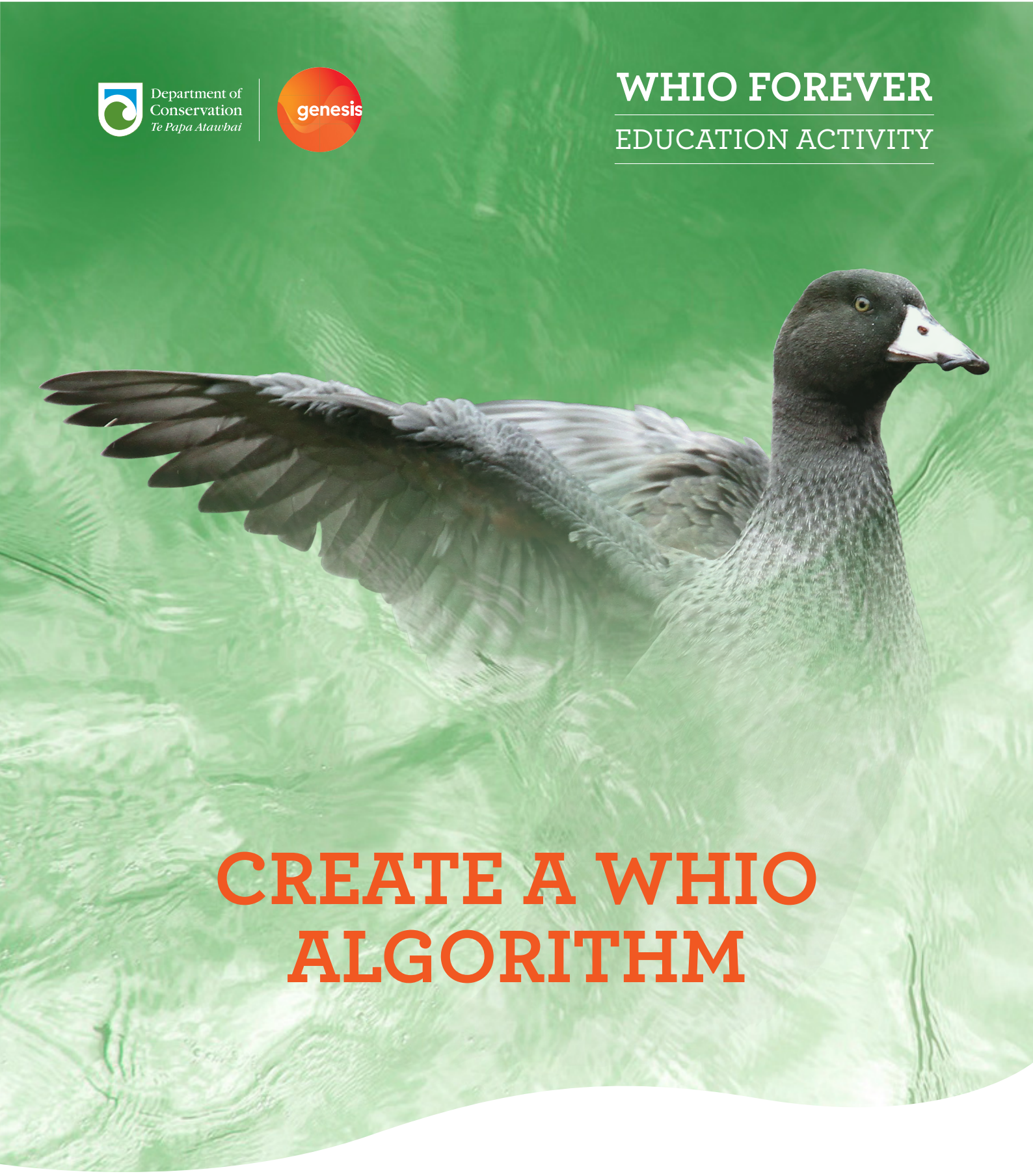
Department of Conservation
Te Papa Atawhai

genesis

WHIO FOREVER

EDUCATION ACTIVITY



CREATE A WHIO ALGORITHM

Activity description

This activity is an introduction to computational thinking and coding, with whio/blue ducks as a context. Students write instructions (an algorithm) for a partner and test their algorithm.

Teaching Information

The Whio Forever digital learning activities can be used as part of the Whio Forever Education Resource, see: http://whioforever.co.nz/teachers. This activity supports learning in Activity 1: Meet the whio and Activity 6: Threats to whio.

Curriculum links

Levels 3-4 (Year5-8) of the NZ Curriculum

Technology: Digital Technology: Computational Thinking for Digital Technologies: Progress outcome 1: In authentic contexts, students use their decomposition skills to break down simple non-computerised tasks. Progress outcome 2: Students use these algorithms to create simple programs involving outputs and sequencing (putting instructions one after the other) in age- appropriate programming environments.

English: Speaking, writing, presenting.

Key competencies: Thinking; Relating to others; Managing self.

Resources needed:

No devices needed! Pen and paper, Whio mountain by Mike Tapp (Ranger Mike): http://bit.ly/2GYIlBt, blue duck/whio mask at: https://whioforever.co.nz/activities, cones or obstacles, duck toy and blanket for nest.

Vocabulary

Algorithm, end-user, program, bug, debugging.

Context for learning

The whio (Blue Duck) is endemic to New Zealand, and one of only four duck species in the world that lives in fast flowing water. Whio are also indicators of a river's health. If they are present the river or stream is considered to be in a very healthy state.

The Whio Forever project is funded through a partnership between the Department of Conservation and Genesis. This partnership is currently in its second five-year term, with Genesis funding $400,000 per year to support the work done through the Whio Forever project.

For more information on the Whio Forever project see www.whioforever.co.nz.

Introduction

1. Read the story Whio mountain by Mike Tapp (Ranger Mike): http://bit.ly/2GYIlBt
2. Discuss which threats to whio/blue ducks were mentioned in the story. Point out that stoats are the number one whio predators.
3. In the following introduction to coding activity, you will guide the whio/blue duck to move around the stoats to get to the nest.

Activity 1: Interactive Instructions

Computational thinking: giving instructions to a partner

- Download the blue duck/whio mask at: https://whioforever.co.nz/activities
- Students can cut out and colour in the mask and tie on some string or elastic.
  One student can wear the mask and pretend to be a whio/blue duck. The other student can give **step by step instructions** to the student who is roleplaying as a whio and get them to move from the starting point to the finishing point.

An 'algorithm' is a set of step-by-step instructions, like directions, that lead to the solution.

- The instructions must be specific and given one at a time.
- Obstacles such as large cones or sandbags add more challenge to the activity. You can pretend that cones are introduced predators to avoid. Set up a very simple obstacle course in your classroom or outside. Be mindful of tripping hazards and take precautions.

Left:
Tomarata students navigating their partners with instructions to the whio nest.

- The students can give instructions to their partner ‘whio’ from one side of the classroom or playground or field to the other, to reach a desired goal such as a ‘whio nest’.
- After verbally giving their instructions, students can then write a set of step by step instructions (an algorithm) down on paper.
- Share written algorithms and test them, starting at the beginning and following step by step.
- Did the algorithm get you to the desired goal? If not, there is a bug in the algorithm.

‘Debugging’ is the process of troubleshooting problems by testing and updating a solution until it completes its desired function

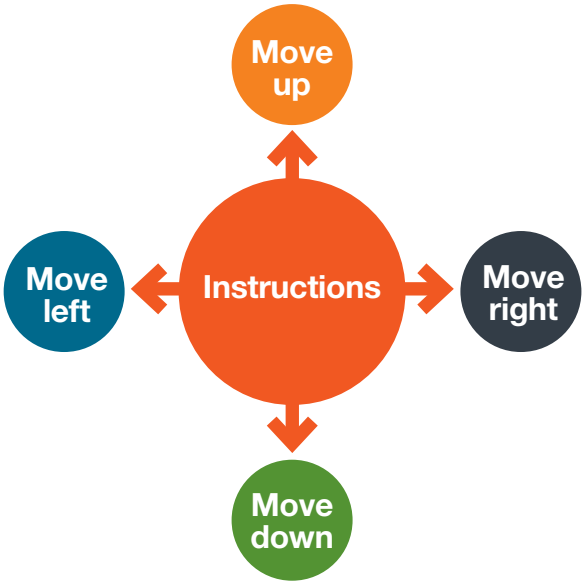
- Start again with your instructions with the writer of the algorithm until you move in an unexpected way. Correct the steps where things went wrong. This is debugging the algorithm.
- Continue to repeat the process of debugging until the whio moves as expected and reaches the goal without any problems.
- Now you have a working algorithm: well done!

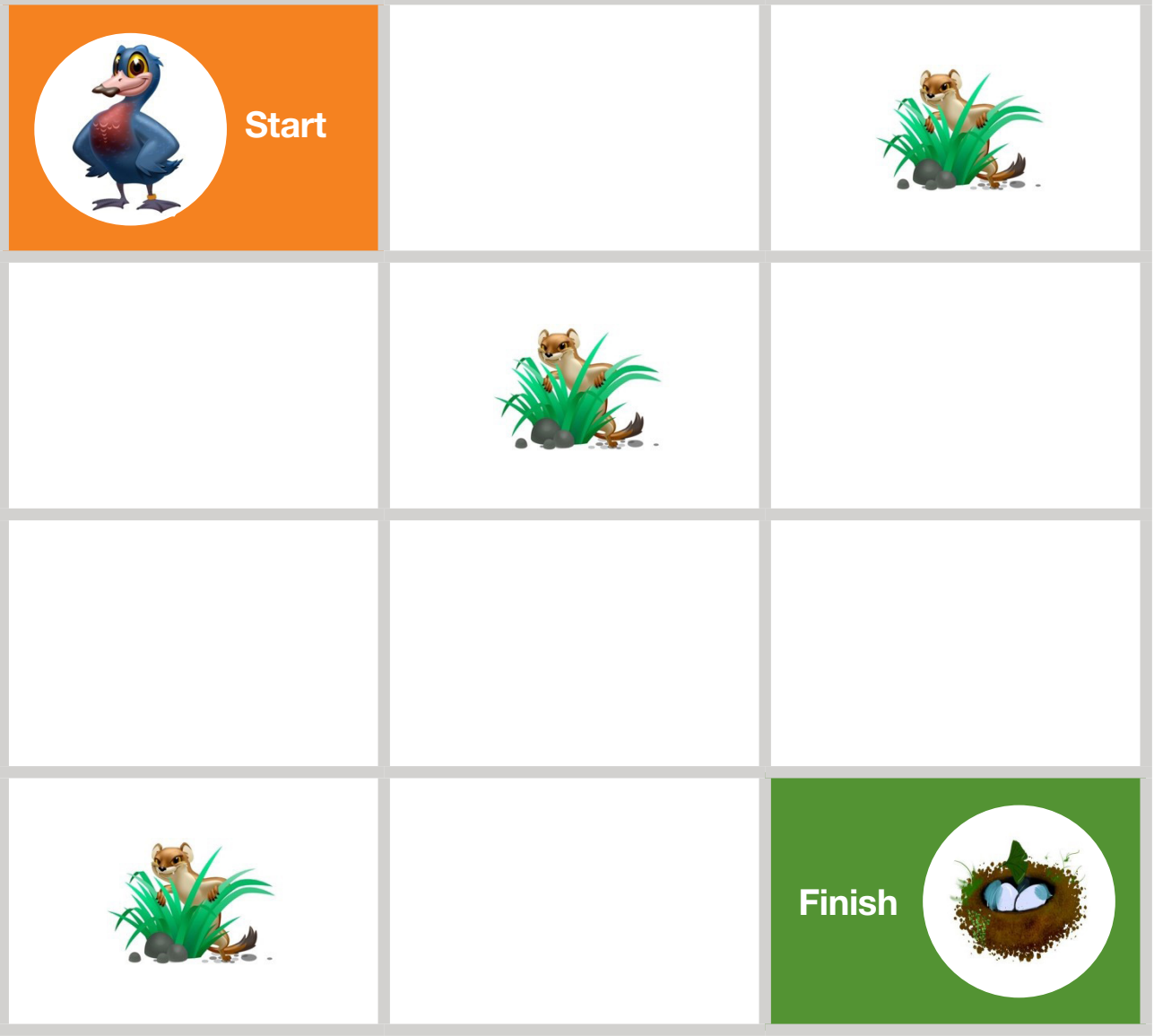
Writing instructions for a character

- Students can try the Writing an Algorithm activity on page 3. After students have written their algorithms, they can swap them with a partner to see if they had the same instructions.

Activity 2: - Written Algorithms

1. Write a set of instructions for the whio/blue duck at the START to move to the nest and eggs at the FINISH square. Tell the whio where to move using the directions on right. Avoid the stoat squares. Include how many squares the whio should move at a time. You will need at least two steps in your instructions.
2. Try your instructions with a partner (your end user).
3. Correct (debug) your instructions until your partner reaches the finish without any issues.





Reflecting on learning

- Nature sometimes operates in instructional/algorthimic ways, for example in DNA and cell reproduction. Whio have to think in algorithmic ways sometimes, to avoid obstacles and evade known predators. However, animal behaviours are very complex and cannot be completely explained by an algorithm. Why do you think this is?
- Discuss what an algorithm is and what it involves. List examples of algorithms.
- How did your whio algorithm go? Were the instructions clear? Were they in the correct order? Were they specific enough?
- Acknowledge that there are several 'right' answers to the activity. Different sequences of coding can result in the same goal being reached.
- Would a computer understand your instructions/algorithm? Revise your algorithm in language that a computer could understand. Make sure you are specific and clear and use numbers where possible.

Extension

- Use a coding programme such as Scratch or Tynker to code a set of instructions/algorithm for a digital character.

Glossary

Algorithm	A sequence of instructions for a process
End-user	The person who will use your algorithm or program
Program	The set of instructions or algorithm that will complete a process
Bug	Part of a program that doesn't work well
Debugging	Fixing your bugs or problems with the algorithm/program

NOTE

Possible solution algorithms to previous page:

- START, move down (x2), move right (x2), move down (x1) FINISH
- START, move down (x2), move right (x1), move down (x1), move right (x1), FINISH

Other resources about teaching digital algorithms

CS unplugged: https://csunplugged.org/en/

Digital ignition resource: http://www.digitalignition.co.nz/assets/yr3-tr.pdf

Are your students excited to try coding?
Try our Drawing and coding with whio activity.