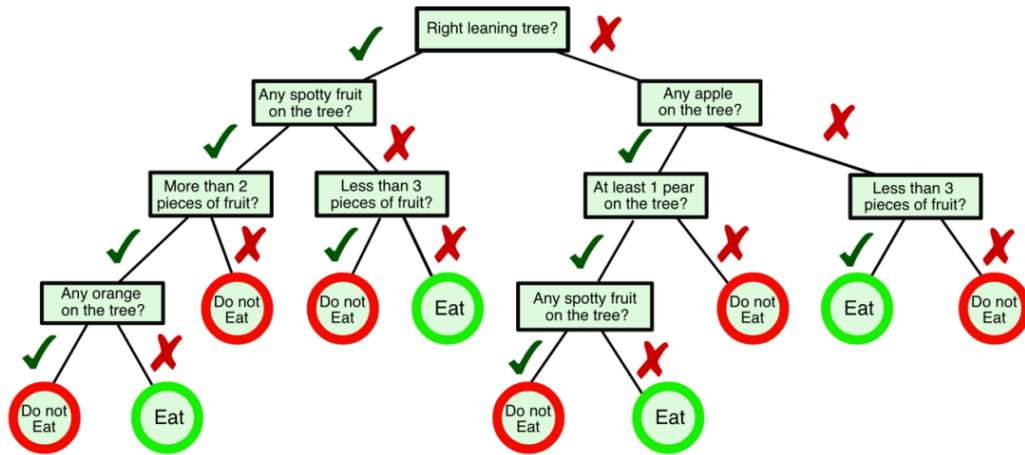<div align="center">

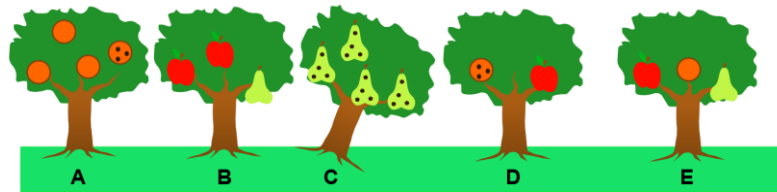**Tasks T1 – T7 carry 3 points each**

</div>

## T1. Decide-uous trees

A hungry, but choosy beaver wants to eat from some trees. He will not eat from every tree. Instead, he uses the decision tree below to help him choose from which trees to eat.
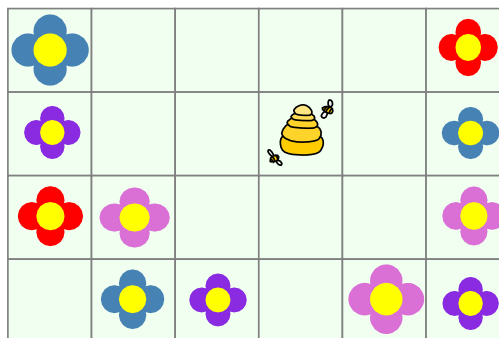


## Question / Challenge

These are the trees the beaver sees. From which trees will he eat?



**A)** BCE **B)** ABC **C)** ABCD **D)** BCDE

## T2. Where can it fly?

Bees can fly from one square to the next in a horizontal or vertical direction only.
When any bee leaves the hive in the morning, it can fly up to a maximum of 3 squares from the square on which the hive is.
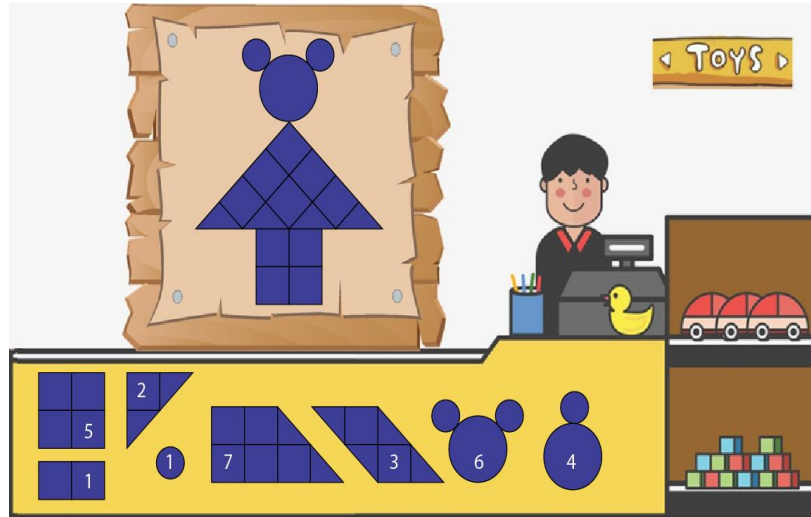


## Question / Challenge

How many flowers can be reached by the bees?

**A)** 5 **B)** 6 **C)** 7 **D)** 8

## T3. Jigsaw puzzle

A young beaver wants to assemble a toy with the same form as in the picture on the wall of the toy shop. He needs to make the toy from the shapes offered on the counter, each with a different price on it, ranging from 1 coin to 7 coins. He can buy as many shapes as he wants of each shape type and rotate them in any way.



### Question / Challenge

What is the minimum cost for the young beaver to assemble the desired toy?

**A)** 20 coins          **B)** 16 coins          **C)** 13 coins          **D)** 14 coins

## T4. Pigs cot code

Beaver found the explanation of an old secret code system named pigs code.
It makes use of three diagrams with nine cells each. The very last cell contains a blank (or space). The rest of the cells contain a letter each.
The first diagram uses no dots, the second one has one dot in every cell and the third one has two dots in every cell.
You can now notice that the borders of a cell, along with the dots in it uniquely determine a letter.



In the picture you can see the codes for A, J, E, and Z.
A has no dots, and two borders (one to the right, another to the bottom).
J has one dot, and two borders (one to the right, another to the bottom).
E has no dots and all four borders (top, bottom, right, and left).
Z has two dots, and three borders (left, top, and right).

## Question / Challenge

Which word is written down here?



**A)** FOUNTAIN    **B)** INTERNET    **C)** IMPERIAL    **D)** INDIRECT

## T5. Mountain Climber

Binsa is a mountain climber. She loves the mountain range shown which has 11 peaks.



Binsa always climbs to a higher peak when a mountain right beside her is higher. If there are two mountains right beside her and both of these mountains are higher, she will always climb to the highest one. She continues to do this until there is no higher mountain right beside her.
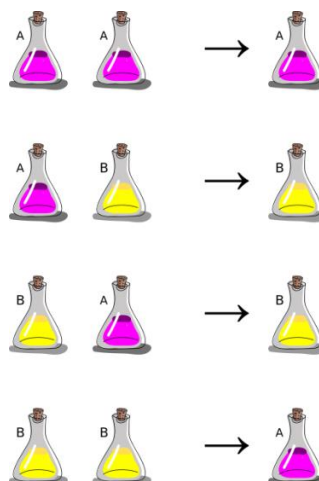
## Question / Challenge

From how many of the peaks (including the highest peak) will Binsa reach the highest peak?

**A)** 3    **B)** 4    **C)** 6    **D)** 7

## T6. Magic Potions

The chemist has two types of potions, A and B. If he mixes two bottles into a cauldron, one after the other, and heats them, the potion changes color as shown on below.

## Question / Challenge

The chemist mixed exactly 4 bottles of his potions in the given order. The result of the mixture became type B . Which is the order of the bottles he used?

**A)** 

**B)** 

**C)** 

**D)** 

## T7. Nim2

Hansel and Gretel are playing a game. There are 3 black stones and 7 white stones.
Each turn, a player may remove 1 or 2 black stones or alternatively 1, 2, or 3 white stones.
The player who removes the last stone(s) of any color wins the game.



## Question / Challenge

Gretel takes the first turn. How many stones does she need to remove in her first turn to ensure she wins the game?

**A)** 1 white stone         **B)** 2 black stones
**C)** 3 white stones        **D)** It doesn't matter how many stones

### Tasks T8 – T14 carry 4 points each

## T8. Needle work

Lina loves Konavle embroidery in yellow and red. She wishes to learn how to make some of the patterns, and her friend Tereza gave her only one instruction and a "code":
Instruction: "Look from the bottom up and from left to right"
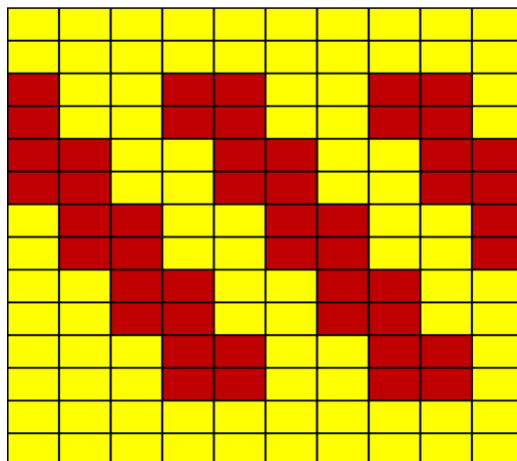
And read this "code":

```
8.4.2
6.4.4
4.4.6
2.4.4.2.2
2.2.4.4.2
6.4.4
4.4.6
2.4.4.2.2
2.2.4.4.2
6.4.4
```

## Question / Challenge

Teresa gave each family member a "code" for new samples. As real computer scientists, they shortened the "code" and wrote down only the repeating part.
Which picture represents the following code?

```
1.1.1.1.1.1

1.2.1.2.1
```

A)

B)

C)

D)
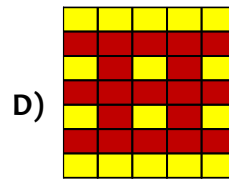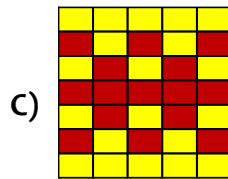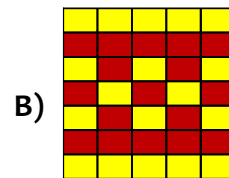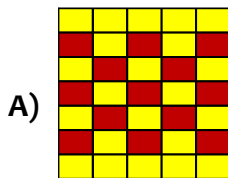
## T9. Water Works

We have a system of buckets, arranged vertically and connected by overflow pipes. Each bucket collects a certain amount of water: the amount which the bucket is labeled with. After the bucket fills to the indicated level, all remaining water splits evenly between the overflow pipes leading down from it and continues to pass down the system of buckets. The top most bucket doesn't hold any water.

200 L of water is poured into the top most bucket (marked "S"), where splits evenly between the overflow pipes leading down from it and continues to pass down the system of buckets to the final ones. For example, in the system of buckets to the right, 40 L of water would accumulate in the bucket "B".
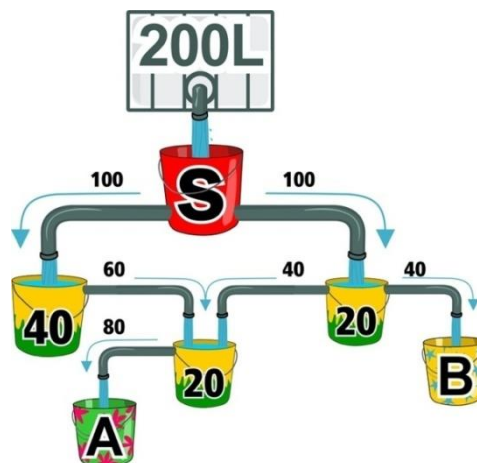
## Question / Challenge

How much water will accumulate in bucket "A" if 200 L of water is poured into bucket "S" of the following system of buckets?

200L

S

8

2

2

9

5

16

8

2

4

2

9

2

A          B          C
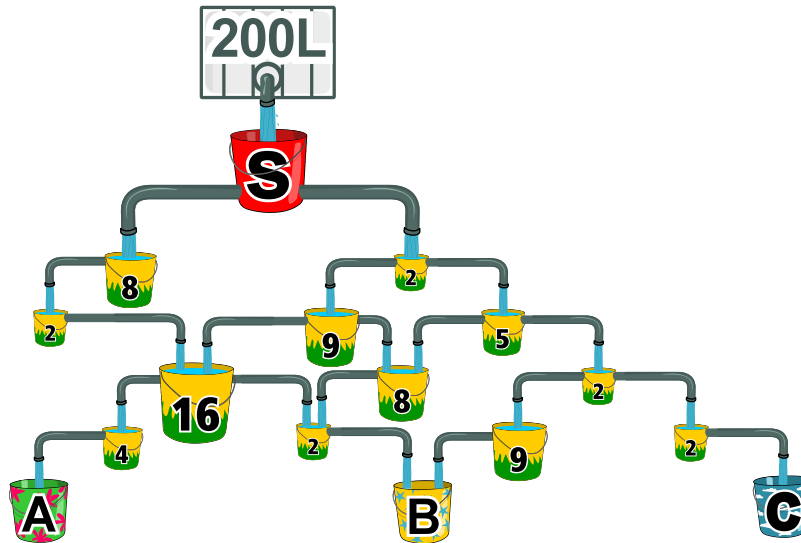
**A)** 65.5 L          **B)** 66.7 L          **C)** 43 L          **D)** 100 L

## T10. Musical Instrument

Mr. Beavo has created a special musical instrument. There are only three keys for producing sound. They are the red key (R), the blue key (B), and the green key (G). It can produce 5 different notes: 1, 2, 3, 4, and 5.

To start playing the instrument, R should be pressed first, and it will play Note 1 as the initial note.

After that, the instrument will play a note based on the previous played note and the key being pressed. The "note change diagram" shows it.

At anytime, when R is pressed, it will play note 1. A song is a sequence of notes. A sequence is well-formed if it ends by two times Note 1.

For instance, the sequence "R-G-B-B-R" will make the instrument producing the notes 1-3-2-1-1, but the sequence "R-G-B-R-B" will make the instrument producing notes 1-3-2-1-2.

B
1          2
B

G
B          G
G
4
G

B
3          G          B
5
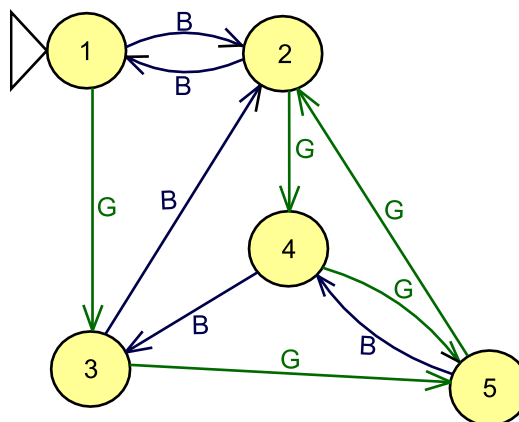
## Question / Challenge

Which one of the following sequences is well-formed?

**A)** "R-B-B-G-B-R"          **B)** "R-G-G-G-B-R"
**C)** "R-B-G-B-G-R"          **D)** "R-G-G-B-G-R"

### T11. Sorting the pencils

There are five boxes, each with a different shape drawn on it.

There are nine pencils in a line on Theresa's desk.

She plays with them comparing the lengths of two neighboring pencils. She changes the order of neighboring pencils, applying the rule:

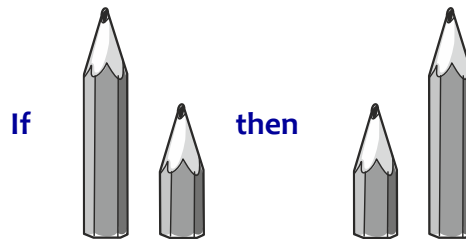If the left pencil of two neighboring pencils is longer, swap the two neighboring pencils, otherwise leave them in the original order.

**If**          **then**

Going from left to right, she applies the rule to each pair of neighboring pencils in the line, until she reaches the end of the line. Note that she applies the rule eight times. This we call the procedure.

The image shows the initial line of pencils. Each number indicates the length of the pencil above.

**7 5 2 4 7 6 5 3 1**
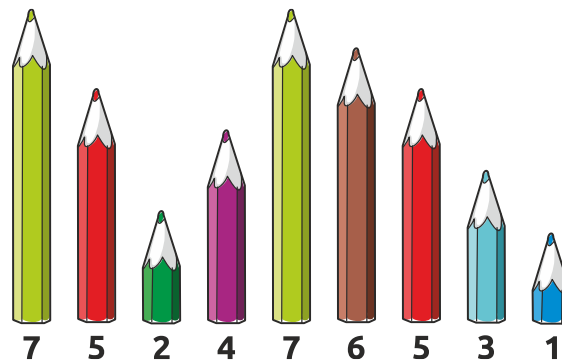
The left picture shows the pencils on the table, after she has performed the procedure once.

The picture on the right shows the pencils after she has performed the procedure second time.

**5 2 4 7 6 5 3 1 7**          **2 4 5 6 5 3 1 7 7**
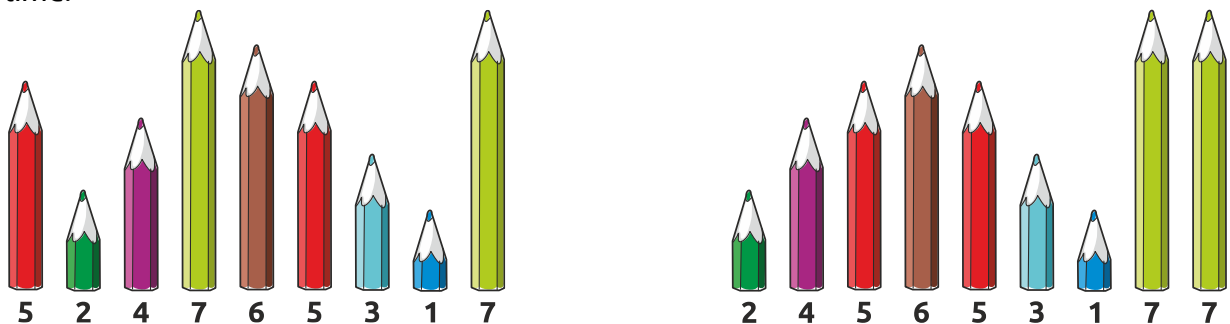
### Question / Challenge

What is the sequence with the lengths of the pencils in the correct order, after she has performed the procedure four times?

**A)** 2,3,4,5,1,6,5,7,7          **B)** 2,4,5,3,1,5,6,7,7
**C)** 4,2,3,5,6,5,1,7,7          **D)** 7,7,6,5,1,2,4,3,5

### T12. Secret Message

The Big Beaver Boss has a secret message for his six agents. Unfortunately, the Big Beaver Boss does not trust his agents equally. So the Big Beaver Boss split the message into four pieces (1 to 4) and added levels of secrecy to each piece.

A piece of message with the seal „-" can be read only by the agent who gets the piece.

A piece of message with the seal „#" can be read by its receiver and his subordinates (in the picture below, the subordinates are shown downward, with the arrows pointing at the headmen).

A piece of message with the seal „+" can be read by every agent.

The following picture shows the agents and the pieces of the message they have received.
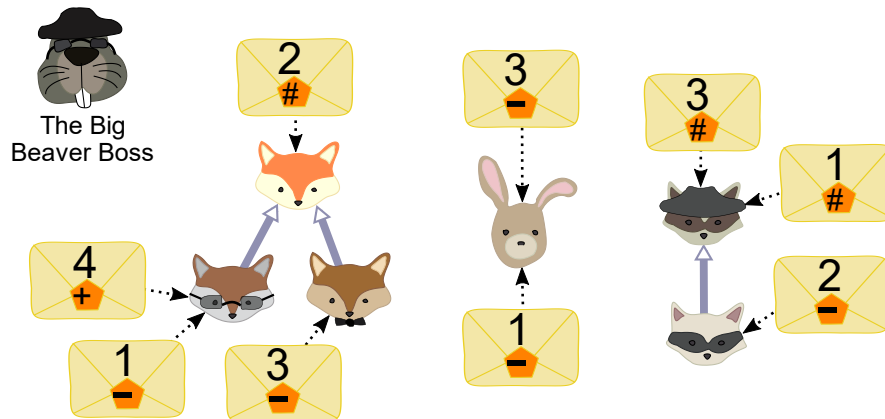


### Question / Challenge

Which agent has access to all parts (1 to 4) of the message?

A)    B)    C)    D) 

### T13. Tree Sudoku

Beavers plant 9 trees in lines on a field so that there are 3 rows each with 3 trees. The trees have three different heights: 1 (🌲), 2(🌲), and 3(🌲). In each row and column, there is exactly one tree of each height (i.e. no row or column has two trees of the same height). For each position around the field (left figure below) beavers observe how many trees are visible from this position and write down this number on a sign (🪧 signs for columns and 🪧 signs for rows).
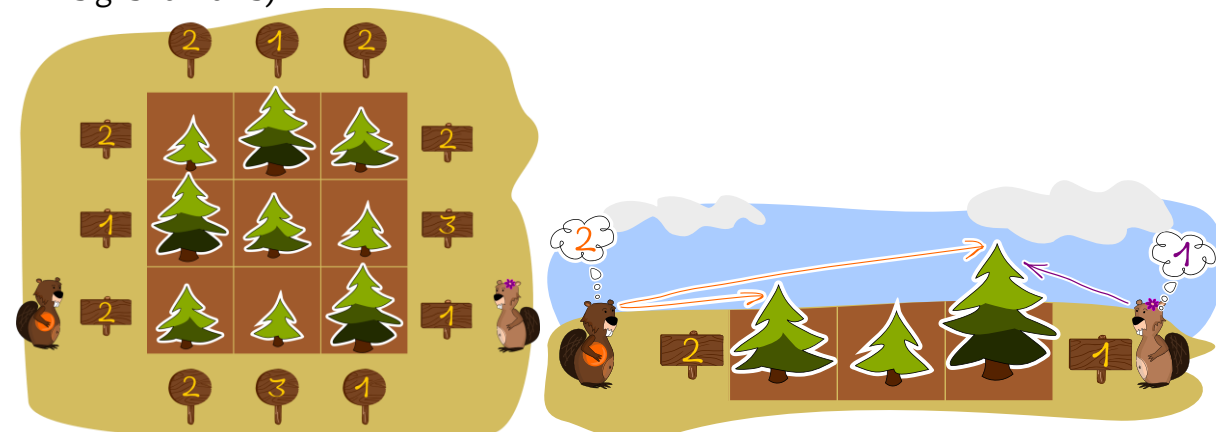
If beavers observe the trees in one line (see right figure above) they **do not** see trees that are hidden behind a taller tree.

## Question / Challenge

Given the numbers currently written, which of the following options would fit the bottom row (left to right)?
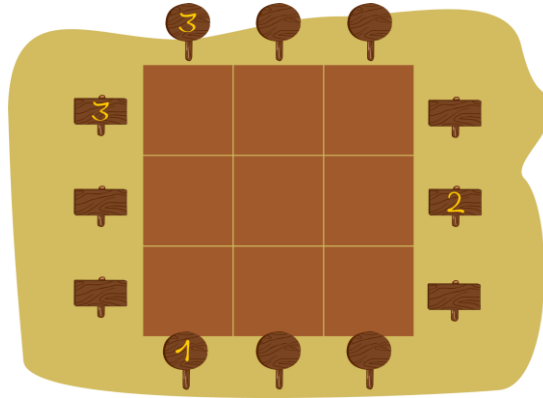


**A)** 1 (🌲), 2(🌲), and 3(🌲)

**B)** 3(🌲),1 (🌲), and 2(🌲)

**C)** 3(🌲),3(🌲) , and1 (🌲)

**D)** 3(🌲), 2(🌲) and 1 (🌲)

## T14. Treasure Hunt

Explorers Adam, Belle and Cody want to find the treasure hidden in a secret room. They take different paths.

On each path they may encounter pull up doors 🚪and jumping stones 🪨. Both doors and stones are labeled with shapes. All doors are initially locked. When an explorer encounters a locked door, the explorer stops and waits until thedoor gets unlocked.

When an explorer steps on a jumping stone, all doors with the same shape label get unlocked permanently.

See how doors and stones are arranged on the explorers' paths:
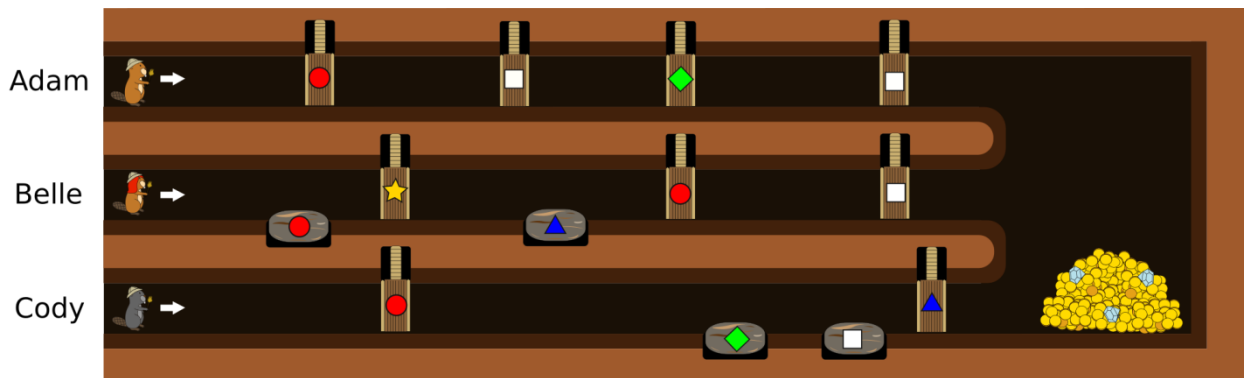


## Question / Challenge

Who will get to the secret room?

**A)** Adam

**B)** Belle

**C)** Cody

**D)** Nobody can get to the secret room

## T15. Snakes and Ladders
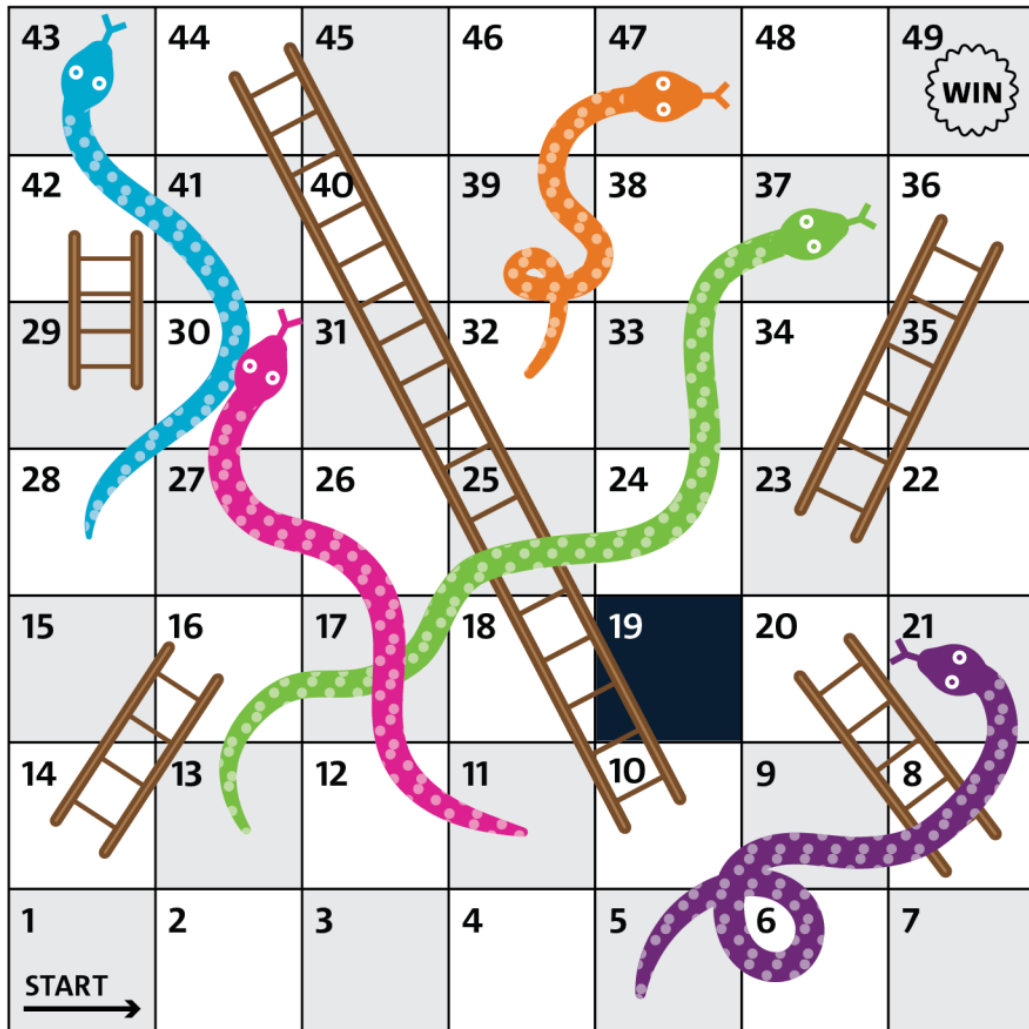
The game of Snakes and Ladders is played by rolling a common dice (giving values 1 to 6) and moving that many places from your current cell position. Each player starts from cell number 1, and a player wins when they reach the last cell (49).



If you reach a cell with a snake's head, you will slide down to the snake's tail. That is, if you land on cell 21, the snake will take you back down to cell 5. And if you reach a cell with the bottom of a ladder, you will climb up to the top of that ladder. That is, if you land on cell 23, the ladder will take you up to cell 36.

### Question / Challenge

If you are at cell 19, what is the minimum number of dice rolls to win?

**A)** 2          **B)** 3          **C)** 4          **D)** 5

## T16. Glowing Panels

The king of Kingdom Bebras decided to make a giant art using glowing panels and display it in the square to celebrate the National Anniversary. The art is created using a total of 36 panels as shown below in Figure 1. Each panel switches between on and off when stepped on. The king starts from the "IN" panel in the figure, step on adjacent panels up, down, left or right (not diagonally), and proceed to the "OUT" panel to create various glowing patterns. He can step on the same panel more than once.
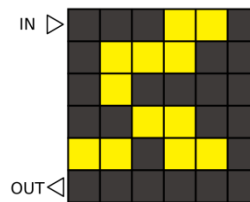
**Panel switched off**

**Figure 1**
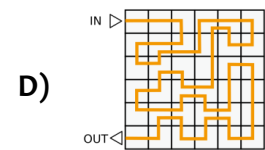
**Panel switched on**

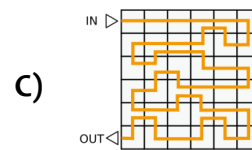### Question / Challenge

The king made the pattern shown above, but he didn't like it, so he wanted to turn on all the panels to start over.
Which of the following routes to light up everything?

A)   B)   C)   D)
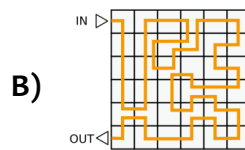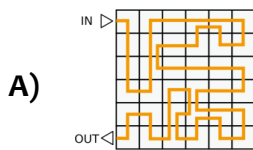
## T17. Follow the rules

You can make pretty patterns by following these rules:

**RULE 1**     **RULE 2**     **RULE 3**
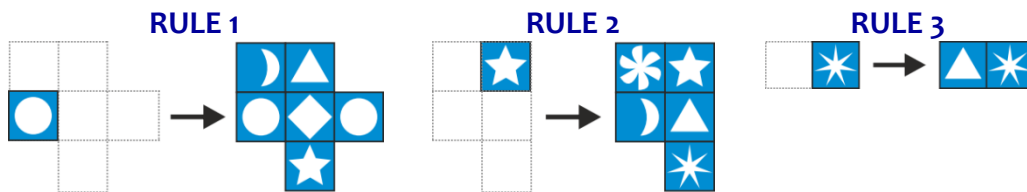
For instance, if you start from you may obtain by applying Rule 3 twice.

### Question / Challenge

If you start with one circle ( ), which of these patterns can you then obtain?

A)   B)   C)   D)
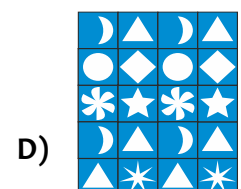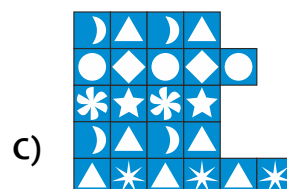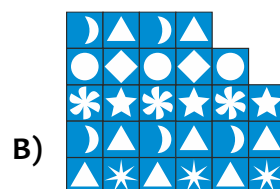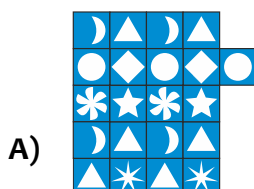
## T18. Hamming Lemmings

The lemming King Hamming wants to send a message to his Queen, who lives in another castle. He chooses four lemmings to deliver his message and gives each of them a flag: red or yellow according to the message he wants to send. But the King worries that something might go wrong during the journey, so he chooses three more helper lemmings and gives them flags according to the following rules:

- The 5th lemming is helping lemmings #1, #2, and #3: if the number of red flags they carry is odd, then lemming #5 will carry a red flag, otherwise he will carry a yellow flag.
- The 6th lemming is helping lemmings #1, #2, and #4: if the number of red flags they carry is odd, then lemming #6 will carry a red flag, otherwise he will carry a yellow flag.
- And the 7th lemming is helping lemmings #2, #3, and #4: if the number of red flags they carry is odd, then lemming #7 will carry a red flag, otherwise he will carry a yellow flag.

On their way, one of lemmings lost his flag. To cover his fault, he quickly made a new one. Unfortunately, he doesn't remember the color of the flag he initially had, so he cannot say whether his new flag is correct or not.
When the lemmings arrived at the Queen's castle, she saw the following situation:
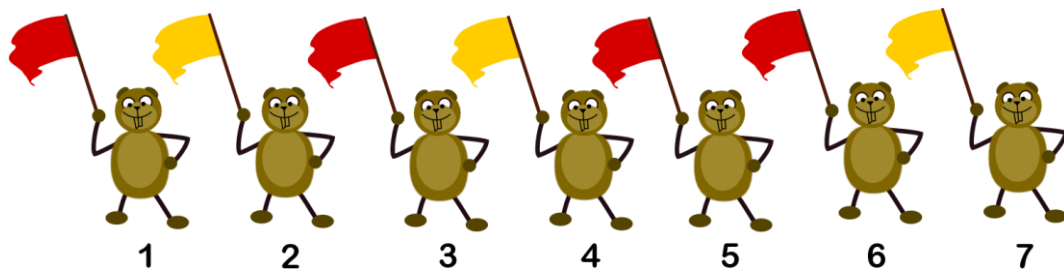


## Question / Challenge

Exactly one lemming lost his flag, but we don't know if his new flag has the right color. Exactly one of the statements below is true. Which one?

**A)** The new flag has the right color.
**B)** Lemming #4 lost his flag, and the new flag has the wrong color.
**C)** Lemming #6 lost his flag, and the new flag has the wrong color.
**D)** Lemming #3 lost his flag, and the new flag has the wrong color.

## T19. Beaverburg Delivery

A part of Beaverland consists of a number of islands connected by bridges. Each bridge has a gross mass limitation and vehicles exceeding it may not cross it. Vehicle gross mass is a sum of the vehicle mass and the mass of its cargo.

The map of Beaverland islands is given below with islands represented as circles and bridges as segments. Furthermore, each bridge has its gross mass limitation written on it.
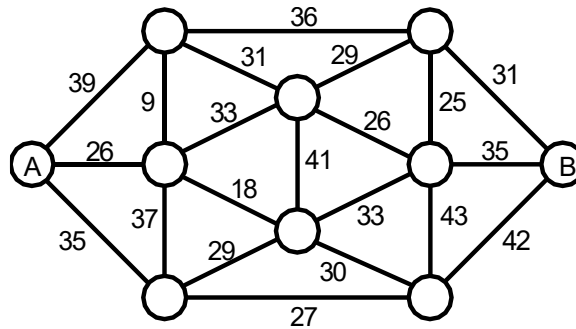


'Beaverland Delivery' is a cargo delivering company that uses trucks with vehicle mass of 10 tons and cargo capacity of 30 tons.

The company needs to move 250 tons of sand from island marked by 'A' to the island marked by 'B'.

## Question / Challenge

What is the minimum number of shipments necessary to move 250 tons of sand from island A to island B using only one truck?

**A)** 10        **B)** 11        **C)** 12        **D)** 13

## T20. Jacques The Porter

Jacques is a porter in an apartment building. There are five apartments. Each apartment is occupied by one beaver. Leaving for work, the beavers give their keys to Jacques.

To not mix up the keys Jacques uses a locker for each apartment. On each locker stands the first three letters of the owner's name.



For security reasons, no names are written on the keys. Instead Jacques labelled three digits to the keys to indicate the owner. For all the keys the same letter always corresponds to the same single digit.

Once all lockers fell down and the keys crumbled. One of the labels got lost.
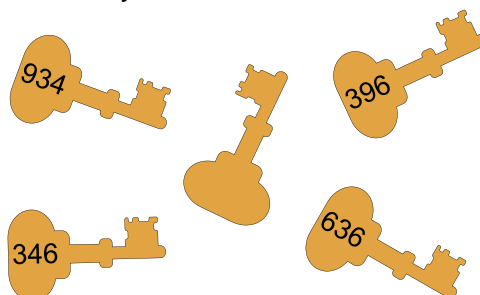
## Question / Challenge
What label is lost?

**A)** 356          **B)** 496          **C)** 596          **D)** 736

## T21. Chairs

The beavers are siting on 6 chairs kept in a row and are given numbers from 1 to 6 and want to play a game. Before starting the game, a number between 1 and 4 is chosen. With every clap, all the beavers would go to the chair on their right as many positions as was the number chosen and beavers at the end will move to the front.

After the movement, the rightmost beaver is out of the game and last chair is removed. The beaver left in the end is the winner. So, if number 2 is drawn, beaver 6 is the winner as you can see below:

**Start:**



**After 1st Clap:**
**(Beaver 4 out)**



**After 2nd Clap:**
**(Beaver 1 out)**



**After 3rd Clap:**
**(Beaver 3 out)**



**After 4th Clap:**
**(Beaver 5 out)**



**After 5th Clap:**
**(Beaver 2 out)**



## Question / Challenge
Who will be the winner if number 3 is drawn?

**A)** 2          **B)** 3          **C)** 5          **D)** 6



Good Luck!