General template to build a detailed sheet for each puzzle and problems treated by cMinds

The problem

Title of the problem: **Water puzzle**

//Long description of the problem. Be as detailed as possible.

You have a 3 and a 5 litre water container, each container has no markings except for that which gives you it's total volume. You also have a running tap. You must use the containers and the tap in such away as to exactly measure out 4 litres of water. How is this done? DON'T spill a drop.

Data

//All the numerical parameters of the problem.

1(One) 5-litre can

1(One) 3- litre can

1 running tap

Desirable outcome: 4 litres of water (either in the 5-litre can or 3-litre can)

Solution

//We need to describe here the most ideal solution for the problem, both with a simple algorithm and with a graphical solution

Three solutions are addressed to this problem. Solutions 2 and 3 are the more optimal.

IMPORTANT NOTE (useful for gaining understanind of the solution): What does poor content from 5 litre can into the 3 litre can means ? (AND VICE VERSA)?

It means that the content from the 5 –litre can is being poored into the 3 litre can **without overflow to occur**.

SOLUTION 1 (SERIAL ACTIONS- maybe the first solution that students will compose)

Graphical

1. Algorithmic – Pseudocode

Fill the 3 litre can from the tap.
Poor content from the 3 litre can into the 5 litre can.
Fill the 3 litre can from the tap.
Poor content from the 3 litre can into the 5 litre can. // Leaving the 5 litre can full and 1 litre in the 3 litre can.

Poor away the contents of the 5 litre can

Fill the 3 litre can from the tap.
Poor content from 3 litre can into the 5 litre can. *// Leaving 4 litres in the 5 litre can*

SOLUTION 2 (A MORE EFFICIENT VERSION OF SOLUTION 1)

2. Graphical

3. Algorithmic

While (3 litre can is empty) {
Fill the 3 litre can from the tap.
Poor content from the 3 litre can into the 5 litre can} // Leaving the 5 litre can full and 1 litre in the 3 litre can. 3-litre can is not empty

Poor away the contents of the 5 litre can

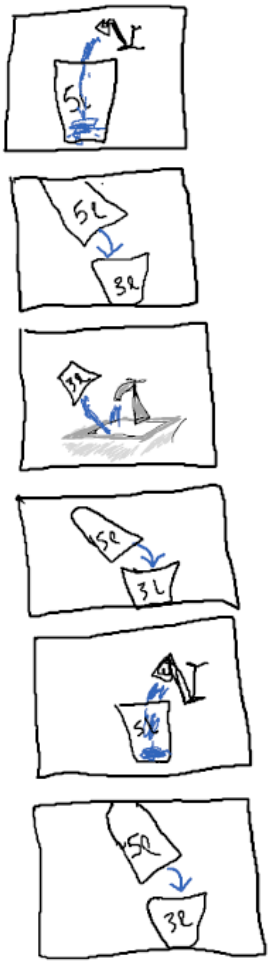
Fill the 3 litre can from the tap.
Poor content from the 3 litre can into the 5 litre can. *// leaving 4 litres in the 5 litre can*

SOLUTION 3 (AN ALTERNATIVE WAY OF SOLVING THE PROBLEM)

Detailed description for solution 3

Fill the 5 litre can from the tap
Empty the 5 litre can into the 3 litre can - leaving 2 litres in the 5 litre can.
Poor away the contents of the 3 litre can.
Fill the 3 litre can with the 2 litres from the 5 litre can - leaving 2 litres in the 3 litre can.
Fill the 5 litre can from the tap.
Fill the remaining 1 litre space in the 3 litre can from the 5 litre can.
Leaving 4 litres in the 5 litre can.

Graphical



Algorithmic

Fill the 5 litre can from the tap
Poor content from 5 litre can into the 3 litre can // 2 litres are now in the 5 litre can
Poor away the contents of the 3 litre can
Poor content from 5 litre can into the 3 litre can // leaving 2 litres in the 3 litre can
Fill the 5 litre can from the tap
Poor content from the 5 litre can into 3 litre can //Leaving 4 litres in the 5 litre can.

List of needed assets (aka talking about the assets)

//Now that we have a solution, we can describe different scenarios (of course not all of them) requiring different assets. This will give us all the assets we need. We need to keep it as simple as possible. It is a list of all the assets used in the result zone and all their possible variations.

For example, if we have a result box for eggs with dots, we need to have it in different states:

- *empty*
- *one egg*
- *two eggs*
- *full*

Important: all the assets described here MIGHT NOT be new. For example, we already have assets for the robot walking or picking stuff. But they still need to be described here.The brand new assets will be singled out in the list below. Also, the assets are just described not pictured here. Again, only the new assets will be pictured below. We could use the same numbering system as below for the assets to keep some level of coherence. In order to have a list as clear as possible, we divide the assets into four categories: action, tests, code, result zone//

A. Action

A1. Fill the 3 litre can from the tap.

A2. Fill the 5 litre can from the tap

A3. Poor content from the 3 litre can into the 5 litre can.

A4. Poor content from 5 litre can into the 3 litre can

A5. Poor away the contents of the 5 litre can

A6. Poor away the contents of the 3 litre can

B. Tests

B1. 3-litre can is empty

C. Code

C1. WHILE

D. Result zone general purpose assets

D1. 5- litre can is full D2 5-litre can is empty D3. 5-litre can has 1 litres of water D4. 5-litre can has 2 litre of water D5. 5- litre can has 3 litres of water D6. 5- litre can has 4 litres of water	D7. 3-litre can is full D8. 3- litre can is empty D9. 3- litre can has 1 litre of water D10. 3 - litre can has 2 litres of water

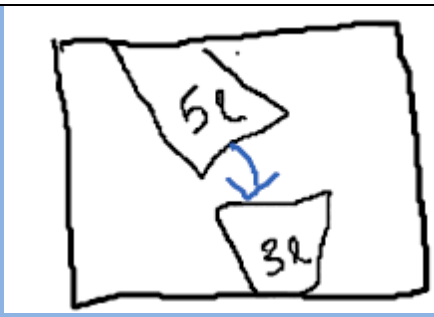
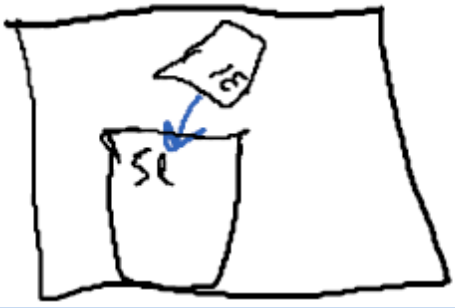
D11. The running tap	D12. Robot is still D13. Robot holds the 5 litre- can D14. Robot holds the 3- litre can D15. Robot is walking holding the 5 litre-can D16. Robot is walking holding the 3 litre-can D17. Robot is pouring water from 5- litre can into 3-litre can D18. Robot is pouring water from 3-litre can into 5-litre can D19. Robot is pouring the content of the 5-litre can away in the tap D19. Robot is pouring the content of the 3-litre can away in the tap D20. Robot fills the 5-litre can from the tap D21. Robot fills the 3-litre can from the tap

Visualization (aka drawing the assets)

Nothing more than a drawing of an asset and a number which will be used throughout this document.

1. Action

//All the assets which will be available in the action toolbox.

	A1		A4
	A2		A5
	A3		A6

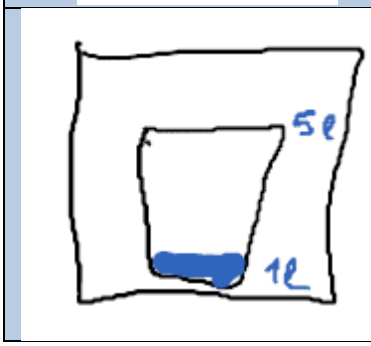
2. Test

All the assets which will be available in the tests toolbox.

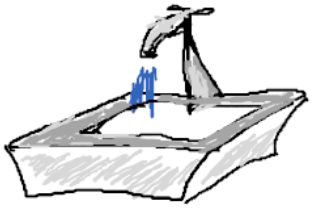
TESTS	
	B1

3. General purpose

//Here we have all the new assets which will be used in the result zone.

	**D1**		**D14**
	**D2**		**D15**
	**D3**		**D16**

	**D4**		**D17**
	**D5**		**D18**
	**D6**		**D19**
	**D7**		**D20**
	**D8** **(THIS IS ALSO A TEST B1)**		**D21**

	**D9**		**D22**
	**D10**		**D23**
	**D11**		**D24**