Computational Thinking in Action

Rubbish Robots– Teacher Guide

Principles

This activity focuses on algorithmic thinking, and evaluation of algorithms. Students are writing and trying to optimise algorithms, then comparing their algorithms to each other.

Logic

One of the most common ways for students to approach this is to try and focus on one robot, and attempt to use that to collect as many chads as possible, or to work towards large clusters. Alternately, students may consider the state of the board, and priorities moves that will bring the most counters closer to a chad.

This is an example of a greedy algorithm, which prioritises the optimal choice at each stage. Depending on the type of problem being solved, this can be a strong way to approach the problem, but is not always optimal, depending on the placement of chads. There may be some circumstances where taking an option that does not move towards the nearest chad will allow for greater total collection.

Sample Answer

As the activity involves random allocation, there is no one answer, and students should be encouraged to discuss the advantages and disadvantages of their responses. The example given below is for one specific random allocation and gives some sample potential student algorithms, which will collect different numbers of chads.

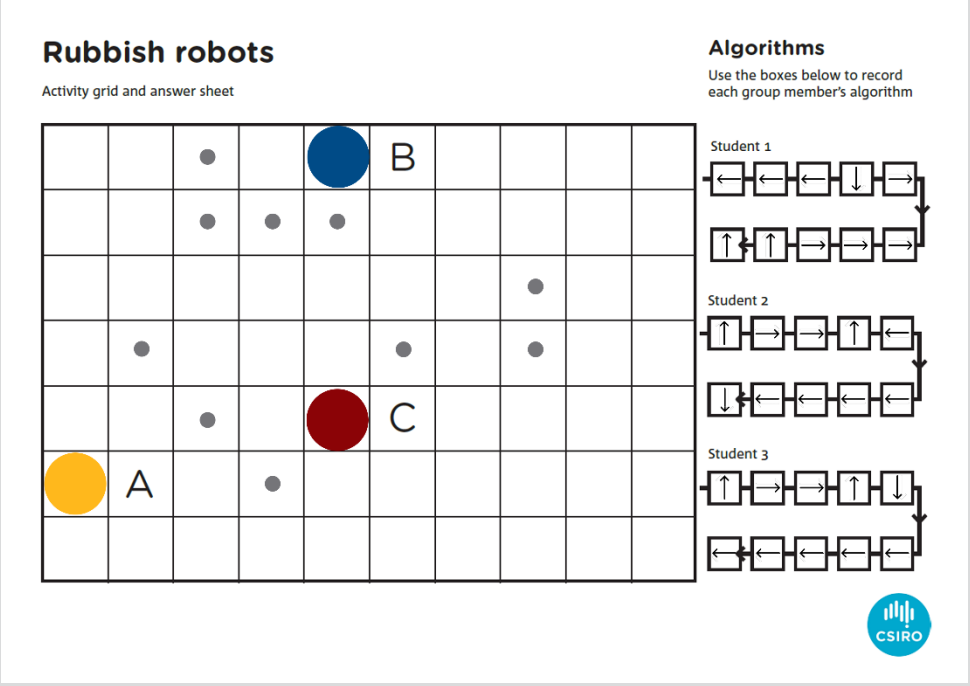

Figure 1 - Position after first move from first student – all counters move to the left

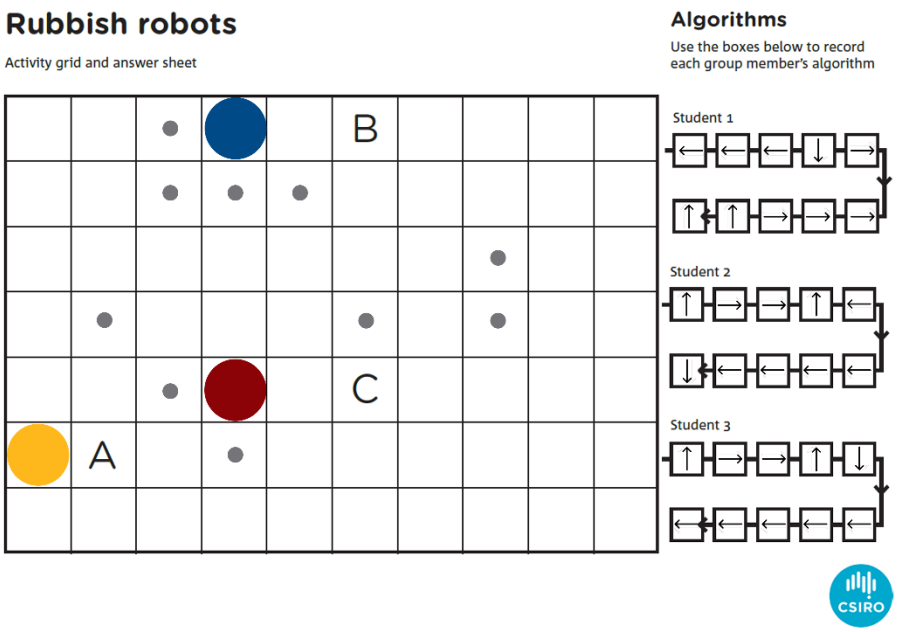

Figure 2 - Position after second move from first student - all counters move to the left again. Note the purple counter cannot move further to the left.

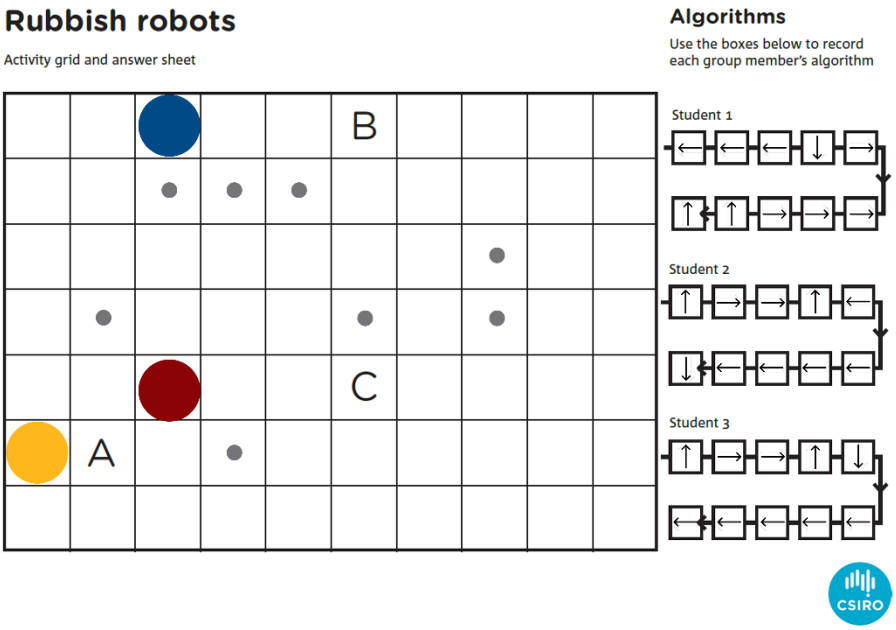

Figure 3 - Position after third move from first student - all counters move left again. The purple counter again cannot move further to the left, so does not move.

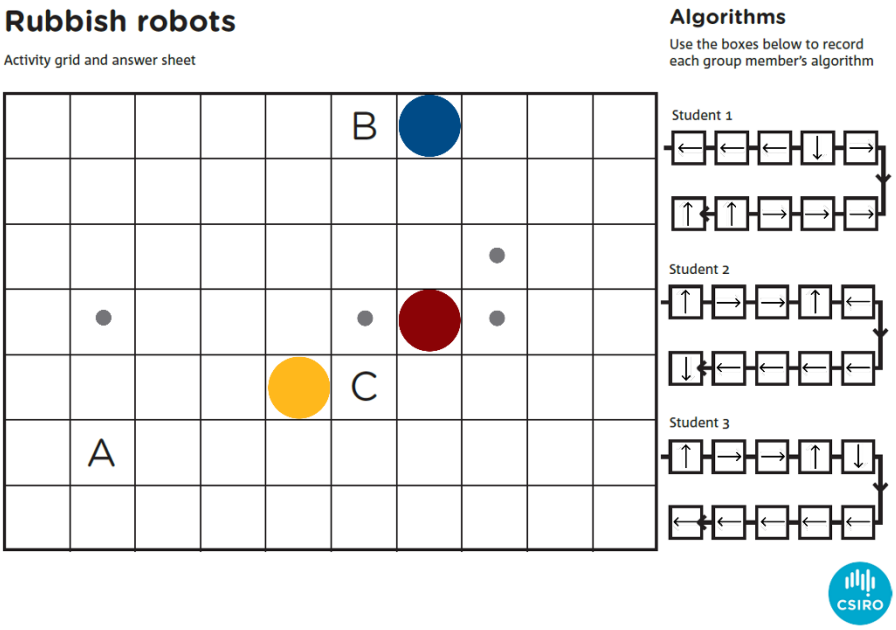

Figure 4 - Final Position image for student 1