



Teachers' Introduction

The Bebras cards are designed to enable pupils to develop their computational thinking skills, whilst at the same time providing an introduction to more advanced computing concepts.

Computational Thinking

Each card is aligned to one of the following computational thinking concepts, which are indicated in the top right-hand corner of each card.

- Patterns
- Algorithms
- Logic
- Abstraction

Task Difficulty

The difficulty of the task on each card is indicated by the icon in the bottom right-hand corner.

● = Easy

◆ = Medium

★ = Hard

Answers and Other Materials

Answers to tasks, ideas for teaching and national curriculum links can be found at: www.bebas.uk

Tip: pupils will need an exercise book or a piece of paper in order to record their answers to each activity.



Index

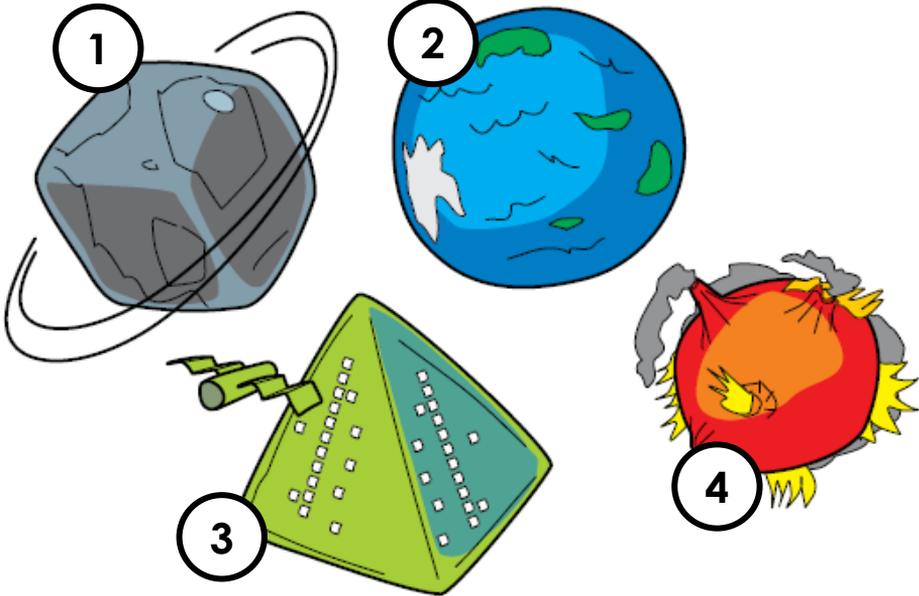
1	Alien residents ●	Patterns
2	Shoestrings ●	Patterns
3	Painting of Stamps ●	Algorithms
4	Layered painting ●	Algorithms
5	Flags ●	Algorithms
6	Robot controlling a car ●	Algorithms
7	Robot and cookies ●	Algorithms
8	Shaman beaver ●	Logic
9	The strip ●	Patterns
10	Christmas tree decorations ●	Patterns
11	Sorting buttons ●	Patterns
12	Feathers ●	Patterns
13	Beaver balance ●	Algorithms
14	Beaver birthday ●	Logic
15	Morning ●	Algorithms
16	After school ●	Logic
17	Coins ●	Logic
18	Colourful tower ●	Algorithms
19	Beaver hut ●	Algorithms
20	Read the words ●	Algorithms
21	Little stones mosaic ●	Algorithms
22	Swimmer beaver ●	Logic
23	Missing numbers ●	Abstraction
24	Picture of the castle ●	Logic

25	Beele robot ●	Algorithms
26	A choice of tracks ●	Algorithms
27	Every other turn ●	Algorithms
28	Floating robot ●	Algorithms
29	Moving diagonally ●	Logic
30	French beaver ●	Algorithms
31	Lunar rover ●	Algorithms
32	Little stones ●	Algorithms
33	Cinema ●	Logic
34	Beautiful tiles ★	Algorithms
35	Beaver map ★	Logic
36	Clothes line ★	Logic
37	Swap ★	Algorithms
38	iFrog ★	Algorithms
39	Laundry ★	Logic
40	Robot is carrying ★	Algorithms
41	Read around ★	Algorithms
42	Necklace for a little beaver ★	Patterns
43	Programmer's new years eve ★	Logic
44	Beaver's House ★	Logic
45	Beaver language ★	Algorithms
46	Find a mistake ★	Algorithms
47	Cat and mouse ★	Logic
48	Cipher ★	Algorithms

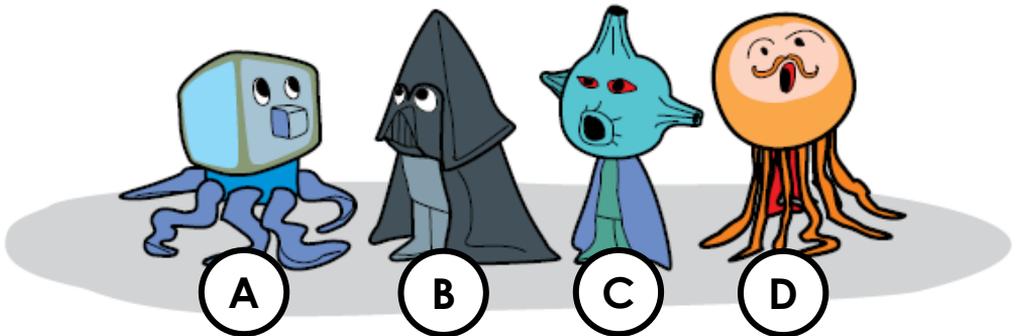


Alien residents

Cute creatures live in newly discovered planets.



Match the creature to the correct planet.





Shoestrings

Match the shoestring to the correct shoe.

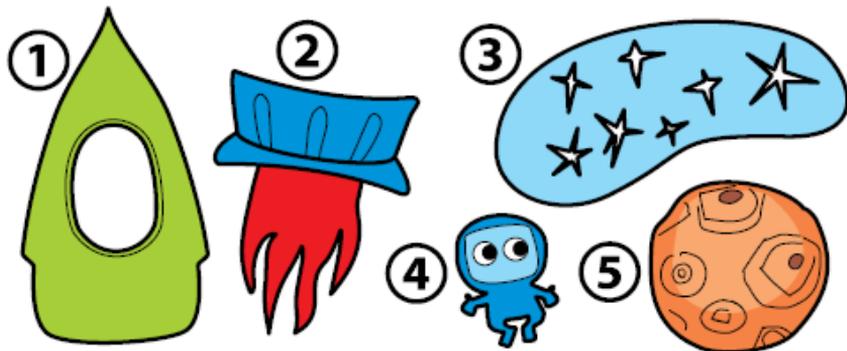
①		Ⓐ		Ⓑ		Ⓒ		Ⓓ	
②									
③									
④									



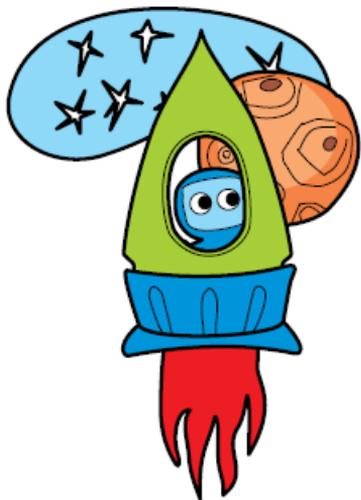


Painting of Stamps

Little beaver has five stamps.



Using these stamps, he created a painting:



In what order did little beaver use the stamps?



Layered painting

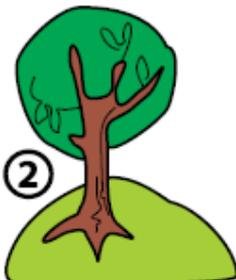


Little beaver has six stamps.

①



②



③



⑤



④



⑥



By using these stamps, he created a painting:



In what order did little beaver use the stamps?





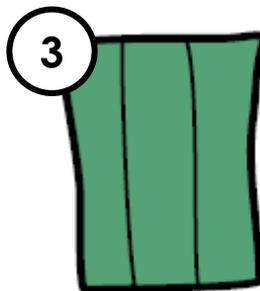
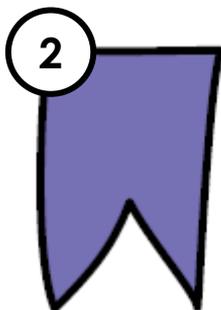
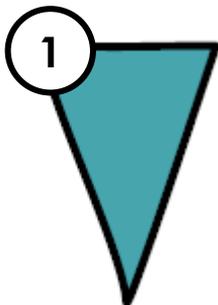
Flags

5

During a birthday celebration the room is decorated with flags.



Which flag is going to be added next?





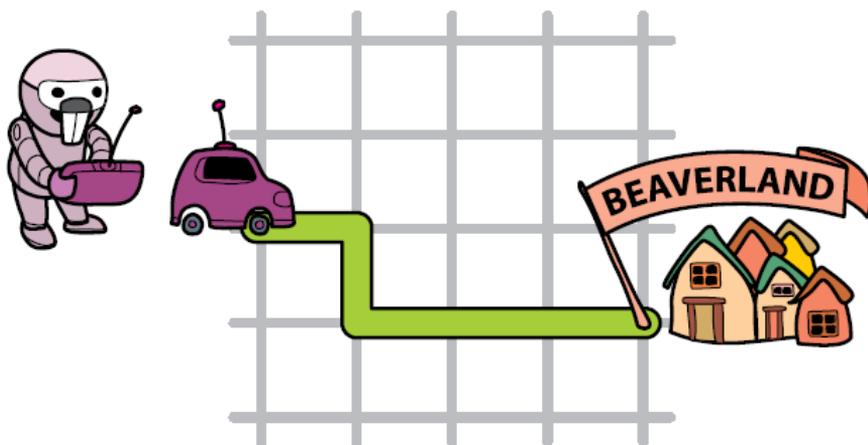
Robot controlling a car

A robot controls a car using the following commands.

Forward 1: – draw a line one square forward. There can be any number.

Left: – turn left ninety degrees.

Right: – turn right ninety degrees.



Which one of the programs below drives the car to Beaverland?

- | | | | |
|--|--|--|--|
| A. Forward 1
Left
Forward 1
Right
Forward 3 | B. Forward 3
Right
Forward 1
Left
Forward 1 | C. Forward 3
Left
Forward 1
Right
Forward 1 | D. Forward 1
Right
Forward 1
Left
Forward 3 |
|--|--|--|--|



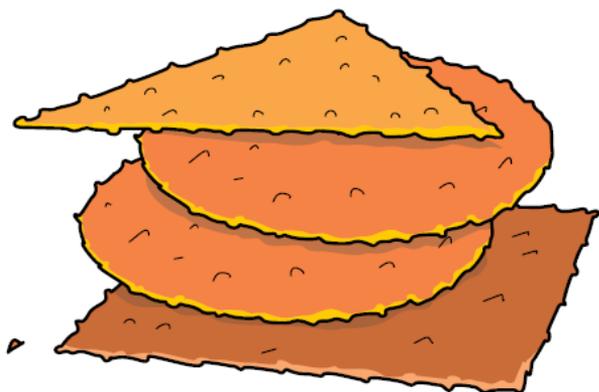


Robot and cookies

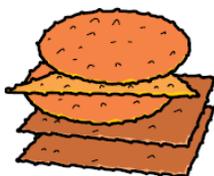
7

A robot recognises several geometric shaped cookies: square, circle and triangle. We are going to mark them with S, C and T.

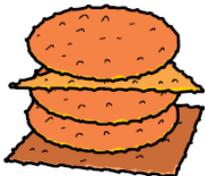
The robot knows a command PUT – puts a cookie on another one. When the robot finishes the commands PUT S PUT C PUT C PUT T, a pile of cookies looks like this:



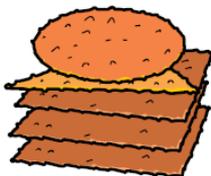
What will the pile of cookies look like when the robot finishes the commands: PUT S PUT S PUT C PUT T PUT C?



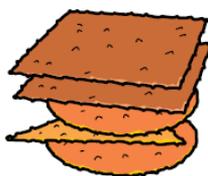
(A)



(B)



(C)



(D)

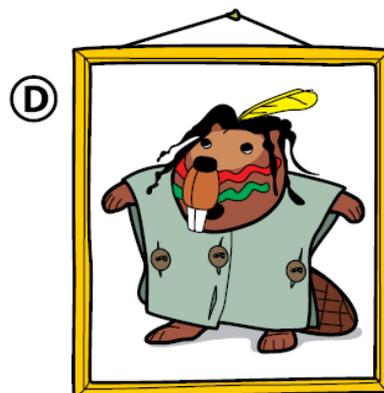
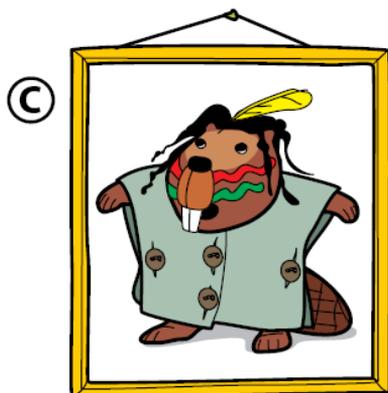
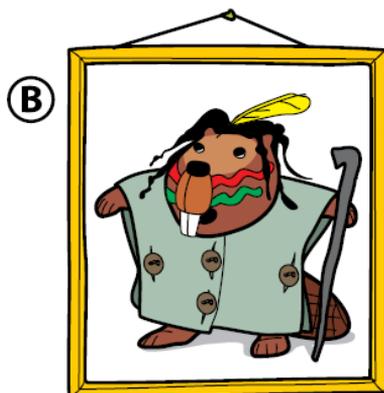




Shaman beaver

Father beaver is choosing a picture, where:

- 1) Shaman, the character in the picture does not have a stick and
- 2) All coat buttons are fastened.



Which is the right picture?

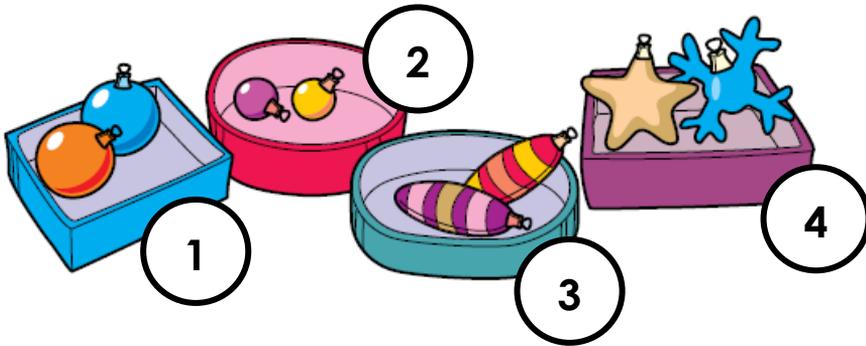




Christmas tree decorations

Christmas tree decorations should be placed in boxes as follows:

- 1st box: Large and rounded
- 2nd box: Small and rounded
- 3rd box: Long and striped
- 4th box: Stars and snowflakes



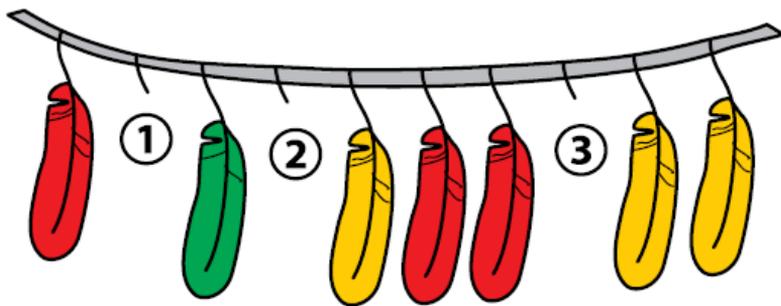
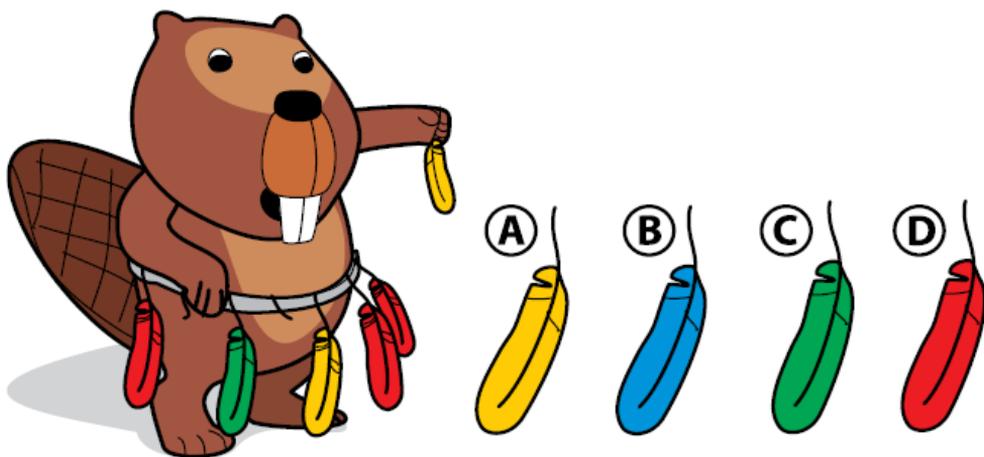
Which decorations do not fit in any of these four boxes?





Feathers

Beaver's patterned feather belt has lost three feathers.



Which feathers should be on the belt?





Beaver balance

We know this is correct...



Also, this...



Which one of those statements is correct?

- A. Beaver is heavier than the printer and motorcycle is heavier than beaver.
- B. Beaver is heavier than the printer and motorcycle is lighter than beaver.
- C. Beaver is lighter than the printer and motorcycle is heavier than beaver.



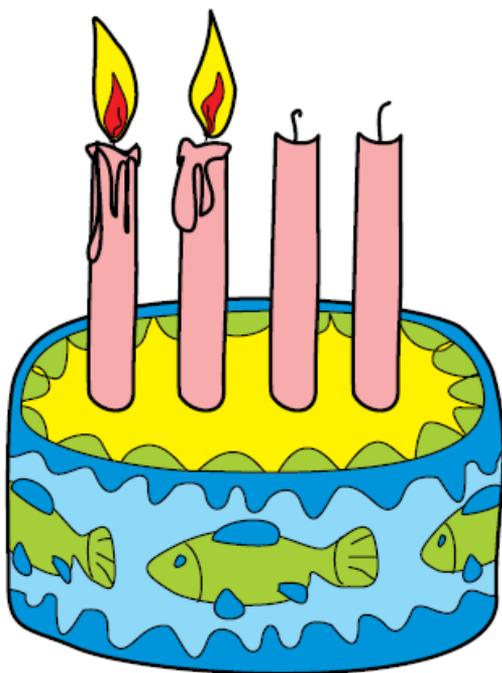


Beaver birthday

There are only two numbers in Beaverland: 0 and 1.

Count in
Beaverland:

0 →	0000
1 →	0001
2 →	0010
3 →	0011
4 →	0100
5 →	0101
6 →	0110
7 →	0111
8 →	1000
9 →	1001
10 →	1010
11 →	1011
12 →	1100
13 →	1101



During a birthday celebration burning candles means 1 and unlit means 0.

How old is the beaver?



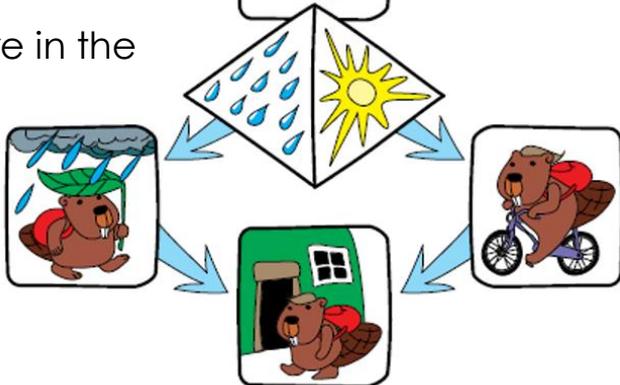


Morning

Morning actions should be performed in the correct sequence. Unfortunately, there is a mistake.



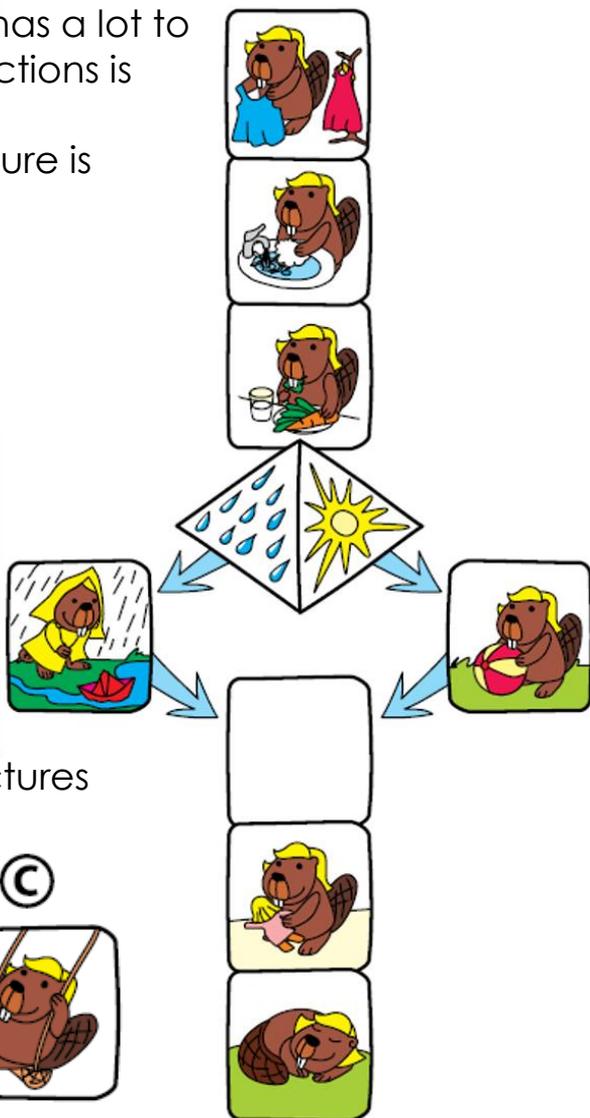
Which two actions are in the wrong order?





After school

After school Gabrielle has a lot to do. Her sequence of actions is shown in the pictures. Unfortunately, one picture is missing.



Which one of these pictures would fit best?

(A)



(B)



(C)





Coins

Beaverland money – beuro coins. Beaver is buying a fish using beuro coins. The fish costs 10 beuros. He has these coins:



In how many different ways can he pay for it?





Colourful tower

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

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

She repeats the sequence until the last correctly coloured ring has been placed.



How many rings will the tower have?





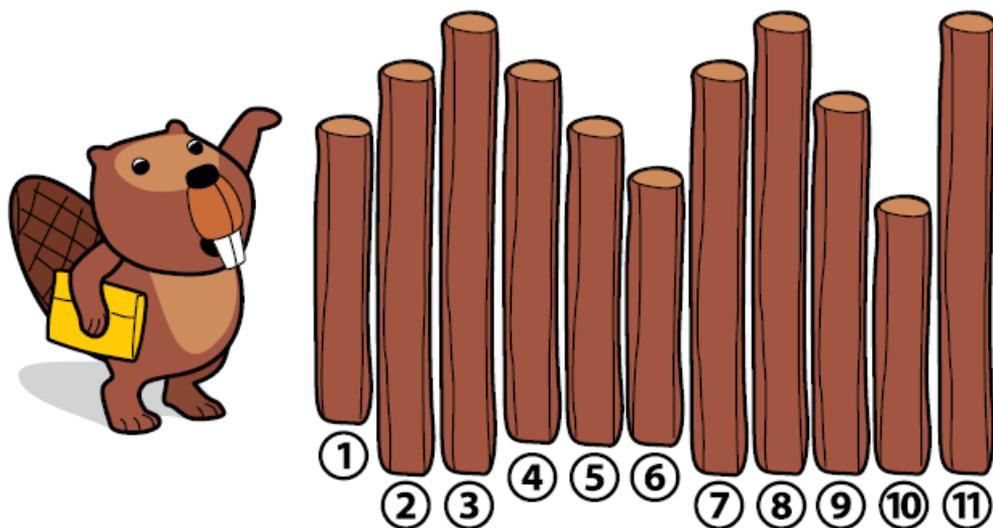
Beaver hut

Programmer beaver is sorting out logs for a hut using these rules:

1st action: if log is shorter than the one to the right of it – it will be used for flooring;

2nd action: if longer, then it will be used for the roof.

Beaver is taking logs in order and repeating actions 1 and 2.



Which logs are used for the roof?

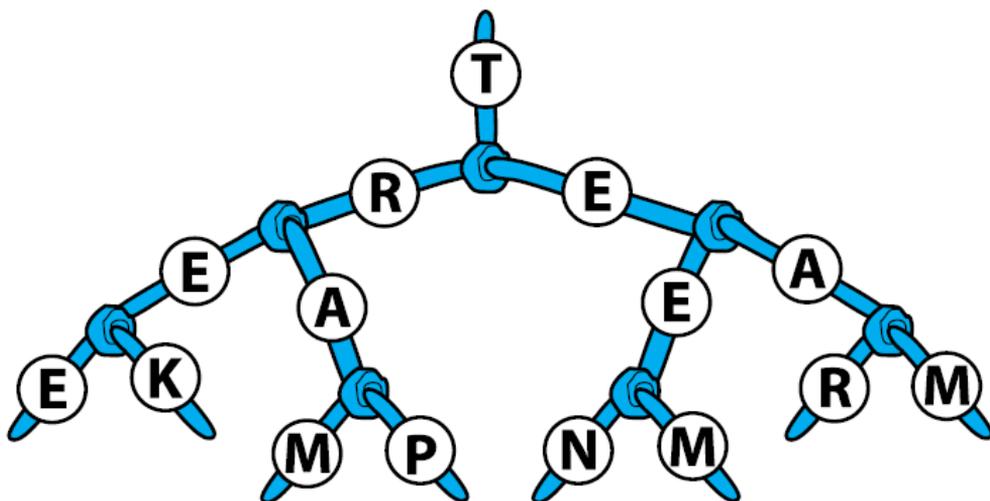




Read the words

Read these words by using the tree of possibilities:

Tree, trek, tram, trap, teen, teem, team.



One word is missing from the list. What is it?



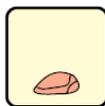


Little stones mosaic

Robot-beaver is walking on a tile path and putting down little stones according to the commands:



– Advance one tile;



– Put a little stone on the tile in front of self;



– Put 3 little stones on a tile in front of self.

When several little stones are put on the same tile they form a tower. Which program causes the robot to create a tower of 4 little stones?

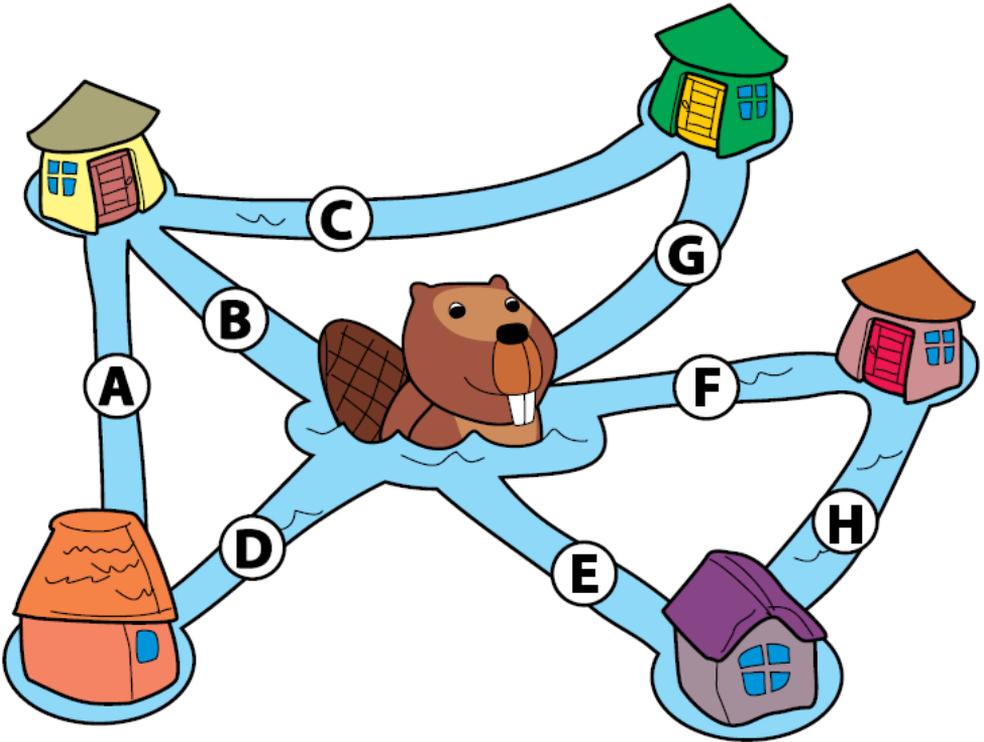
- (A)
- (B)
- (C)
- (D)





Swimmer beaver

Beaver wants to swim across all rivers but he is only allowed to swim along each river once.



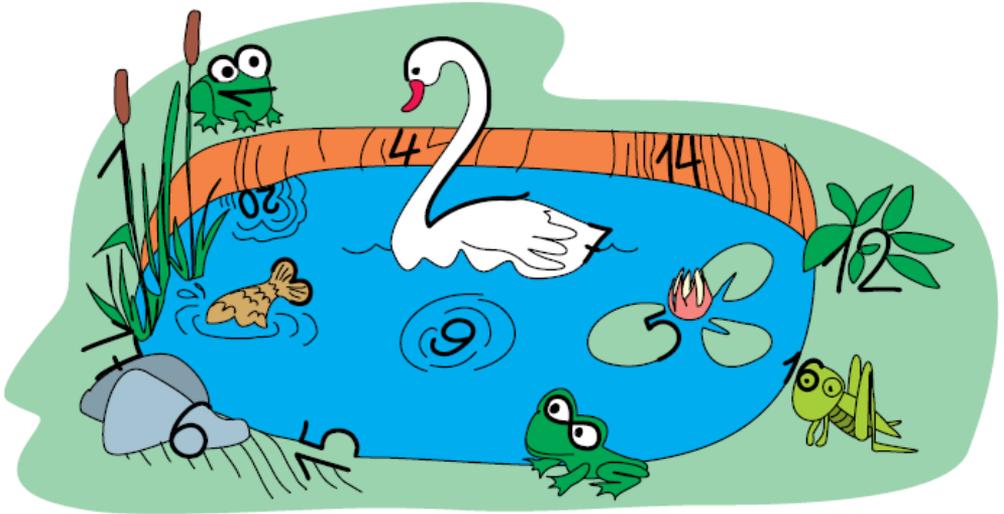
What is the path the Beaver needs to swim?





Missing numbers

In the picture there are numbers from 1 to 20.



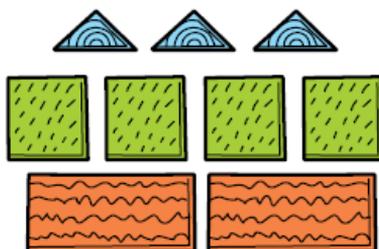
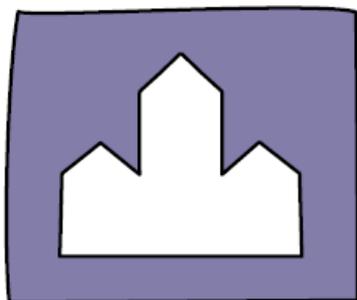
Unfortunately, four numbers are missing. What are the missing numbers?



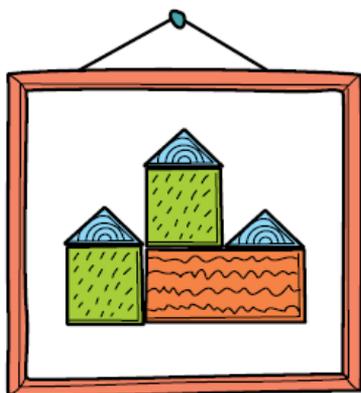


Picture of the castle

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?



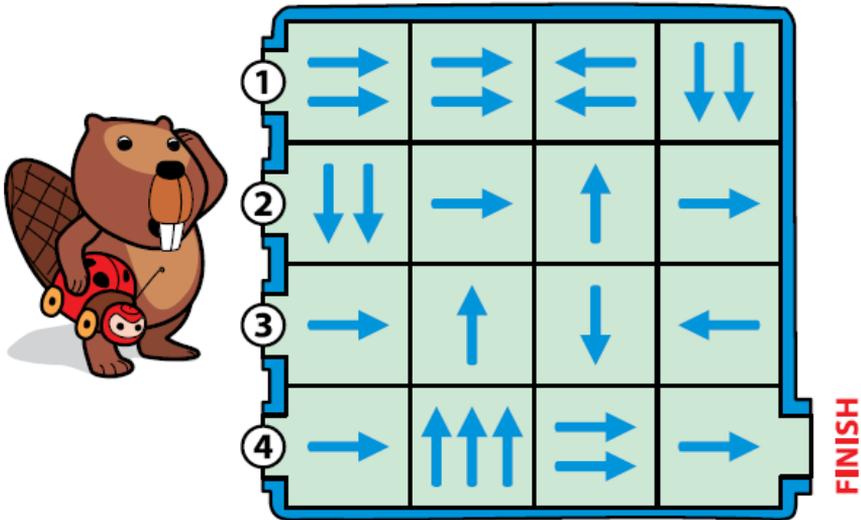


Beetle robot

Beaver created a beetle robot, which can move from one square to another one following the arrows. The beetle robot starts at one of the entrances on the left.

The robot moves in the direction indicated by the arrows for as many squares as there are arrows (e.g. one square if there is one arrow, two squares if there are two arrows etc.).

When the robot is moving, he ignores the arrows on the squares.



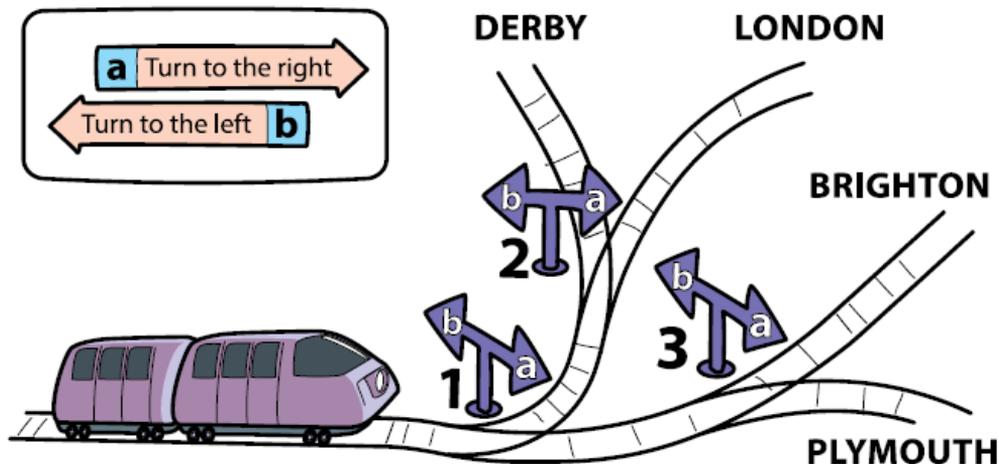
Which starting entrances allow the robot to reach the finish?





A choice of tracks

Train traffic arrows control train movements at each crossing.



Which pair of instructions will result in then train arriving in London?

- A. 1a and 3a
- B. 1b and 2a
- C. 1a and 2b
- D. 1b and 3a

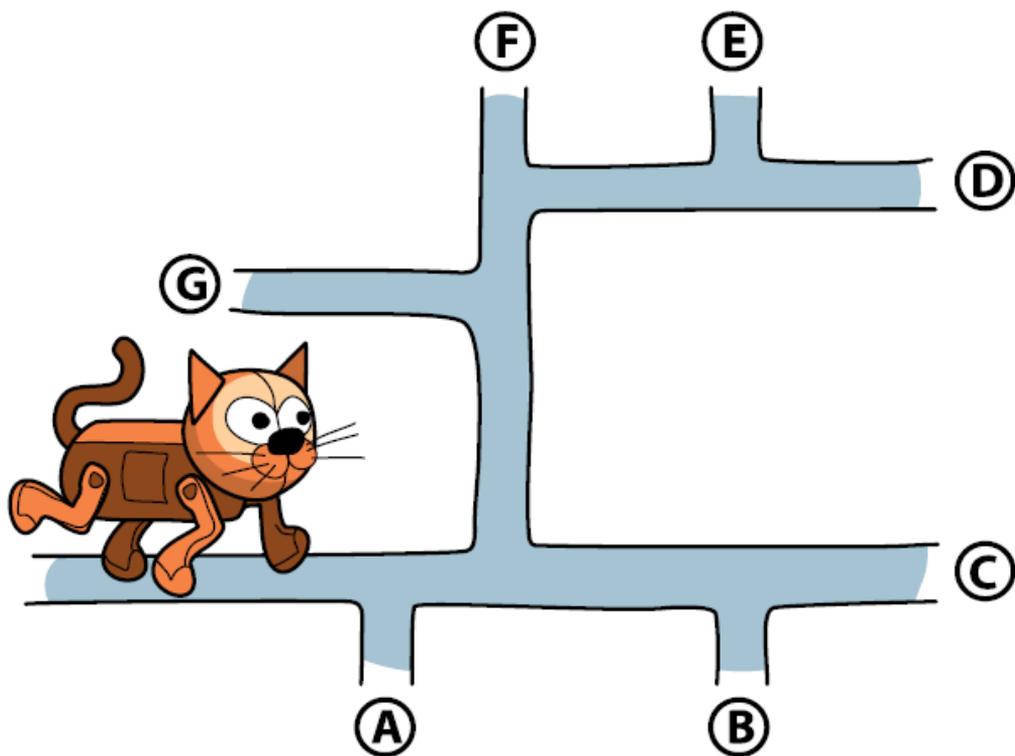




Every other turn

Beaver created a robot cat, which moves according to the following rules:

- 1) Move forward
- 2) Turn at every other turn



Where will cat exit?

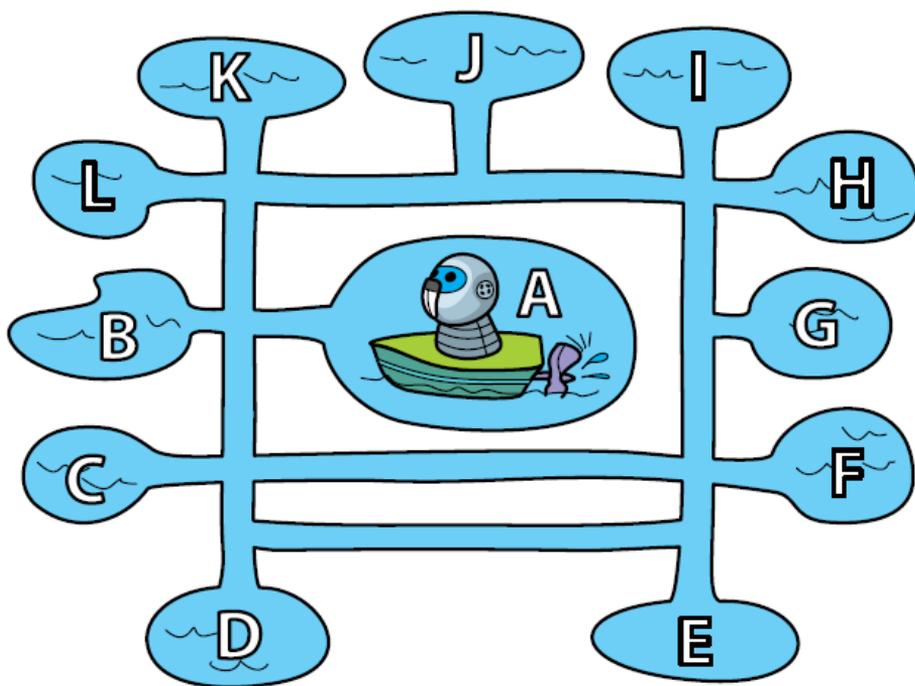




Floating robot

Little beaver created a robot which swims according to the following commands:

- 1) Swim forward;
- 2) When it is possible, turn left.



Little Beaver launched his robot at home – in pond A.
In which pond will the robot will finish his journey?





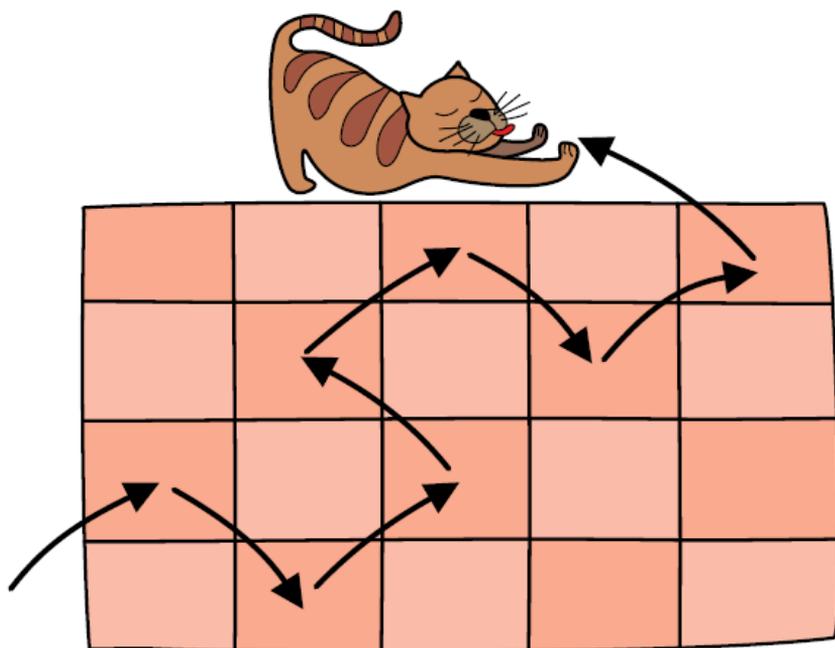
Moving diagonally

Robocat moves diagonally to another square according to the commands:

IF there is a mouse in the square, then move to the left,

IF NOT (if there is no mouse) – go to the right.

Robocat has followed the path below and eaten all the mice.



How many mice did the cat eat?



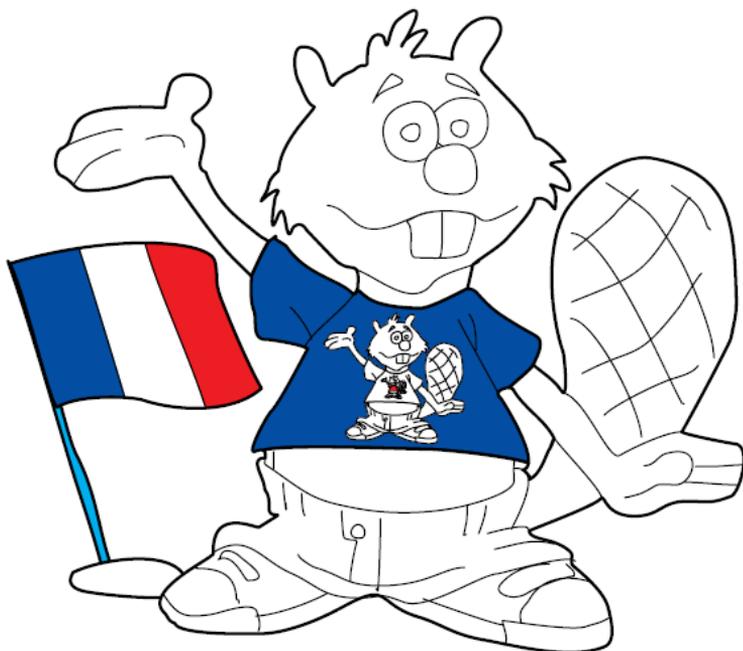


French beaver

30

French beaver is wearing a t-shirt with a logo of himself on it.

He would like different colours on every t-shirt he wears, each t-shirt should be a colour from the French flag. He would wear a blue colour t-shirt, next would be white, then – red.



Which colour will the 10th t-shirt be?



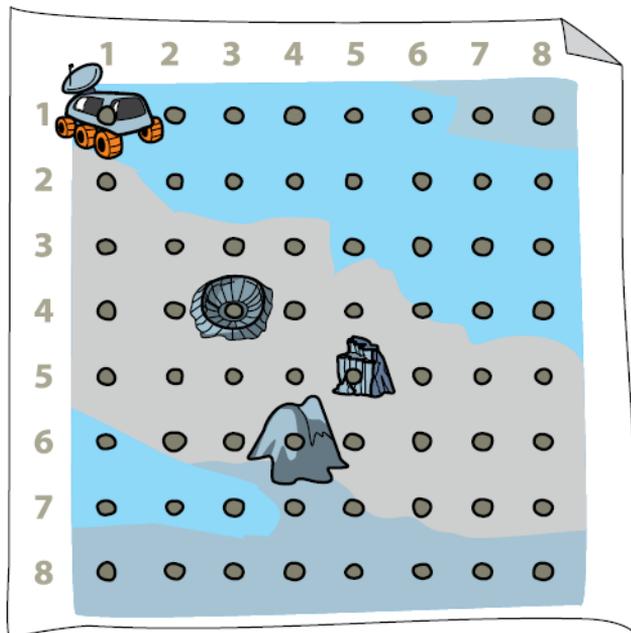


Lunar rover

The beaver controlled lunar rover is moving from one point to another using the map below. Lunar rover's path is:

$(1, 1)$ $(1, 3)$ $(4, 3)$ $(4, 6)$ $(5, 6)$

The first number is the row, the second – is the column number.



Which one of these objects will be encountered by the lunar rover: hill, crater or rocks?





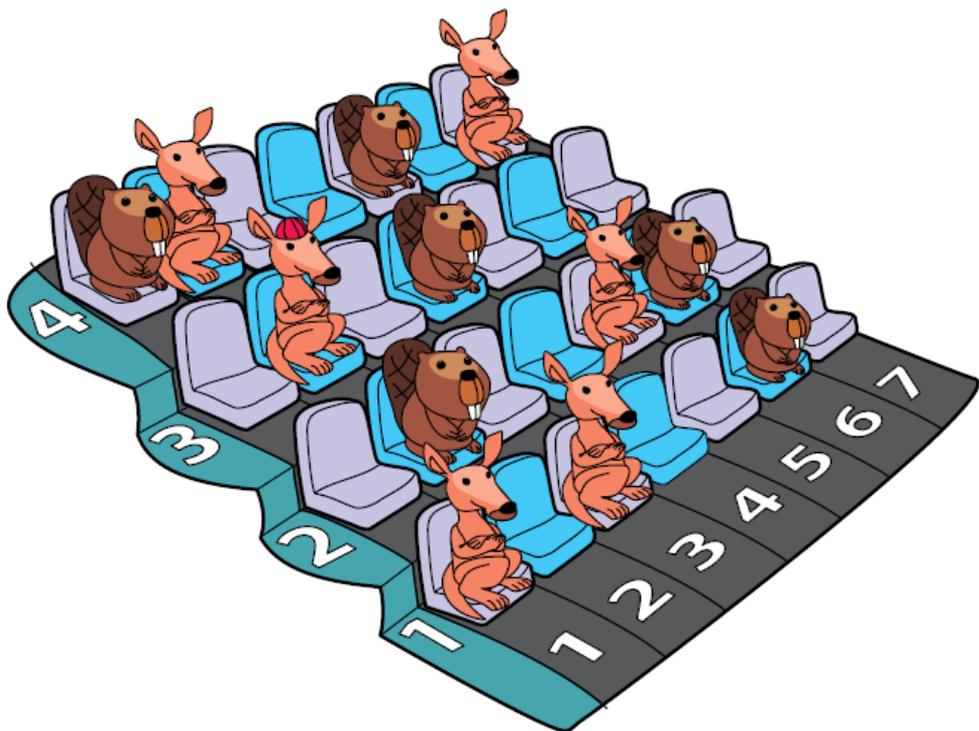
Cinema

33

Chairs in a cinema are marked by numbers.

All customers are sitting in these chairs:

[1, 1]; [1, 3]; [1, 6]; [2, 2]; [2, 5]; [2, 6]; [3, 2]; [4, 3]; [4, 1];
[4, 2]; [4, 5]; [4, 7].



Is this true? Is there a mistake?





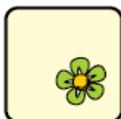
Beautiful tiles

34

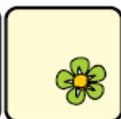
Robot-beaver is walking on tiles and decorating them with ornaments. He knows these commands:



– Advance to next tile;



– Draw a flower;



– Repeat any command 3 times, in this case “Draw a flower”.

Several flowers on the same tile are drawn next to each other.



What is the largest number of flowers drawn on a single tile by robot-beaver, after these commands?



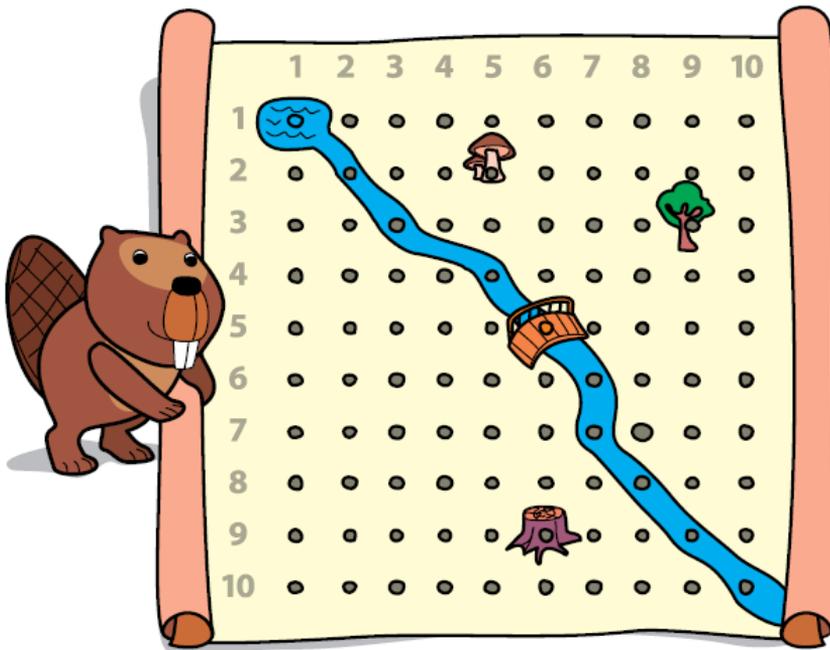


Beaver map

On the beaver map the location of objects are indicated by two numbers in brackets. Row number first, then – column number.

Lake (1, 1)

Bridge (5, 6)



The beaver hut is located four points below bridge and two points to the right of the bridge.

What is the location of the Beaver hut?





Clothes line

Kangaroo built a clothes dryer. They want to strengthen the poles to save the dryer from beavers. Unfortunately, they can only afford to strengthen one pole.

In which pole should they invest?





Swap

Beaver's and kangaroos' cards are in an order:



You can swap two cards next to each other.

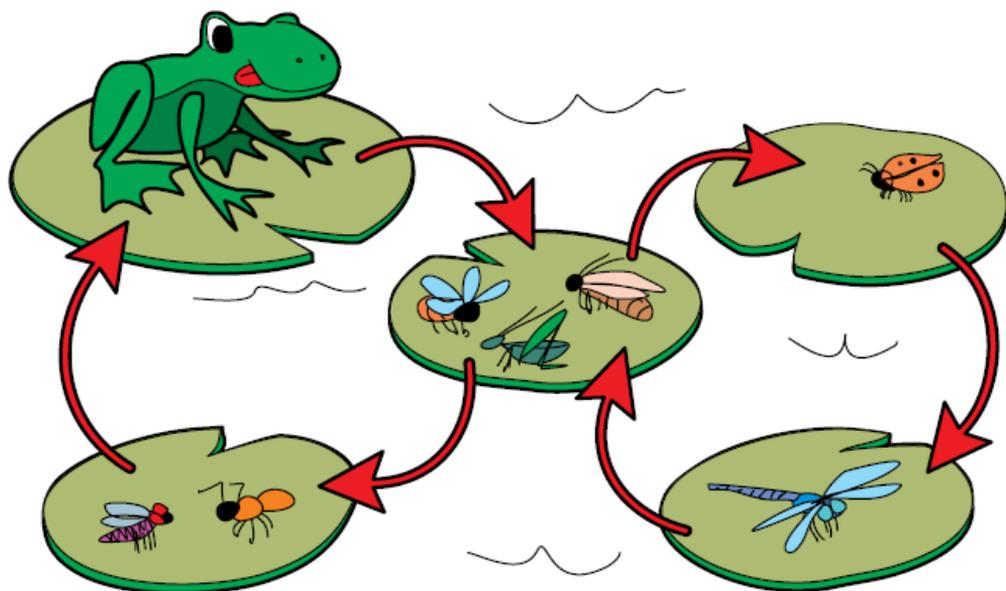
How many swaps are needed to swap cards to get all beavers at the beginning of the row and kangaroos at the end? Use the minimum number of swaps.





iFrog

Robot frog can grab one insect by jumping once from one leaf to another one.



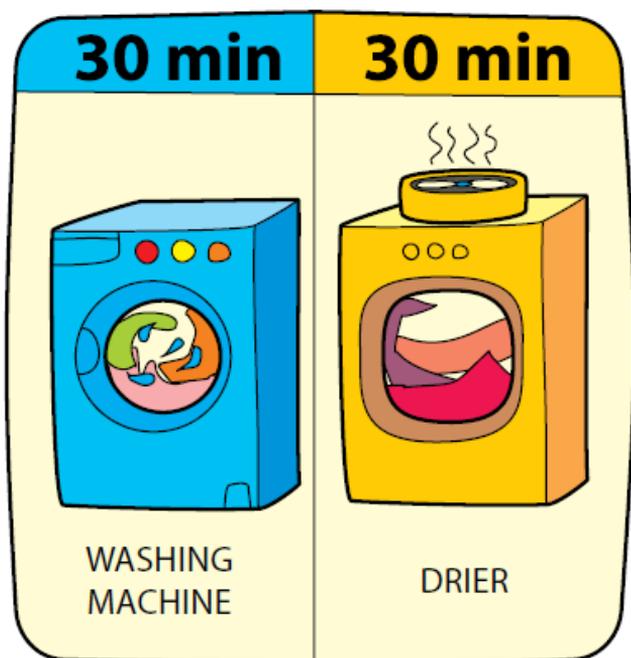
How many jumps does robot frog have to make in order to to grab all the insects?





Laundry

Beaver has a laundry with two separate machines for washing and drying. Both machines have an half hour operating cycle, so each customer needs 60 minutes.



Two beavers arrive in a hurry. They need to wash and dry their clothes as quickly as possible.

How many minutes it is going to take to wash and dry clothes for two beavers?

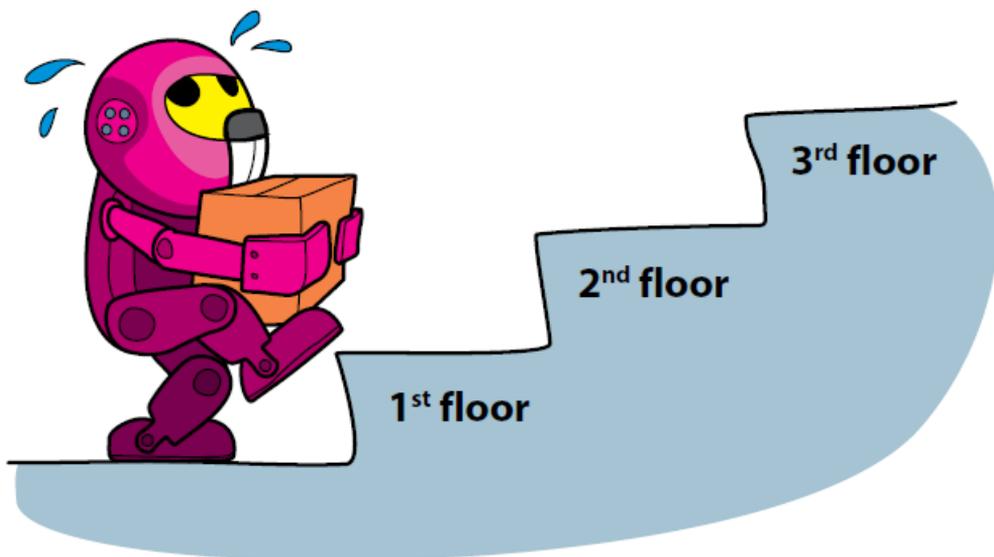




Robot is carrying

40

Robot-beaver is programmed to carry parcels to the third floor. If a parcel weighs up to 10 kilo, robot can move one floor per minute. If it is heavier 2 minutes per floor. Robot-beaver delays 1 minute preparing to move before each flight of stairs.



How many minutes will it take Robot-reaver to carry a 13 kilo parcel to the 3rd floor?



Read around



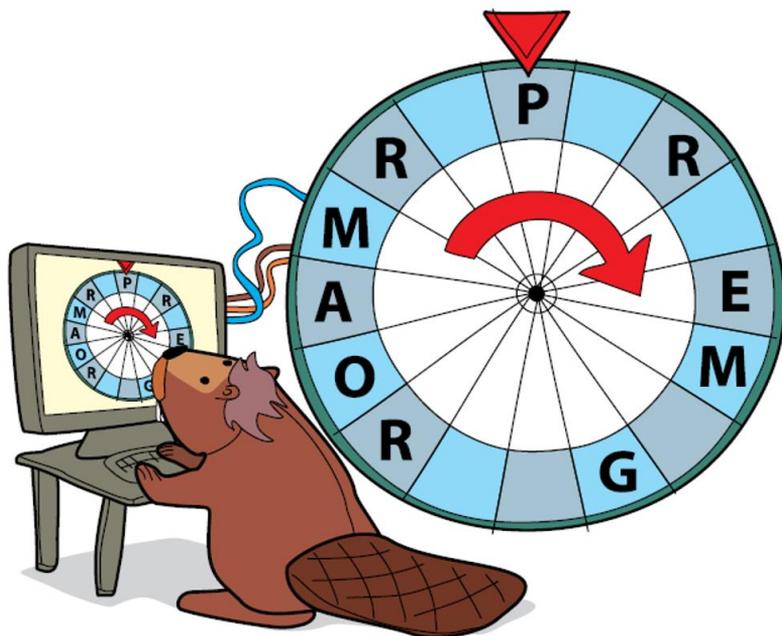
A wheel is programmed to stop according to the following rules:

1st time – skip one square,

2nd time – skip two squares,

3rd time – skip three squares etc.

The first letter of the word is “P”.



What is the word?

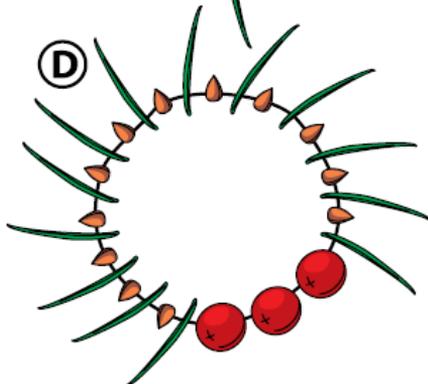
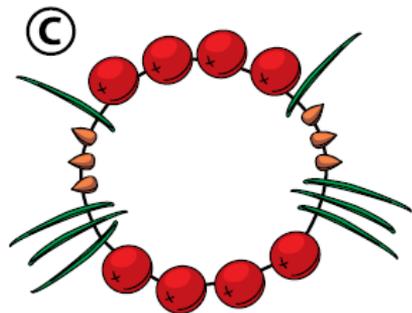
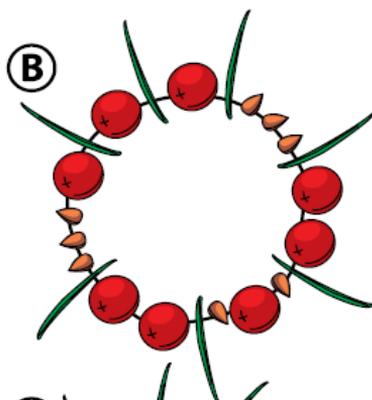
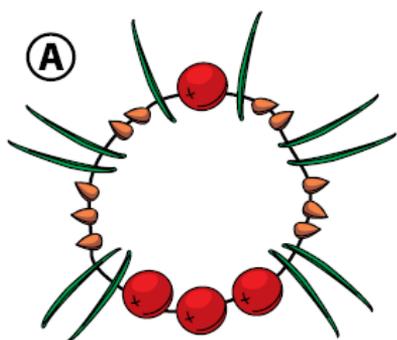




Necklace for a little beaver

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

- 1) Red berries have to be between pine needles and
- 2) The number of apple pips has to be equal to the number of pine needles.



Which necklace will little beaver girl like?

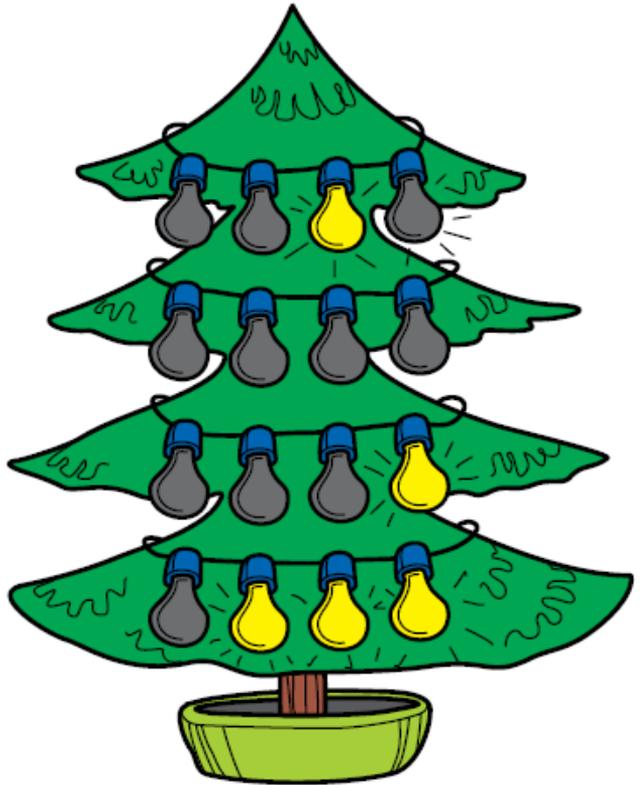




Programmer's new years eve

Programmer beaver decorated an extraordinary Christmas Tree especially for a New Year's Eve. A lit light bulb means 1 and unlit means 0.

0 →	0000
1 →	0001
2 →	0010
3 →	0011
4 →	0100
5 →	0101
6 →	0110
7 →	0111
8 →	1000
9 →	1001
10 →	1010



Which New Year Eve is being celebrated?

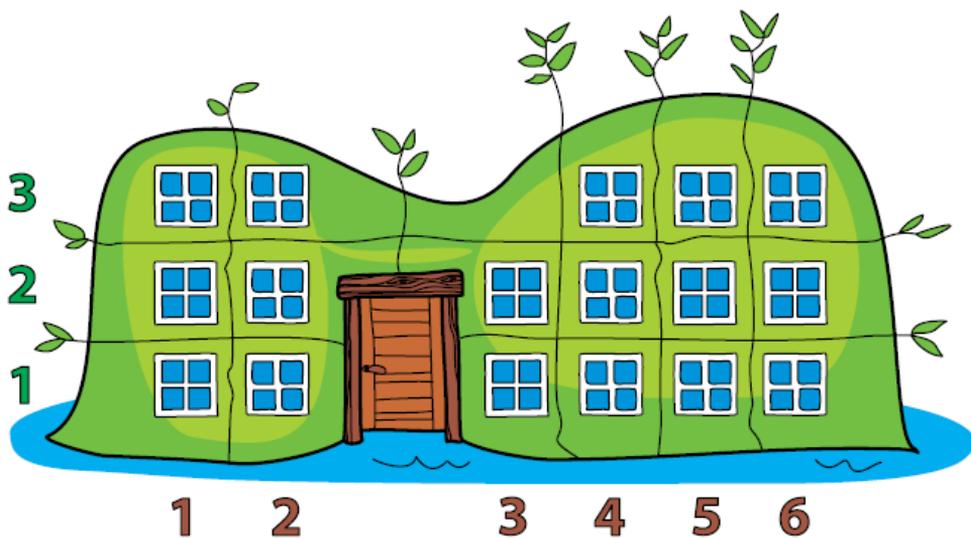




Beaver's House

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?





Beaver language

Whistling beavers can talk with each other from a long distance using whistle language. Every letter is made up of a combination of long and short whistles. There is a pause between letters.

— Long Whistle • Short Whistle

Sounds for the following letters are:

A • —	S • • •
R • — •	N — •
E •	T —



Which whistle sequence makes the word BEBRAS?

- (A) — • | • | — • | • — • | • — • | • • •
- (B) — • — | • | — • • • | • — • | — | • • •
- (C) — • • • | • | — • • • | • — • | — | • • •
- (D) — • • • | • | — • • • | • — • | • — • | • • •





Find a mistake

A wheel is programmed to stop according to the following rules:

1st time – skip one square,

2nd time – skip two squares,

3rd time – skip three squares etc.

The first letter of the word is “P”.



Beaver read a word and found a mistake. What is the mistake?

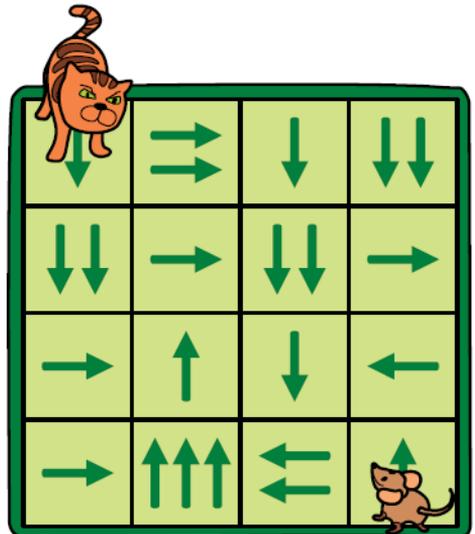




Cat and mouse

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 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 it moves over.
- Mouse is eaten, when the cat is on the same square as the mouse.



Can the mouse avoid the cat?

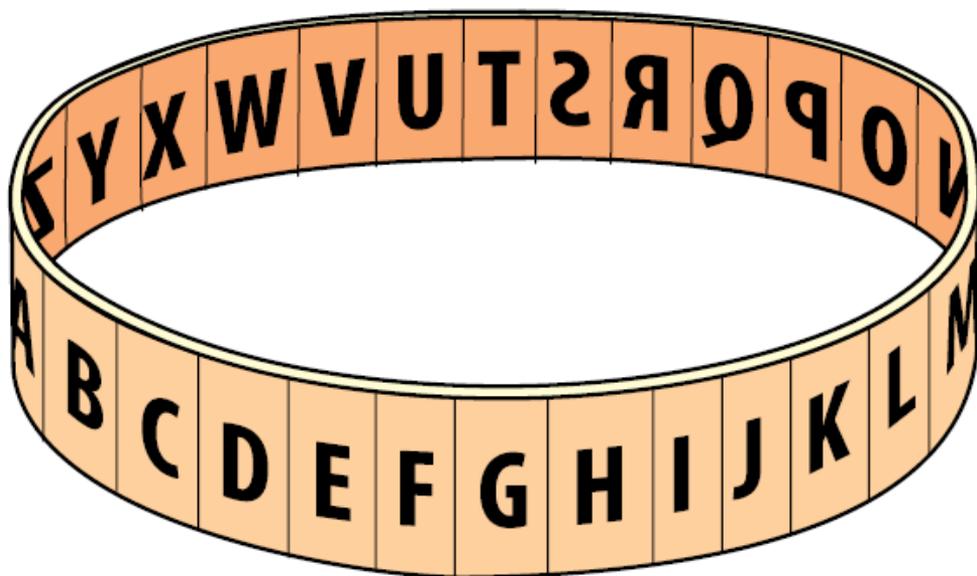




Cipher

Beavers send messages encoded with a specific cipher: every alphabet letter is shifted by two letters.

E.g. A->C, B->D..., Y->A, Z->B.



Message received: JGNNQ VJGTG

What was written by the Beaver?

