

Informatics Concepts in „Mind-Size Bites“ for Primary Education



**Vilnius
University**

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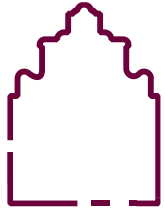


LITHUANIA – LIETUVA

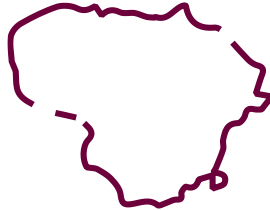


- Territory – 65 300 Km²
- Population – 2.85 mln.
- Lithuanians – 84%
- Vilnius – 622 000
- Currency – Euro
- Borders: with Belorussia, Latvia, Poland, Russia, and Baltic sea

ABOUT VILNIUS UNIVERSITY: FACTS AND FIGURES



Founded in **1579**



#1 in Lithuania*



401–410 in the world*



189 study
programmes offered



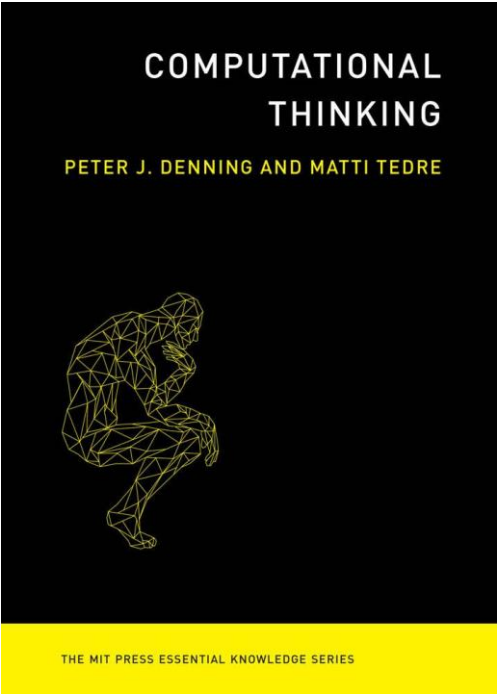
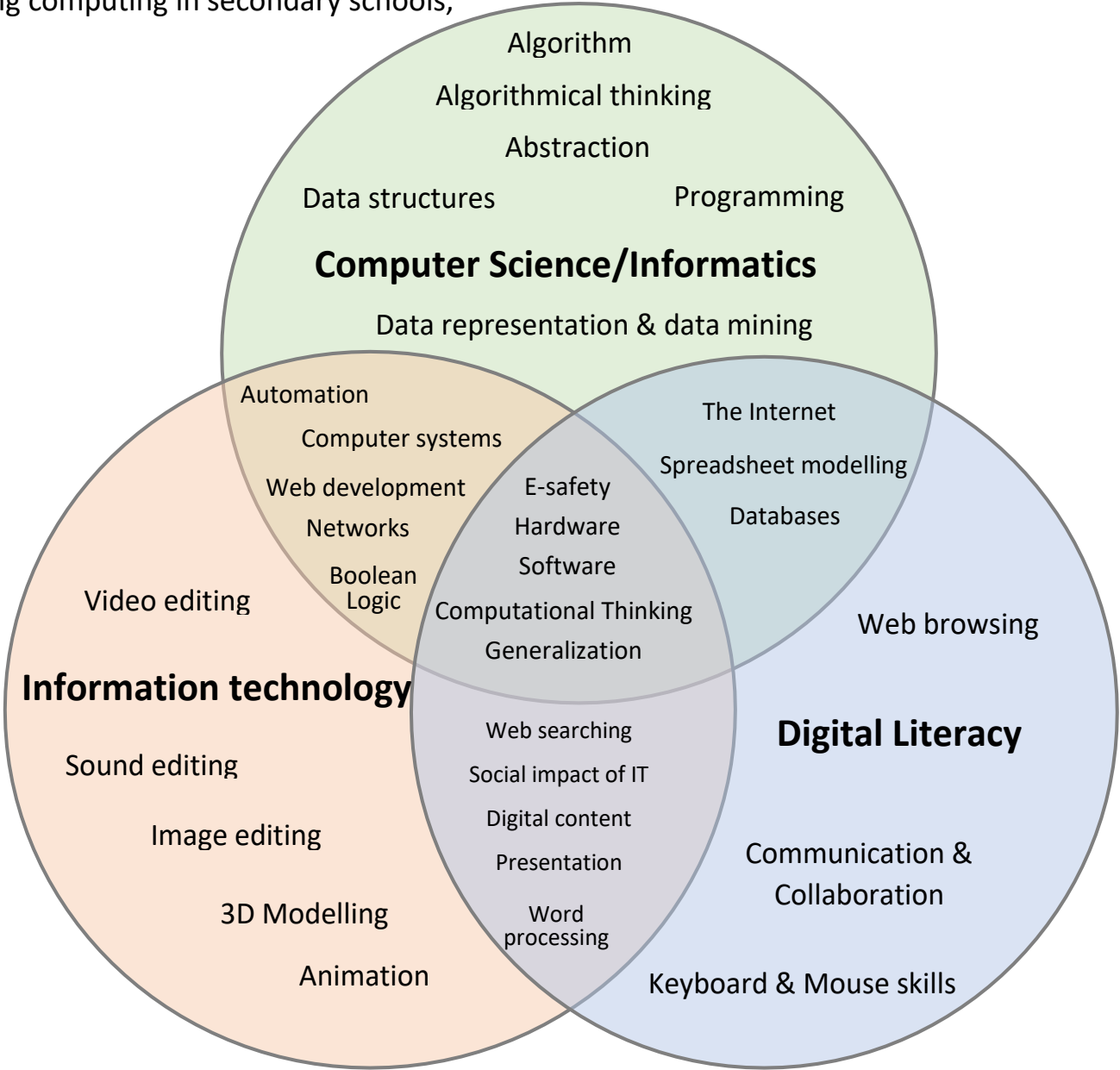
~1 500
scientific publications annually



~ 20 000 students

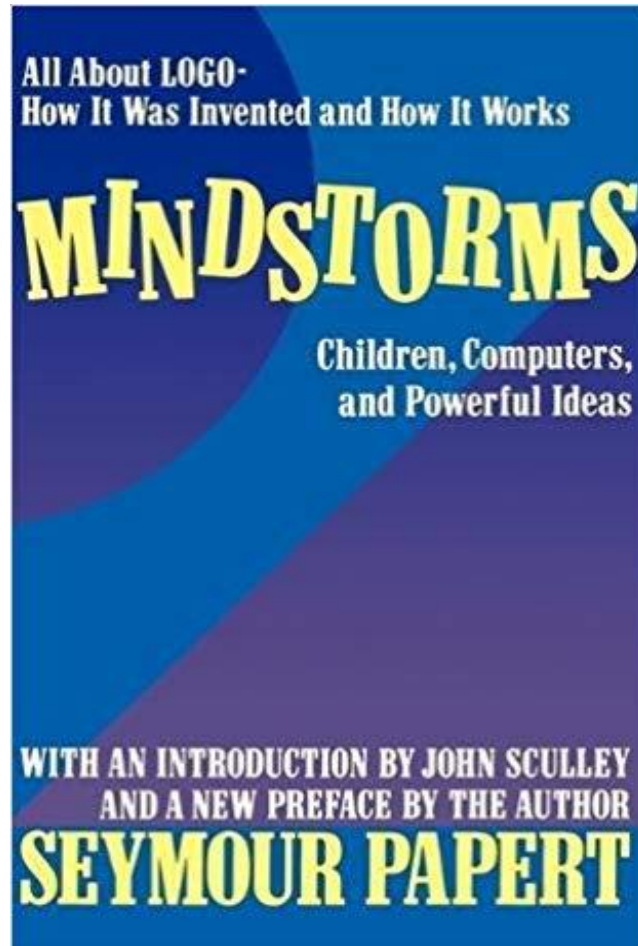
*QS World University Rankings

An overview of the Informatics national curricula.
Adapted from W. Lau. Teaching computing in secondary schools,
Routledge, 2018.



Concepts in „Mind-Sizes Bites“

- Used by Seymour Papert in **Mindstorms:** Children, computers, and powerful ideas



In this revolutionary book, a renowned computer scientist explains the importance of teaching children the basics of computing and how it can prepare them to succeed in the ever-evolving tech world.

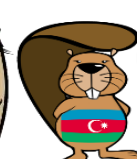
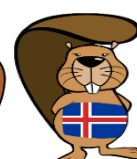


“Mind-Size Bites” for Primary Education

- Main goal of informatics at school is to **teach how to think**
- **Thinking computationally** draws on the concepts that are fundamental to computer science
- For primary education two types of problem solving are usually declared:
 - hands-on tasks that take more time and cover several topics,
 - everyday exercises, that are common in math and grammar lessons
- The third type can be the short tasks with double folded aim, to cover informatics concepts and to be solvable in few minutes
- Solving short tasks can be one of the strategies that engage and **motivates pupils for deeper learning** and **fosters the deeper thinking** skills



What is Bebras?





Bebras International Challenge on Informatics and Computational Thinking

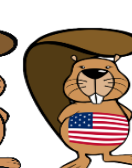
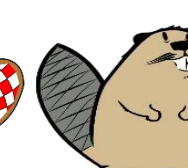
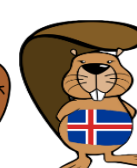
As an easily accessible contest for students of all school ages, it serves to promote informatics and to support informatics education.

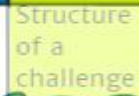
Bebras Community promote informatics and computational thinking among teachers and young people in particular, among decision-makers in the area of education, and to the public at large

The members of the Bebras Community are organizations responsible for running a national Bebras Challenge in their country

A member organization of the Bebras Community is referred to as National Bebras Organizer (NBO).

From the Bebras Community Statutes, RC 3, May 21, 2015





Participants are usually supervised by teachers who may integrate the *Bebras* challenge in their teaching activities. The challenge is performed at schools using computers or mobile devices.



Computational thinking involves using a set of problem-solving skills and techniques that software engineers use to write programs and apps. The *Bebras* challenge promotes problem solving skills and Informatics concepts including the ability to break down complex tasks into simpler components, algorithm design, pattern recognition, pattern generalisation and abstraction. More about [computational thinking](#).



The second week of November is declared as World-Wide BEBRAS week for solving tasks. Some countries extended it to two weeks. Many countries run all-year-round *Bebras* activities like participants awarding events, second round of the challenge, summer campus, teacher workshops, collecting statistics and writing research papers.

[Read more...](#)



**Pasirinkite
policiarinką**

International website

www.bebbras.org

Bebras: The Challenge of Thinking

- ❖ To solve the tasks one has to **think**
- ❖ Already learned knowledge is not asked
- ❖ Pupils have to **find solving strategies**
- ❖ They have to find and **understand structures**
- ❖ They have to find arguments for or against given alternatives

Bebras tasks

- ❖ Attract students and drive them to learn and explore as well to develop skills in the particular area
- ❖ Require deep-thinking skills in the informatics field
- ❖ Clearly related to fundamental informatics concepts

Dagienė, V., Stupurienė, G. Bebras – a Sustainable Community Building Model for the Concept Based Learning of Informatics and Computational Thinking. (2016)



Types of tasks

Drag & drop	Pick up an object and place it on one of the fixed locations
Click objects	Click on an object and make something happen with it
Simulation	Show an animation as explanation of the task
Open text	Enter text
Open integer	Enter number, but with specified symbols
Matching	Match one object to one other object
Selection	Select one or multiple objects from a task
Graph	Connect one object to multiple other objects
Grid	Select an object and effect other objects while doing so

Computer Science Concepts

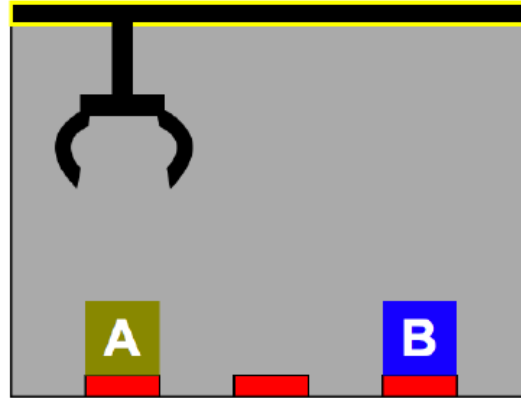
See Dagiene, Sentance, Stupuriene (2017): Developing a two-dimensional categorization system for educational tasks in informatics. *Informatica*, 28(1), 23-44.

Category	Concepts
Algorithms and Programming	Algorithm; Binary search; Boolean algebra; Breadth-first search; Brute-force search; Bubble sort; Coding; Computational complexity; Constants; Constraints; Debugging; Depth-first search; Dijkstra's algorithm; Dynamic programming; Divide and conquer; Encapsulation; Function; Greedy algorithm; Heuristic; IF conditions; Inheritance; Iteration; Kruskal's algorithm; Logic gates; Loop; Maximum flow problem; Objects; Operations AND, OR, NOT; Optimization; Parameters; Prim's algorithm; Procedure; Program; Programming language; Program execution; Quick sort; Recursion; RSA algorithm; Shortest path; Searching; Sorting; Traveling salesman problem; Variables
Data, data structures and representations	Array; Attributes; Bi-connected graph; Binary and hexadecimal representations; Binary tree; Character encoding; Databases; Data mining; Eulerian path; Finite-state machine; Flowcharts; Fractals; Graph; Hash table; Integer; Information; Linked list; List; Queue; Record; Stack; String
Computer processes and hardware	Cloud computing; Deadlock; Fetch-execute cycle; Grid computing; Image processing; Interpreter; Memory; Multithreading; Operating systems; Parallel processing; Peripherals; Priorities; RAID array; Registers; Scheduling; Sound processing; Translator; Turing machine
Communication and networking	Client/server; Computer networks; Cryptography; Cryptology; E-commerce; Encryption; Parity bit; Protocols; Security; Topologies
Interactions, systems and society	Classification; Computer use; Design; Ethics; Graphical user interface; Interaction; Legal issues; Robotics; Social issues, Virus

Variable and Commands – Crane operations

The crane in the port of Lodgedam has six different input commands:

left
right
up
down
grab
let go



Crate A is in the left position, crate B is in the position on the right.

Question:

Using the command buttons, swap the position of the two crates.

The effect of the sequence of commands is the exchange of parcels, similar to the exchange of variable values

Logical operators – Dream dress

Kate wants to buy her dream dress.

It must have:

- short sleeves,
- more than 3 buttons,
- stars on its sleeves.

Four shops sell only the dresses shown.



Logical operators are used in algorithms and in programming. Here the AND operator is investigated.

Logical operators – Clara likes flowers

Clara likes colorful bouquets of flowers and visits a flower shop.
In there are the following types of flowers: gladiolus, lily, tulip, rose.



Every flower is available in the colors:

white	blue	yellow
-------	------	--------

Clara wants a bouquet with six flowers satisfying the following conditions:

1. each of the colors yellow, white and blue should occur exactly twice,
2. flowers of the same type should not have the same color,
3. every type of flower should only occur at most twice.

Which of the following bouquets satisfies all the conditions 1), 2) and 3)?

A



B



C

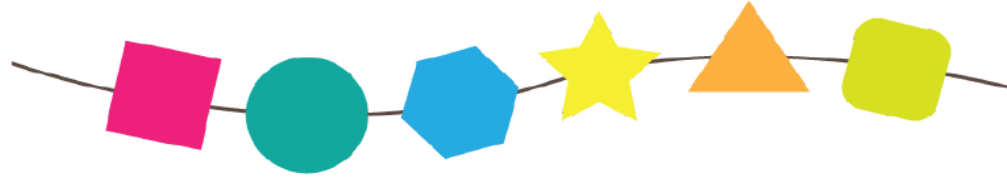


D



Pattern recognition - Bracelet

Emily has broken her favourite bracelet. The broken bracelet now looks like this:



Question:

Which of the following four bracelets shows what the bracelet looked like when it was whole?



A



B



C



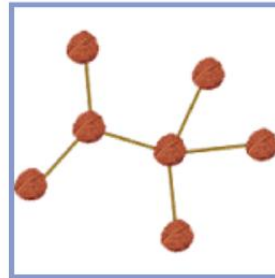
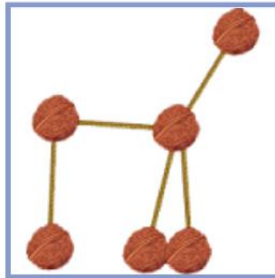
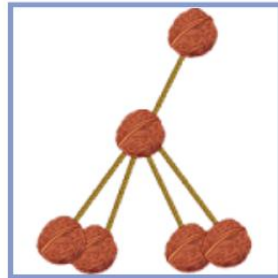
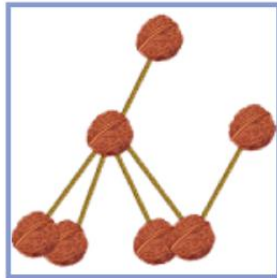
D

To solve this problem it is necessary to find the fitting pattern.

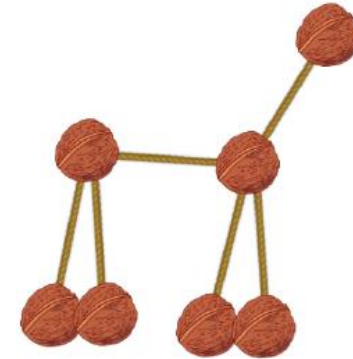
Equal Graphs – Walnut animal

Question:

Which of the following figures can be bent back to make the figure of the dog again?



Dog

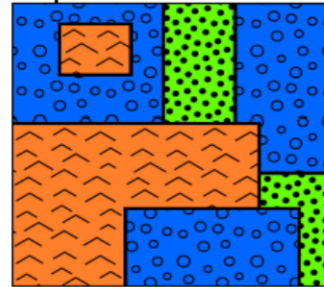


Graphs are an Abstraction, relations of nodes are important, size and position are irrelevant.

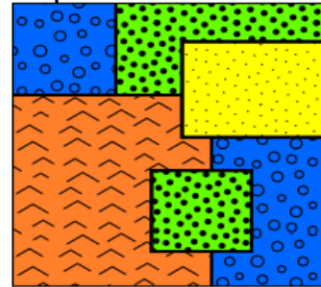
Graph of a map

- Maps can be easily pictured as graphs. In such a graph every node is a country and the lines between the nodes mean that they border each other. The picture shows a graph of a map with seven countries.
- **Indicate the map that fits the given graph**

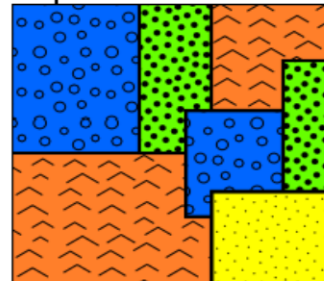
Map 1:



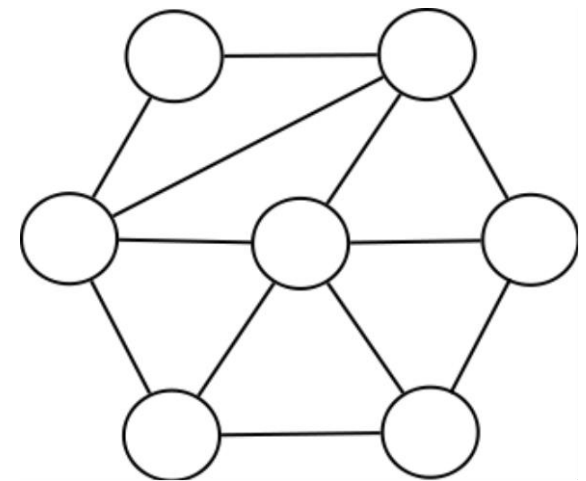
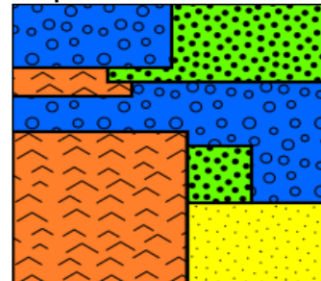
Map 2:



Map 3:



Map 4:



Planting Flowers

A big beaver and a little beaver are planting flowers in the garden. The little beaver has smaller arms and smaller legs than the big beaver. Little beaver's steps are therefore shorter and it plants the flowers at positions closer to its body.

At the beginning, they stand on the lawn back to back looking in opposite directions. Then both move according to these instructions:

repeat twice:

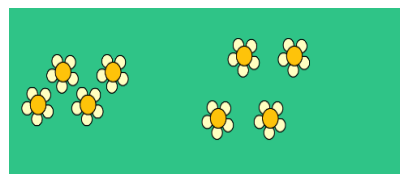
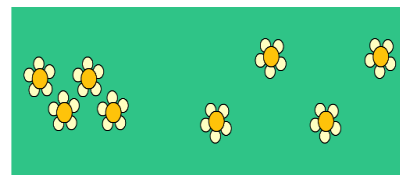
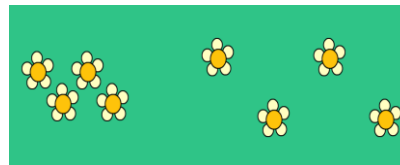
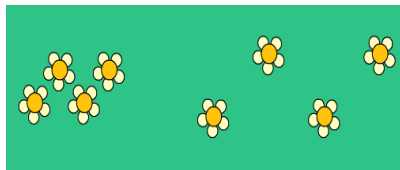
plant a flower on your right hand side

move one step forward

plant a flower on your left hand side

move one step forward

How does the lawn look like afterwards?

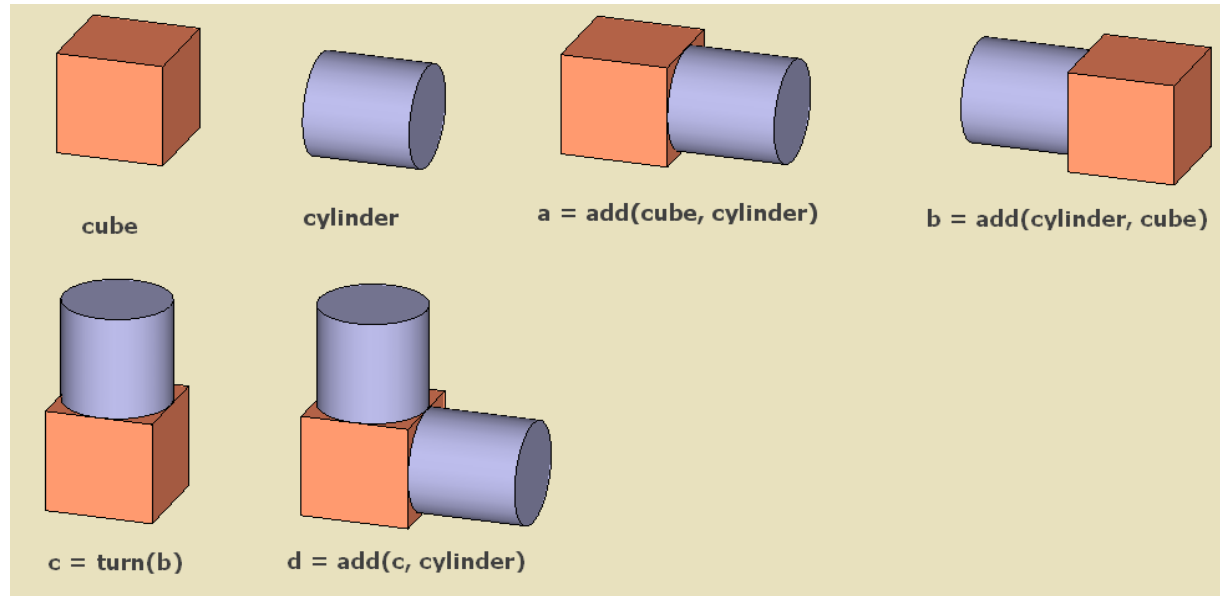


This is Informatics

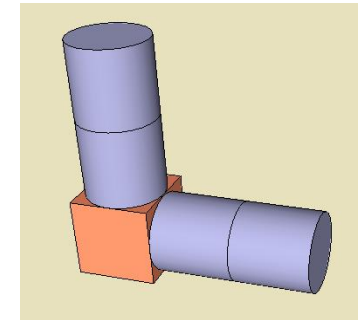
In robotics, algorithms are interpreted and executed by devices with certain physical properties. The program developer has to take this into account. Different machines may move in slightly different ways executing the same program.

Constructive Beaver

Beaver has developed a very simple modeling language. It consists only of two kinds of objects and two possible operations



Which operation sequences would generate this thing?



The operation **add(A, B)** means: Put A and B side by side and glue B to the right side of A. The operation **turn(A)** means: turn A clockwise around 90 degrees.

A

A = add(cylinder, cylinder)
B = turn(A)
C = turn(B)
D = add(C, cube)

B

A = add(cylinder, cylinder)
B = add(A, cube)
C = turn(B)
D = add(C, A)

C

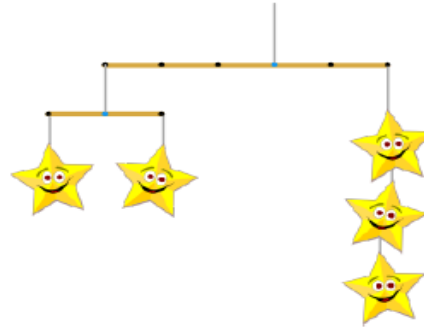
A = add(cube, cube)
B = add(A, cylinder)
C = turn(B)
D = add(C, cylinder)

D

A = add(cube, cylinder)
B = add(A, cylinder)
C = turn(B)
D = add(C, cylinder)
E = add(D, cylinder)

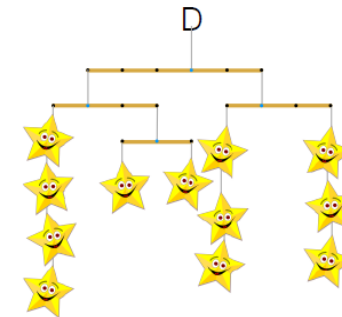
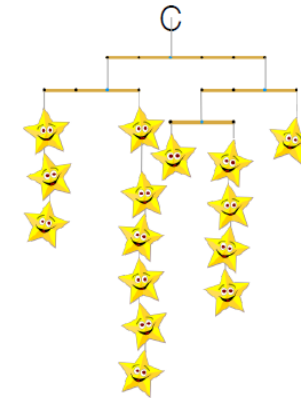
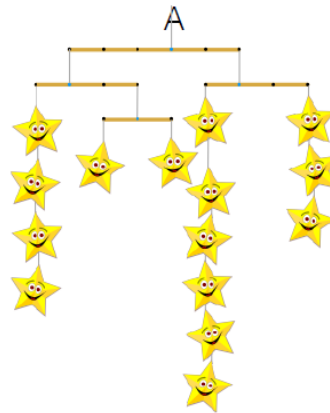
$(-3 \ -1 \ 1) \ (1 \ 1)) \ (2 \ 3)$

Mobiles



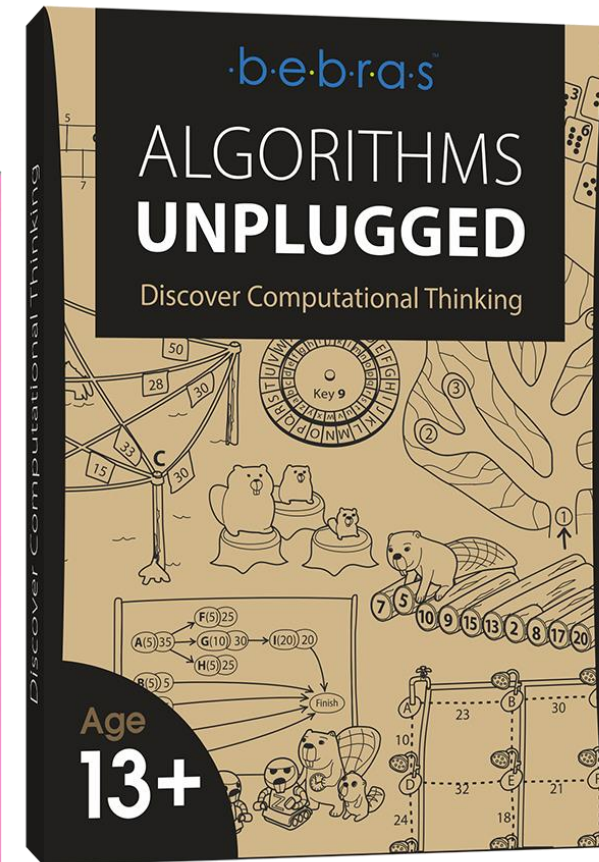
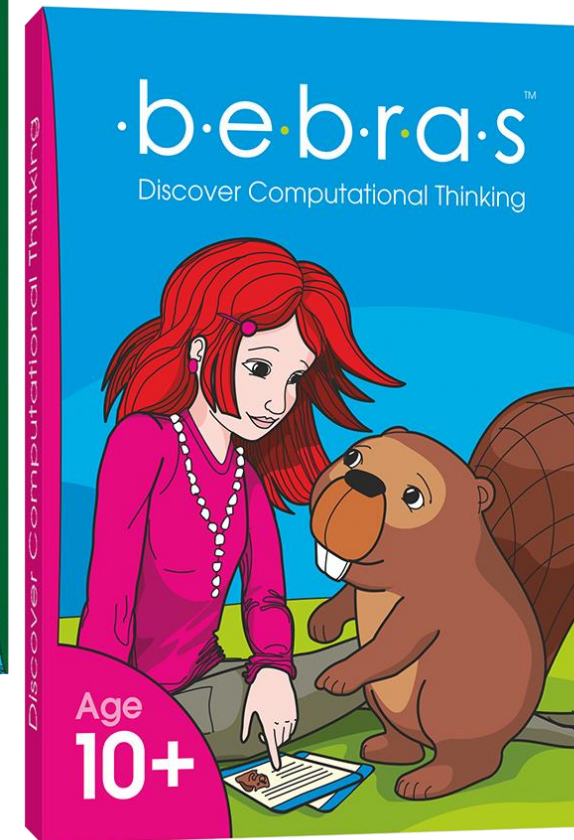
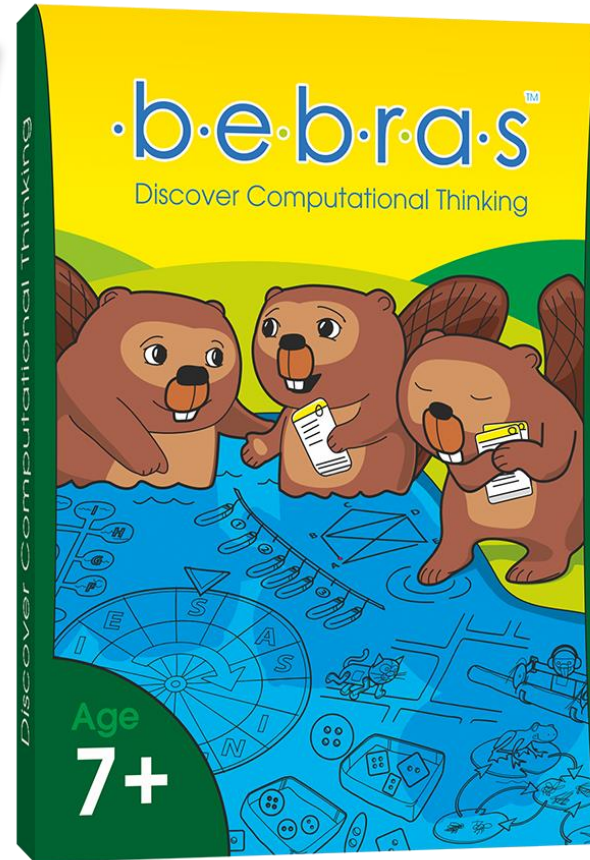
Which of the following mobiles could be constructed using these instructions:

$(-3 \ (-1 \ 4) \ (2 \ (-1 \ 1) \ (1 \ 1))) \ (2 \ (-1 \ 6) \ (2 \ 3))$



Generalisation is associated with identifying patterns, similarities and connections, and exploiting those features. It is a way of quickly solving new problems based on previous solutions to problems, and building on prior experience.

BEBRAS cards





INFORMATINIO MĄSTYMO UGDYMAS

100 uždavinių - 10 temų:

SEKOS

VYKDYMAS

LOGIKA

PASIRINKIMAS

TIKRINIMAS

RŪŠIAVIMAS

RIKIAVIMAS

PAIEŠKA

DĖSNINGUMAI

ABSTRAKCIJA

 bebrasplay.com

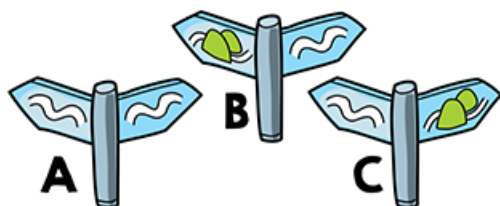


Pasirinkimas

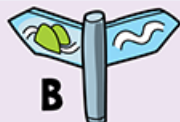
34 Rodyklė



Kuri rodyklė čia tinka?



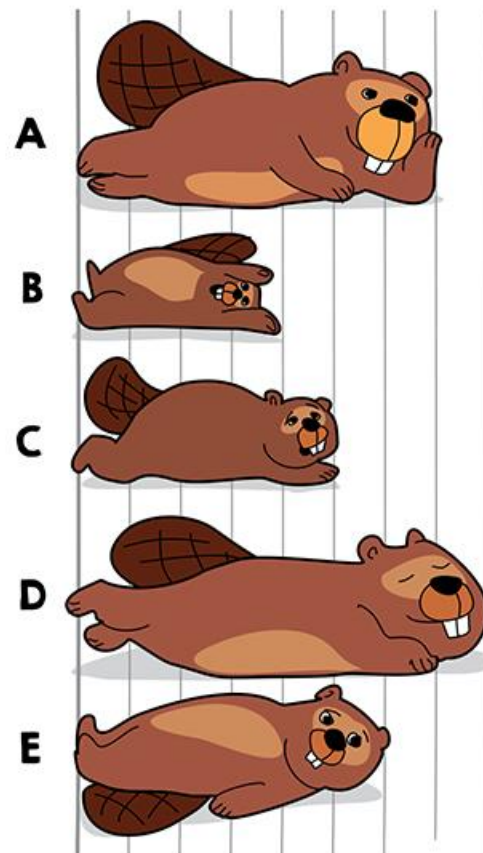
Atsakymas



Rikiavimas

65 Nuo aukščiausio iki žemiausio

Išvardink bebiukus nuo aukščiausio iki žemiausio.



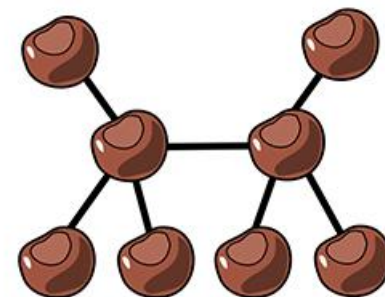
Atsakymas

D, A, E, C, B

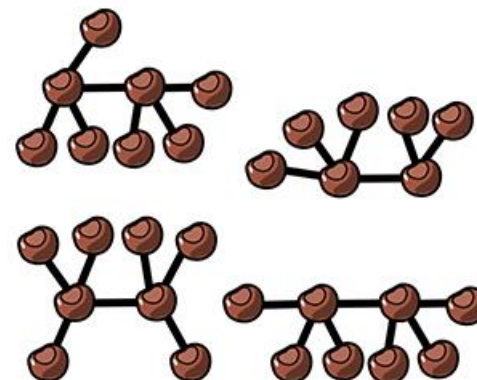
Abstrakcija

100 Lankstus šuo

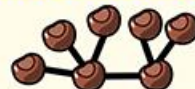
Iš kaštonų ir pagaliukų padarytas šuo.



Šunį galima įvairiai išlankstyti.
Kuri viena figūra nėra šuo?



Atsakymas



Be "uodegos" ar "galvos".

17 COLOURFUL TOWER



A little beaver girl put rings on the top of each other in this sequence:

- 1) Red
- 2) Green
- 3) Yellow

Repeats till the last correctly coloured ring.



How many rings will the tower have?

This game is one of the simplest examples of algorithm. In everyday life we do many kinds of actions by following sets of rules. Using rules makes doing many routine tasks easier and faster. If we can write rules exactly, describe and express them using commands, we can construct a robot to execute these commands.

44 BEAVERS HOUSE



Beaver house windows are marked by row & column numbers, e.g. windows on the door's right: [1, 3] and [2, 3].

Beaver replaced windows: [1, 2]; [1, 6]; [2, 2]; [2, 5] last year.




This year he wants to replace other windows, but only those, which have 4 "neighbours": to the left, right, above & below.

How many windows Beaver is going to replace this year?

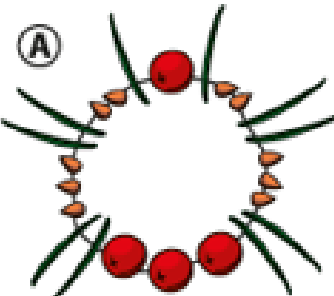
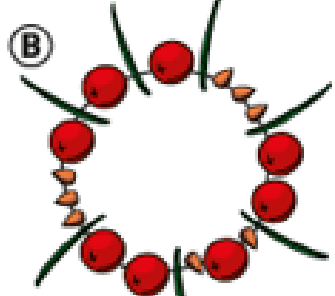
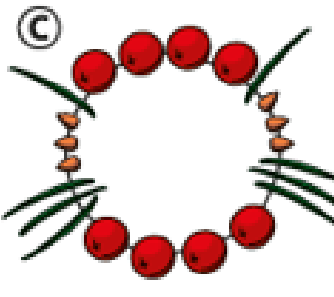
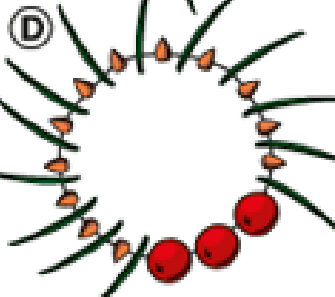
To identify a window there needs to be an agreement. When programming, it is best to lay out data in a table constructed from rows and columns: it is called an array. Every array element (table square) is indicated by a row and a column intersection number. It is possible to look at the beaver's house as an array and its elements (windows), which are identified by row and column numbers.

TASK TITLE
Age group/category
Difficulty level
A list of keywords/concepts that more specifically identify the informatics topic(s) the task is related to
A list of computational thinking skills
TEXT based on short STORY
IMAGE(S)
QUESTION
ANSWER (Multiple Choice/Open Ended/Interactive)
Explanations of solutions
It's Informatics! Explanation of Informatics background and concepts of the task

12
NECKLACE FOR A LITTLE BEAVER


Little beaver wants to present a necklace to his girlfriend beaver. He knows she wants a specific one:

- 1) Sorb apples have to be between pine needles and
- 2) Amount of apple seeds have to be equal to the amount of pine needles.

Which necklace will little beaver girl like?

In informatics it is important to be able to determine patterns which may be useful to us. Pattern matching helps us find similarities in things that may look different at first, but have something in common. When we detect that a new problem is similar to another problem we have already solved, we can apply a similar solution.

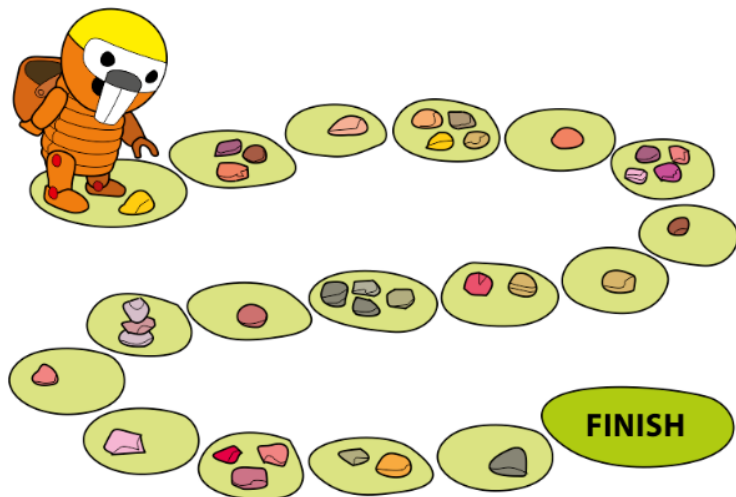
32 LITTLE STONES



Robot is collecting interesting stones by repeating the commands:

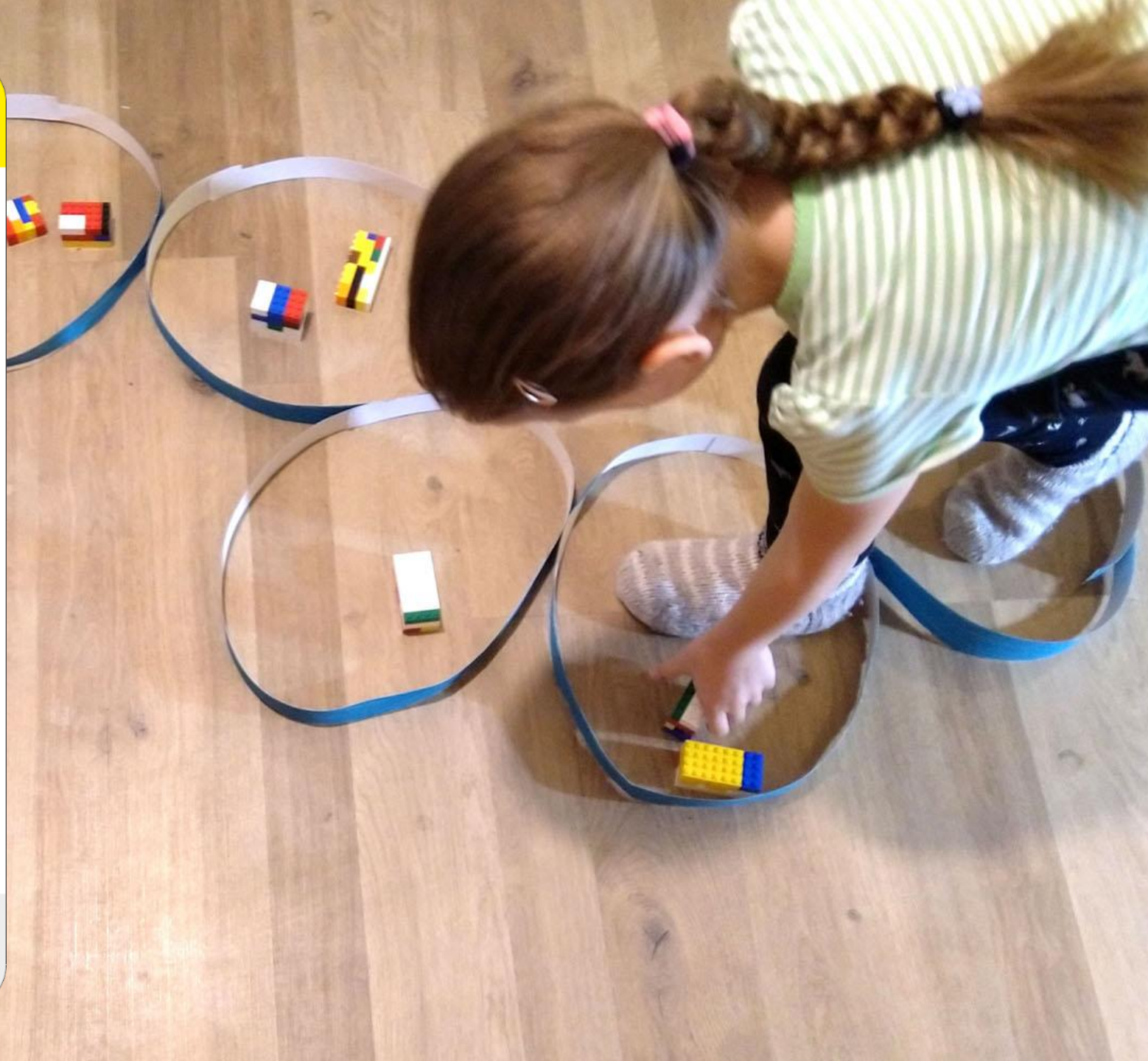
IF there is one stone in the square, then move to the next square,

IF NOT – take one stone and move forward the same number of squares as there are stones left on the square.



How many stones will be gathered by the robot?

An important thing when you program is to write down the commands which do things you want to do. The selection command, presented here, is quite complex. Its condition is a number of little stones. If there is more than one stone, then two commands are implemented: take one little stone and move forward a number of squares.

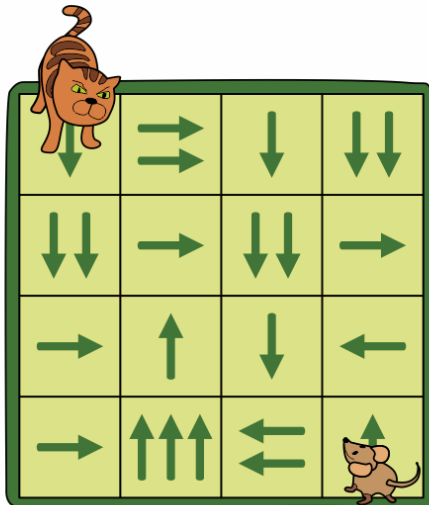


24 CAT AND MOUSE



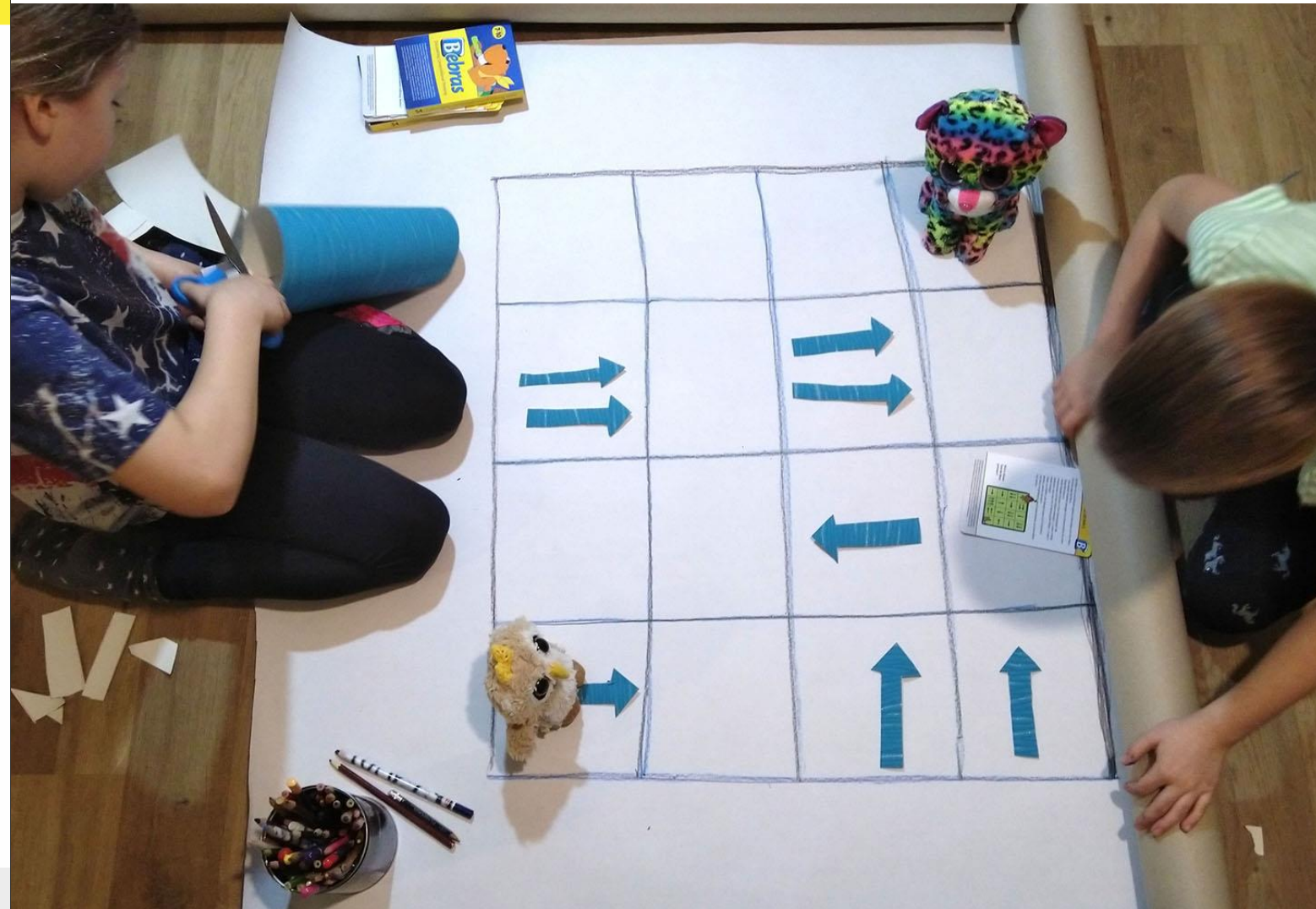
Beaver created two robots: cat and mouse. Both of them can move from one square to another following the arrows. Cat wants to hunt the mouse.

- Cat starts first.
- Moves are made in alternately (cat, mouse, cat, mouse, etc.)
- The robots move in the direction indicated by the arrows as many squares as there are arrows (E.G. one square if there is one arrow, two squares if two arrows and etc.).
- When a robot is moving, it ignores the arrows on the squares.
- Mouse is eaten, when the cat is on the same square as the mouse.



Can the mouse avoid?

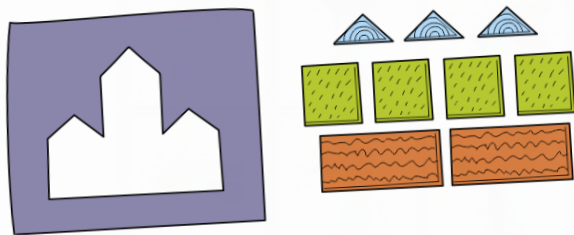
A playground is a simple program: start and finish is specified and there are rules that determine actions. Arrows in squares clearly and non-ambiguously determine where to go next. It is important that our mechanisms would understand these arrows. Cat and mouse are the mechanisms of this problem which can move according to the arrows.



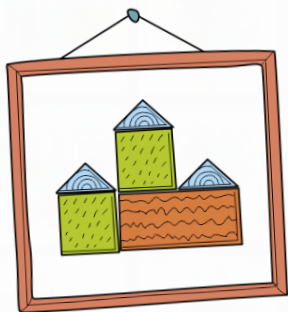
19 PICTURE OF THE CASTLE



A little Beaver Lina uses an exciting method to create pictures. She cuts out a stencil of the castle in a cardboard panel. Then she places colourful bricks in it.



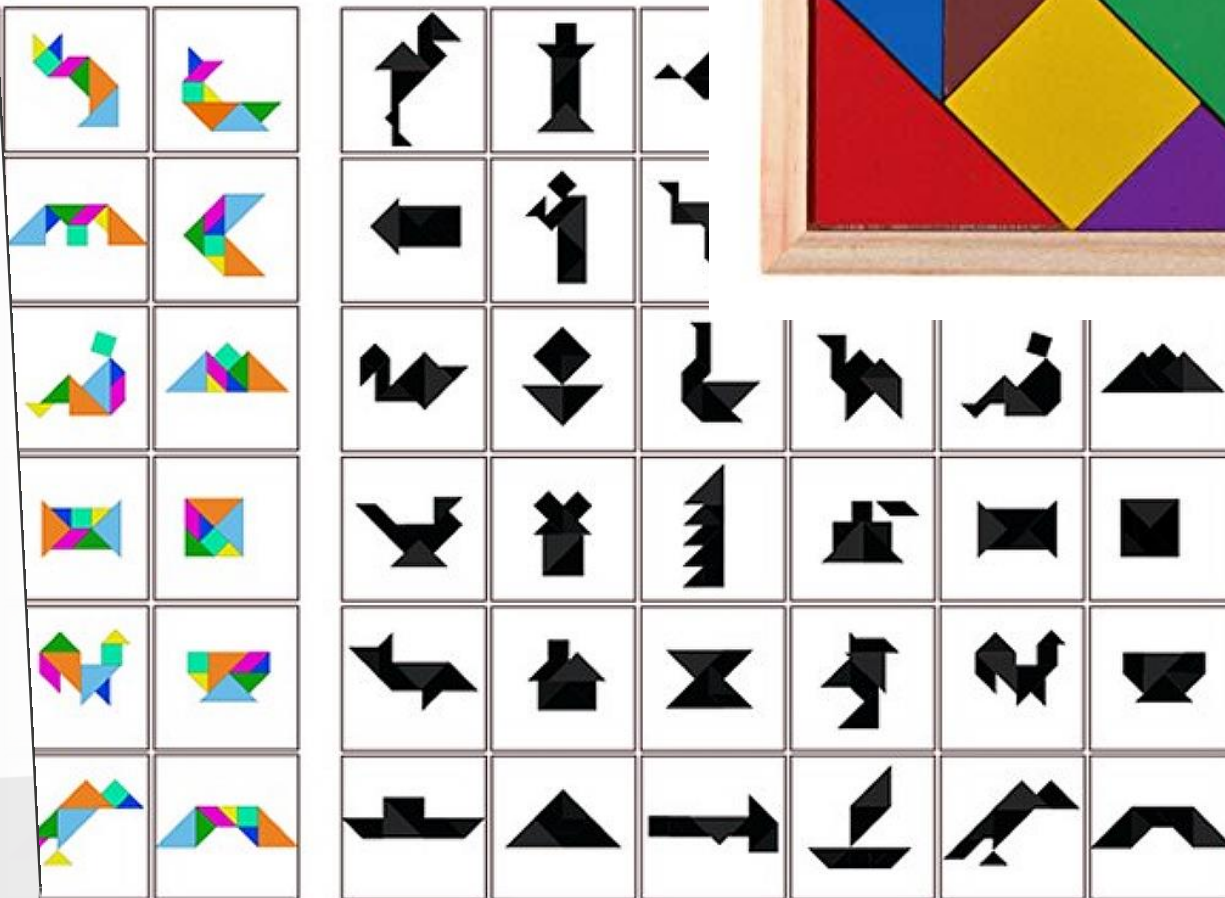
Lina created this picture:

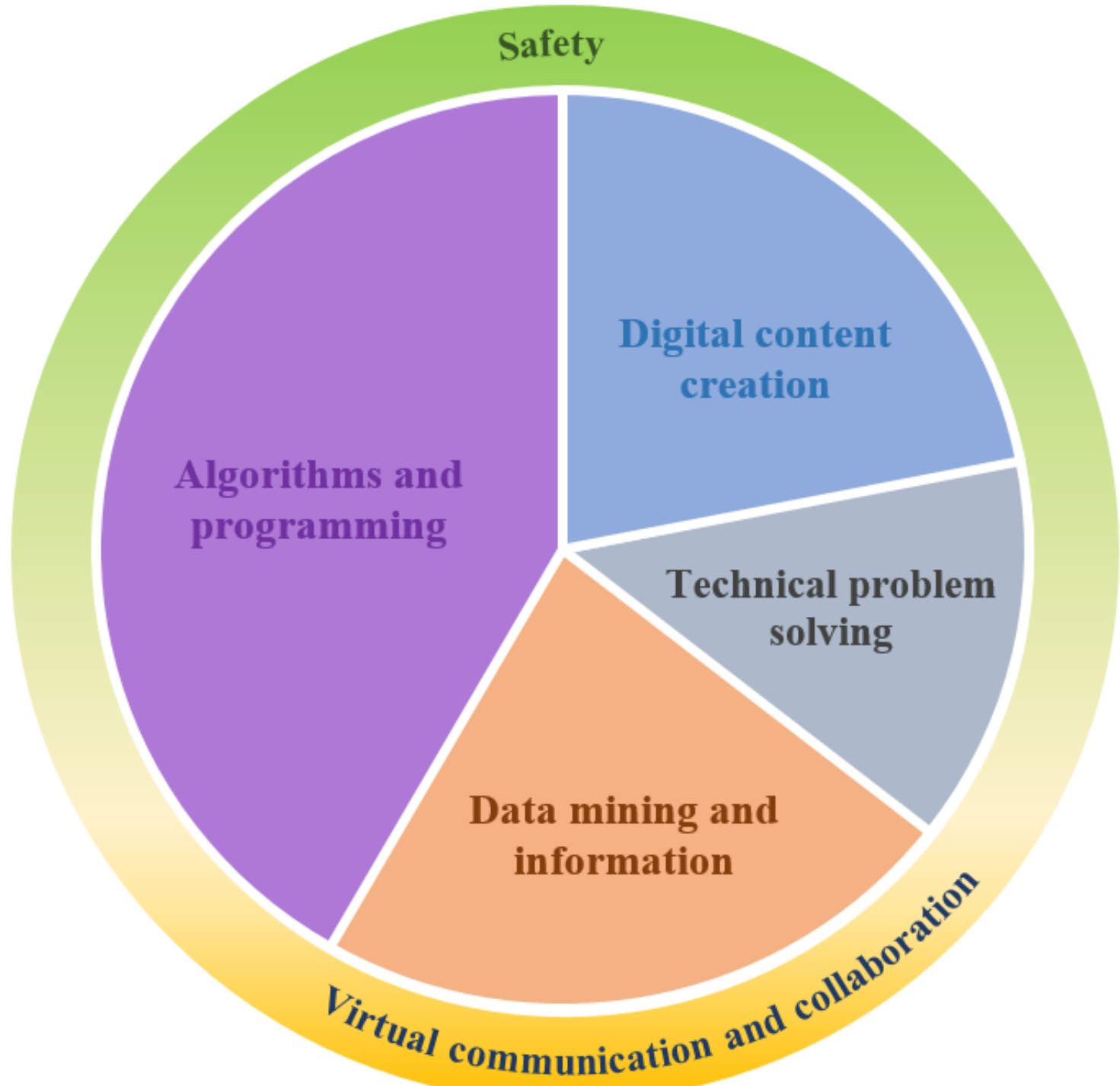


In how many different ways is it possible to create this picture?

This problem is related to combinatorics. Combinatorics is a branch of mathematics that deals with combinations of objects belonging to a finite set in accordance with certain constraints. The aim is to find the number of possible ways to achieve these combinations. The method used in this problem is called brute force and is based on the consideration of all possible solutions.

Tangram





**Informatics curriculum.
Areas of achievement**



Informatics in Education in Lithuania

Algorithms & programming	<ul style="list-style-type: none">• Understand the benefits of an algorithm, a program, recognize and use informatics concepts• Apply programming commands, logical operations and call programming interfaces (APIs)• Create (code) and execute programs• Detect bugs, test and improve programs. Use IDEs
Data mining & information	<ul style="list-style-type: none">• Understand the importance of data and information, make data analyses• Perform various actions with data: collect, store, group, search, visualize• Evaluate relevance and reliability of information
Digital content creation	<ul style="list-style-type: none">• Know various digital content for learning, recognize concepts• Create various digital content: draw, write, compose, record, film, create mind maps, tables, diagrams• Evaluate and improve, shares digital content





Informatics in Education in Lithuania

Technical problem solving	<ul style="list-style-type: none">• Investigate hardware, see problems arising from the use of digital technologies, use properly technical concepts• Select and combine various digital technologies• Self-educate and self-evaluate own digital skills
Virtual communication & collaboration	<ul style="list-style-type: none">• Collaborate, share experiences and resources, communicate using digital technologies• Assess the dangers of virtual communication, protects software and hardware
Safety	<ul style="list-style-type: none">• Protect health and environment• Behave safely in virtual space



KURIU IR MAŠTAU. Integruotos Informatikos užduotys – smagių uždavinių rinkinys, padedantis žingsnelis po žingsnelio ugdyti informatinio mąstymo įgūdžius, reikalingus būsimiems kompiuterių, robotų, naujų išmaniųjų įrenginių kūrėjams.

Pagal projekto „Informatika pradiniam ugdyme“ gaires parengtas leidinys yra susijęs su integruoto ugdymo vadovėliu „Vaivorykštė“, todėl jame esančias užduotis galima įtraukti į pasaulio pažinimo, matematikos, gimtosios kalbos ar kitų mokomųjų dalykų turinį.

Leidinį papildo metodiškai paaiškinti užduočių sprendimai ir atsakymai, kuriuos galima rasti skaitmeninėje ugdymo priemonėje **e.lankos** (www.e-lankos.lt) arba leidyklos svetainėje (baltulankuvadoveliai.lt/kuriu-ir-mastau/).

Pradinėms klasėms skirtas
integruoto ugdymo vadovėlis „Vaivorykštė“



www.vaivorykste.eu



www.baltulankuvadoveliai.lt

Valentina Dagienė

MAŠTAU

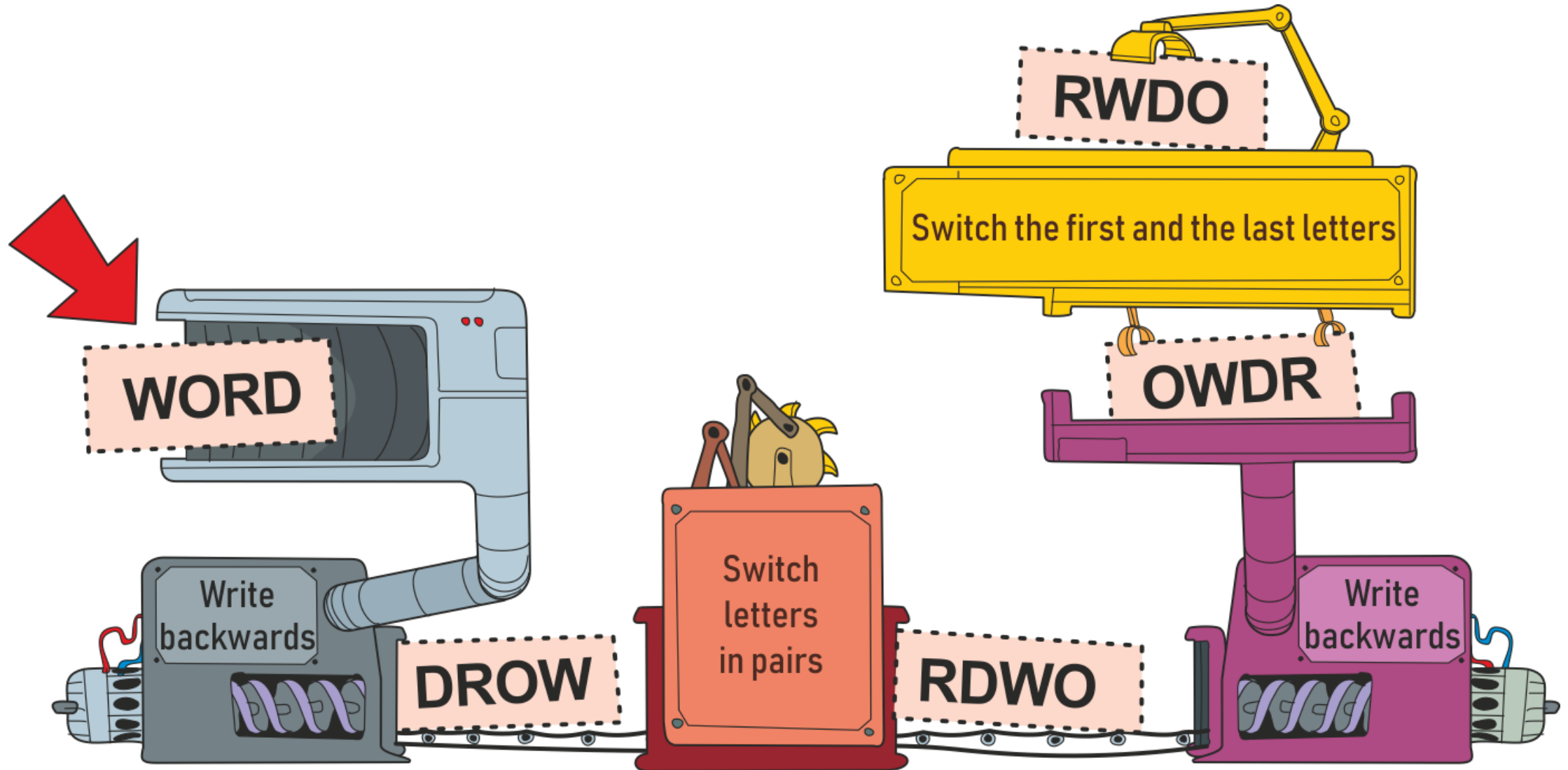
KURIU IR

Integruotos informatikos
užduotys 6–8 metų vaikams

baltos lankos
PABULVIAI

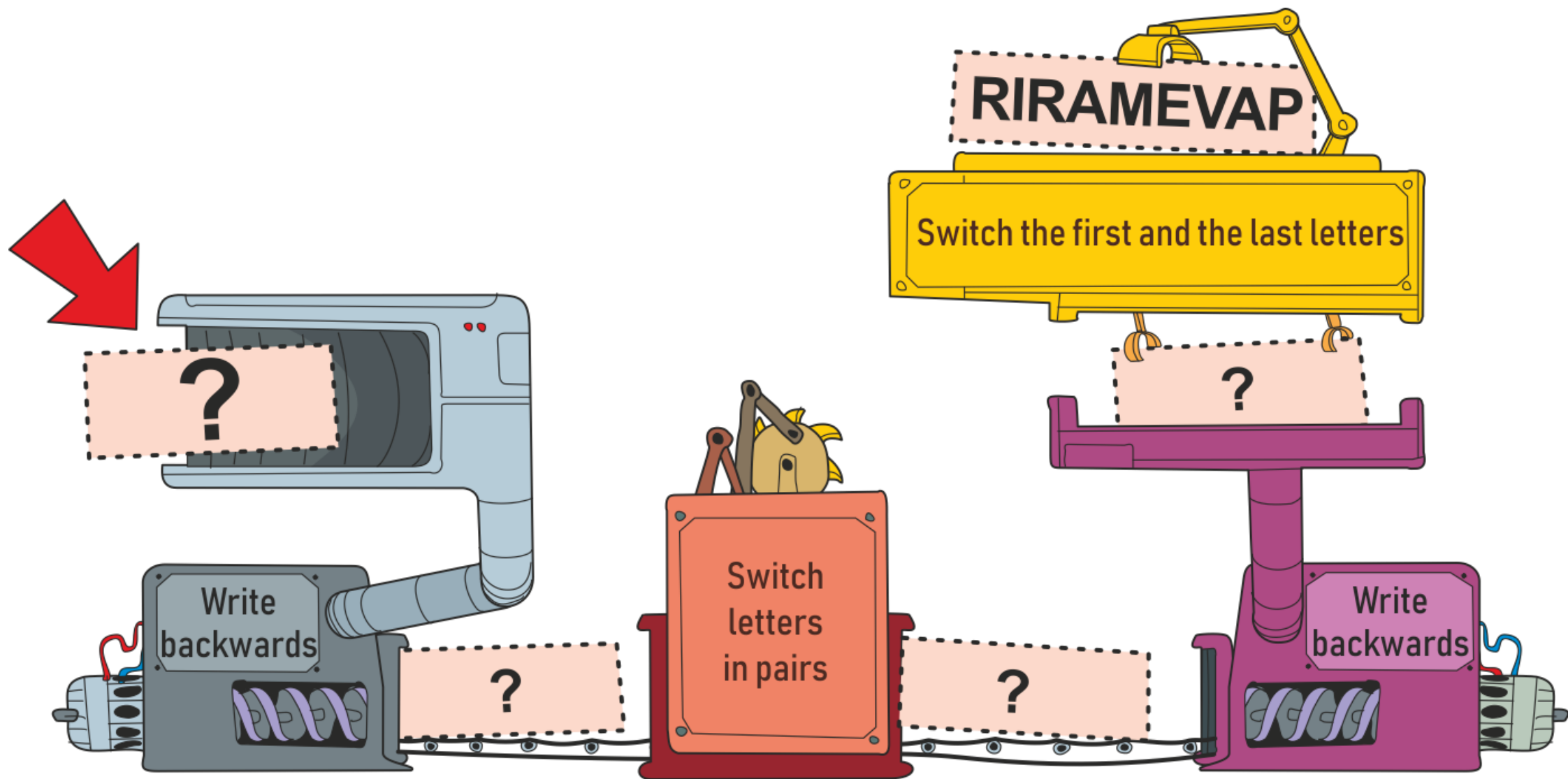
Text machine

The example

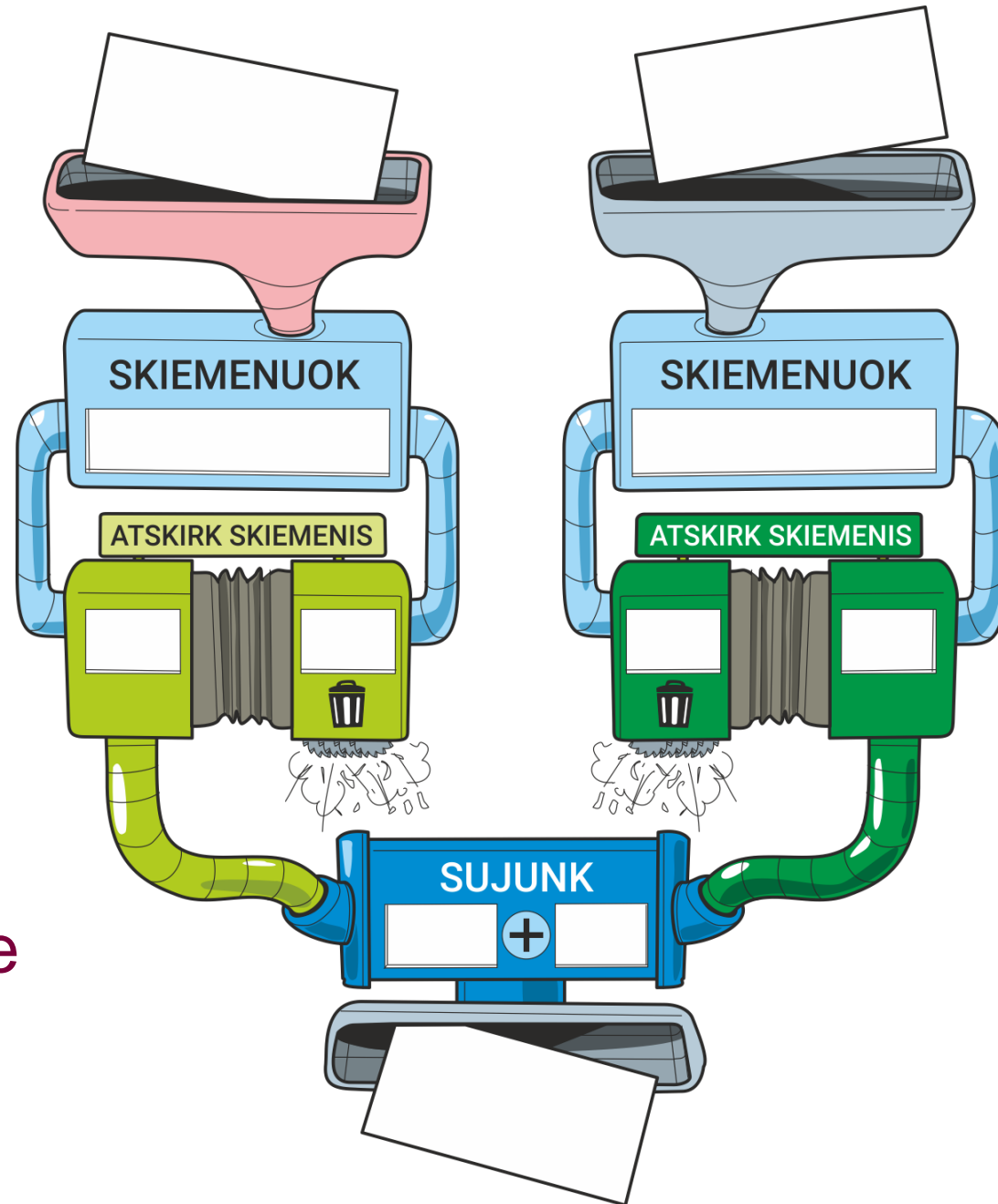


Text machine

Task



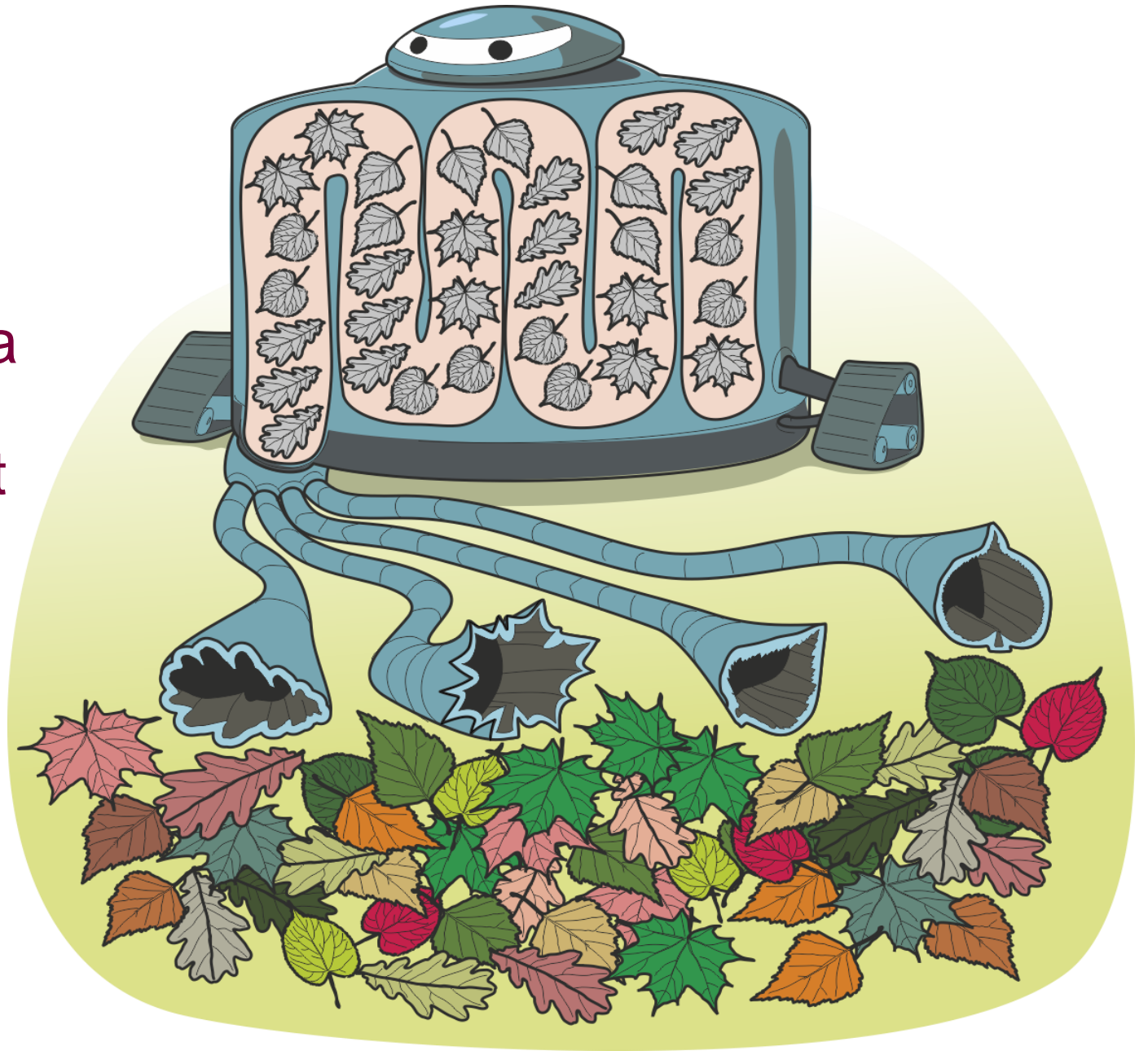
The machine produce new words from given words.



Which words you should give to the machine in order to get word **Master**?

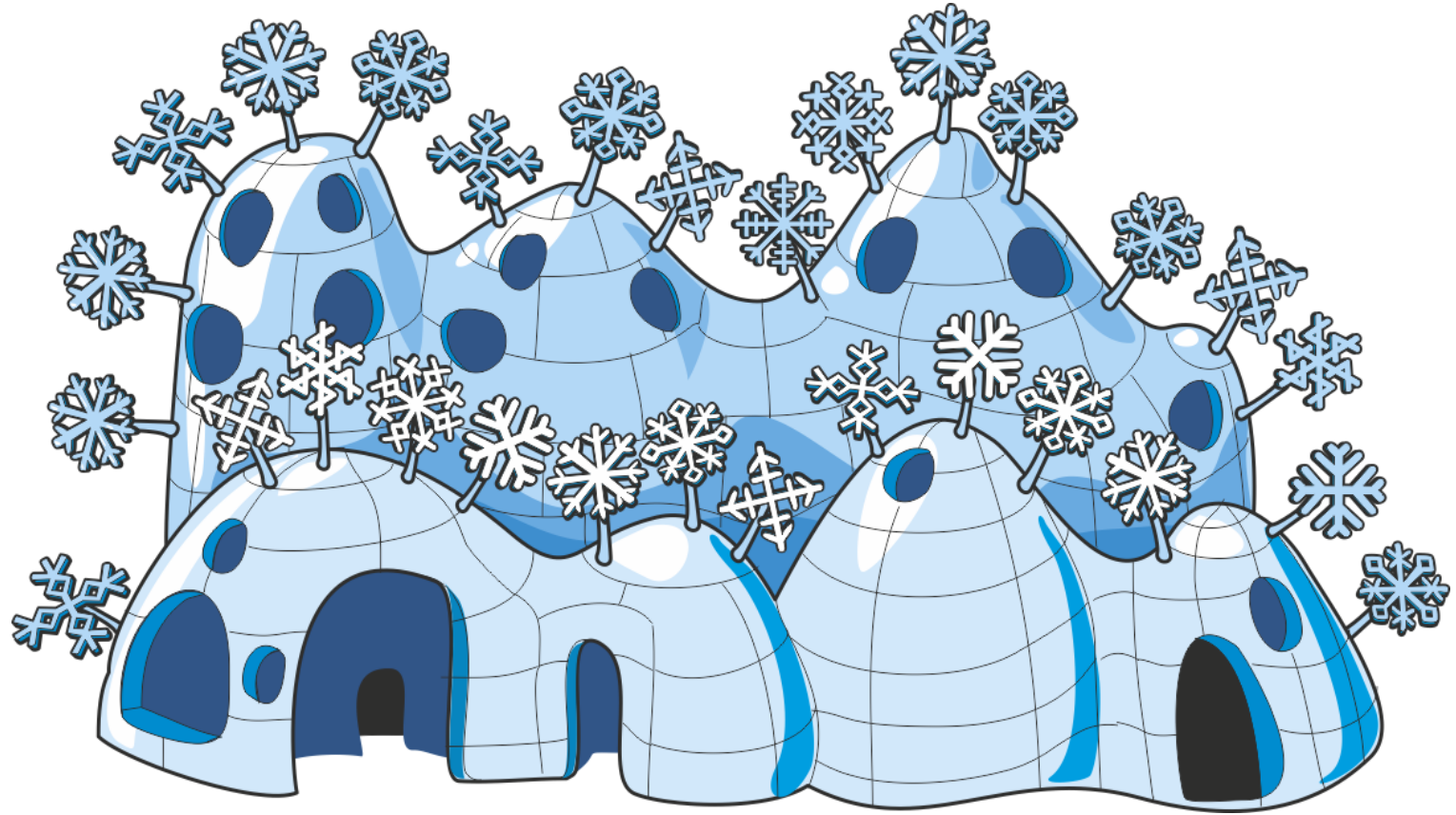
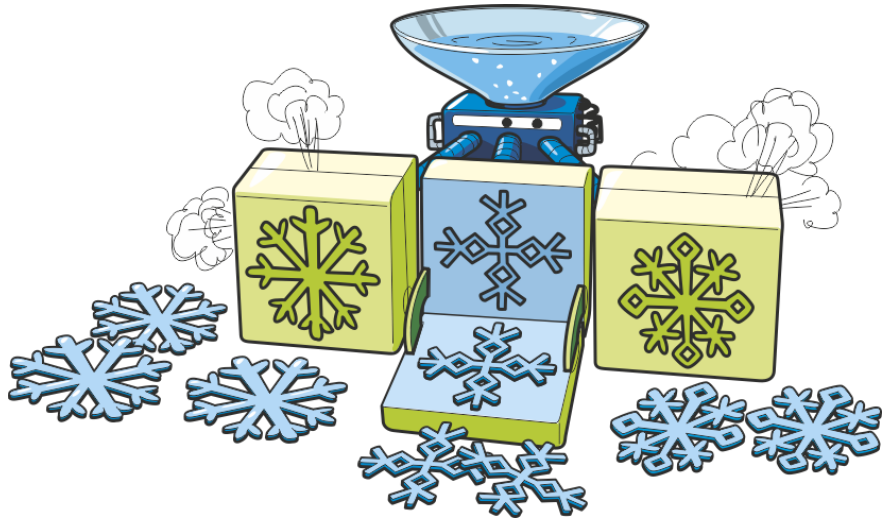
Smart robot pumps in the leaves in a certain sequence.

- Do you notice a pattern in a sequence?
- Which is the next leaf robot will pump in now?



Ice Hotel

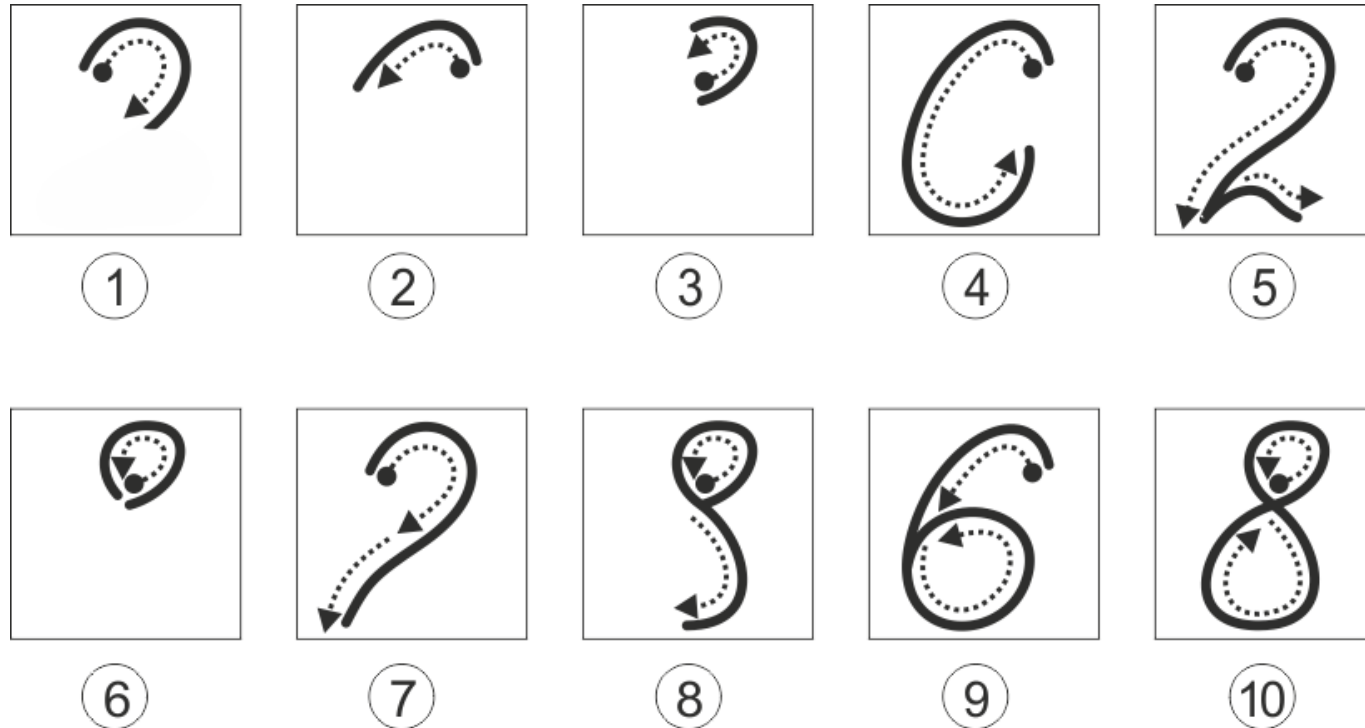
Little Snowflake robot produces three kind of snowflakes for decorating Ice Hotel.



- Circle the snowflakes that could not be produced by Snowflake robot. How many such snowflakes are there? Count them and write down the number.
- Count and write down, how many snowflakes of every kind Snowflake robot has produced

How to write digits 2, 6, 8

We write digits, as well as letters, in a certain order. The order how to write 2, 6 and 8 in steps is shown, but the sequence of pictures is mixed.



Write down **digit 2** writing numbers in a sequence.

Write down **digit 6** writing numbers in a sequence.

Write down **digit 8** writing numbers in a sequence.

Image in a computer

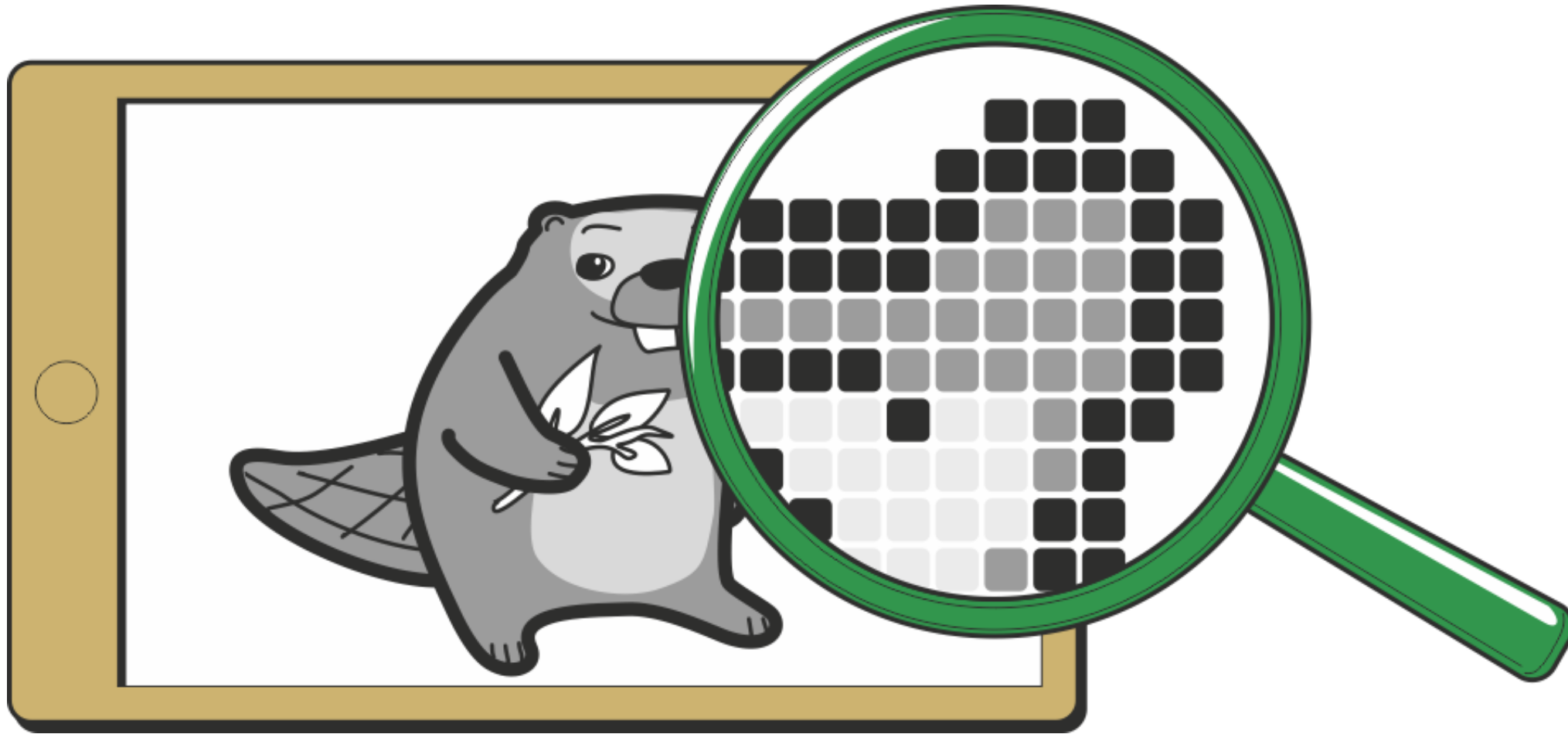
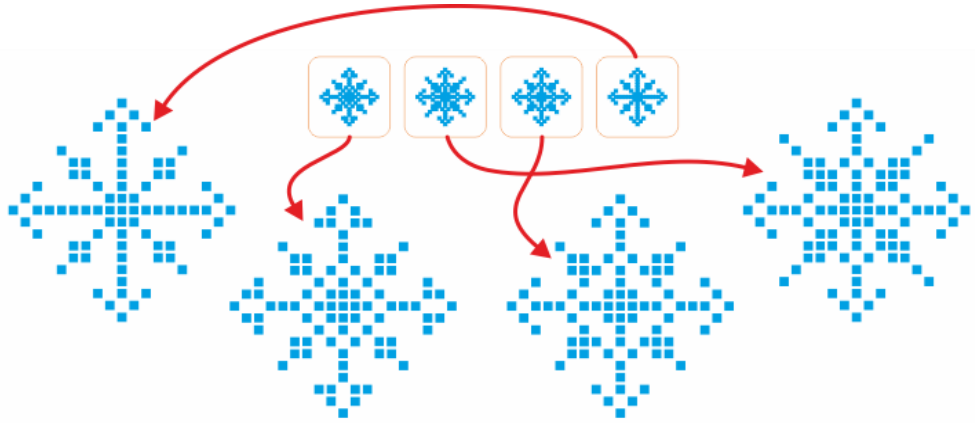
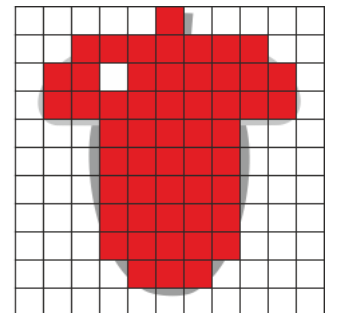
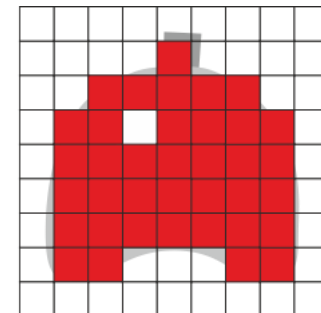
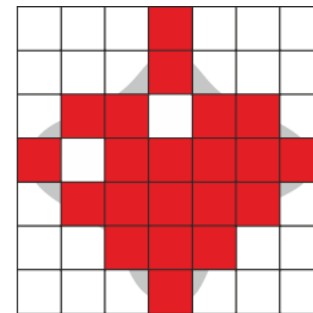
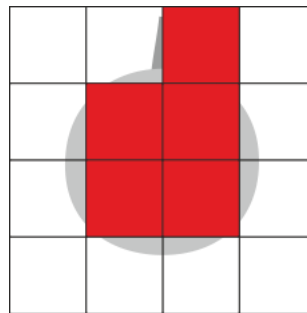


Image in a computer



Small snowflakes were magnified several times.
Connect with lines small snowflakes, corresponding the magnified ones.



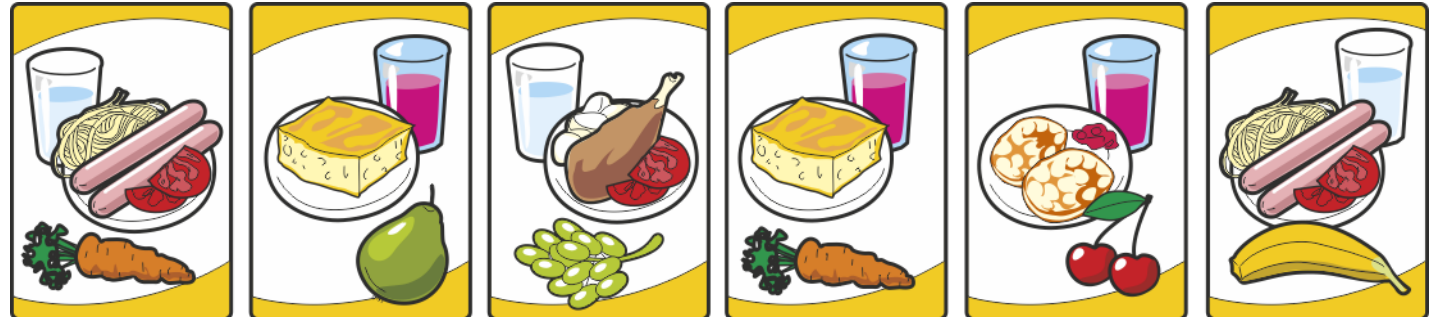
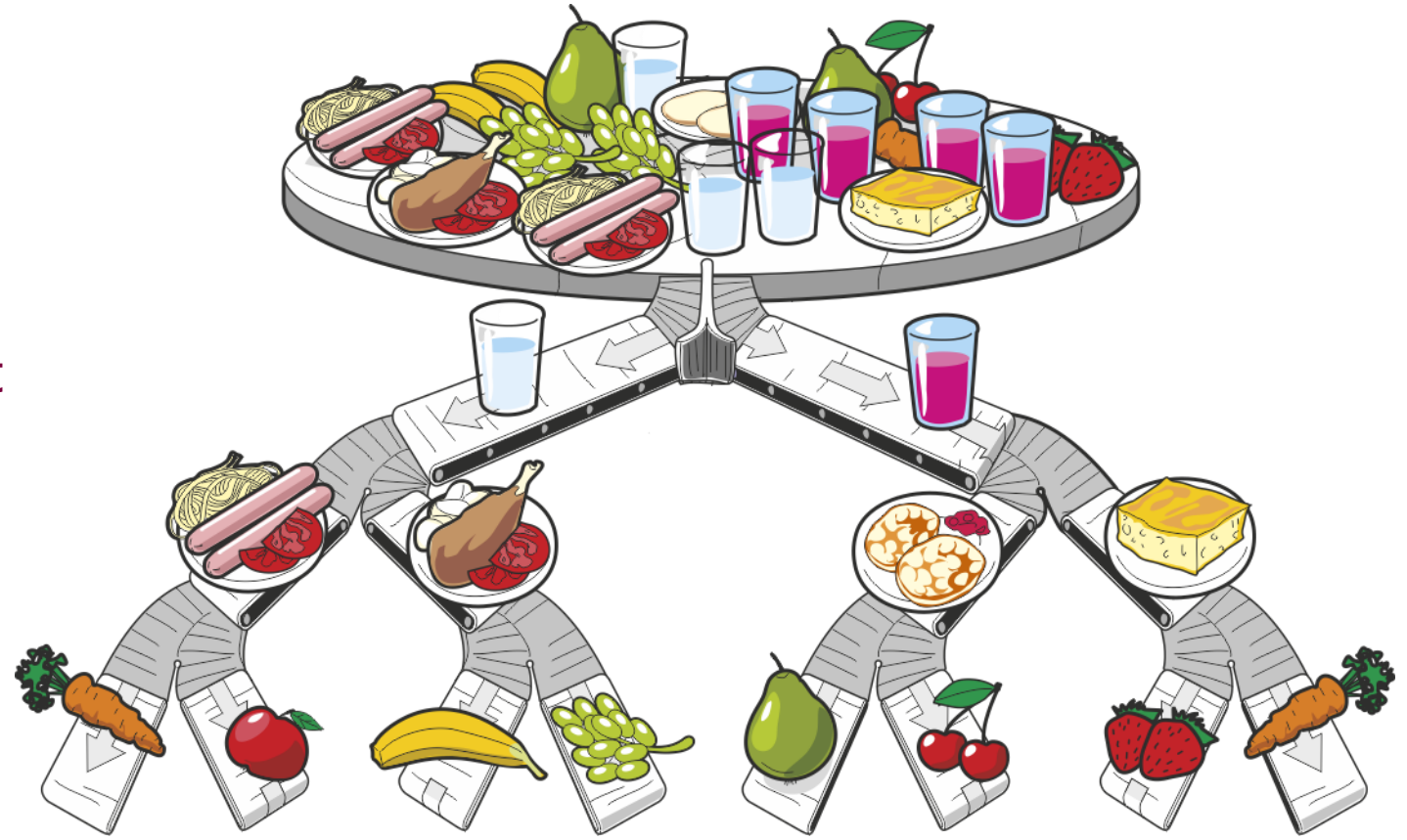
Food machine

A food dispenser delivers meals in the canteen.
The advertisement posters depict several lunch sets.

Mark with plus sign (+) the lunch sets that can be delivered by the food dispenser.



Could you get:

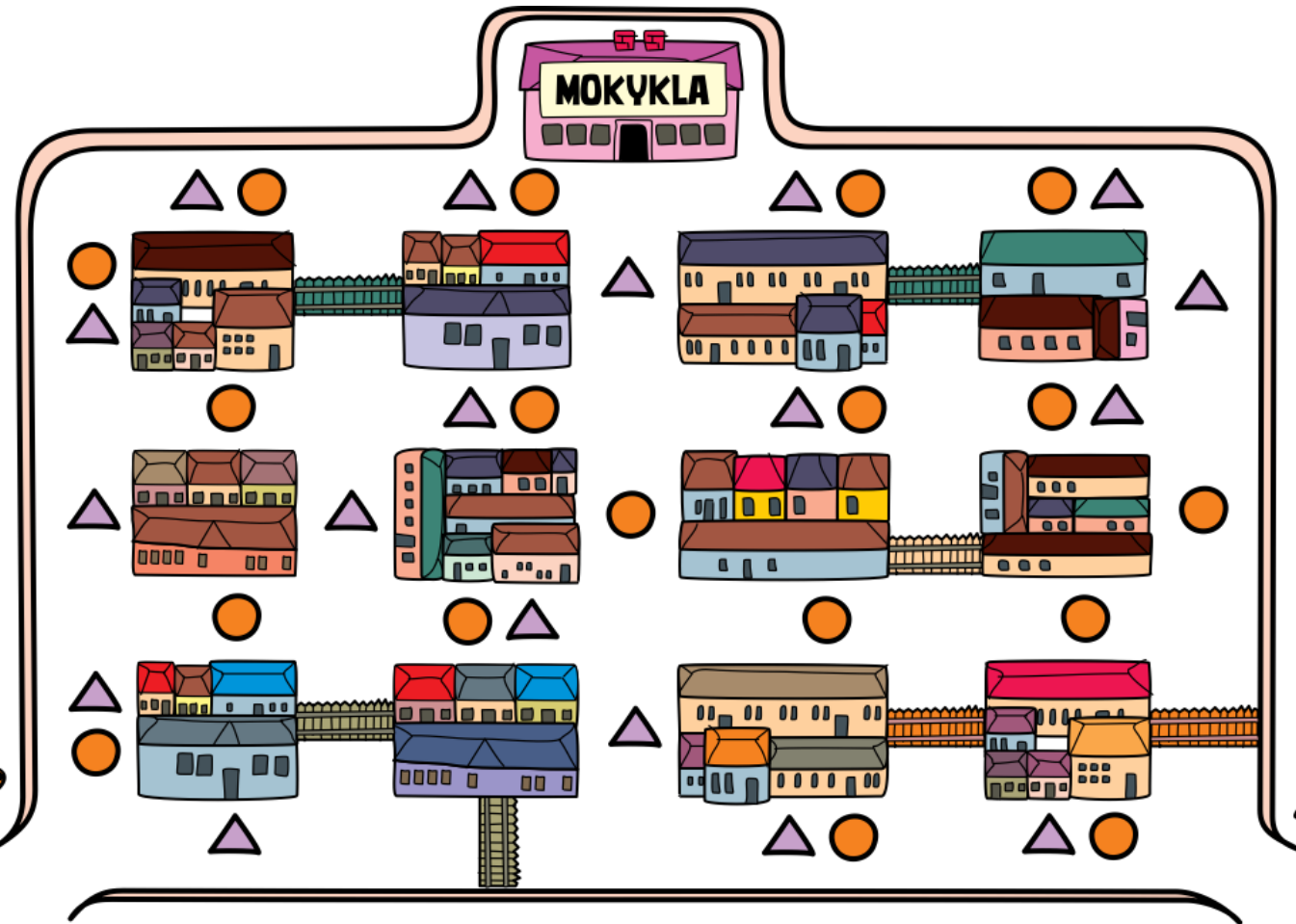
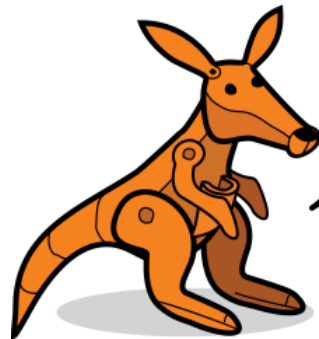
- a glass of water, chicken leg and carrot;
- a glass of juice, pudding and strawberries.



Beaver and Kangaroo

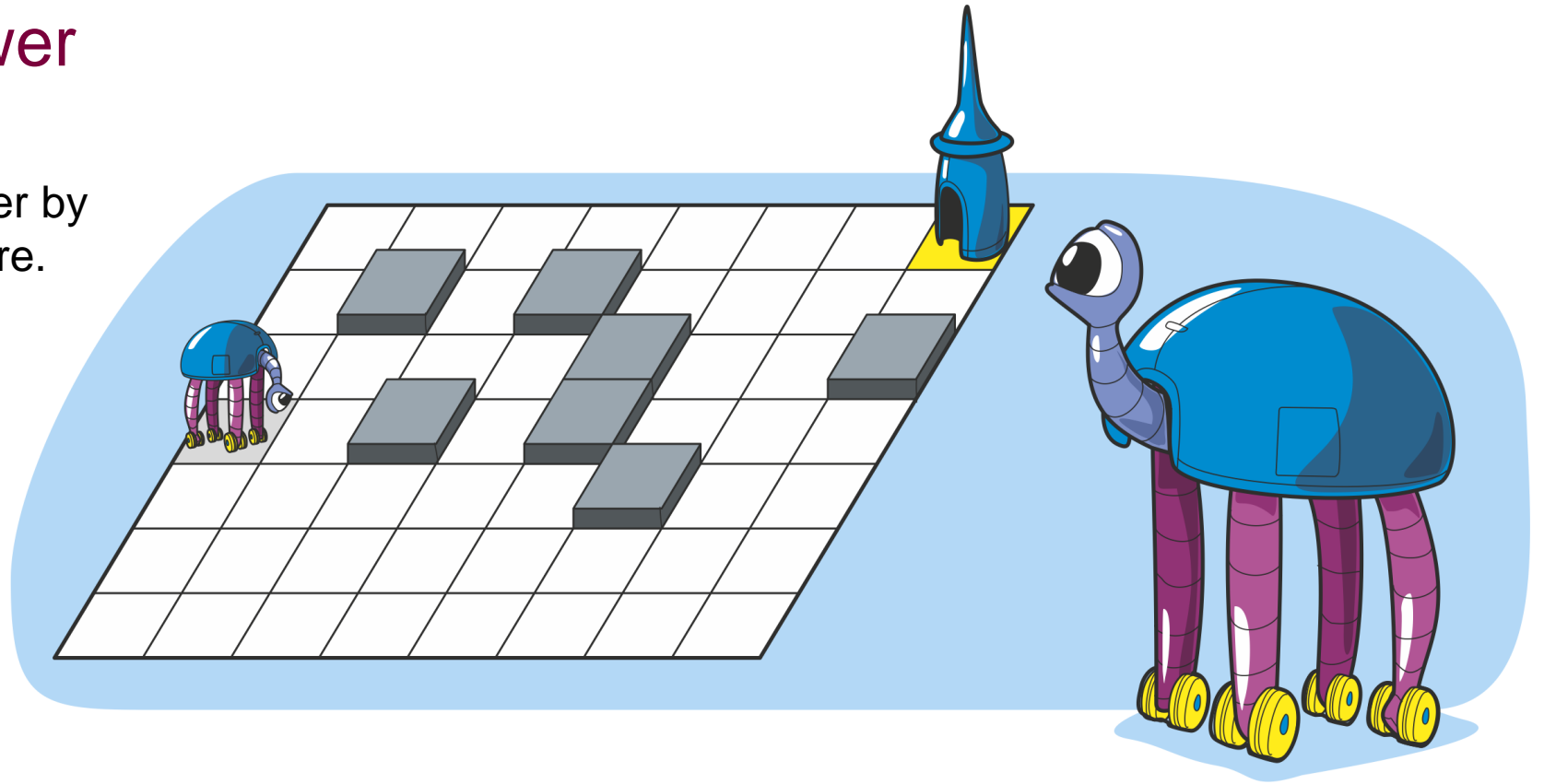
Kangaroo robot moves by paths marked with , Beaver robot's path is marked with .

1. Write down the length of the Kangaroo path (how many ).
2. Write down the length of the Beaver path (how many ).
3. Find more paths of Kangaroo and Beaver and mark them with the lines of different color.

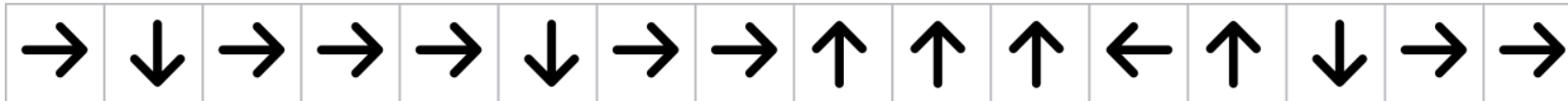


Robot and the Tower

Robot should reach the Tower by walking from square to square.



The programmer has made a program out of movement direction commands marked by arrows:

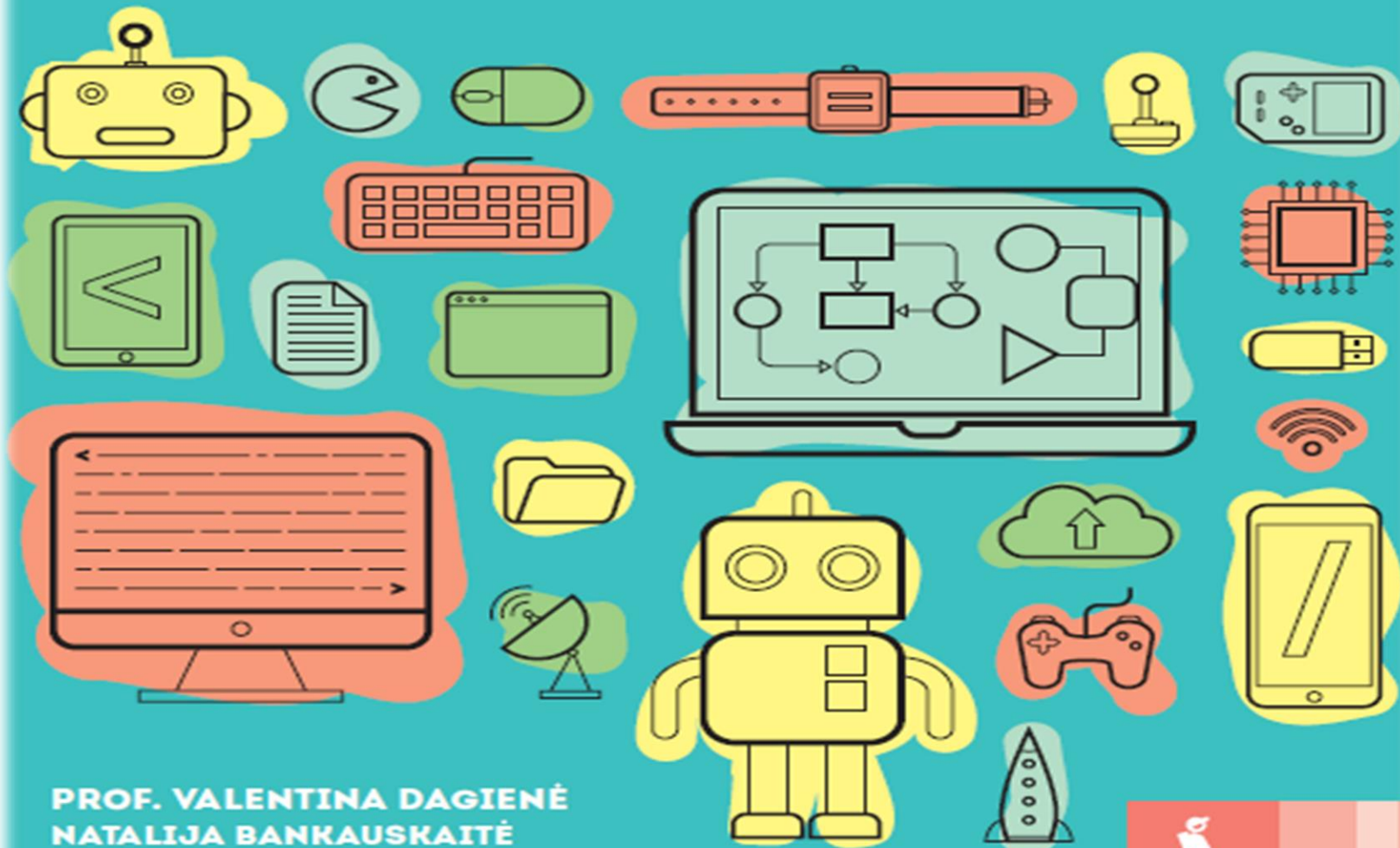


However, he made a mistake.

The program can be corrected by rotating one of the arrows. Fix it.

INFORMATIKOS UŽDUOTYS

1-2
KLASEI



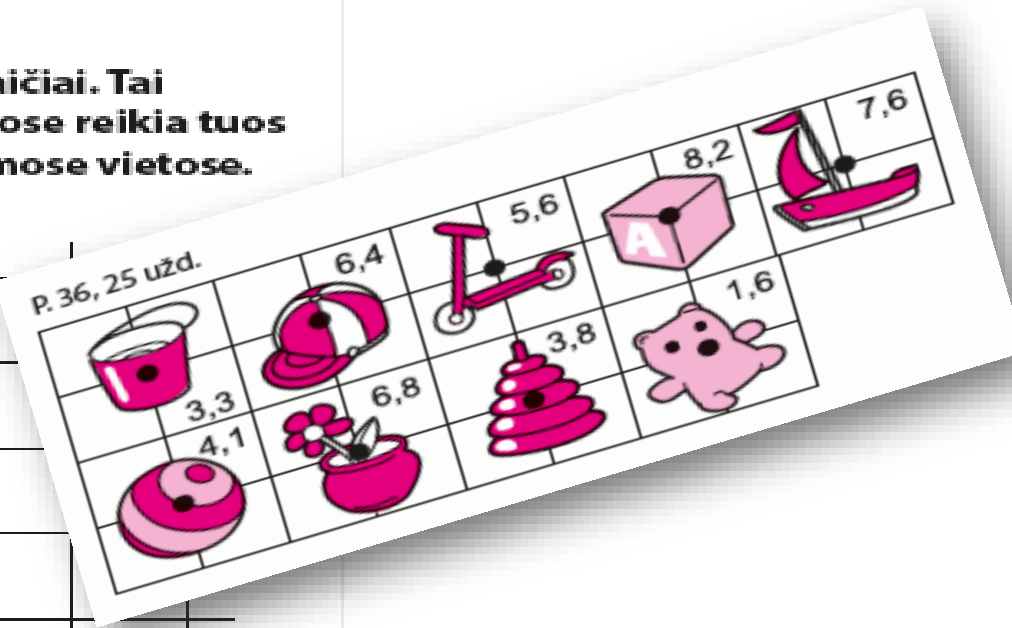
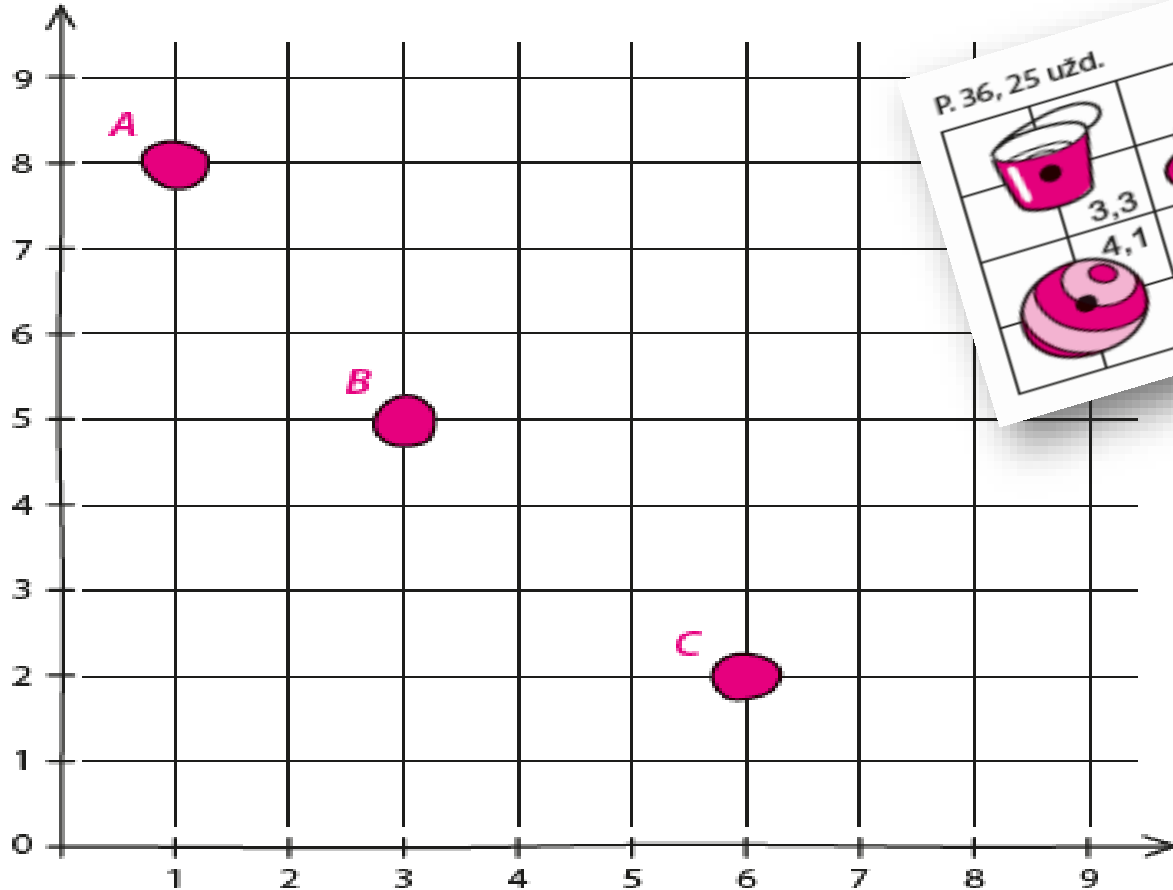
PROF. VALENTINA DAGIENĖ
NATALIJA BANKAUSKAITĖ
SONATA BRUŽIENĖ



ALGORITMAI IR PROGRAMAVIMAS

KOORDINATĖS

- 25 Šios užduoties lipdukuose yra užrašyti skaičiai. Tai koordinatės – jos rodo, kurių linijų sankirtose reikia tuos lipdukus priklijuoti. Priklijuok juos reikiamose vietose.



The numbers on the stickers are the coordinates that show where to stick those stickers.

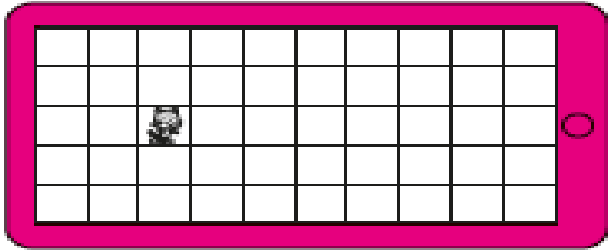
- Užrašyk tinklėlyje pažymėtų taškų koordinates.

A taškas B taškas C taškas

ALGORITMAI IR PROGRAMAVIMAS PROGRAMAVIMO KALBA *SCRATCHJR*

32 Katinėlis supranta šias komandas:

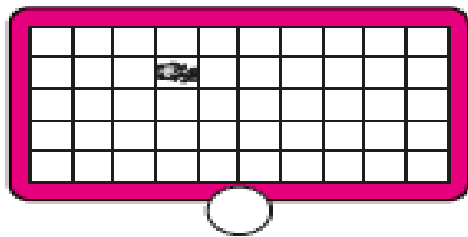
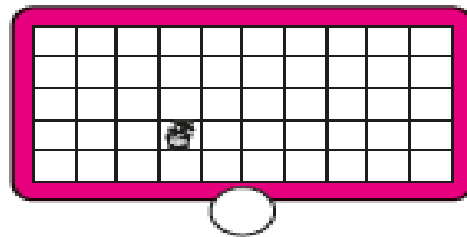
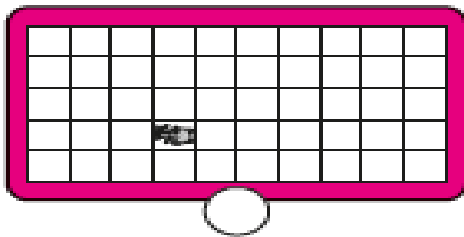
 – žengti žingsnį į priekį;  – pasisukti į dešinę.



Jis įvykdė tokias komandas (vėliavėlė žymi pradžią):



Kur dabar yra katinėlis? Pažymėk tai rodantį planšetinį kompiuterį.



The cat knows commands:
FORWARD and TURN RIGHT

He runs a sequence of the commands

Where is the cat?

- 5 Pagalvok, kaip sėdi dirbdamas kompiuteriu. Įsiziūrėk į paveikslėlius ir mėlyna spalva pažymėk tą, kuriame pavaizduota tavo sėdėseną.



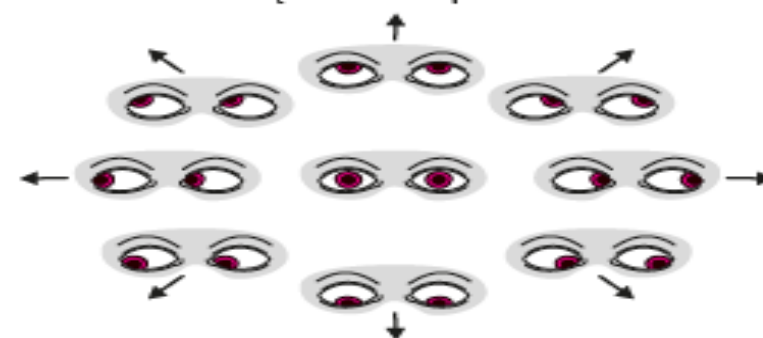
- Žalia spalva apibrauk paveikslėlį, kuriame pavaizduotas teisingai sėdintis vaikas. Jei nežinai, kokia sėdėseną teisinga, paprašyk suaugusiųjų pagalbos.



Atmink!

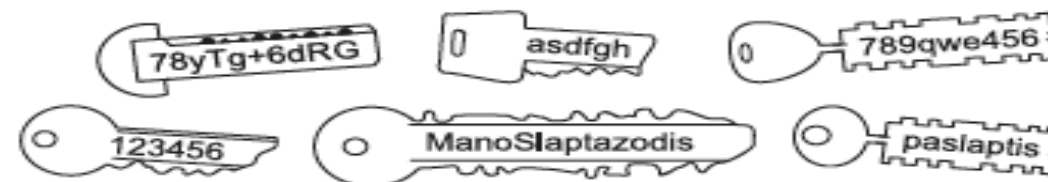
Svarbu ne tik teisingai sėdėti. 9–12 metų vaikams patartina prie kompiuterio praleisti ne daugiau kaip 1 valandą per dieną. Jei prie kompiuterio dirbi jau 20–30 min, būtina 10–15 min pertrauka ir trumpa mankštelė: atsistok, padaryk kelis tau žinomas raumenų tempimo pratimus, pamankštink akis.

Akių mankštos pratimai



Norint naudotis koku nors mokymosi ar žaidimo tinklalapiu paprastai reikia prie jo prisijungti – nurodyti savo slaptažodį. Kaip sudaryti gerą, sunkiai atspėjamą slaptažodį? Naudok didžiąsias ir mažąsias raides, skaičius ir kitus ženklus, visus juos sudėliok atsitiktine tvarka, pavyzdžiui: 1p56_ku!)1miH.

- 6 Kuris slaptažodis, tavo nuomone, yra geras? Nuspalvink raktą, ant kurio jis užrašytas.



Mark the picture of a child sitting correctly

Which password is strong?

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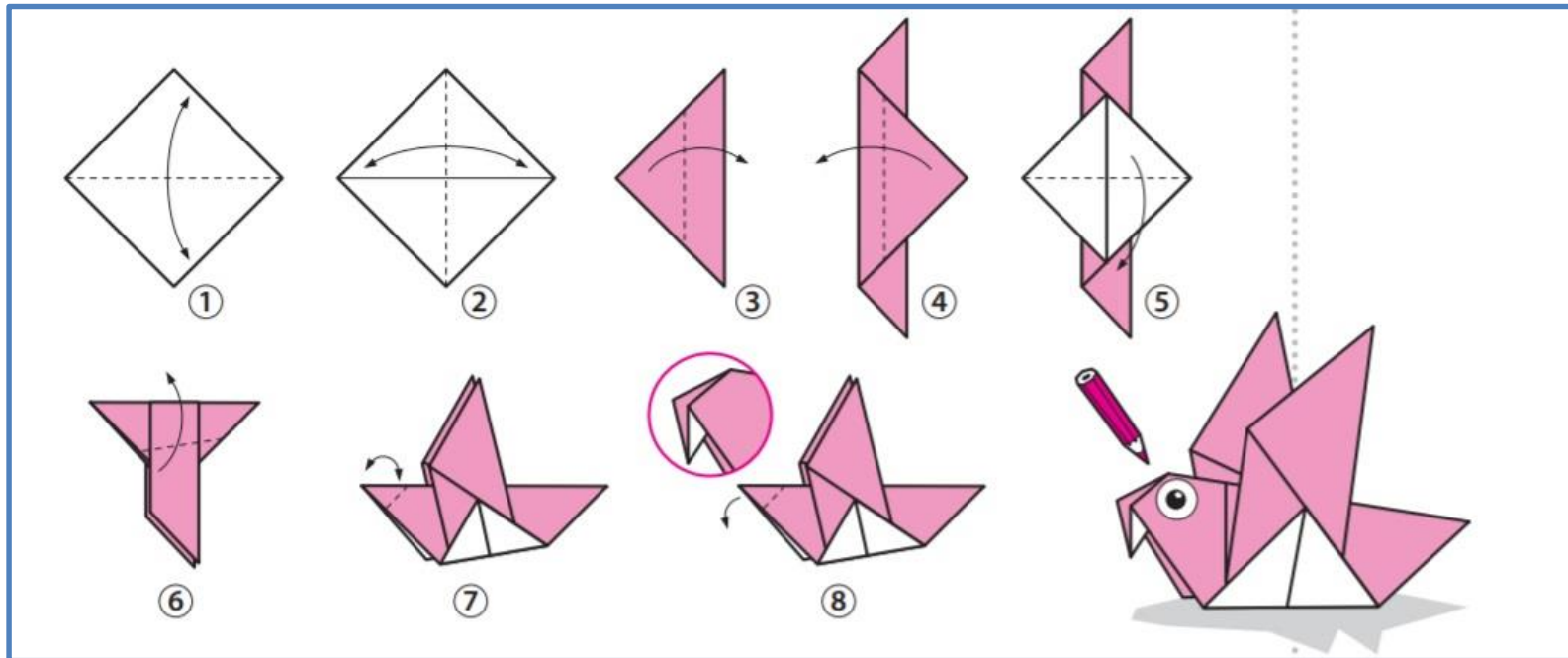
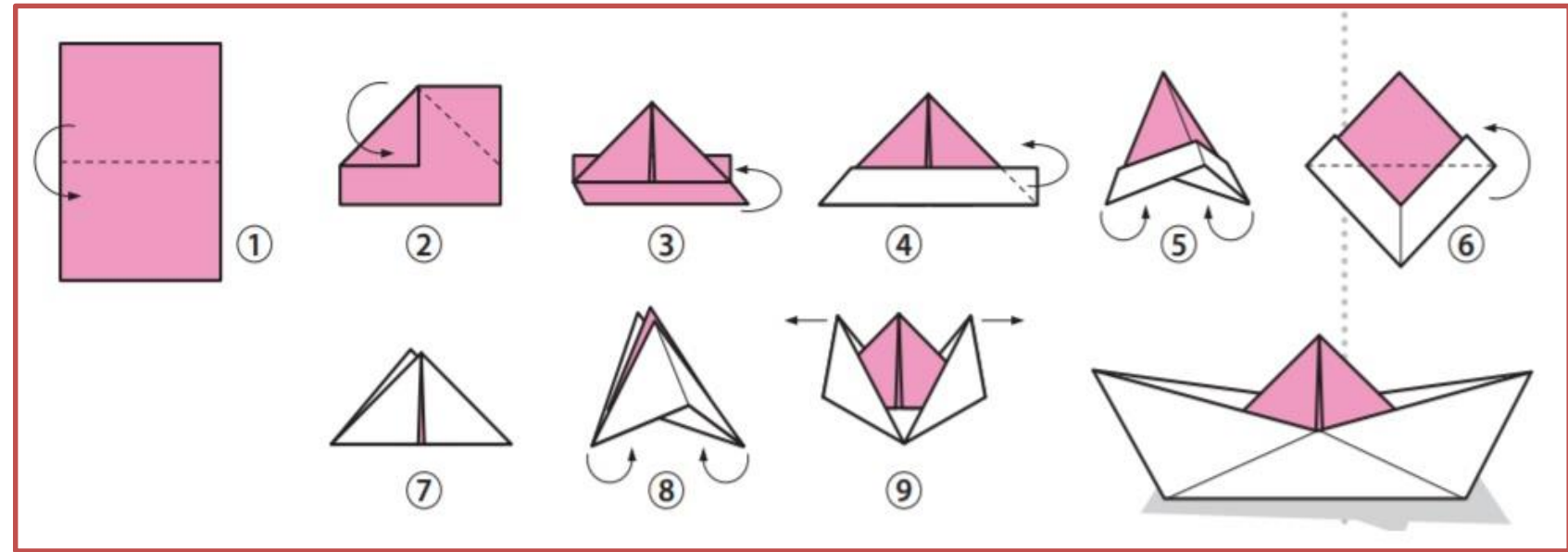
INFORMATIKOS UŽDUOTYS

3-4 KLASEI



Exercise book

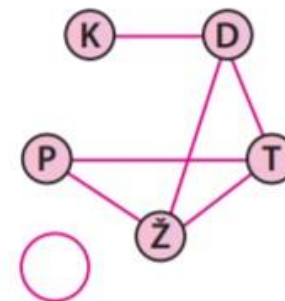
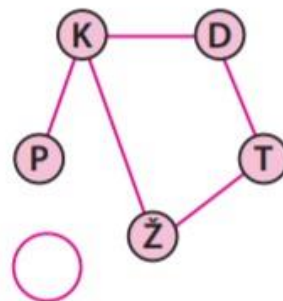
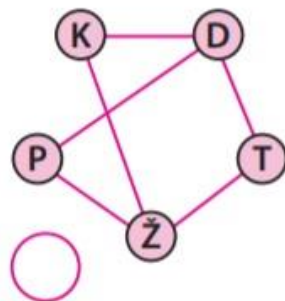
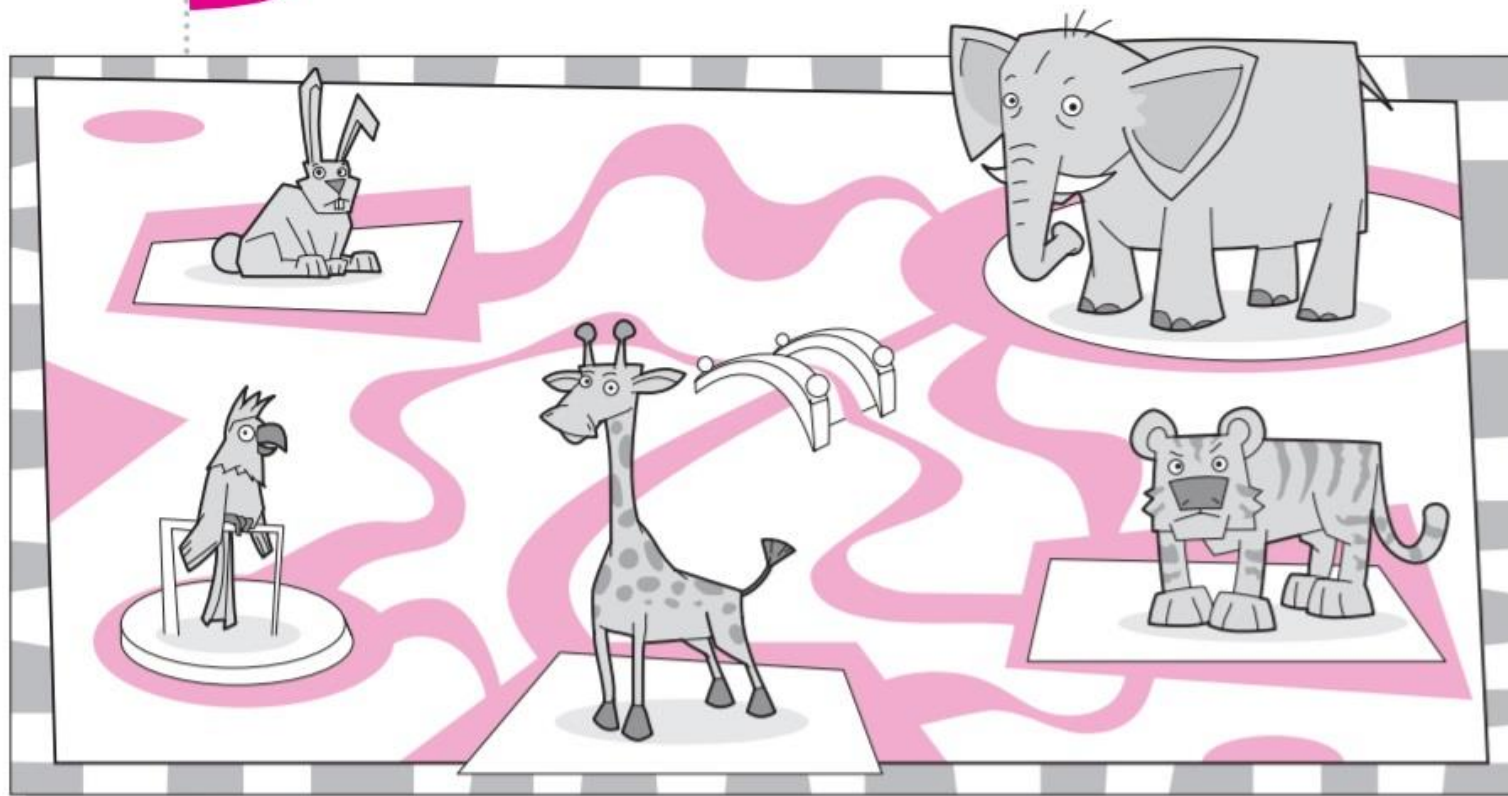
Algorithms and programming



Examine the map of the zoo and mark the corresponding scheme

7

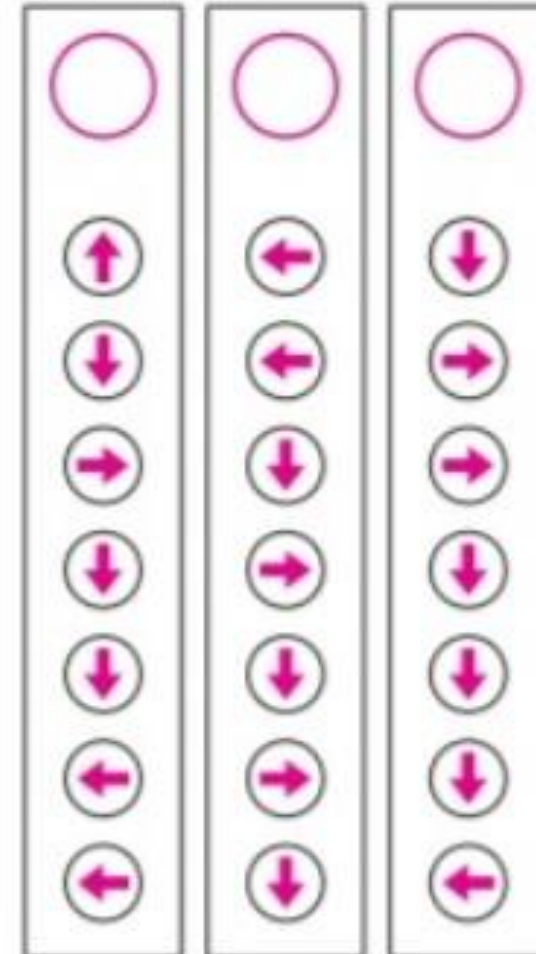
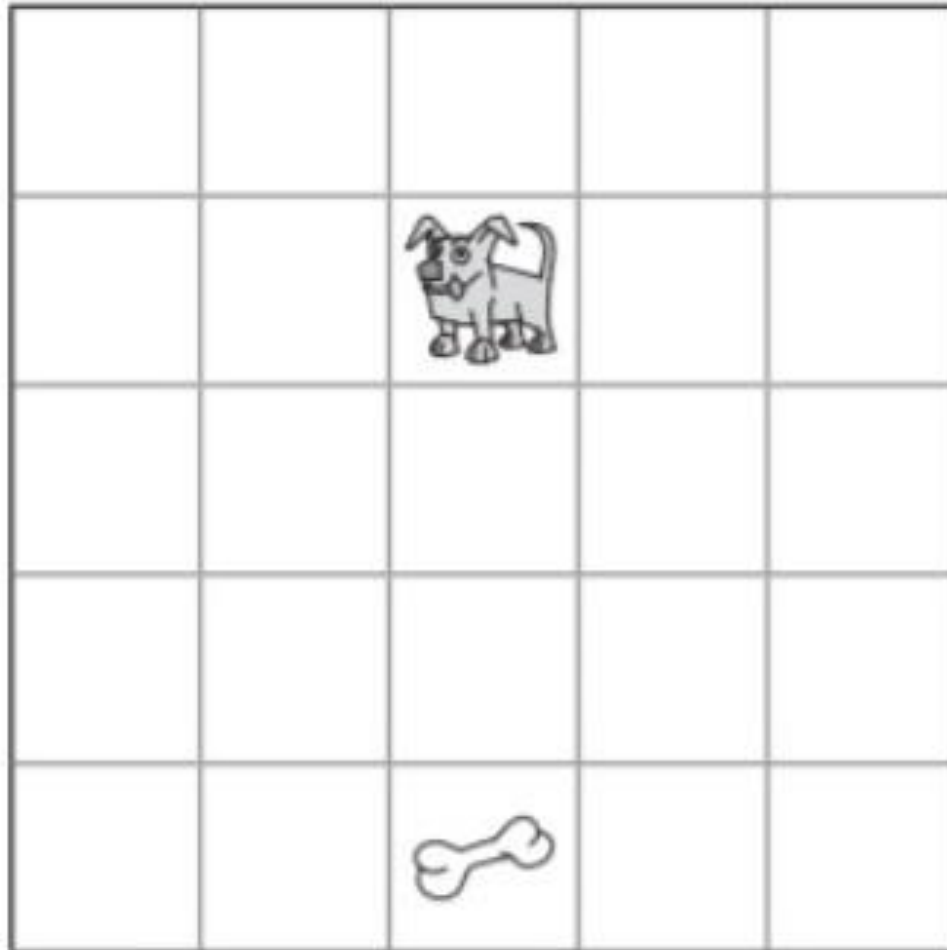
Patyrinėk zoologijos sodo žemėlapį ir pažymėk jį atitinkančią schemą.



Which algorithm will bring the puppy to the bone?

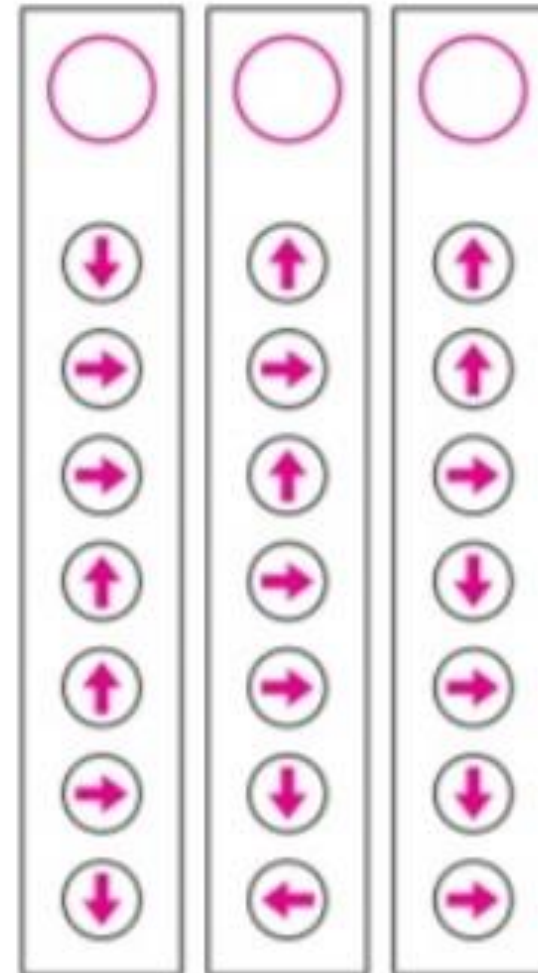
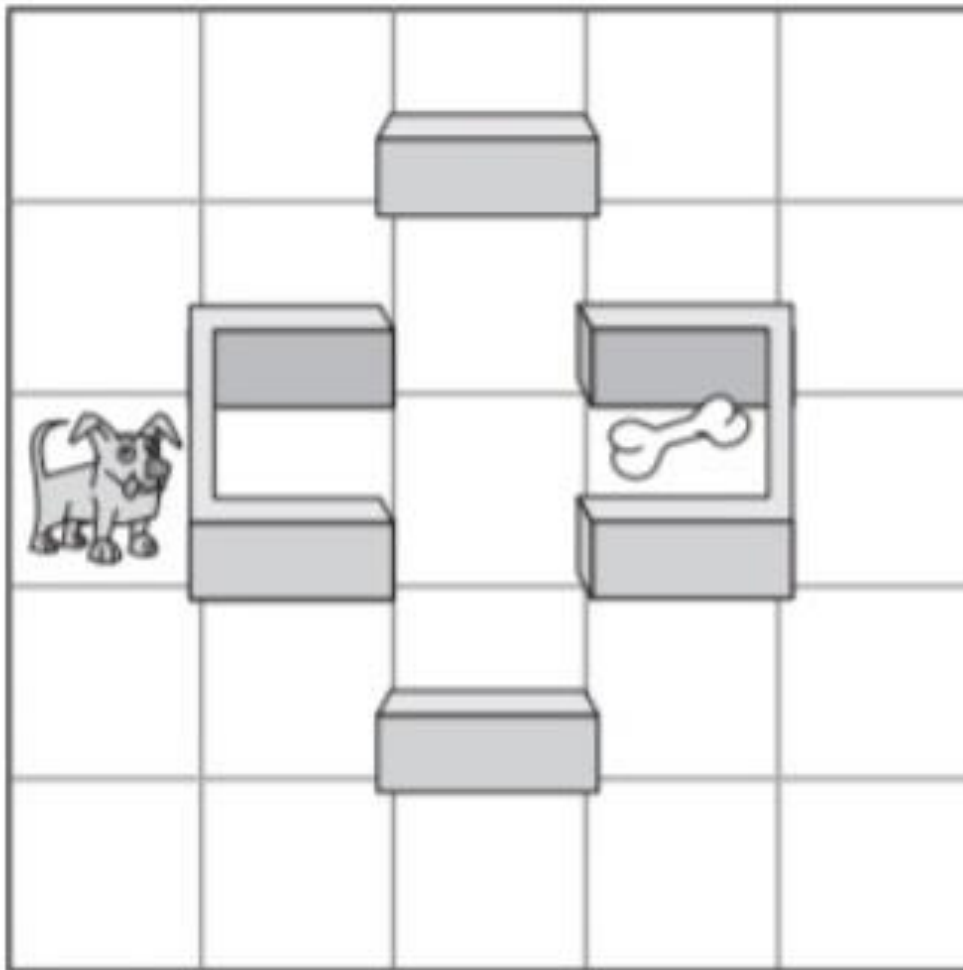
9

Pažymėk, kuri rodyklių seka – algoritmas – atvestų šuniuką prie kaulo.



Which algorithm will bring the puppy to the bone? Do not cross walls.

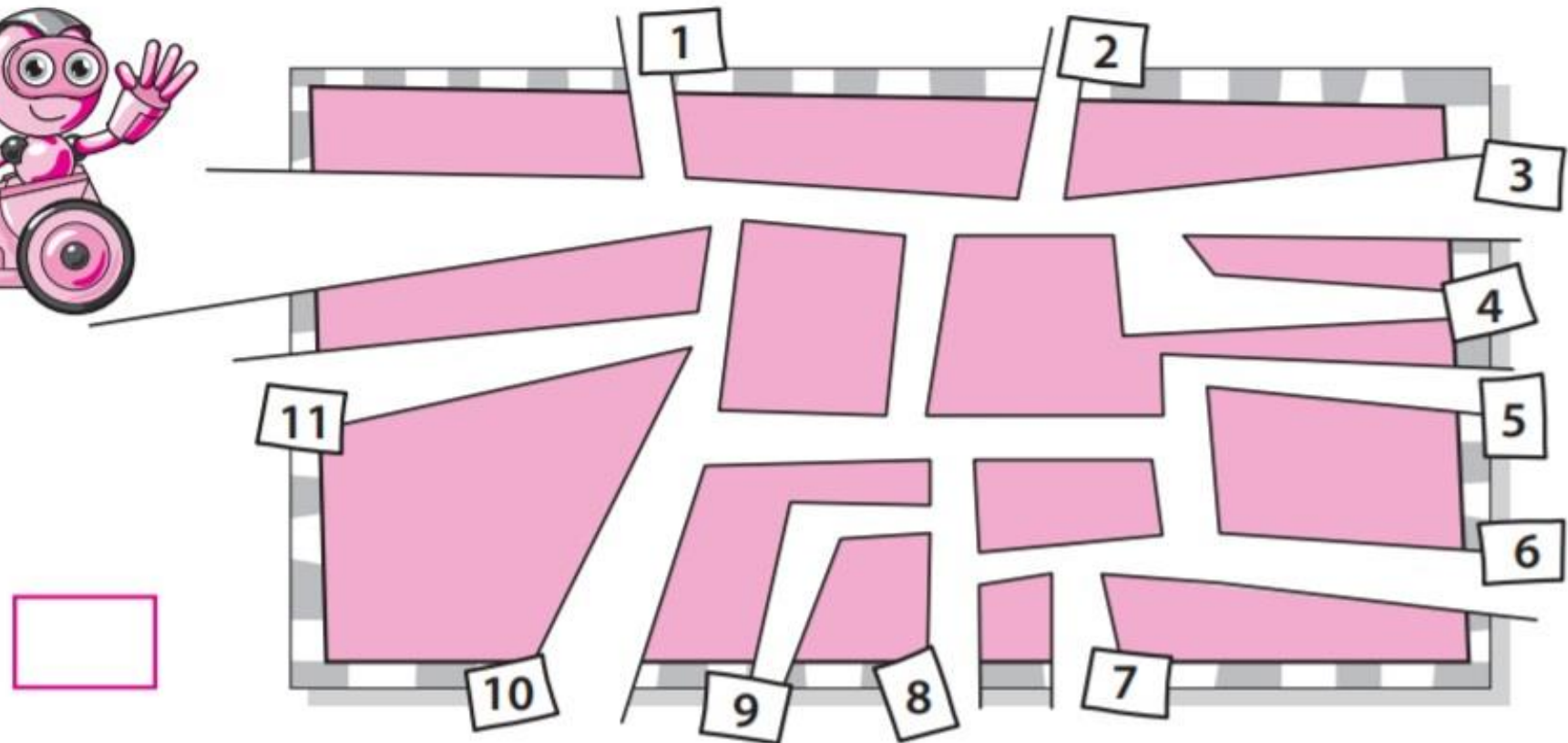
- O dabar kuri rodyklių seka atvestų šuniuką prie kaulo?
Sienų kirsti negalima.



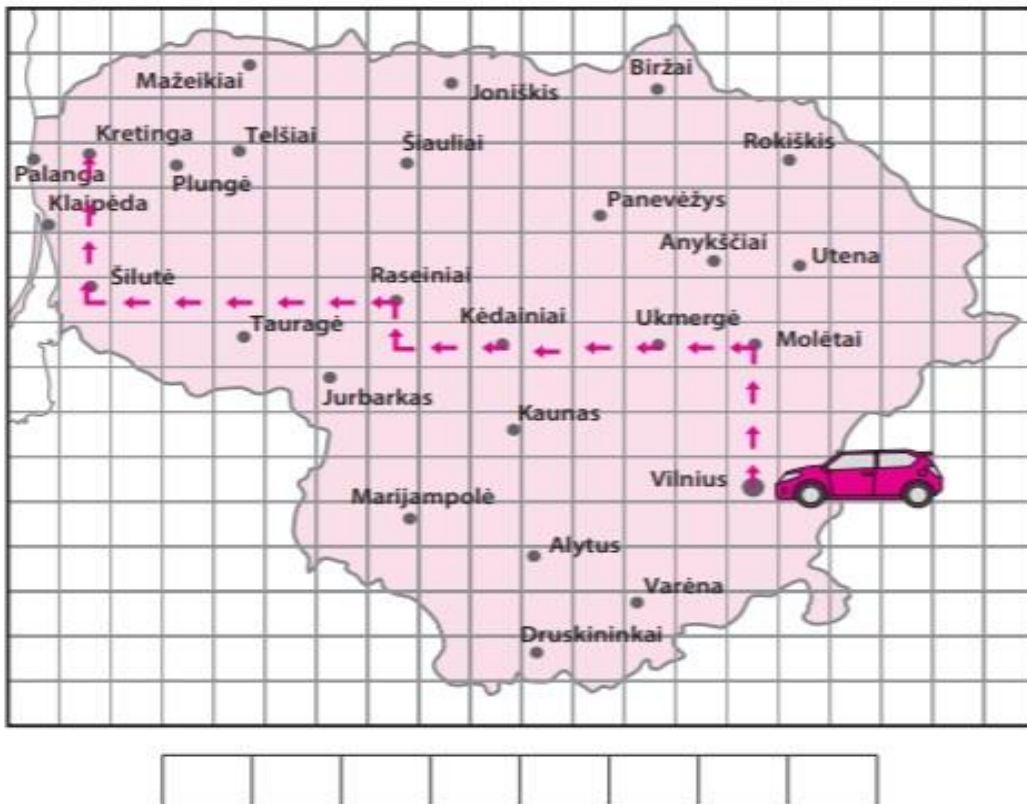
The robot execute the commands: 1) moves forward, 2) turns every second turn in any direction. Where will the robot finish?

13

Robotukas užprogramuotas taip, kad važiuoja pagal komandą: važiuoti tiesiai, pasukti į kas antrą posūkį, nesvarbu, į kurią pusę. Pro kur robotukas išvažiuos iš labirinto?



Vilniečių šeima vasarą automobiliu keliauvo po Lietuvą. Žemėlapyje pavaizduotas jų kelionės maršrutas. Užrašyk šį maršrutą nurodydamas, kiek kartų kartojamas tas pats žingsnis.



- Parašyk, kokius Lietuvos miestus aplankė ši šeima.

Vilniečių šeima aplankė

- Pratęsk žemėlapyje pavaizduotą maršrutą taip, kad jis eitų per Šiaulius, Panevėžį, Uteną ir baigtųsi Vilniuje. Užrašyk šią maršruto dalį.

.....

- Su draugu palyginkite savo užrašytas maršruto dalis. Ar jos skiriasi?

Aptarkite kodėl.

.....

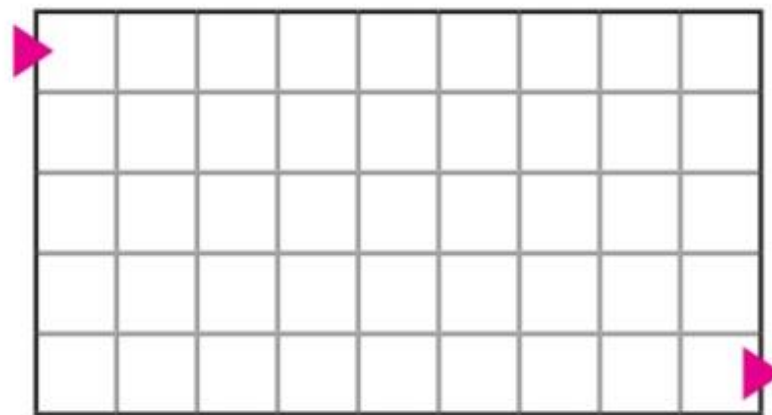
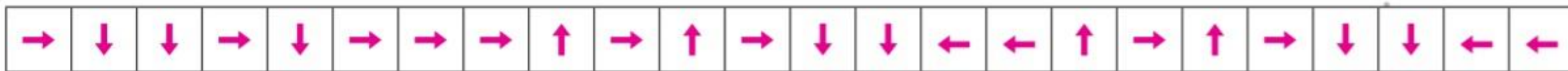
.....

The map shows the route of the family trip in Lithuania.

Write down this route, indicating how many times they repeat the same step.

Check that the robot will reach the car by executing the algorithm

41 Patikrink, ar vykdydamas jį algoritmą robotukas prieis automobilį.

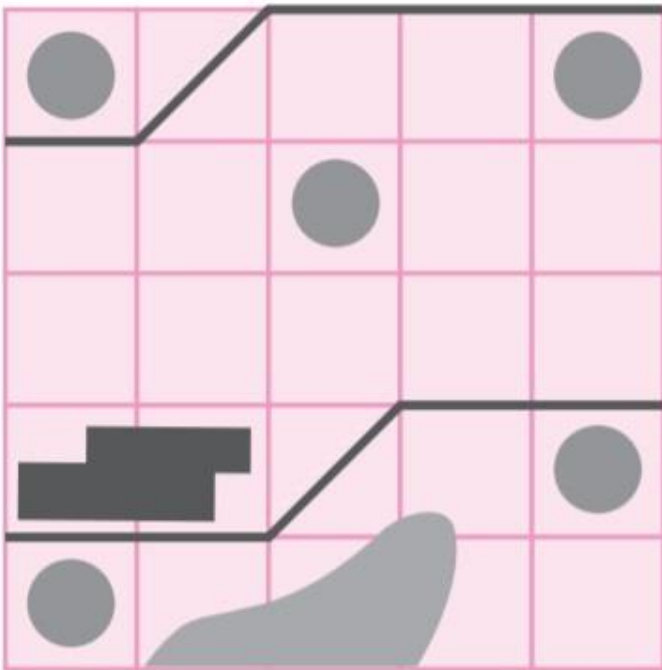


- Jei neprieis, ištaisyk algoritmą taip, kad prieitų.



The robot drew a plan of one of the home place. Outline the letter of the correct answer.

3 Robotukas nubraižė vienos iš pavaizduotų sodybų planą. Kurios?
Apibrauk teisingo atsakymo raidę.





- ❖ **Small things:** Less is more!
- ❖ **Doing – Solving and enjoying!**
- ❖ **Creating deeper** digital learning culture



Prof. dr. Valentina Dagienė



INTERESTS

teaching and learning of informatics/computing, informatics curricula for schools, informatics olympiads, gamification, puzzle-based learning, intelligent technologies for education

<https://www.mii.lt/en/structure/staff/408-dagiene-valentina-en-gb>



MAIN RESULTS

- over 300 research articles
- over 60 textbooks for schools
- editor of two international journals: „Informatics in Education“ (WOS emerging list) and „Olympiads in Informatics“ (Scopus)
- established Bebras Challenge on Informatics and Computational Thinking in 2004 – a of 68 countries

www.bebras.org

Thank You!



valentina.dagiene@mif.vu.lt