

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

**Cambridge ICT Starters  
Initial Steps**

Scheme of Work

4272  
Starting Control  
Stage 2 Module



UNIVERSITY *of* CAMBRIDGE  
International Examinations

## Introduction

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In this module, students learn to control the actions of a screen turtle by giving a series of instructions and should consider examples of how we can control machines and devices: for example, students and their families control devices by giving them instructions when selecting sweets or a drink from a vending machine, setting a microwave oven to cook some food, or recording a television program using a video recorder.

### What is Assessed in This Module?

Students will demonstrate how to:

- produce instructions to control a screen turtle, using directions and measurable units
- record these moves as instructions on a worksheet and plot the movement of the turtle
- use and write instructions correctly in relevant control software language
- use instructions for angles other than 90 & 180 degrees
- develop and record a sequence of instructions

### To Start This Module You Will Need

- a simple version of control software, such as LOGO.
- a number of teacher prepared instructions or task cards for students to follow
- a variety of objects to use as obstacles when practising instructions
- simple maps of a familiar place or board game
- floor turtle or roamer (optional)
- real-life examples of computer controlled devices

### Underpinning Knowledge

Before commencing this module it is recommended that students understand

- the terms on and off
- directional language forward, back, left, right
- how to count
- how to estimate distances
- quarter, half, and full turns

### General Principles and Procedures

The following are further suggestions and considerations:

- before introducing the software, spend time on activities involving instructions e.g. to move around a room or around obstacles
- use board games and floor tiles to convey the notion of spaces and units
- if one is available, let students drive a remote-controlled toy car around a course or if you have a floor turtle, show students how to give it instructions then let them try out their own
- try to use combinations of distance and direction instructions to see the effect
- integrate learning from this module into classroom practice as often as possible so that students relate the experiences to everyday situations
- allow them plenty of time to practice and experiment, working in pairs and small groups wherever possible

## Scheme of Work

Learning Objectives	Classroom Ideas	Resources	Notes
<b>Session Plan One</b>			
<ul style="list-style-type: none"> <li>record a set of instructions in a common format</li> </ul>	<ul style="list-style-type: none"> <li>teacher demonstrates a battery-operated toy and explains that the instructions have already been decided by the manufacturer and cannot be altered</li> <li>teacher demonstrates a remote-controlled toy/device and explains that the manufacturer has set the actions, but the directions of the toy are decided by the user and instructed through the remote. Teacher explains that they will be learning how to program a turtle/roamer</li> </ul>	<ul style="list-style-type: none"> <li>battery-operated toy</li> <li>remote-controlled toy/device</li> <li>a number of simple plain language directions to follow e.g. actions with physical movements               <ul style="list-style-type: none"> <li>getting on a slide - 'get on'</li> <li>go 'up three'</li> <li>go 'down'</li> <li>a simple dance routine</li> <li>building with blocks</li> <li>making a simple recipe (instant pudding)</li> <li>making a cup of tea</li> <li>drawing and cutting out a simple shape etc.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>this activity could be carried out outdoors as part of a physical activities program using equipment such as balls, hoops, ropes etc.</li> </ul>

Learning Objectives	Classroom Ideas	Resources	Notes
<b>Session Plan One</b> Continued			
	<ul style="list-style-type: none"> <li>• students listen and follow simple instructions. Start with providing one instruction at a time e.g. 'stand up', 'now face me', 'now put your arms above your head', 'and now sit down'. Ask students to recall what they did in the correct order. Teacher records this in writing or drawings</li> <li>• repeat the activity a number of times gradually increasing the number of instructions given at one time e.g. 'hop to the box, pick a ball, bounce it five times, sit with the ball between your knees'. Teacher and/or students record the sequence. Select the final sequence for students to record as a drawing with arrows or as a list of instructions</li> </ul>		

Learning Objectives	Classroom Ideas	Resources	Notes
<b>Session Plan Two</b>			
<ul style="list-style-type: none"> <li>use directional language and measurable units</li> </ul>	<ul style="list-style-type: none"> <li>teacher writes or records a set of instructions including the directional words 'forward, back, turn, left, and right' and measurable units (use objects as possible end locations). Teacher reads or plays the instructions and students can try to guess the end location. Students pace out the sequences, comparing predictions with outcomes</li> <li>introduce and use abbreviations FD, BK, RT, LT</li> </ul>	<ul style="list-style-type: none"> <li>a number of instructions prepared by teacher using directional language for moving to a place in the classroom or school e.g. 'forward five steps, turn right, forward three, turn left, back four, where are you?'</li> <li>tape recorder</li> <li>lay out objects in the playground e.g. hoop, box, seat, tin etc.</li> </ul>	<ul style="list-style-type: none"> <li>use turn right and turn left if students understand directional language otherwise use object clues i.e. 'turn to face the door'. Introduce the terms 'clockwise' and 'anticlockwise', and 'North', 'South', 'East', and "West", and 'quarter turn', 'half turn', and 'full turn'</li> </ul>

Learning Objectives	Classroom Ideas	Resources	Notes
<b>Session Plan Three</b>			
<ul style="list-style-type: none"> <li>• use directional language and measurable units</li> </ul>	<ul style="list-style-type: none"> <li>• students work in pairs to prepare sequences using directional language. Students make or use a road or neighbourhood map using paper or marking a space with chalk. They could also use the same objects from previous activity</li> <li>• each person prepares a set of instructions to get to a certain point, by going around one or more of the objects</li> </ul>	<ul style="list-style-type: none"> <li>• objects used in previous activity</li> <li>• chalk and concrete space</li> <li>• blocks, Lego, paper, pens – to make a neighbourhood</li> <li>• simple maps of a familiar place or board game e.g. Snakes and Ladders</li> </ul>	

Learning Objectives	Classroom Ideas	Resources	Notes
<b>Session Plan Four</b>			
<ul style="list-style-type: none"> <li>talk about the use of simple commands to control devices like a floor turtle</li> </ul>	<ul style="list-style-type: none"> <li>introduce a floor turtle or roamer, making the link between technology and instructions by referring back to the actions they carried out in the previous activities</li> <li>students program simple actions. Put the students into small groups (e.g. four) and provide simple task cards for them to follow. Start with simple movements and turns, then movements to make simple shapes, then movements to given points, then movements to given points avoiding obstacles</li> <li>students report discoveries/findings back to the class</li> </ul>	<ul style="list-style-type: none"> <li>floor turtle or roamer</li> <li>make a number of task cards e.g. <ul style="list-style-type: none"> <li>go forward three and turn right</li> <li>make a square</li> <li>move from start to finish</li> <li>move from start to finish by crossing two bridges, and going round the church</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>Group work</b> - provide each student with a role to perform e.g. <ul style="list-style-type: none"> <li>1 = <b>controller</b> - controls the roamer</li> <li>2 = <b>collector</b> - collects and returns things</li> <li>3 = <b>reader</b> - reads out instructions/directions from task card</li> <li>4 = <b>reporter</b> - tells the class about what they learned/discovered</li> </ul> </li> <li>discuss roles before the activity</li> <li>use cards showing roles and tasks or use a wall chart</li> <li>repeat the activity four times (over two sessions) so that everyone has time in each role</li> <li>evaluate how group work went</li> </ul>

Learning Objectives	Classroom Ideas	Resources	Notes
<b>Session Plan Five</b>			
<ul style="list-style-type: none"> <li>• use instructions to control a screen turtle, using directional language and measurable units</li> </ul>	<ul style="list-style-type: none"> <li>• introduce students to the computer with screen turtle software, making the link between technology and instructions by referring back to the actions they carried out in the previous activities. Students explore the program using a blank screen. Discuss and record what students have discovered</li> <li>• use forward, back, and left and right turns. Introduce the degree of a turn and discuss how a series of 90 degree turns can be used to make a full turn</li> <li>• provide a series of simple straight line shapes for the turtle to make e.g. square, triangle, oblong etc.</li> <li>• students explore maze type backgrounds that use forward, back, and left and right turns</li> </ul>	<ul style="list-style-type: none"> <li>• computer with screen turtle software e.g. LOGO</li> <li>• paper for recording student discoveries</li> <li>• instructions to make straight-line shapes e.g. 'make a small square, large triangle, and small rectangle' or 'make a house using squares, triangles, and rectangles'</li> </ul>	<ul style="list-style-type: none"> <li>• allow students to work in pairs for initial explorations in order to make predictions and discuss outcomes</li> </ul>

Learning Objectives	Classroom Ideas	Resources	Notes
<b>Session Plan Six</b>			
<ul style="list-style-type: none"> <li>• develop and record sequences of instructions</li> <li>• create moves which involve angles other than 90 or 180 degrees</li> </ul>	<ul style="list-style-type: none"> <li>• provide a background (street plan or map) and, using a computer program with screen turtle software or a programmable remote controlled device, students move their object from a given point to a given point by programming a sequence of moves</li> <li>• students look at the task cards, write/ program instructions correctly (in relevant control software format) to get to the end point, test it and modifying the instructions until the task is complete</li> <li>• start with simple sequences gradually building up to adding 60 and 120 degree turns</li> </ul>	<ul style="list-style-type: none"> <li>• computer with screen turtle software. Select a background that allows the turtle to move from one shape to another using a number of counts and has a function to enter a line of instructions then 'go'</li> <li>• backgrounds, street maps, neighbourhood maps etc.</li> <li>• task cards for simple sequence movements (90 and 180 degree turns) and complex sequences (60 and 120 degree turns)</li> </ul>	<ul style="list-style-type: none"> <li>• Use a marker to draw on clear film – this can be placed over the screen to create a simple path to follow</li> </ul>

## Assessment Ideas

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

Provide students with control software containing a screen turtle that can be programmed using directions such as left 90 or right 40, and measurable units of distance e.g. LOGO. Use a background or provide a map or street plan and ask students to program the turtle so that it follows a specific route or track (1). Define the start position and end positions; include three moves using 90 and 180 degree turns, and two moves requiring angles other than 90 or 180 degrees such as 60, or 120 (3). Provide students with a photocopy of the background or map with space for them to write down the instructions (2). Give them time to test the instructions and then modify them (there should be at least 5 required moves) (4)

	Stage 2 Module – Starting Control
1	Give a screen turtle a set of instructions
2	Record these instructions to the turtle
3	Use angles other than 90 and 180 degrees
4	Use at least five moves overall

**Tutors should retain the following evidence for moderation:**

- copy of the tutor's map or equivalent
- students' completed instructions and maps