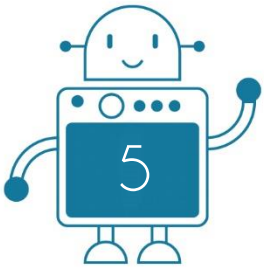


Robot and Maths

STEMJAM Teaching Guide

Developing make spaces to promote creativity around STEM in schools

Acronym: STEMJAM
Project no. 2016-1-ES01-KA201-025470

www.stemjam.eu

Co-funded by the Erasmus+ Programme of the European Union

ROBOT AND MATHS

ABSTRACT

Using the MBOT robots assembled in the first experiment, students will explore their main programming features and abilities by playing with simple mathematical theories, which may be chosen according to the students' age. As an example in the proposed code Pythagoras' Theorem is used. Students will have to develop the codings for calculating the hypotenuse of a triangle using the mBot.

DIDACTIC OBJECTIVES

The purpose of this experiment is:

- To study maths using a robot.
- Learning about using a Led matrix.
- Learning about developing codes for formulas.
- Learning about coding some effects with the mBot.

STEM Subject: Science☐ Technology ☐ Engineering☐ Mathematics☒

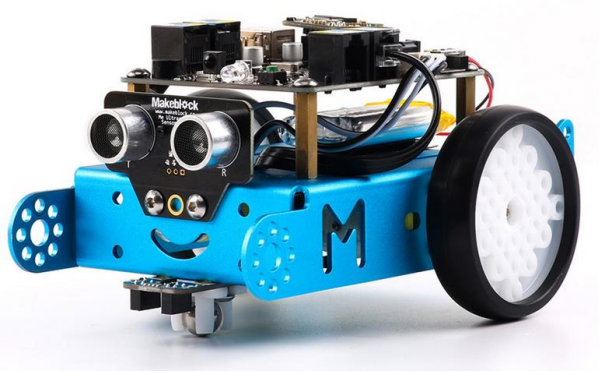
Education Level: 12-14 years☐ 14-16 years☒

PROBLEM STATEMENT

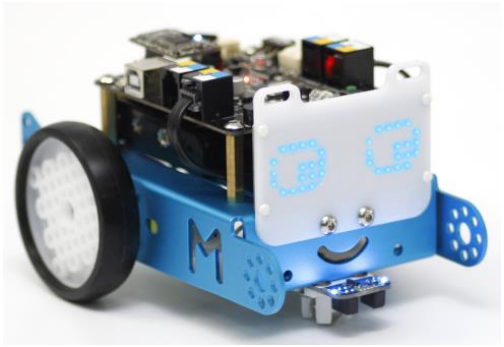
Students have to develop a code implementing Pythagoras' Theorem for calculating the hypotenuse of a triangle, given the base and the height of it.

BOM (Bill of Materials Needed)

- mBot => Ref. 90054



❖ Me **LED Matrix 8 × 16**:



❖ Different beams and structures:

ACTIVITY DESCRIPTION

The work of the students consists first of all, in developing the flow chart needed for this activity.

They have to realize what their unknown variable is, and then they have to create the formula for calculating it.

For this purpose, they also need to be aware of what parameters they need. So, the coding also has to ask the player about the value of these parameters.

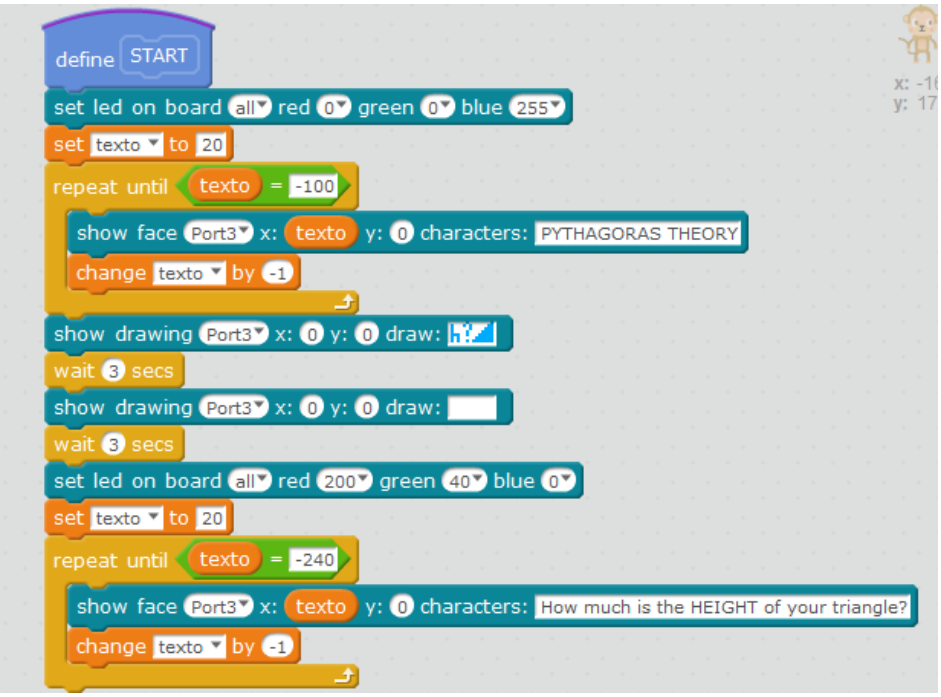
In the meanwhile, all the information must be shown in a Led Matrix and also in the screen of the computer.

Setting the starting parameters:
We set all the variables to zero. We also switch off the Leds on board.

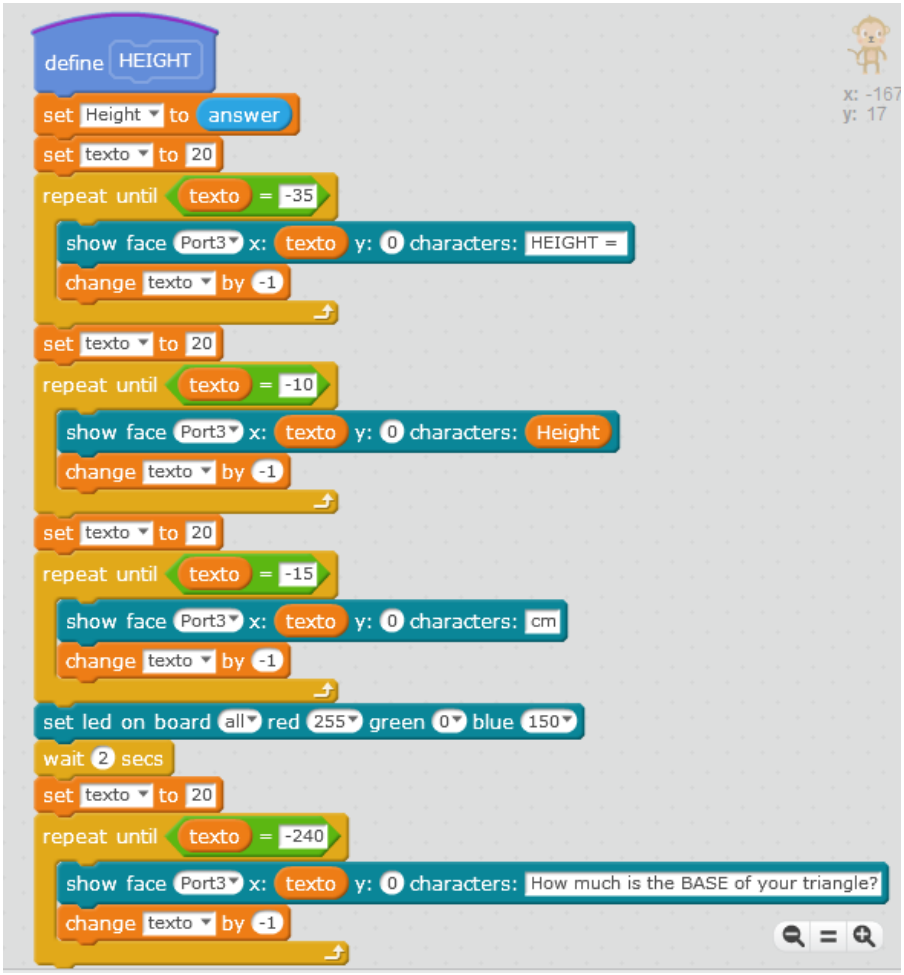
Setting the main routine:
In this part, it is shown the order of the different subroutines needed for asking the known parameters and for calculating the unknown variable, the hypotenuse.

Coding the different subroutines and its effects:

Starting subroutine: Pythagoras Theory, blue colour.

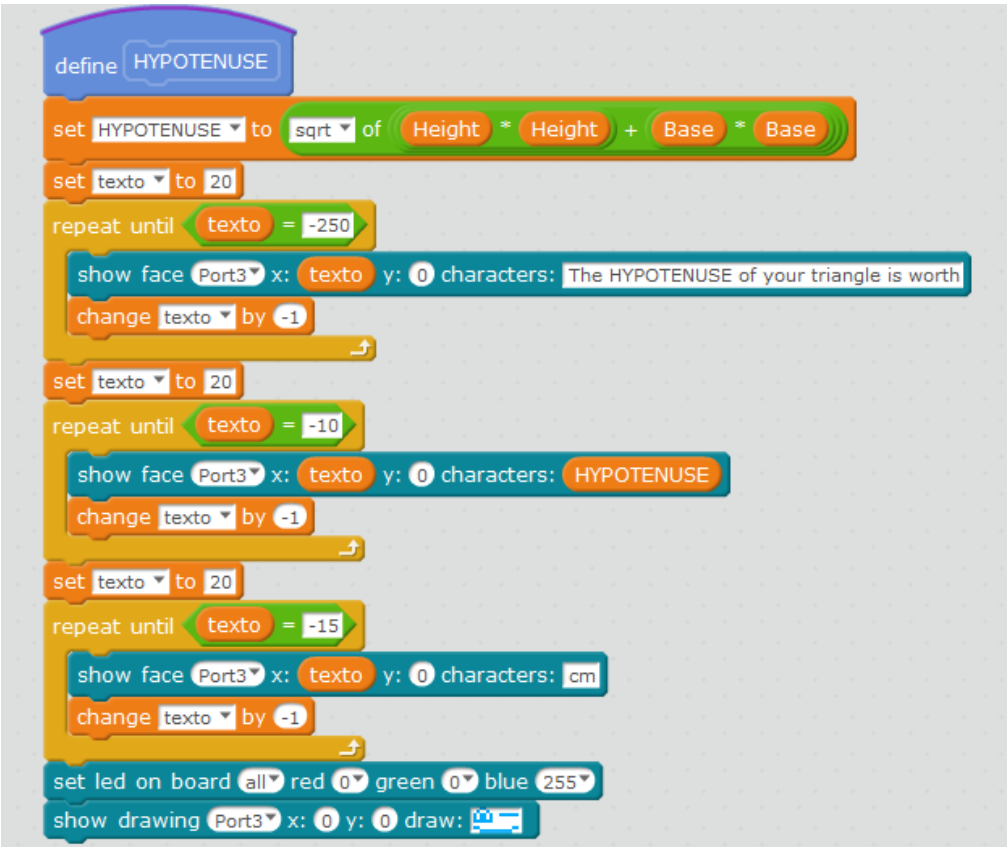


Height subroutine: orange colour.

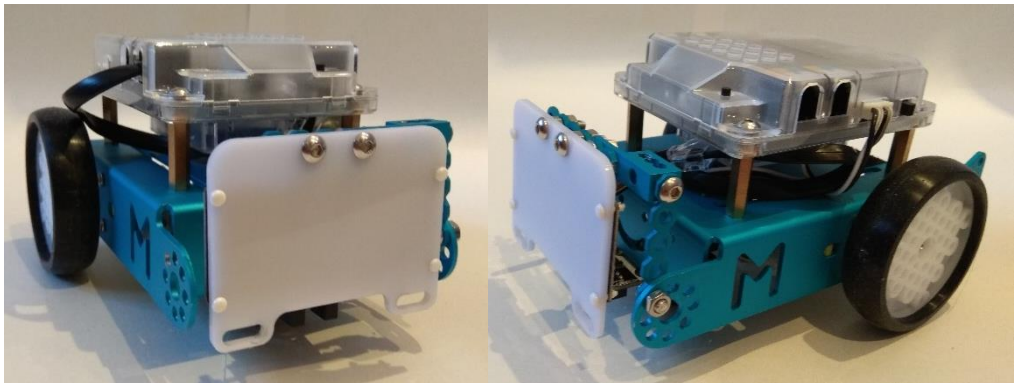


Base subroutine: pink colour.

Hypotenuse subroutine: green colour.



Structural composition:



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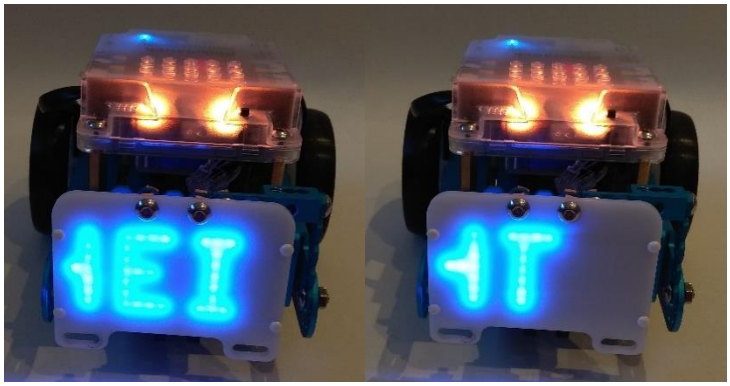

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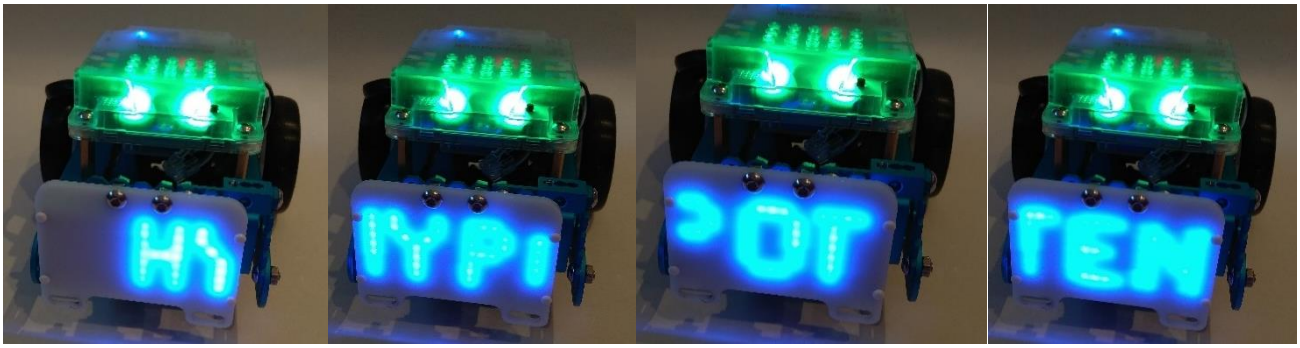
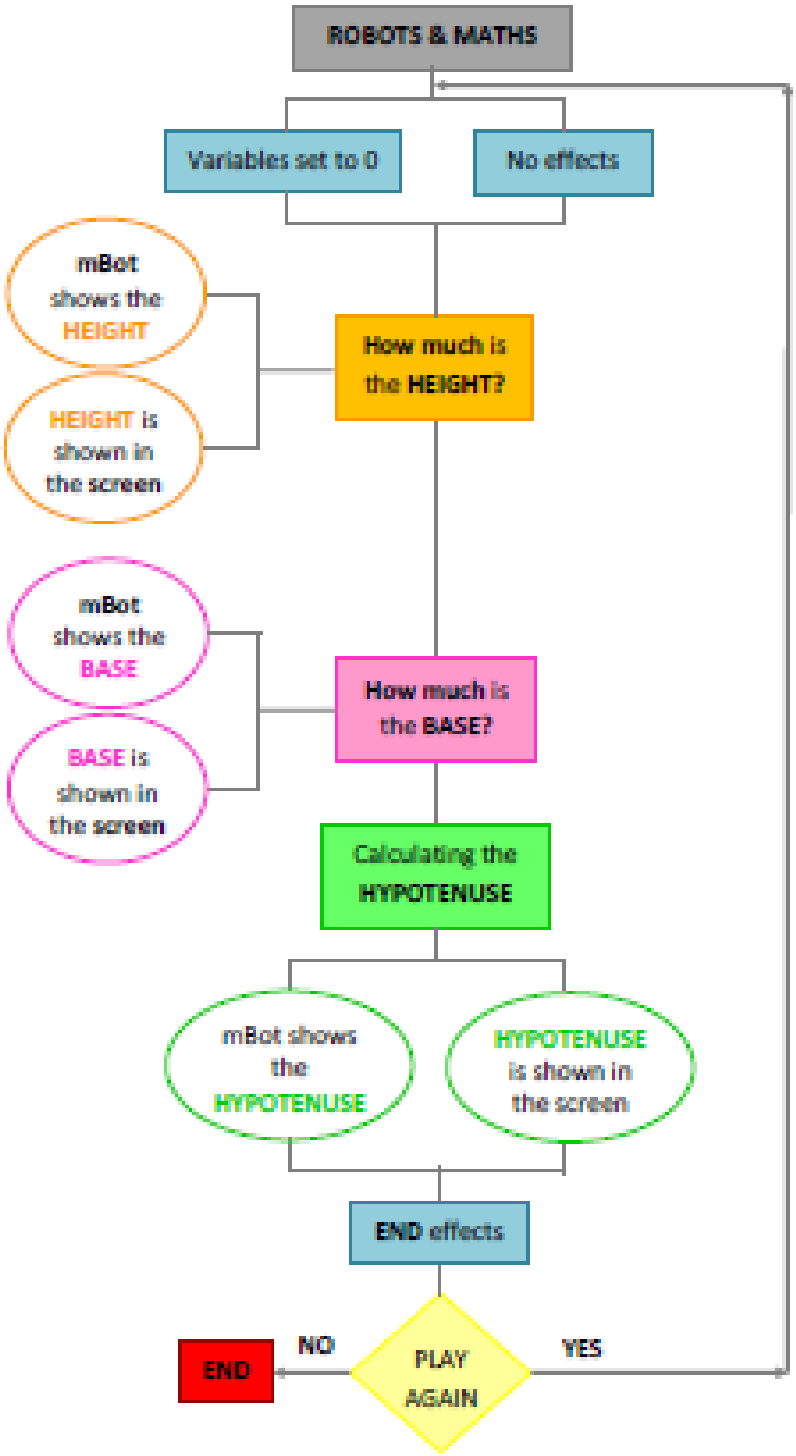


End of the programme:

FLOW CHART



BIBLIOGRAPHY

http://www.makeblock.com/

SCALABILITY

The design is based on students with "zero" preconditions.