

SQUARES ALL OVER

To use a Logo program to build a procedure using the 'REPEAT' facility.

†† Pairs.

⌚ 30 minutes at the computer; 15 minutes discussion/demonstration.

Previous skills/knowledge needed

The children should have some knowledge of sequencing commands, either from playing robot games and inventing their own commands or from using an IT robot.

Key background information

The software known as Logo, of which there are many versions, allows children to draw on the computer screen. Instructions are entered via the keyboard using the Logo language. The pointer on the screen moves and draws in accordance with the commands entered. The joy of using the Logo language is that the commands are very straightforward, for example: 'FORWARDS', 'BACKWARDS', 'RIGHT', 'COLOUR', 'REPEAT', and so on. A command is usually followed by a value, for example 'FORWARD 40', 'RIGHT 90'. Turns are usually measured in degrees, but distances can be in arbitrary units, for example in mm or screen pixels. Most versions of Logo

software allow the children to experiment with lists of instructions. Rather than just entering a series of commands to draw a particular shape, instructions can be packaged into what is known as a procedure. A procedure is usually given a name, for example 'SQUARE' or 'PATTERN'. Rather than rewriting a whole set of instructions each time, the user simply enters the name of the procedure. If the instructions within the procedure are incorrect, changes can be made and tested out. The software is designed to encourage trial and error until a suitable end result is obtained. This is a useful characteristic of IT which is not limited to Logo software alone. Such software is known as modelling software – trying out a variety of inputs and seeing what happens.

In this activity, the children use Logo software to build a procedure (a series of instructions) that will make the computer draw a square. If their procedure is inaccurate, it is very straightforward to make adjustments and re-test until a satisfactory output is obtained.

Preparation

Make a copy of photocopiable page 147 for each child. Before teaching the activity below, make sure that you are familiar with the Logo commands and the process of building a procedure.

Vocabulary

Procedure, Logo software, Logo language, REPEAT.

Resources needed

A computer, Logo software, a printer (preferably colour), photocopiable page 147.

What to do

Use the photocopiable sheet as a way of introducing the idea of a procedure. Ask the children to look at the first example on the sheet which deals with making tea. Discuss how to do this, encouraging the children to break the process down into the separate stages, then let them write out the appropriate instructions on the sheet. Discuss some other everyday activities which could be written in a procedural form – for example, brushing our teeth, feeding the cat or programming a video machine to record a favourite TV programme. Ask the children to complete the other examples on the photocopiable sheet.

Next, tell the children that you would like them to build an IT procedure to draw a square on the computer. Provide a whole class or large group introduction to the various commands within the Logo software that they will need to use: FORWARD, RIGHT, LEFT, REPEAT. They should understand that to draw a square, the same commands are repeated four times and the Logo software uses a 'REPEAT' command to handle this. Explain that a set of commands – such as those for drawing a square on screen

– can be packaged into what is known as a procedure. This saves having to repeat all the commands individually each time. Demonstrate the PROCEDURE building routine to draw a square; the procedure may typically look like this:

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TO SQUARE
REPEAT 4
FORWARD 50
RIGHT 90
END
    
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Finish by showing the children how to name and edit the procedure.

Allow each pair of children about 30 minutes or so at the computer to carry out the activity. Throughout this, it is important to emphasise the modelling aspect of the software – that is, the opportunity to make changes to a series of commands, to test out the result and repeat this until the outcome is acceptable. Using a procedure is a very neat way of doing this.

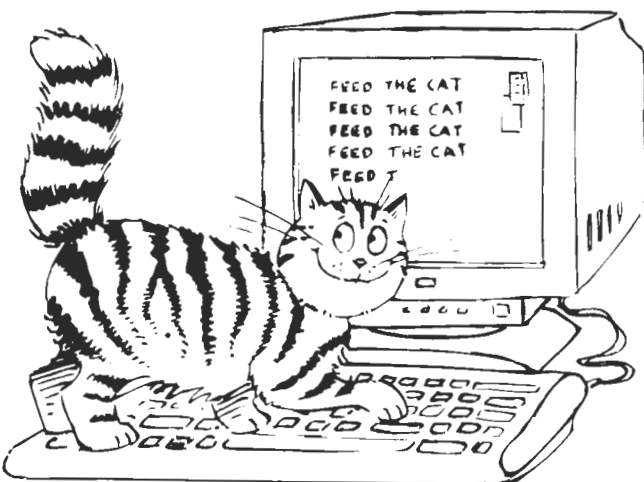
Once they have mastered drawing a square, suggest that the children try drawing squares in different colours and sizes. Give them time to experiment, drawing attention to any interesting work so that others can learn from this. Through experimentation, the children will learn to appreciate the power of Logo, and see how commands entered can have surprising results! As far as possible, the children should record their procedures on paper as they progress. However, not all Logo programs have a straightforward printing routine.

Suggestion(s) for extension

The more able children could try a more demanding task; for example, drawing squares within squares, using the 'REPEAT' command within a procedure to draw hexagons and so on.

Suggestion(s) for support

It is important that the less able children understand the process of the 'REPEAT' command. Going over this with



Practice at procedures

Name _____ Date _____

Procedures consist of a series of steps or instructions that we need to carry out to achieve a certain result. Below are some examples of procedures

Tea time

▲ Complete this list of instructions to make a cup of tea

- 1 Put water in the kettle.
- 2 Heat the water by lighting the gas or switching on the electricity.
- 3 _____
- 4 _____
- 5 _____

Safe crossing!

▲ Complete these instructions for crossing the road:

- 1 Stand at the kerb
- 2 Look left.
- 3 _____
- 4 _____
- 5 _____
- 6 _____

Square it up!

▲ Now write a list of instructions to draw a square on the computer using Logo software. Use the following letters to list the commands:

F = forwards, B = backwards,
R = right, L = left.

▲ Remember to add the distance in cms and the angles in degrees.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

What name could you give to this procedure?

Create a procedure

▲ Now create another procedure in Logo, perhaps to draw a different shape, for example. Write the procedure in the space below, listing the necessary commands you would use, and draw or attach a small printout of the result this would produce.

pencil and paper may help before they use the software. You could also ask them to pace out on the floor the route that would make a square while saying aloud: 'Repeat 4 times, forward two steps, right 90 degrees...' Comparing a procedure to a re-usable shopping list may help – we write it once but can use it again and again and it has the name 'shopping list'.

Assessment opportunities

This activity will enable you to assess how well the children recognise patterns and relationships from the results obtained from the software, and how well they predict outcomes of various decisions when they adjust their procedures. Look out for their ability to make changes to their procedures, and for their understanding that such changes can be made repeatedly until the desired outcome is achieved.

Display ideas

Logo patterns can look most attractive when carefully mounted for display. It would be interesting to have a series of printouts of the children's procedures for producing the squares, showing the various changes they went through and accompanied by the relevant list of commands. This would enable the children to link the commands with the outcome.

Reference to photocopiable sheet

Photocopiable page 147 can be used to introduce the children to procedures in control technology. They are asked to write clear instructions, in the form of words or symbols, in order to achieve a specific result.

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Date _____

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