



# TanglIn

**Tangible Programming & Inclusion**

## TanglIn Toolbox Multiplication

6-8 years old

Area model

Coordinates

Probotic



[www.tanglin.eu](http://www.tanglin.eu)



/tanginproject



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## Summary

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Multiplication tables and area model - logic and fun with the BOT.

Expected duration: **40 min** (the lesson plan duration is flexible, and teachers can adapt them accordingly to their needs and class duration).

## Learning Outcomes

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At the end of the session, students are expected to:

- Multiply using the area model;
- Identify the area unit measure and measure a given area according to that unit;
- Read the position as a coordinate (x,y);
- Program the robot adequately;
- Value STEM areas;
- Develop transversal competencies such as problem-solving, communication and reasoning;
- Develop group work skills, namely, to respect and favor the inclusion of all elements, regardless of gender, culture, etc.

## Links With Curriculum Topics

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Covered Curriculum Topics	
Subject	Topics
Engineering	<b>Mathematics</b> Numbers and Operation <ul style="list-style-type: none"> <li>• Multiplication</li> </ul> Geometry <ul style="list-style-type: none"> <li>• Orientation and localization –coordinates of points</li> <li>• Area</li> </ul>
	<b>Science</b> It depends on the contextualization that the teacher does - or in day-to-day situations or other disciplinary areas
	<b>Technology</b> Programming <ul style="list-style-type: none"> <li>• Concepts of programming</li> <li>• Programs – Results, errors, and troubleshooting</li> </ul>

## Notes for Teachers

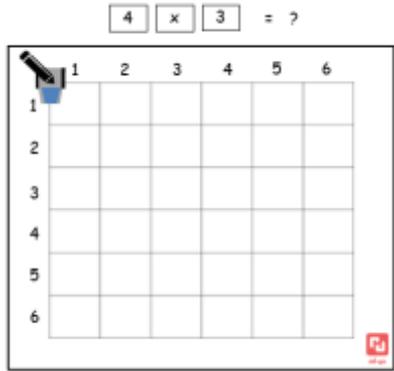
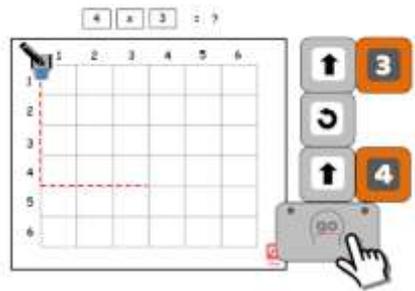
The teacher must contextualize the task in day-to-day situations (for example, to tile a room; garden turf; decorate the school wall, ...) or other disciplinary areas and prepare, in advance, all the materials needed and the classroom according to the activities to be developed.

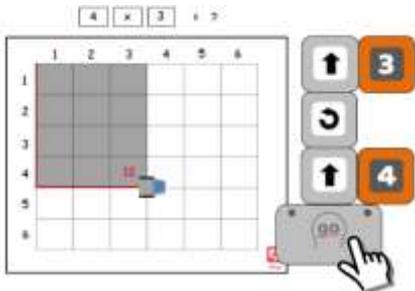
The proposed activity uses a 6x6 grid. It's possible to extend the grid to perform the operations with higher numbers.

The teams should be as heterogeneous as possible to foster the integration of all students.

It's important that clear rules are established in terms of group work. This way it avoids the most active children assuming the lead and the quitter ones only observing.

## Lesson Plan

				
Prep	10'	Groups	<p>"Let's help MI-GO building multiplication tables"</p> <p>Divide the class into groups. Each group will have a 6x6 grid in which they will number 1-6 the first row and column according to the picture. And several cards with multiplications to solve:</p> <p>e.g. <math>2 \times 5 = ?</math>; <math>6 \times ? = 18</math>; <math>? \times 3 = 15</math></p> <p>To start, position the BOT on the upper left corner.</p>	
Play	20'	Group	<p>Each group will divide in two and alternately each group will program the BOT for a certain coordinate (x front; y left) and the other group will have to fill the destination square with the correct number (according to the multiplication table) before the BOT arrives there</p> <p>Example: <math>4 \times 3 = ?</math></p>	

				
			<p>To confirm it, they will outline the area of the coordinate and count the squares.</p> <p>They then return to position the BOT in the initial position and switch roles.</p> <p>Every time one team fills the correct number wins one point.</p> <p>Continue until the square is finished or time's up.</p>	
Discussion	10'	Class	<p>The teacher asks the class which unit of area was used so that students conclude that it is the smallest square of the given grid.</p> <p>Then, regarding 4 x 3 example, the area of the red rectangle (in the figure) is 12 times that area unit.</p> <p>In fact, that square fits 12 times on that surface of the red rectangle.</p> <p>The students must also realize that 12 is at the junction of the 4<sup>th</sup> line with the 3<sup>rd</sup> column.</p> <p>The class must give and discuss other examples.</p>	

## Resources List & Support Material

### Per each group:

- A robot kit with drawing capabilities;
- Transparent scenario with a 6x6 grid.
- Markers for each group (easy to erase/clean): Black for the numbers and red for the BOT;
- Alcohol for cleaning the scenarios (for teacher use only);
- Scissors (to cut the cards).
- Cards with multiplications, e.g.

$$2 \times 5 = ?$$

$$6 \times ? = 18$$

$$? \times 3 = 15$$

$$4 \times 3 = ?$$