robocomp
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# Combinatorics

| Year | Field of study, subject | Subject connections |
|---|---|---|
| 5., 6., 7., 8.. | Mathematics | Digital culturedigital culture |

## The purpose and didactic tasks of the lesson

The class should introduce the basic concepts of combinatorics (permutation, combination) and apply them in practice with the help of the INDI car.

## The effect of the clock

I created this to teach the basics of combinatorics, using the INDI robot car with a simple track. Students will learn the basics of permutations and combinations in the lesson, and then practice different sequences and path combinations by driving the car on different colored paths.

## Tools and resources used

| | |
|---|---|
| | *State curriculum, local curriculum, textbooks* |
| | *INDI robot and color code cards* |
| | *INDI robot track, task cards* |

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# Occupation plan

| | | |
|---|---|---|
| **5 minutes** | **Introduction and objective** | • Attention-grabbing, motivation, frontal explanation, individual attention.<br>• Device: INDI robot car.<br>• A brief explanation of the importance of combinatorics and its everyday examples. |
| **10 minutes** | **Introduction to basic concepts of combinatorics (permutation and combination)** | • Theoretical foundation, frontal explanation, question and answer, individual attention.<br>• Equipment: Course plan (drawn), colored cards.<br>• Explaining permutations (order matters) and combinations (order does not matter) and using them on the course with different color codes. |
| **5 minutes** | **Introducing the INDI small car** | • Knowledge of equipment, demonstration, individual attention.<br>• Equipment: INDI toy car, color-coded markings.<br>• They explain how the INDI car reacts to different colors. |
| **15 minutes** | **Course planning and combination practice** | • Targeted practice, development of algorithmic thinking, problem solving, group work, pair work.<br>• Equipment: Colored markers, course plan.<br>• Students create route combinations where the car visits different stations by solving the 7 tasks. |
| **5 minutes** | **Independent task: Trying out route variations** | • Encouraging creativity and observation, individual problem solving, individual work.<br>• Device: INDI car.<br>• Each student is given a task to drive the car around the track in a given order to understand the essence of permutations. |

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# Methodological advice for designing a robot track

## INDI WORKSHEET – Combinatorics

Name: _____ ___ Date: _____

**1. In how many different orders can 6 kitchen items be placed on the bottom shelf of a kitchen cabinet?**

-3×2×1=6

-6×5×4×3×2×1=720

-4×3×2=24

**2. How many different three-digit positive numbers can be formed using the digits 0, 6, 7?**

-2x3x3 = 18 possible numbers

-3x2x2 = 12 possible numbers

-2x2x1 = 4 possible numbers

**3. A group of four members are in an email relationship. Each member writes exactly one letter to each other each week. Choose from the listed options the maximum number of letters the 4 members of the group could have written to each other in total in 1 week?**

-4 x4=16

-4x3=12

-

**4. In a group of 7 people, everyone shook hands with everyone else once. How many handshakes were there?**

-21 handshakes were made

-42 handshakes were made

-7 handshakes were made

**5. Anna has 5 classes on Tuesday, namely mathematics (M), German (N), physical education (P), English (A) and biology (B). We know that mathematics is followed by physical education and the last class is German. Write down all the possibilities for Anna's Tuesday schedule!**

-MTABN, MTBAN, AMTBN BMTAN, ABMTN, BAMTN

-MTABN, MTBAN, AMTBN BTMAN, ABMTN, NAMTN

-MTANB, MTBAN, AMTBN BMTAN, ABMTN, BAMTN

**6. How many six-digit numbers are there that are divisible by 5?**

-9 ×10 ×10 × 10 ×10 ×2 = 180 000

-10 ×10 ×10 × 10 ×10 ×2 = 200 000

-9 ×10 ×10 × 10 ×10 ×10 = 900 000

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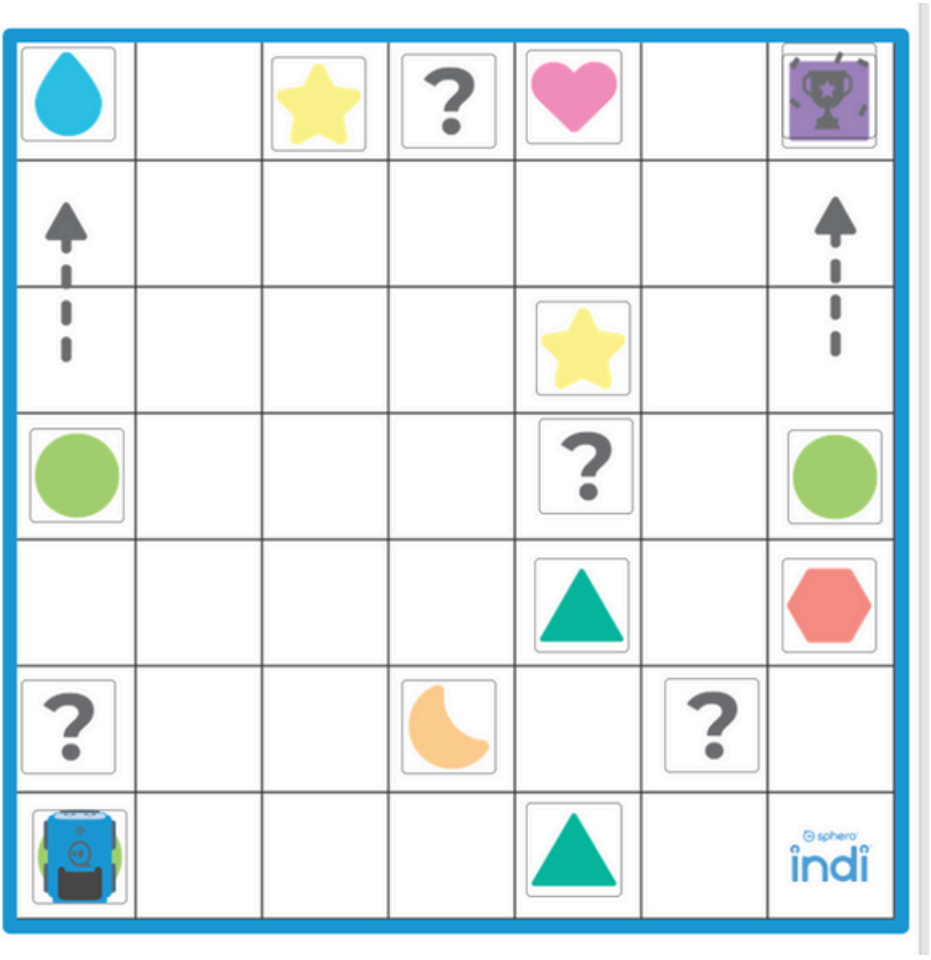
**Notes on the course plan**
**Color-coded track: Use different colored markings to give instructions to the toy car at junctions, and students can use combinations of these to control the vehicle.**
**Multi-stop route: We designate multiple destinations on the track (points A, B, C), where students can stop in different orders.**
**Group and individual work: During group work, students plan the route together, while in the individual task they try out their own order.**




**The ? is the place for the question and answer card.**