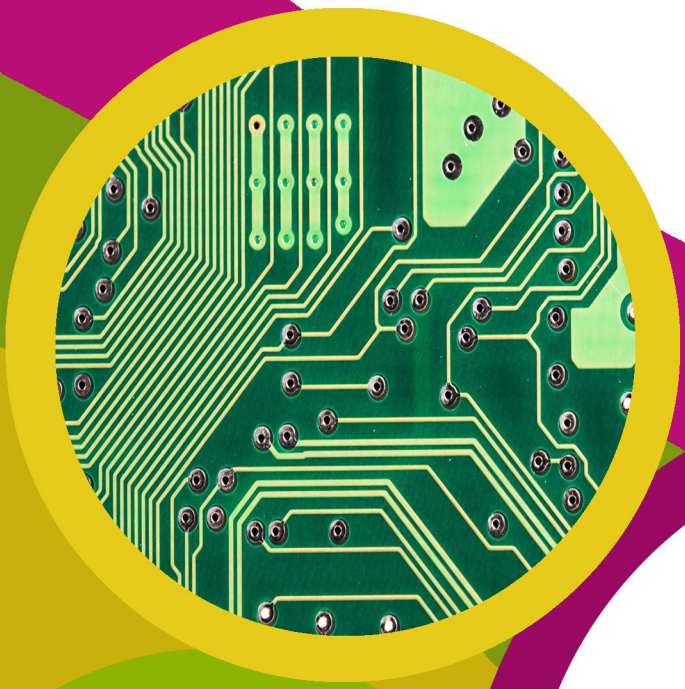
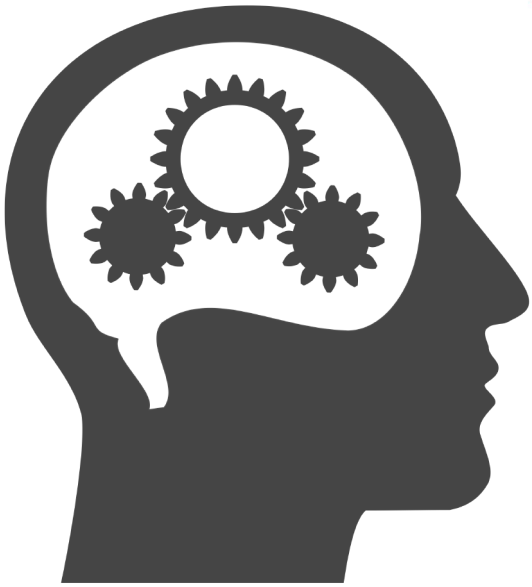
technocamps

Computational Thinking Workbook





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Overview

In this workshop, we will be looking at the concept of Computational Thinking and applying it to solve problems and simulate real-world sequences in Scratch.

Learning Outcomes

1. Improved knowledge of Decomposition, Abstraction, Pattern Recognition and Algorithms.
2. Improved problem-solving abilities.
3. Improved programming skills in Scratch.

Attendee Prerequisites

1. Basic experience of programming in Scratch.

What is Computational Thinking?

In your own words, write down what you think computational thinking is:

_____

_____

_____

Guess Who Reflection

How many questions were needed? _____

What questions did you ask?

i) _____?

ii) _____?

iii) _____?

iv) _____?

v) _____?

vi) _____?

Which questions were the most useful? _____ , _____ , _____ , _____ , _____

Did your partner's answers influence your next question? How?

_____

_____

_____

What is Decomposition?

In your own words, write down what you think decomposition is:

Decomposition of a Game

Let's use your favourite video game, board game or app as an example:

What type of game is it? What is the main objective of the game / how do you win? Is the game single player or multiplayer? How do you interact with the world?

LEGO Reflection

Did the creation look the same? _____
If not, whose fault do you think it is and why?

_____

_____

What would have made the task easier?

_____

_____

Who or what may experience the same problems as the student following the instructions?

_____

What makes a good set of instructions and briefly say why? Give four points:

1. _____

2. _____

3. _____

4. _____

Drawing Instructions

Make a small drawing/picture and try to give instructions to your partner on how to draw it. Remember, they are not allowed to see the drawing or ask questions.

Get Arty!

You are shown a detailed picture which you must try drawing to your best ability. You have 1 minute and must stop drawing afterwards:

Artist Reflection

How did you decide what to include and what not to include? What were your reasons for including certain things and not others?

_____

_____

_____

What is Abstraction?

Abstraction is:

_____

_____

_____

Why is abstraction useful? And to whom?

_____

_____

_____

Think of two different scenarios where abstraction is used:

1. _____
2. _____

What is Pattern Recognition?

In your own words, write down what you think pattern recognition is:

_____

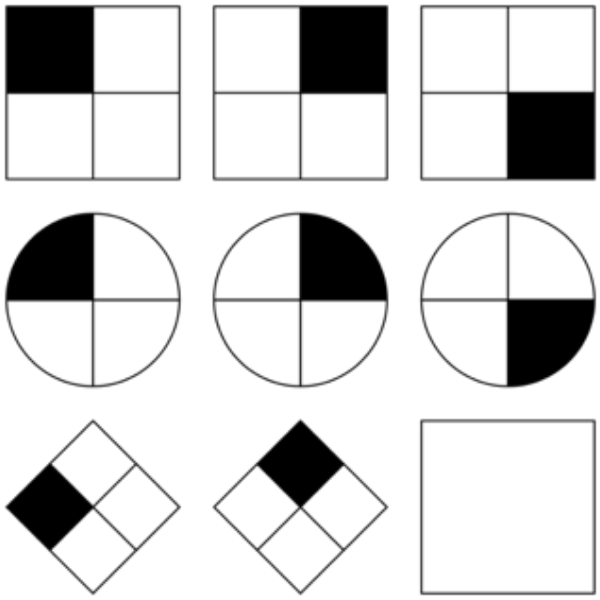
_____

_____

Complete the Pattern (1)

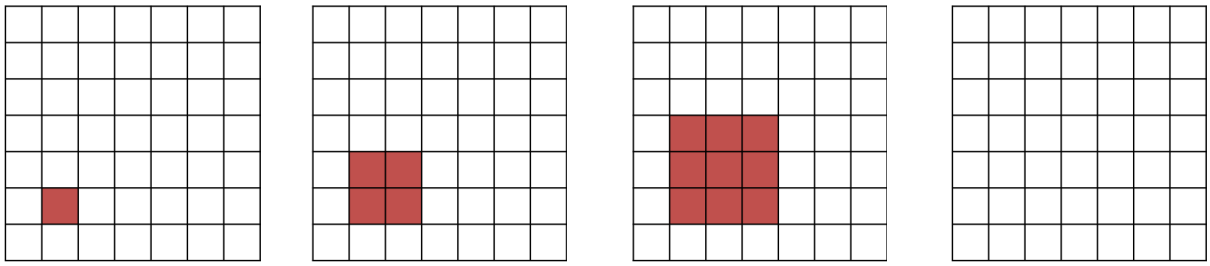
Can you see what should go in the final square?

Complete the pattern by drawing in the final box.



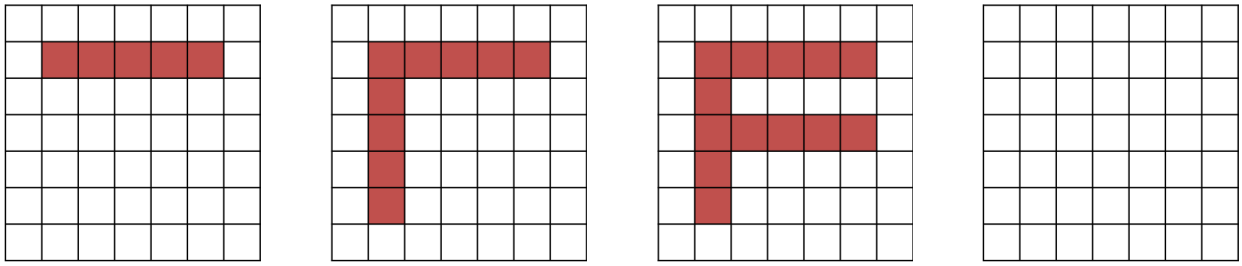
Complete the Pattern (2)

Complete the pattern:



Complete the Pattern (3)

Complete the pattern:



Create Your Own Patterns

Number Sequences

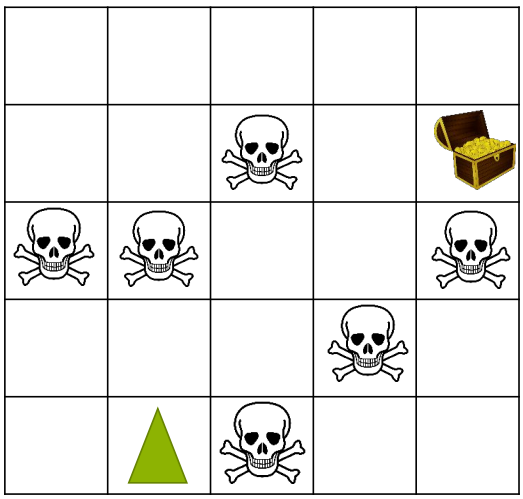
Can you spot the pattern in these sequences? Write the number that will come next:

Sequence	Next Number	Why?
1 2 3 4 5		
2 4 6 8 10		
8 4 0 -4 -8		
1 2 4 7 11 16 22		
1 1 2 3 5 8 13 21 34		

Buried Treasure (1)

Write a set of instructions to guide the triangle to the treasure, avoiding the pirates!

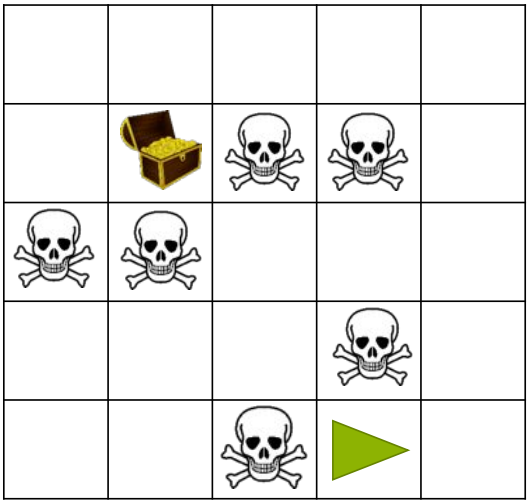
	Instruction		Instruction
1		8	
2		9	
3		10	
4		11	
5		12	
6		13	
7		14	



Buried Treasure (2)

Write a set of instructions to guide the triangle to the treasure, avoiding the pirates!

	Instruction		Instruction
1		8	
2		9	
3		10	
4		11	
5		12	
6		13	
7		14	



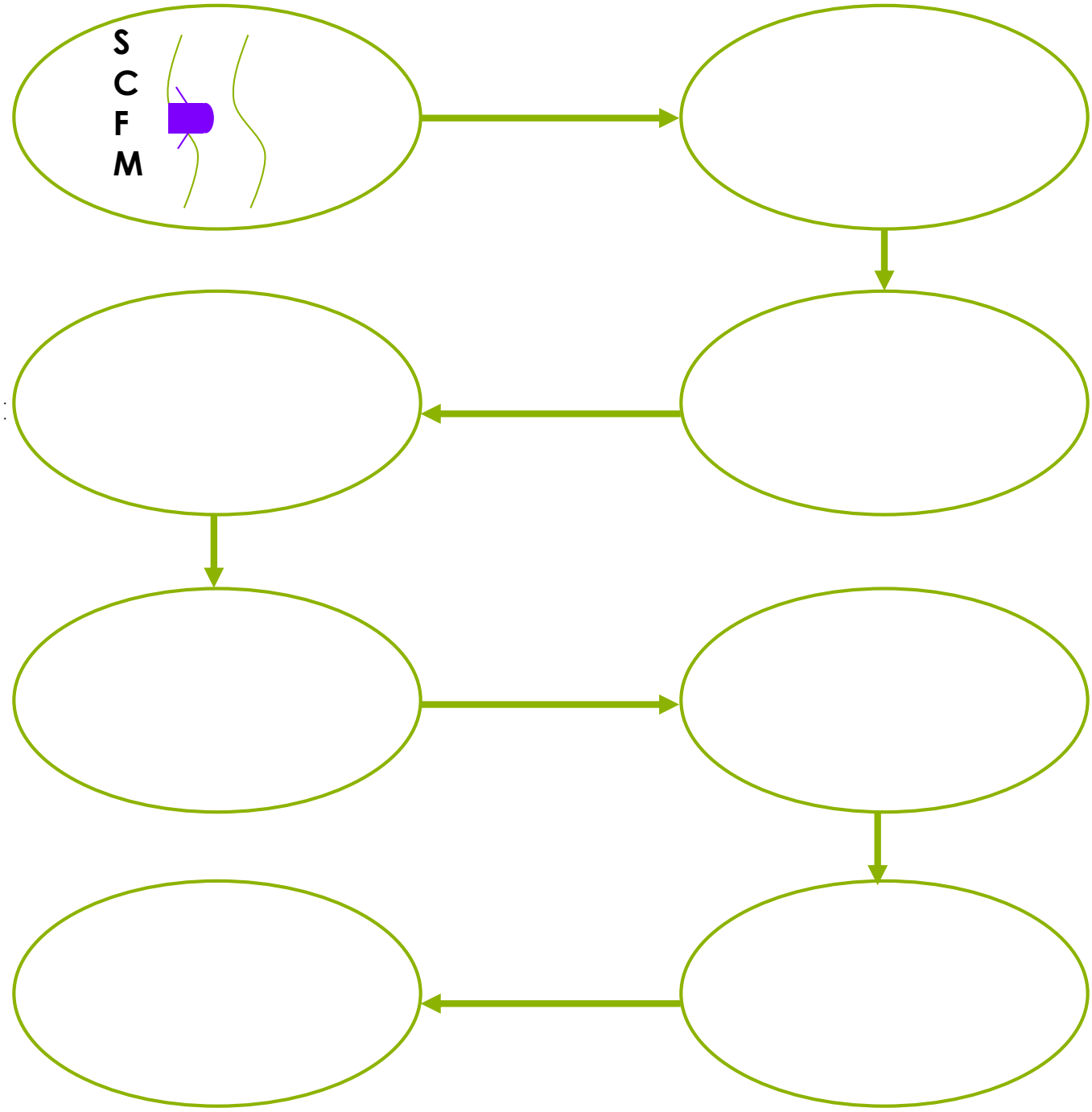
Was There a Pattern?

Is there a pattern in the instructions? Could we re-write them in a much shorter way by repeating steps? Re-write your answers to the last two puzzles using "repeat steps ___" to shorten your instructions:

Puzzle 1	Puzzle 2

River Crossing LTS

Use the space below to create a Labelled Transition System of the steps needed to solve the River Crossing Problem



What is an Algorithm?

In your own words, write down what you think an algorithm is:

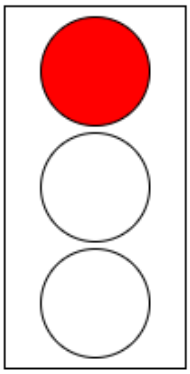
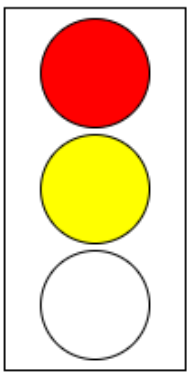
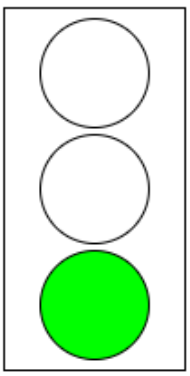
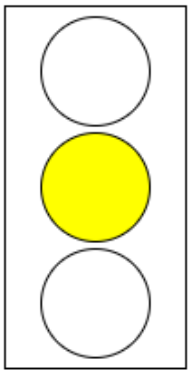
Defining an Algorithm

In our daily lives algorithms are everywhere, but we may not realise it! An algorithm is:

It is important to remember when writing an algorithm to:

Where do we use algorithms in everyday life?

Traffic Lights Algorithm

			
5 Seconds	2 Seconds	5 Seconds	2 Seconds

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