



TanglIn

Tangible Programming & Inclusion

TanglIn Toolbox Triangles

8-12 years old

Triangle Classification

Decomposition of figures

Golden ratio

Probotic



www.tanglin.eu



/tanginproject



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

This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein. Project N°.: 2017-1-PT01-KA201-035975

Summary

Decomposition of figures in triangles. Golden ratio. Representation, classification, and identification of several types of triangles.

Expected duration: **70 min** (the lesson plan duration is flexible, and teachers can adapt them accordingly to their needs and class duration).

Learning Outcomes

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

- Understand that many geometric figures can be the result of a combination of other simpler ones;
- Identify and appreciate the golden ratio in nature, in the arts, etc.;
- Visualize and classify different types of triangles;
- Program the robot adequately taking advantages of the angle block;
- 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

Covered Curriculum Topics		
	Subject	Topics
Engineering	Mathematics	Geometry <ul style="list-style-type: none"> • Polygons decomposition • Golden ratio • Triangles – classification and representation
	Science, arts, ...	The natural world, Arts, Architecture ... <ul style="list-style-type: none"> • Golden ratio in Nature, arts, architecture, ...
	Technology	Programming <ul style="list-style-type: none"> • Concepts of programming • Programs – Results, errors, and troubleshooting Robotics <ul style="list-style-type: none"> • Programming objects to solve challenges

Notes for Teachers

The teacher should prepare, in advance, all the materials needed and the classroom according to the activities to be developed.







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






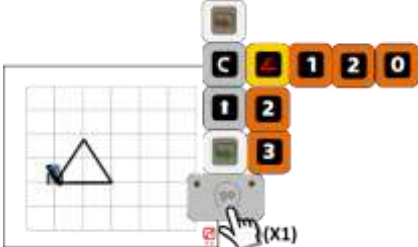
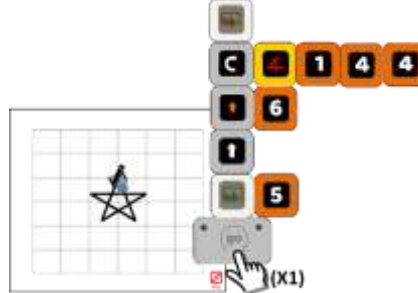
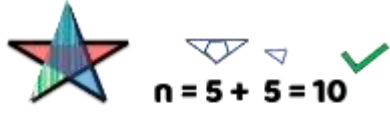
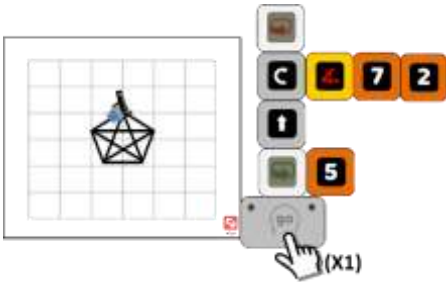
It's important that clear rules are established in terms of group work. This way, it avoids the most active children assuming the lead and the quitter ones only observing.







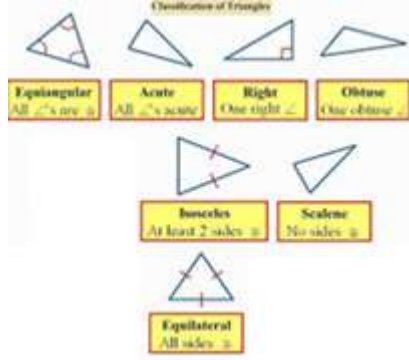
This lesson introduces the concept of geometry and uses codes with the angle block. In the described dynamic it is not necessary for the students to know which angles are involved or even to have the concept explained. The code is simply provided to them. But, for more advanced students, one can tease them to estimate (by calculus or using rulers and a protractor) some of the possible angles involved before revealing them.

The teacher can present, as curiosity: the proportion from the pentagram to the pentagon side length that contains it is approximately 1.618 which is also known as the **golden ratio**, a very common proportion found on mathematics (Fibonacci sequence) but also in arts/architecture and nature/biology (see more: https://en.wikipedia.org/wiki/Golden_ratio). And propose extra class research on the golden ratio in nature, arts, architecture This research should be explored later. For example, by organizing an exhibition for the educational community.

Lesson Plan

				
Intro	10'	Class	Talk a little bit about the importance of triangles, not only in geometry/mathematics but on the real world. Try to bring examples. Depending on the age group, review their knowledge about triangle types and characteristics	

				
Play	20'	Group	<p>Divide the class into groups.</p> <p>Each group will have a <i>Bot</i> with a marker and a <i>Set</i> where they will reproduce the code presented in the picture (written on the board), examine the characteristics of the resulting triangle and classify it. If they are aware of the angles, you can tell them about the <i>Bot's</i> perspective and external angle. If they have represented triangles before with the <i>Bot</i> (not step-by-step), you can skip this step.</p>	
			<p>After cleaning the previous drawing, they will now draw the code presented in the picture (written on the board) and will have 10 minutes to find as many triangles possible in the drawing (5-point star/pentagram) and represent it down.</p>	
Share	5'	Class	<p>After the 10 minutes elapsed, every group will share how many triangles they found, and pointing to them. For every confirmed triangle, the group/team will receive one point. There are 10 in total.</p>	
	10'	Group	<p>Starting from any vertex point of the previous drawing, place the bot with the marker on top of the vertex, and pointing to the next vertex point (anticlockwise direction) as shown in the figure. Write the code on the board and ask them to execute. They will now have 10 minutes to find as many triangles possible in the overall drawing and write it down.</p>	

				
Share	10'	Class	<p>After the 10 minutes elapsed, every group will share how many triangles they found, and pointing to them. For every confirmed triangle, the group/team will receive one point. There are 35 in total (counting with the 10 previous ones). The team with more points in the end wins.</p>	
Discuss	15'	Class	<p>Finally, from the drawing, you can discuss the triangles classification, regarding sides and angles (as shown in the picture). Highlight that the two main groups of triangles (according to the sides) - the scalene (with all different sides) and the isosceles (with, at least, two equal sides) should be mentioned. The equilateral triangle appears as a case of the isosceles triangle.</p>	

Resources List & Support Material

Per each group:

- A robot Kit with drawing capabilities;
- Two markers for each group (easy to erase/clean);
- Alcohol for cleaning the scenarios (for teacher use only);
- Transparent scenario with a 6x6 grid.