Computational thinking for digital technologies: Exemplar 7

PROGRESS OUTCOME 3

Climbing stairs

Annotation

Wiremu can create an algorithm that is different to his teacher's but that accomplishes the same task. He can implement his algorithm in a programming environment, and he can improve it by including iteration using a repeat block.

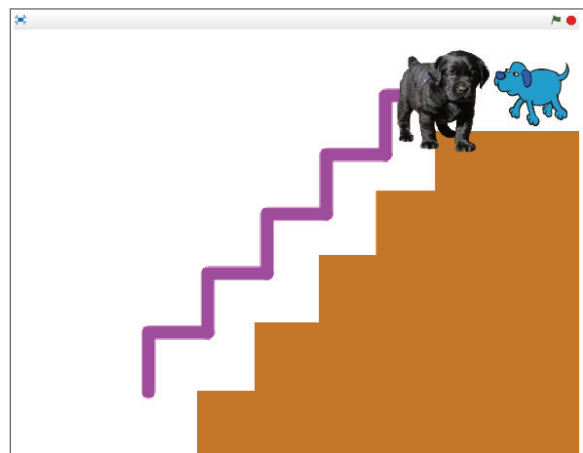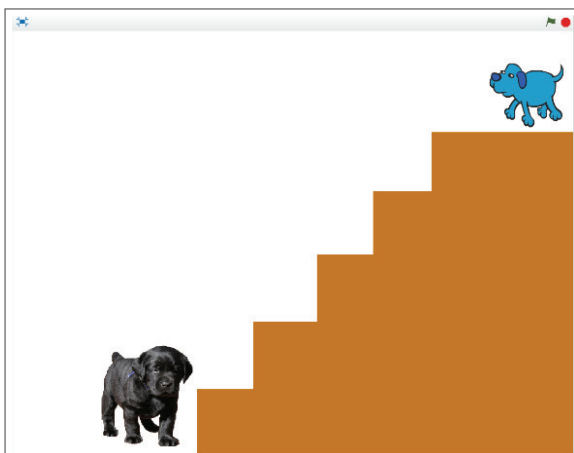By doing this, Wiremu demonstrates that he:

- understands that there can be more than one algorithm for solving the same problem
- can create an algorithm to develop a basic computer program in a block-based programming environment
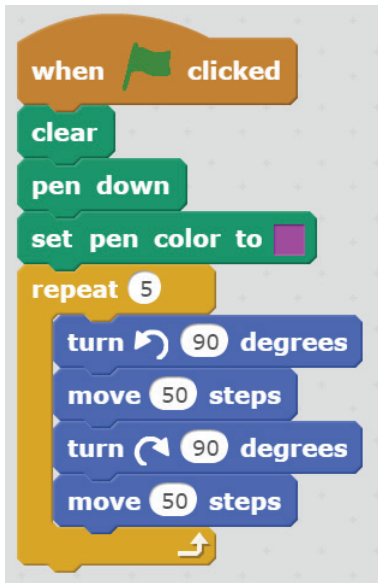- can identify patterns where he can apply iteration.

Background

The students in Wiremu's group have some experience in creating programs involving sequence and iteration (using repeat blocks) in a block-based programming environment (Scratch).

Task

Mr Chandra asks the students to create a program to move a puppy to the top of some stairs with a line behind it showing its path.
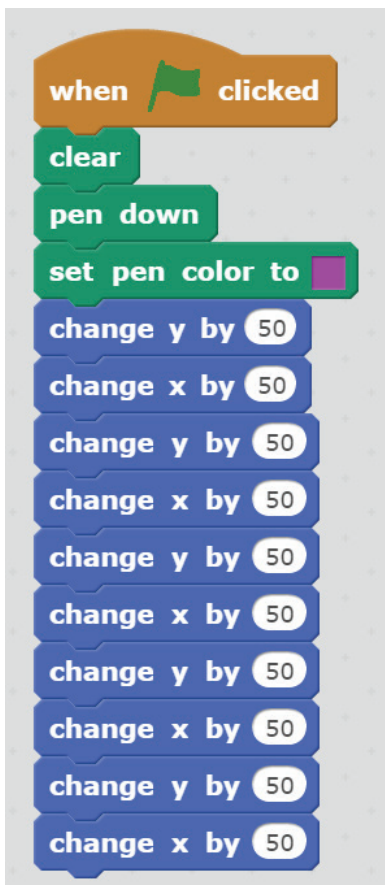
```
when [flag] clicked
clear
pen down
set pen color to [purple]
repeat 5
    turn ↺ 90 degrees
    move 50 steps
    turn ↻ 90 degrees
    move 50 steps
```

Mr Chandra shows the students this program.

He then asks them to create another program that solves the problem using a different algorithm.
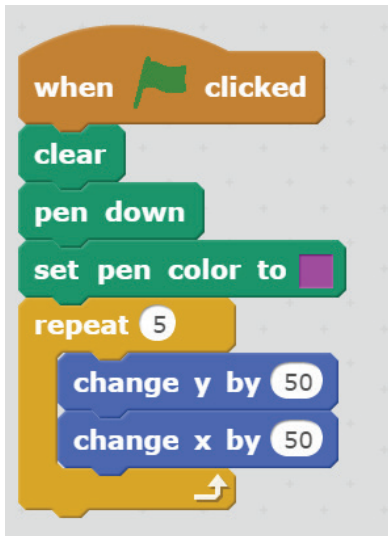
As well as highlighting how symbols are used to communicate instructions (including iteration), the task enables the students to use their mathematical understanding of right-angled turns and their emerging understanding of how x and y can be used to signal direction.

Student response

```
when [flag] clicked
clear
pen down
set pen color to [purple]
change y by 50
change x by 50
change y by 50
change x by 50
change y by 50
change x by 50
change y by 50
change x by 50
change y by 50
change x by 50
```

Wiremu creates a program that follows a different algorithm to Mr Chandra's.

He notices there is a pattern in his code and improves his program by adding iteration using a repeat block.

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