

# Computational Thinking in Action

A catalyst for growth and extension of Computational Thinking in the classroom.

## What is Computational Thinking?

Computational Thinking is a set of skills that underpin learning within the Digital Technologies classroom. These skills allow students to engage with processes, techniques and digital systems to create improved solutions to address specific problems, opportunities or needs.

## The six Computational Thinking skills:



### DECOMPOSITION

Breaking down data, processes, or problems into smaller, manageable parts.



### PATTERN RECOGNITION

Observing patterns, trends, and regularities to make sense of data.



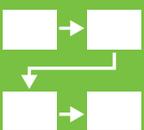
### ABSTRACTION

Identifying and extracting relevant information.  
The process of ignoring or removing unnecessary information.



### MODELLING AND SIMULATION

Developing a model to imitate processes and problems.



### ALGORITHMS

Creating an ordered series of instructions for solving similar problems or for doing a task.



### EVALUATION

Determining the effectiveness of a solution and generalising.  
Applying that information to new problems.

# Thinking about Computational Thinking

## Sort

## Computational Thinking Skills

Not important in the problem or solution

Important but not critical in the problem or solution

Critical in solving the problem or creating the solution

## Compare

## Strategies



Challenges and successes



Other students' strategies



Wider problems and solutions

## Apply

## Understanding

Explore real-world examples



Create designs and projects



Present and communicate findings



# Rubbish robots



Years 3-4  
Years 5-6



Groups of 3



15 minutes



Pens/paper  
A4 graph paper  
3 coloured counters  
Handful of hole punch chads

## Student Instructions

Write a single algorithm that can move three robots at the same time to pick up the maximum amount of rubbish.

### Robot Instructions



### Rubbish Robots

Represented by the 3 coloured counters

A B C

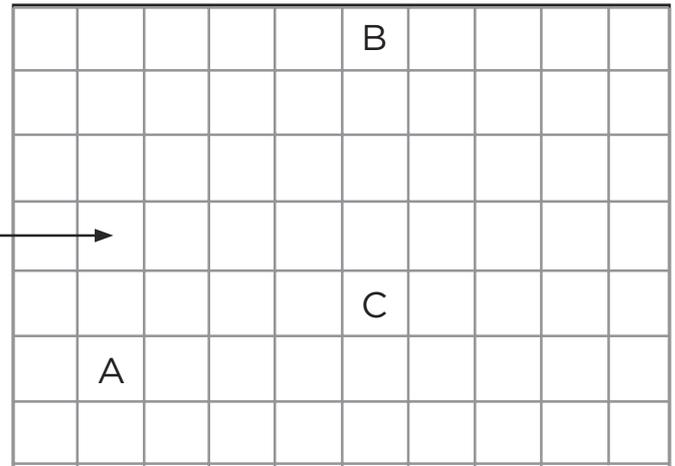
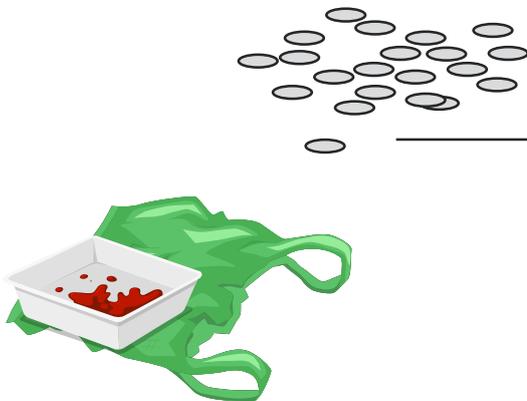
### Algorithm

You can only make one algorithm and you can only use 10 instructions



## Rubbish

Randomly sprinkle the hole punch chads onto your grid.



1. Sprinkle the hole punch chads randomly onto your grid paper (this represents the rubbish)
2. Choose the starting point for each robot and place the counter at this point
3. Write the algorithm to move all three robots
4. Move the robots one instruction at a time, collecting rubbish as you go
5. Count the total rubbish collected
6. Repeat this for each student
7. Compare to see which algorithm collected the most rubbish



# Rubbish robots: extension

## Anna's algorithm

Check out [annadu.org](http://annadu.org)

Anna Du was 12-years-old when she built a robot to find microplastics in the ocean. The idea came to her after walking along a beach near her house and realising there were too many pieces of plastic for her to collect alone.



After doing some research and finding out how much plastic ends up in the oceans each year, she got to work on a remote-operated vehicle to spot plastics on the ocean floor. Anna's robot takes photos of the microplastics underwater and uses an algorithm to identify what is plastic and what isn't using infrared light. This algorithm calculates if a photo has plastic in it by looking for the wavelength returned by the infrared light.

Want to know more about robots helping to solve the ocean plastic problem?

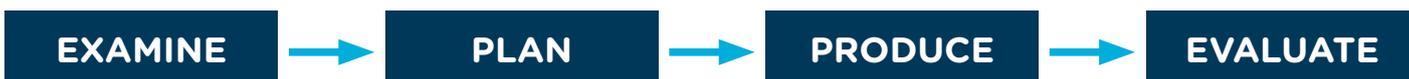
For more information and the latest news on plastic pollution solutions, visit:

[www.digitalcareers.csiro.au/links](http://www.digitalcareers.csiro.au/links)



Design a rubbish robot to tackle plastic waste in your schoolyard.

Use a design thinking process to create your own robot



Submit your design to YICTE!

[www.youngictexplorers.net.au](http://www.youngictexplorers.net.au)