

Title: DRAWING WITH ALGORITHMS

Educational level: 1st ESO.

Subject: Foreign Language: English.

Timing: One 50-minute session in the 2nd term.



Summary

Students will learn what an algorithm is. To do this, they will be given a worksheet with a simple drawing made up of geometric shapes and will have to write a series of detailed steps so that another group, who has not seen the drawing, can reproduce it exactly by following the algorithm. The concept of loops will also be introduced, and students will need to use them within the steps.

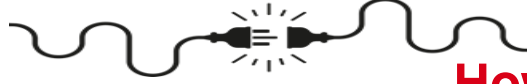


Aims



- Practise creating algorithms with loops by specifying instructions to reproduce a given drawing.
- Give, request, and understand instructions and directions. Imperatives.
- Work as a team.

Key Competences to Develop: linguistic communication competence, mathematical competence, competences in science and technology, digital competence, social and civic competences, learning to learn.



1. Introduction to algorithms, loops, and symbols

- Explain that an algorithm is a series of clear and precise steps to perform a task.
- Introduce the concept of a flowchart and show the symbols used.
- Analyse a simple example of an algorithm and its flowchart. Once students understand the concepts of algorithm and flowchart, we will analyse the algorithm for creating a square and its flowchart.

2. Game preparation

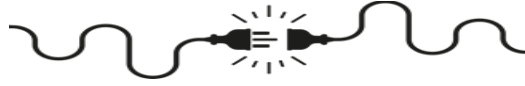
- Divide students into small groups.
- Each group receives a worksheet with a drawing to create the algorithm for another group to draw.

3. Creating the algorithm:

- Students must create an algorithm in English to specify how to achieve the drawing on their worksheet. The algorithm must include loops. For example:
 - Place your pencil at the bottom left of the drawing.
 - Draw a green rectangle measuring 26 x 2 squares.
 - Move 4 squares horizontally and 2 squares vertically.

4. Testing the algorithm:

- Groups exchange algorithms and follow them to reproduce the drawing of the other group using the given algorithm.
- Each group must follow the algorithm to complete the drawing.



5. Review and improvement:

- The group that created the algorithm compares the drawing made by their peers with the expected result.
- After each round, groups can review their algorithm and make improvements to correct any errors.
- This step will be repeated until the drawing matches the model.
- Discuss with the students how they used loops to create their algorithms and how they could improve them.

6. Reflection:

- Talk about the importance of algorithms in programming and how loops help automate tasks.
- Reflect on how this activity can be applied to real-life problems and in programming robots.



Suggestions

You can increase the difficulty by including more elements in the drawing or more complex elements.

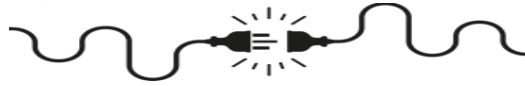
Each group can create their own drawing to describe using the algorithm instead of using the ones provided by the teacher.

To reinforce learning, students can exchange their algorithms and try to follow the instructions created by another group.





Unplugged Activity



Resources

- **Personal:** teachers and students.
- **Materials:** paper, pens, and colours. Ruler. Presentation explaining what an algorithm is. Worksheets with drawings for students to create algorithms for reproduction.



Spaces: classroom.

Type of activity: group work.



Algorithms and Flowcharts



Algorithms and Flowcharts

An **ALGORITHM** is a set of well-defined, ordered, and finite instructions or rules that allow an activity to be carried out through successive steps that do not generate doubts for the person who must perform the activity. Given an initial state and an input, following the successive steps leads to a final state and a solution is obtained.

It is the step prior to coding in a specific programming language. They can be written in pseudocode or as flowcharts.

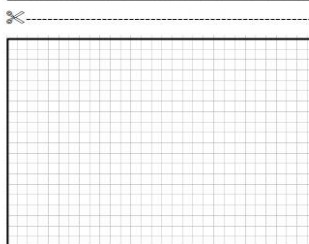
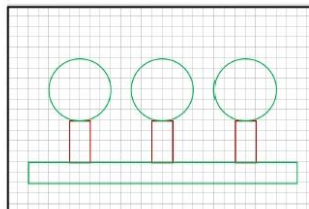
- **Pseudocode:** it is a textual description of the steps of an algorithm using a language similar to natural language, but structured.
- **Flowchart:** It is a graphical representation of those steps using symbols and arrows.

FLOWCHART:

Main symbols used:

	Start or end of the algorithm
	Perform an action.
	Data input or data output.
	Used when it is necessary to make decisions that involve performing different instructions. The answer to the question will be YES or NO

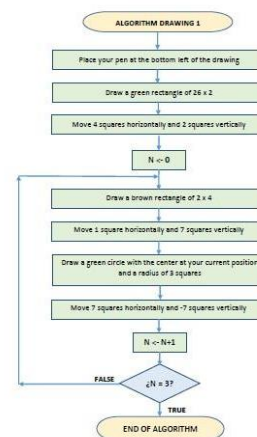
Drawing Sheets

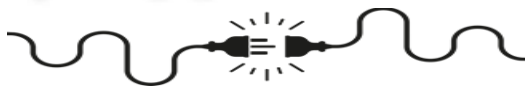


Example of solution for drawing 1



POSSIBLE ALGORITHM FOR DRAWING 1





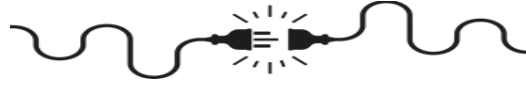
Assessment Criteria

Learning Outcomes and Evaluation Rubric:

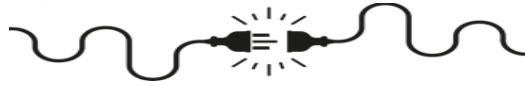
Assessment Criteria	4 Excellent	3 Satisfactory	2 Needs Improvement	1 Insufficient
Understands the concept of an algorithm.	Understands the concept of an algorithm without difficulty.	Understands the concept of an algorithm with help.	Understands the concept of an algorithm with great difficulty.	Does not understand the concept of an algorithm.
Understands the concept of a loop.	Understands the concept of a loop without difficulty.	Understands the concept of a loop with help.	Understands the concept of a loop with great difficulty.	Does not understand the concept of a loop.
Is able to create and follow an algorithm.	Creates and follows algorithms without difficulty.	Creates and follows algorithms with help.	Creates and follows algorithms with great difficulty and only occasionally.	Does not create or follow algorithms.



Unplugged Activity



Expresses algorithmic instructions without major errors.	Expresses algorithmic instructions without major errors without difficulty.	Expresses algorithmic instructions without major errors with help.	Expresses algorithmic instructions with some major errors.	Expresses algorithmic instructions with many major errors.
Uses vocabulary related to drawing skills, geometric shapes, measurements, strokes, and colours without major errors.	Uses vocabulary related to drawing skills, geometric shapes, strokes, and colours without major errors without difficulty.	Uses vocabulary related to drawing skills, geometric shapes, strokes, and colours without major errors with help.	Uses vocabulary related to drawing skills, geometric shapes, strokes, and colours with some major errors.	Uses vocabulary related to drawing skills, geometric shapes, strokes, and colours with many major errors.
Uses the imperative correctly when giving algorithmic instructions.	Uses the imperative correctly when giving algorithmic instructions without difficulty.	Uses the imperative correctly when giving algorithmic instructions with help.	Uses the imperative with some major errors when giving algorithmic instructions.	Uses the imperative with many major errors when giving algorithmic instructions.
Works in a team, collaborating and communicating.	Works in a team in an organised and positive manner.	Works in a team, although with communication problems.	Tasks are distributed within the group.	Does not work in a team.



Pensamiento computacional

Logic (prediction and analysis): thinking to make predictions, solve problems and make decisions based on available information.

Algorithms (steps and rules): is a step-by-step process that solves a problem or completes a task.

Decomposition (breaking down into parts): breaking a large problem into smaller, manageable parts that are easier to understand and solve.

Patterns (recognise and use similarities): recognising similarities or patterns in problems or data, which means come up with solutions quickly and effectively.

More information



QR codes to the activity resources:

Algorithms and
Flowcharts



Drawing Sheets



Example of solution for
drawing 1

