measure turns and understand that 90, 180 and 360 degrees are one quarter, half and full turns
- how to measure angles
- the names of basic shapes and be able to understand simple properties of shapes

General Principles and Procedures

The following are further suggestions and considerations:

- give students experience of writing instructions for people or floor turtles and drawing simple shapes on paper before they attempt similar shapes/instructions on screen
- students will need to know how to clear the screen and to use the pen up/pen down commands before they can draw some letters or shapes
- give plenty of opportunities for students to see how changing numbers in the commands affects the final path of the screen turtle
- provide a worksheet with simple repeat sequences and ask the students to predict what shapes will be produced
- set simple challenges such as 'draw a square, then draw a smaller square next to it'
- Merit students will also need to learn how to use repeats and the correct form of brackets before learning how to create a procedure

Scheme of Work

Recommended prior learning – builds on Initial Steps Module Four – Starting Control

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan One			
• recognise that objects can be controlled by careful instructions	• remind students how the floor turtle operates, including 'go' button (or use instructions to control a person walking around the room) • introduce students to screen turtle and LOGO software • students experiment using the LOGO software and become accustomed to the step sizes and movement of the turtle	• a floor turtle • a version of LOGO that includes the commands 'clear', 'pen up', 'pen down', and which allows results to be printed out	• when using a floor turtle, students will be accustomed to viewing the turtle from a horizontal plane. The screen turtle is viewed from a vertical plane and students might find the commands Forward and Backward confusing • allowing students opportunity to experiment and explore in the first session will help to build confidence to 'try out' new ideas in later sessions

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Two			

• enter sets of instructions
 	
• predict turtle movements
 	
• understand how to modify a shape
	• students enter instructions for LOGO moves
	
	• students try to guess what shape will be drawn before entering instructions
	
	• students practise by:
	
	  - creating new versions of the shapes they have already drawn but of different sizes and in different positions on the screen
	
	• class discussion to answer questions like:
	
	  - what values would you change in your instructions to get a bigger square?
		• LOGO instructions for simple shapes, like square, rectangle, house	• students need to be encouraged to be accurate when typing instructions and to enter correct spacing
			
			• the work in this unit is good for reinforcing Mathematics concepts in Shape, Angles and Turns

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Three			
• use pen up and pen down commands • create a set of instructions to make a specific shape • print instructions	• students draw letters E and M on squared paper, marking where pen up and pen down are needed. They write out LOGO instructions to create these letters • students test and modify their instructions • print instructions • students practise by: - use the same method to create LOGO instructions for your first name - a top secret message has been written in LOGO instructions – can you work out what it is without doing it on the screen because everyone would then see the message?	• squared paper • a prepared secret message: a simple sentence of four or five words written as logo instructions to decode	• letter shapes need to be 'squared' in order to be simple to draw

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Four			

• use the repeat command	• teacher demonstrates repeat command and where to find square brackets on keyboard
	
	• students practise using repeat commands by:
	
	  - entering sets of instructions for LOGO moves with repeat command included
	
	  - creating their own patterns using repeat command on the basic shape or letter instructions they created in other sessions
	
	• class works together to draw up a list of rules for using repeat command
		• prepared worksheet with sets of instructions using Repeat commands	• point out to students that it is easy to make errors when typing several repeated instructions. Using the repeat command is quicker and makes errors less likely
			
			• encourage students to experiment and refine instructions to get the simplest set for any given shape

Learning Objectives	Classroom Ideas	Resources	Notes
Session Plan Five			
• know the term 'procedure' • learn how to create procedures • learn how to add rotation to repeat procedures and make patterns	• teacher demonstrates how to create a procedure • students practise by: - creating procedures for simple shapes or letters which they have written instructions for in other sessions • teacher demonstrates how to add rotation to procedure, e.g. repeat 36 [triangle, right 10] • students practise by using combinations of repeat and rotation on procedures to create patterns	• examples of simple procedures	• show students that any name can be given to a procedure. However, if the name is recognisable as the shape, e.g. 'square', then it is easier to recognise when you want to use it

Assessment Ideas

To show how the Assessment Idea fully incorporates the Learning Objectives tested, the Assessment Idea is cross-referenced with the Learning Objective table below.

Assessment Idea

Create written LOGO instructions for the rectangle shown. Test and modify your instructions. (1). Use the Repeat command to create more copies of your shape and create a pattern. Test and modify your design (2). Print your instructions.
Create written LOGO instructions for the Arrow shape. Test and modify your instructions (3). Create a procedure for the arrow and call it Arrow. Use repeat (and rotate) commands on your Arrow procedure to create a pattern. Print your instructions (4).

	Stage 2 Module – Exploring Control
1	Write a list of commands to produce a simple picture or design
2	Use repeat commands
3	Create complex shapes with varied angles
4	Name and run a procedure

Teachers should retain the following evidence for moderation:

- copy of Assessment Task
- students printed instructions for shape 1 and 2

Resource List

Hardware

PIP Educational Robot	Swallow Systems	http://www.swallow.co.uk/pip/pip1.htm

Websites

NRICH Maths - LOGOland
http://www.nrich.maths.org.uk/mathsf/journalf/jan02/logoland.html

Becta - Control and monitoring information & resources
http://curriculum.becta.org.uk/docserver.php?docid=279

First Logo Instructions
http://www.primaryresources.co.uk/ict/firstlogo.htm

Roamer Task
http://www.primaryresources.co.uk/ict/pdfs/10roamertask.pdf

Using Logo
http://www.primaryresources.co.uk/ict/pdfs/15logo1.pdf

Roamer Activities & Instructions
http://www.primaryresources.co.uk/ict/roamer.htm

Logo Lesson Plans
http://www.kented.org.uk/ngfl/logo/

CD ROM and Software

The Crystal Rain Forest 2000	Sherston Software	http://www2.sherston.com/
Terrapin Logo	Sherston Software	http://www2.sherston.com/
PIP Simulator	Swallow Systems	http://www.swallow.co.uk/download/pipsim.htm
Black Cat Logo	Black Cat Software	http://www.blackcatsoftware.com/catalog/products/logo.html
Who's in Control? CD ROM	ICT 4 Learning	http://www.4learning.co.uk/shop/product.cfm?ipc=312293&c4shop=208017&c4country=UKD&Level1=5.00000&Level2=128.00000&ID=128.00000