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abacusan STÚDIÓ
WE TEACH ROBOTICS

The orbital period of the planets

Year	Field of study, subject	Subject connections
5.	Natural Science and Geography Natural Science	Physics, digital culture

The purpose and didactic tasks of the lesson

Teaching the Solar System with the INDI robot: students can interactively learn about the movement of planets around the Sun, while developing their algorithmic thinking.
Students playfully learn about the structure of the Solar System, the order of the planets, and their orbits.

The effect of the clock

With this track, students can playfully and visually learn the order of the planets in the Solar System, their orbits and their different speeds. Thanks to the color-coded controls of the INDI car, the track can be changed, so children can even create different paths around the planets themselves.

Tools and resources used

	*State curriculum, local curriculum, textbooks*
	*INDI robot and color code cards*
	*INDI robot orbit, with circles representing planetary orbits drawn*

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Occupation plan

5 minutes	**Introduction and objective**	• Motivation, frontal explanation, individual attention. • Tool: Solar system image, INDI. • Briefly discuss what you need to know about the Solar System and the movement of the planets!
10 minutes	**Introduction to the planets of the Solar System and their locations**	• · Theoretical foundation, explanation, illustration, frontal work format. • Equipment: Solar system diagram, pictures of planets. • Explaining the order of the planets and interesting facts.
5 minutes	**Introduction to INDI car and color coded programming**	• Knowledge of tools, presentation, individual attention, repetition. • Device: INDI robot, colored markings. • Explanation of how the INDI robot works.
15 minutes	**Orbit planning and planet display**	• Problem solving, development of spatial orientation, group course planning, discussion, group work. • Equipment: colored markers, course plan, colored papers. • In groups, children assign orbital paths to the planets, distinguishing between the lengths of the inner and outer orbits.
5 minutes	**Driving an INDI car along planetary orbits**	• Development of rule-making and logical thinking, demonstration, group presentation, group work. • Device: INDI robot, pre-designated track. Guiding the robot through the orbits of the planets at different speeds.
5 minutes	**Summary of the lesson**	• Systematization of knowledge, evaluation, joint evaluation, frontal class work. • The groups share their experiences.

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Methodological advice

INDI robot track design:
INDI robot can move around the Sun in circles of different radii, demonstrating the orbits and movements of the planets. Color codes help the robot move at the appropriate speed along the inner and outer planetary orbits.
The track is designed so that the INDI robot can travel around the Sun in circles of varying radii, demonstrating the orbits and movements of the planets. The color codes help the robot travel at the appropriate speed along the inner and outer planetary orbits.
1. Placing the sun in the center of the orbit

- **Sun symbol: I place a yellow piece of paper or cardboard in the middle of the orbit to represent the Sun. The Sun is 20-30 cm in diameter to provide a clearly visible center for the orbits.**
- **Decoration: I decorate the area around the Sun with radiating lines or sunbursts to help students visualize the role of the central star in the movement of the planets.**

- **Use of colors: I choose a different color for each planetary orbit, for example:**
  - **Mercury (innermost circle) – Gray**
  - **Venus – Orange**
  - **Earth – Blue**
  - **Mars – Red**
  - **Jupiter – The Children**
  - **Saturn – Yellow**
  - **Uranus – Light Blue**
  - **Neptune - Dark Blue**

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- **Difference in orbital lengths: The inner planets move in shorter orbits (closer around the Sun), while I draw longer orbits for the outer planets**

3. Color-coded controls for changing speed and direction

- **Speed setting: In the inner circles (e.g. the orbits of Mercury and Venus) I place the green color code, which represents faster movement. In the outer orbits (e.g. Saturn, Uranus, Neptune) I place a yellow color code, which slows down the robot.**
- **Color code for direction changes: I put blue and red colors on each point of the path that turns the robot right or left, thus demonstrating the orbital motion of the planets.**

4. Marking planets in orbit
Planet symbols: I place cut-out or printed planet images on the orbit along the appropriate circles. For example, on the Earth's orbit, which is color-coded blue, there is a small Earth symbol.
Adding Stations: For some planets, I designate a location on the planet as a station where the robot must stop briefly and then continue moving. I color code these to indicate a red area so that the car can stop for a moment to explore the planet.
5. Programming the INDI robot to navigate the track
Speed and direction settings: The robot moves at varying speeds and directions according to the color codes of each circle. I set a faster pace on the inner tracks, and a slower pace on the outer tracks.
Orbiting the Sun: Using the blue and red color codes, the robot simulates the circular motion of the planets by continuously turning.
Tasks for students: Students are tasked with following the robot, interpreting the color codes, and observing the order of the planets in the Solar System.

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