TangIn

Tangible Programming & Inclusion

TangIn Toolbox
Space Train

8-12 years old

Itineraries

Loops

Uniform velocity

Time Tables

Probotic

www.tangin.eu

f /tanginproject

Summary

Building routes and networks between planets in the solar system. Create and synchronize timetables.

Expected duration: **55 – 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:

- Name the planets of the Solar System;
- Order the planets according to their proximity to the Sun;
- Create schedules and timetables;
- Synchronize transports networks;
- Understand velocity as the relationship between time and space;
- Program the robot adequately, taking advantage of the looping tool;
- 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	**Science**	Natural sciences • Solar System - Planets names and their relative position Physics • Uniform velocity
	Mathematics	Geometry • Localization and orientation – itineraries OTD: • Timetables regarding synchronizing networks
	Technology	Programming • Concepts of programming • Programs – Results, errors, and troubleshooting • Loops Robotics • Programming objects to solve challenges

Notes for Teachers

The teacher should prepare, in advance, all the materials that are needed and the classroom space 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.
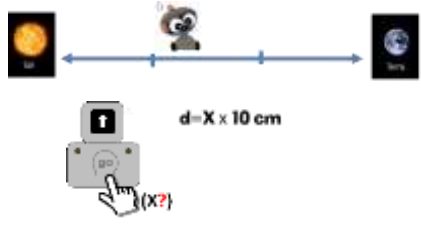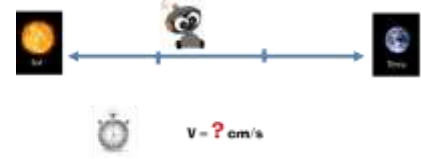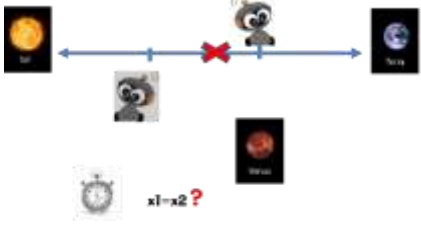
To discuss the concept of planets and stars, the solar system and its order (relative position of planets in relation to the sun). The teacher can use several internet resources available - images, videos, etc.
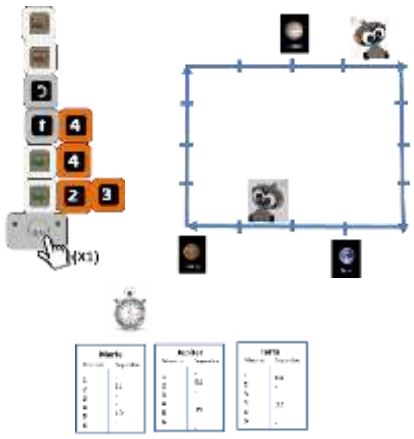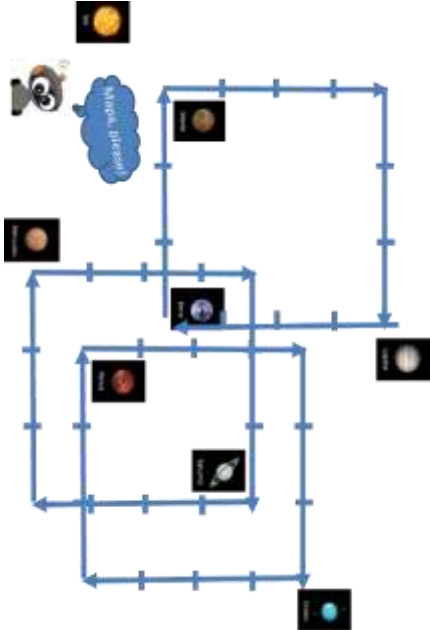
The circuit codes can be built at will (squares, rectangles...) and can be done on the floor without the use of any Set/Grid. You can even use obstacles or tables and chairs to make corners. Try to use loops in the code to make the bots repeat it many times. If you want to make it more challenging, create a few seconds stops at your choice. Try to avoid collisions.

The teacher must circulate through the various groups to support the activities and the dynamics of each one. In the end, it should promote a collective discussion of the main issues focused and the constraints and difficulties experienced.

Lesson Plan

🎬	🕐	👥	📄	🖼
Intro	10'	Class	*Let's go for an adventure in MI-GO's familiar territory: Space!* Discuss the research that was previously asked of students - the concept of planet and star, the solar system and its order.	

![clapperboard]	![clock]	![group]	![document]	![image]

Play	45 - 60'		1. Put a Sun card and an Earth card at a certain distance from each other. So, the students use one *Bot* to measure this distance (e.g. by using the *forward* block multiples times and counting how many steps did it take). Note that each step measure 10 cm in length but, if you want to be very precise, you can use the decimal block in the end (1 cm).	d=X x 10 cm (X?)
			2. Now that we know the distance, the students make the code for it to go in once (forward/decimal x times) and measure the time that MI-GO takes to get from one point to the other. Discuss the concept of velocity and, if the students are old enough, ask them to calculate MI-GO´s velocity (they can also convert the units next). Alternatively, calculate yourself and discuss the bot velocity comparing with other means of transport.	V = ? cm/s
			3. Add another planet card (e.g. Mars or Venus) and also another *Bot* to run on the opposite direction (without colliding). Make them start from different points and different times and anticipate where do they cross paths. Ask them to write down how many seconds it took for each of them to reach each planet.)	x1=x2 ?

🎬 🕐 👥	📄	🖼
	4. Expand the last exercise with a closed circuit (square/rectangle) using loops (n times). Ask them to put planet cards along the circuit but respecting their relative position/order towards the sun. Note: Fix the Sun (starting point) and the direction of movement. 5. Ask them to time the passages through the planets and help them building timetables for each (like a train timetable. See example above)	
Extra 20'	Propose to the students the creation of different interconnected circuits with bots crossing paths. Create timetables and help them synchronize and test the circuits in order to avoid collisions!	

Resources List & Support Material

For the teacher or per each group:

- 9 Solar System cards

- At least 3 Bots

- Watch/stopwatch/phone

Earth	
Minutes	**Seconds**
1	04
2	-
3	-
4	22
5	-
6	-

TangIn

Space Train time-table

circuit:

	minutes	seconds			minutes	seconds
Sun	0	0		Pluto	0	0
Mercury				Neptune		
Venus				Uranus		
Earth				Saturn		
Mars				Jupiter		
Jupiter				Mars		
Saturn				Earth		
Uranus				Venus		
Neptune				Mercury		
Pluto				Sun		

Sun	Mercury	Venus
Earth	Mars	Jupiter
Saturn	Uranus	Neptune