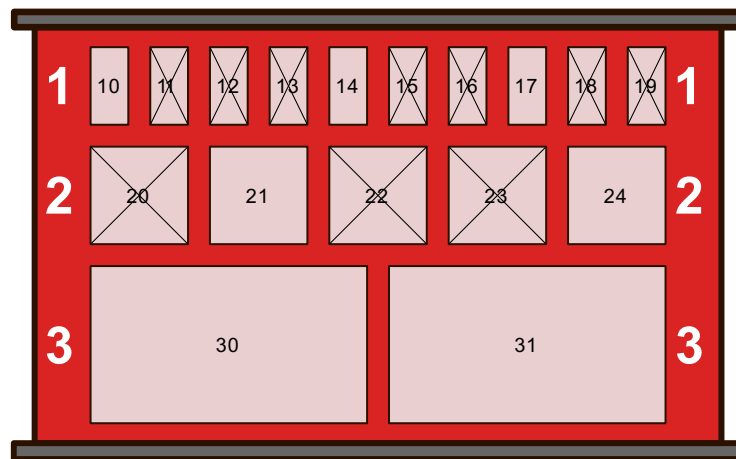


Tasks T1 – T7 carry 3 points each

T1. Package locker

At the package delivery station in Bebraville, a robot takes packages that arrive and puts them in lockers. There are three different sizes of packages, small, medium and large, and three different sizes of lockers, 1, 2 and 3. Small packages can fit in all three types of lockers. Medium packages can fit in lockers of size 2 and 3. Large packages can only fit in size 3 lockers. The robot uses computer vision to detect the size of an incoming package and put it in the empty locker with the lowest number in which the package can fit. One morning, the lockers in the delivery station are as follows. Lockers marked with an X are occupied, they contain a package and no more packages can be placed there.



During that day, the following eight events take place.

1. Two small packages arrive.
2. Someone picks up the package from locker number 22.
3. A large package arrives.
4. Three more small packages arrive.
5. Someone picks up the package from locker number 15.
6. A medium-sized package arrives.
7. Someone picks up the package from locker number 18.
8. One more small package arrives.

Question / Challenge

In which locker did the robot put the last package?

A) 10

B) 18

C) 15

D) 31

T2. Cooking

Two beavers cook a breakfast burger together. To get one burger they need to:

- Bake buns in the [toaster oven] (3 minutes)
- Peel lettuce on the [cutting board] (1 minute)
- Fry bacon in the [frying pan] (3 minutes)
- Fry an egg in the [frying pan] (2 minutes)
- Put fried bacon, peeled lettuce and fried egg between the baked buns (1 minute)

There is one cutting board, one toaster oven and



one frying pan. Beavers can use them all at the same time, but the frying pan fits only one ingredient at the time.

Question / Challenge

What is the minimum time it takes to cook one burger?

- A) 3 minutes B) 5 minutes C) 6 minutes D) 10 minutes

T3. BebrasGPT

BebrasGPT is a chat bot that is recently developed to produce three-word sentences by predicting the next word based on the previous sequence of words. Each word is chosen one by one, with the next word being chosen based on the probabilities. The tables below show some of these probabilities.

Probabilities for second word:

	"love"	"hate"
"Cats"	0.7	0.3
"Beavers"	0.6	0.4

Probabilities for third word:

	"swimming"	"running"
"Cats love"	0.2	0.8
"Cats hate"	0.9	0.1
"Beavers love"	0.7	0.3
"Beavers hate"	0.1	0.9

For example, if the sentence starts with the word "Cats", the probability of the 3-word sentence being "Cats love running" is 0.56 because:

- the probability of the second word being "love" if the previous word is "Cats" is 0.7,
- and the probability of the next word being "running" if the previous sequence is "Cats love" is 0.8,
- so, because the model predicts words one by one, the probability is $0.7 * 0.8 = 0.56$.

Question / Challenge

If a sentence starts with the word "Beavers" what is the most likely output of BebrasGPT?

- A) "Beavers hate swimming" B) "Beavers hate running"
 C) "Beavers love swimming" D) "Beavers love running"

T4. Logic Treasure

An island contains three treasure chests: one by the mountains, one under the palm tree, and one by the sea. At the start of the day all three treasure chests are empty



At some point during the day, Pirate Beaverbeard fills one of the chests with gold



Three tourists took photos of the treasure chests while exploring the island. One tourist took their photos before Beaverbeard filled a chest with gold. The other two tourists took their photos after Beaverbeard filled a chest with gold.

		Alice: The chest by the sea was empty.
		Bob: The chest by the sea was empty and the chest under the palm tree was empty.
		Carla: The chest by the mountains was empty and the chest under the palm tree was empty.

Question / Challenge

Luckily for Beaverbeard, no tourist found the gold. Which treasure chest was the gold in?

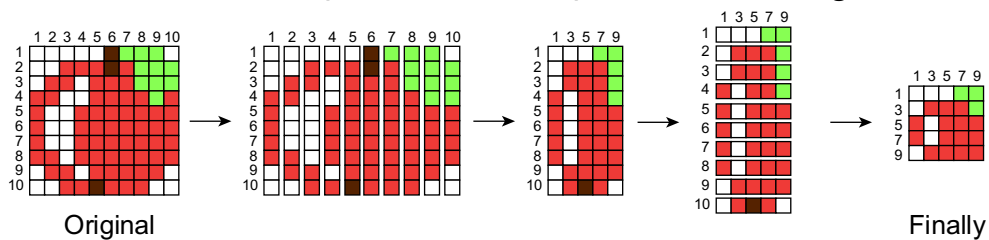
- A) The chest under the palm tree
 B) The chest by the sea
 C) The chest by the mountains
 D) The chest cannot be determined

T5. Snail Compress

Beaver has a special technique to shrink their captured images.

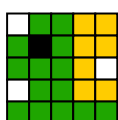
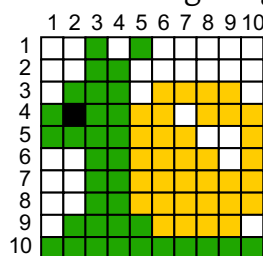
First, they will cut the original image into 10 equally sized strips vertically. Then, they will assemble the odd-numbered strips to create a new image.

Next, they will cut the new image horizontally into 10 equally sized strips. Then, they will assemble the odd-numbered strips to create a complete shrunken image.

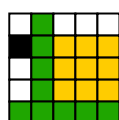


Question / Challenge

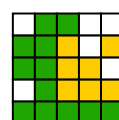
What image will the beaver obtain after shrinking the given image using this technique?



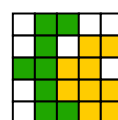
A)



B)



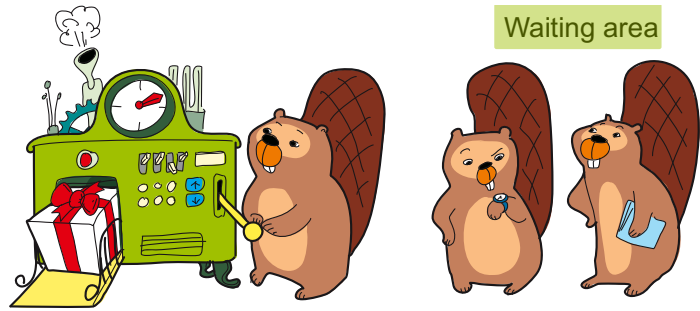
C)



D)

T6. Santa's helpers

This year beavers help Santa make presents. Each beaver will make exactly one toy in a toy-making machine according to the following table.



Beaver	Toy	Production time	Beaver's arrival time
Andrej	Car	5 minutes	8:00
Bojan	Teddy bear	10 minutes	8:00
Cene	Doll	7 minutes	8:04
Dejan	Train	12 minutes	8:10
Enej	Bricks	9 minutes	8:10

When a beaver arrives he first goes to the waiting area. The toy-making machine can only be used by one beaver at the same time, the others are staying in the waiting area. When the toy-making machine is free, the beaver who is already in the waiting area and needs the least production time to make the toy starts using it.

Question / Challenge

In what order will the beavers make their toys?

- A)** Andrej, Bojan, Cene, Dejan, Enej

C) Andrej, Bojan, Cene, Enej, Dejan

B) Andrej, Cene, Enej, Bojan, Dejan

D) Andrej, Cene, Bojan, Enej, Dejan

T7. Detective

Sherlock Beaver is about to catch a band of thieves. While visiting their lair he sees a guard at the door asking for a password to get in. He observes another beaver walk toward the entrance. The guard says “twelve” and the beaver replies “six”. He is allowed in. Later, he observes another beaver, the guard says “six” and this beaver answers “three”. He is allowed in too. Sherlock decides to walk towards the entrance and the guard says to him “sixteen” and Sherlock replies “eight” but he is not allowed in and the thieves discover that he is a spy.



Question / Challenge

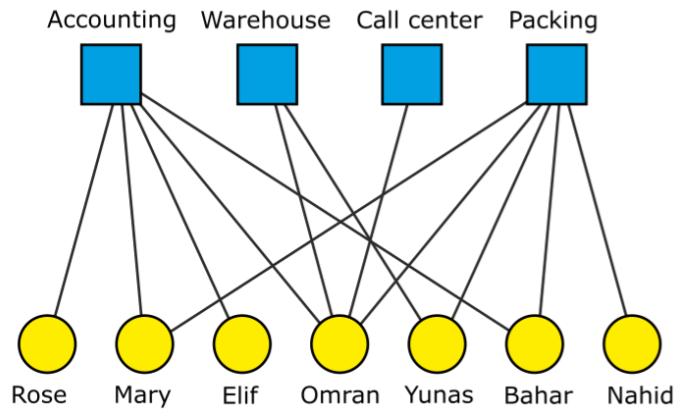
Which of the following rules could have been used by the thieves for their passwords?

- A)** To answer a number that does not start with the first letter of the word the guard says.
- B)** To divide in half the number the guard says.
- C)** To count how many letters are in the word the guard says.
- D)** To answer with a number that has the same number of letters as the word the guard says.

Tasks T8 – T14 carry 4 points each

T8. Job Assignment

Rose, Mary, Elif, Omran, Yunas, Bahar and Nahid have applied for open positions in factory departments including accounting, warehouse, call center, and packing. Each individual is only qualified for jobs shown in the figure. One person must be hired to work in each position and each person can hold at most one of the jobs.



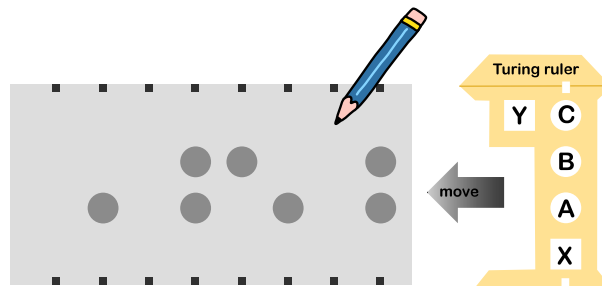
Question / Challenge

Which of the following is definitely true?

- A) Nahid will be hired for packing.
- B) Yunas will be hired for the warehouse.
- C) Omran will be hired for packing.
- D) Elif will be hired for accounting.

T9. Fancy ruler

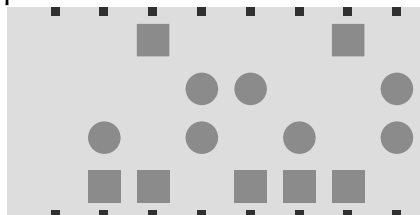
A fancy ruler with 5 holes (A, B, C, X, Y) and a pencil are used to draw gray squares on a sheet of paper.



The algorithm for drawing gray squares at locations X and Y can be described as follows.

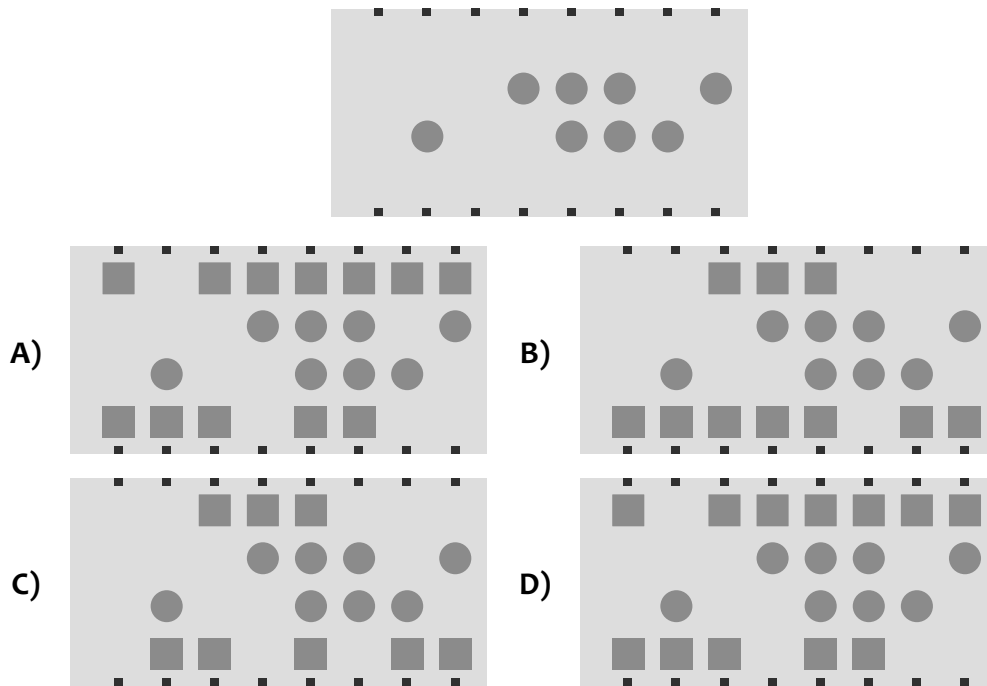
- Start with the first column on the right.
- If you see two or more gray circles through holes A, B, and C, draw a square at location Y. Bear in mind that a square drawn at location Y will appear as a circle when viewed through hole C.
- If the number of gray circles through holes A, B, and C is odd, draw a square at location X.
- After moving one column to the left, repeat the same process until the leftmost column.

This is the result for the example from above:



Question / Challenge

What will be the result for the following sheet?



T10. Sealed Letters

The Republic of Beaveria maintains a cabinet full of secret letters. Among the 16 letters in this cabinet, numbered 1 to 16, 10 had been opened, while the other 6 were still sealed inside their envelopes.

One evening, an enemy spy snuck in and opened one of the sealed letters. However, he forgot to seal it again.

The next morning, the Republic of Beaveria goes into an investigation after noticing that there are now 11 opened letters, as shown below:



The Republic's guard does not recall all the details, but he is sure that before the enemy spy sneaked in:

- The number of opened letters in the C2 and C4 columns combined was even.
- The number of opened letters in the C3 and C4 columns combined was even.
- The number of opened letters in the R2 and R4 rows combined was even.
- The number of opened letters in the R3 and R4 rows combined was even.

Question / Challenge

Which letter was opened by the enemy spy?

A) 5

B) 9

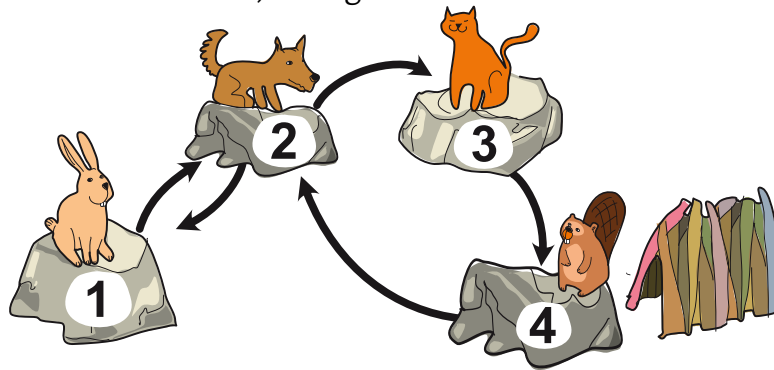
C) 10

D) 13

T11. Jumping Together

Beaver lives near a rock. In his neighborhood there are three other rocks where his dog, cat and rabbit friends live.

The animals have decided to have a party on the rock of Beaver. In order to do this the animals can jump from rock to rock, following the arrows, according to the drawing below. Because they all want to be equally tired when the party starts they all want to jump around and arrive on beaver's rock, having all made the exact same number of jumps.



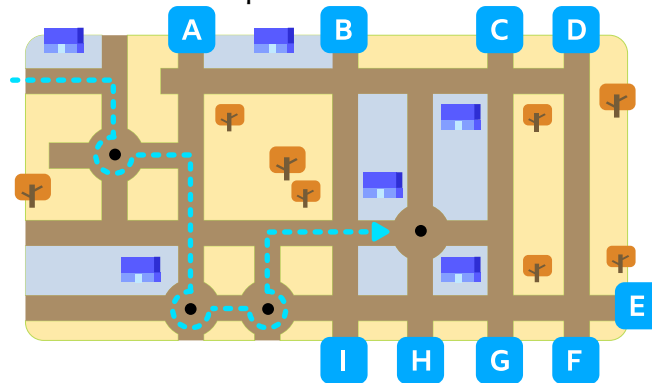
Question / Challenge

What is the minimum number of jumps that the animals must make so they all arrive on the rock of beaver with the same amount of jumps?

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

T12. Autonomous Car

Tim is traveling with his autonomous car. A recent software update of the car had a major bug which causes it to make the same turn every time it reaches the same type of intersection as shown below. For example the car takes the third exit in every roundabout.



Question / Challenge

Which letter will be reached during Tim's journey?

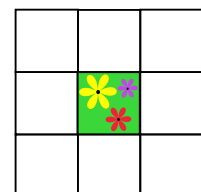
- A) C** **B) D** **C) F** **D) E**

T13. Game of Life

Flowers in Bebraverse grow in a garden that is divided into a grid with square cells. Colored cells contain flowers, while white cells do not contain flowers. Each cell has 8 neighboring cells:

Flowers grow according to the rules:

1. If a colored cell has fewer than two colored neighbors, it will turn white the next day.
2. If a colored cell has two or three colored neighbors, it will remain colored the next day.
3. If a colored cell has more than three colored neighbors, it will turn white the next day.

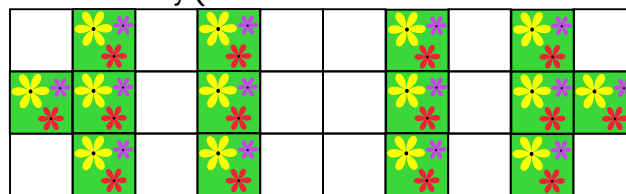


4. If a white cell has exactly three colored neighbors, it will turn colored the next day.
Example:



- The left middle colored cell became white by **Rule 1**.
- Two middle colored cells became white by **Rule 3**.
- The remaining 3 colored cells stayed colored on to the next day by **Rule 2**.
- Two right corner cells became colored cells by **Rule 4**.

Below is the garden on the first day (there are no colored cells outside this garden):



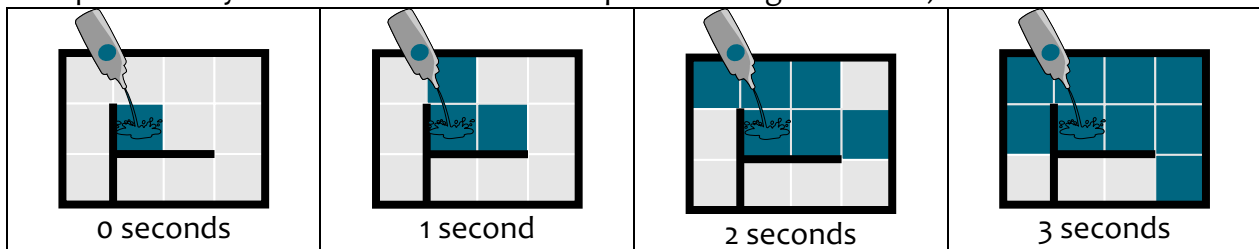
Question / Challenge

How many colored cells will be there the next day?

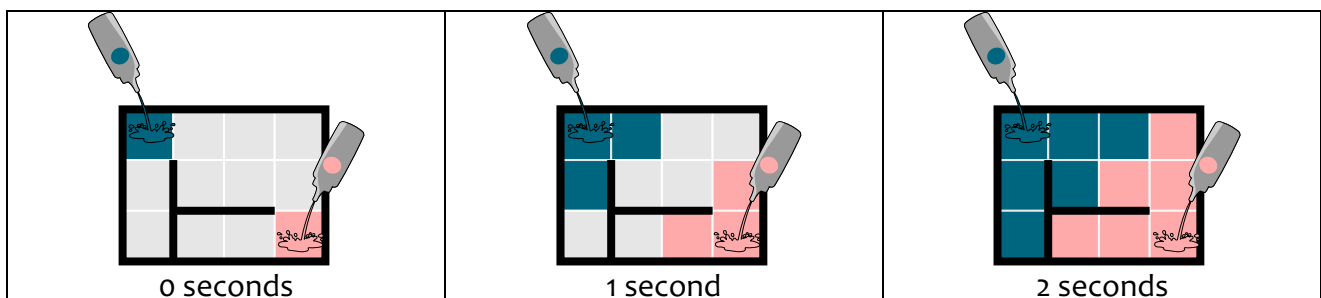
- A) 12 B) 13 C) 15 D) 16

T14. Watercolor

When the beavers pour watercolor into a maze, the color will spread to neighboring empty squares every second. The color cannot spread through the walls, see below.

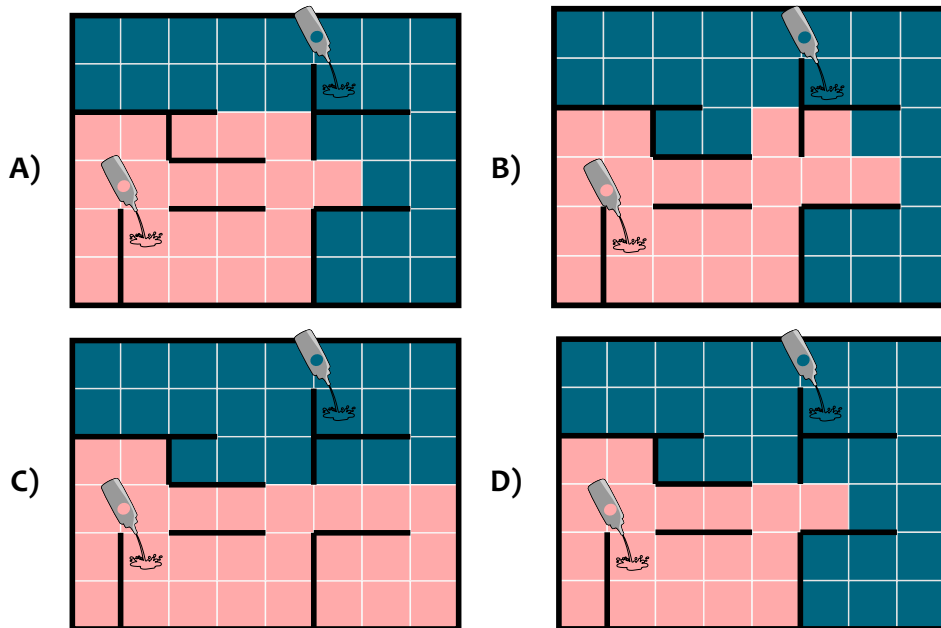
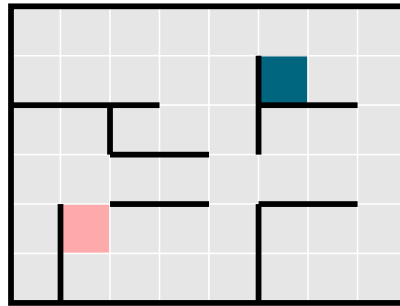


If the beavers pour more than one watercolor into the maze, the first color that reaches a square will fill it completely. When the colors reach a square at the same time, the square takes the darkest color.



Question / Challenge

The beavers poured two colors into the maze below. What does the maze look like when all the squares are filled with color?



Tasks T15 – T21 carry 5 points each

T15. Forest Patrol

The Forest of Beavaria is home to many animals of 7 different species: beavers, lions, birds, boars, squirrels, monkeys, and deer.

For their mission to protect the endangered plants in the forest, the animals organize themselves into ten squads. Each squad is represented in the table below by row with the numbers of each species in it (empty cell means 0).

Squad							
A	2	4					
B	6						
C			6				
D	3			3			
E					6		
F						2	4
G	2	1		3			
H					6		
I				6			
J		5		1			

The endangered plants in the forest are scattered across several regions. The animals want to patrol as many regions as possible, but they must follow two rules to keep their patrols organized:

- Animals belonging to the same squad should patrol the same region.
- Animals belonging to the same species should patrol the same region.

For example, a squad A (2  and 4 ) along with a squad D (3  and 3 ) can patrol only a single region.

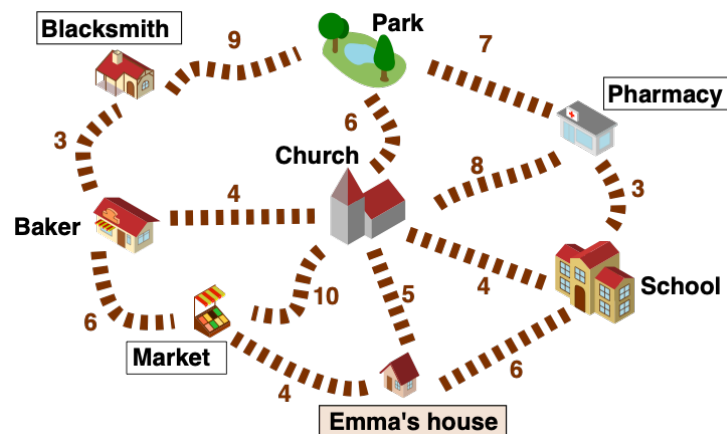
Question / Challenge

At most how many regions of the forest can the animals patrol?

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

T16. Emma's tasks

This is a map of Emma's village. The numbers on the map show how long (in minutes) it takes for Emma to walk from place to place.



One day Emma needs to do the following tasks:

- Get a horseshoe from the blacksmith
- Get medicines from the pharmacy
- Get fruit from the market

These tasks can be performed in any order. Emma starts at her house and returns there after completing the tasks. Each task takes 1 minute to complete on site.

If Emma takes the following route, it takes her 41 minutes:

Emma's house
→ Market (fruit) → Baker → Blacksmith (horseshoe) → Park → Pharmacy
(medicine) → School
→ Emma's house

(Indeed: $4+6+3+9+7+3+6$ is 38 minutes, to which we add 3 minutes for the tasks themselves.)

Question / Challenge

What is the shortest time in which Emma can perform all her tasks (and return home again)?

- A) 37 minutes B) 38 minutes C) 39 minutes D) 40 minutes

T17. Documents Moving

Employees of Beaver Logistics must move documents from one site to another using a single small truck. The documents are placed in boxes before being loaded into the truck. It takes 1 minute per box to load or unload it from the truck. The total trip time between the two sites is 60 minutes. The truck can move at most 20 boxes at a time. If the employees want to move more than 20 boxes they must first wait for the truck to return.



Documents are not always well arranged in the boxes. By spending some time compacting the documents in the boxes, it is possible to reduce the total number of boxes. Three methods can be used:

- Method A takes 3 minutes per box and reduces the number of boxes by half.
- Method B takes 1 minute per box and reduces the number of boxes by a third.
- Method C does no compacting.

A compacting method can be used only once, on the initial number of boxes.

Question / Challenge

The employees need to move 36 boxes in less than 4 hours. Which of the three methods can they use?

- A) Method A only B) Method B only C) Method C only D) Method A or B only

T18. Finding the encryption key

Mimi and Chuchu decided to create and use a ciphertext based on the following three steps.

(1) Start with a message string and divide it into substrings of a specified substring length (from left to right). If the length of the last substring is less than the substring length, add spaces at the end. For example, if a substring length of 3 is chosen with the message "AMORE CUPID", then the substrings would be "AMO", "RE ", "CUP", "ID ".

(2) Reverse the order of all substrings to obtain "OMA", "ER", "PUC", "DI".

(3) Choose a sequence of numbers that would indicate how the substrings must be rearranged. Afterwards, concatenate the substrings to form a ciphertext. For example, if the sequence of numbers is (3, 1, 4, 2), the ciphertext would be "PUCOMA DI ER".

To keep their secret, they both need to have the same substring size and the same sequence of numbers which are 3, (3, 1, 4, 2) in the example. This is called an encryption key.

Question / Challenge

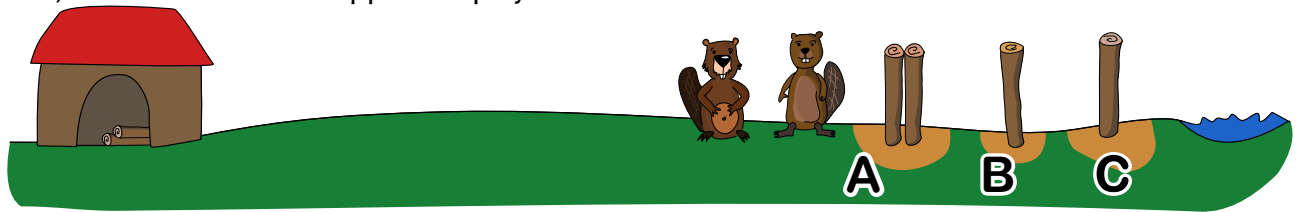
ChuChu converts "I LOVE YOU MIMI" into ciphertext and sends it as the first message to inform Mimi of the encryption key. If the ciphertext Mimi receives is "Y EV IMIM UOOL I", which of the following is the encryption key?

- A) 2, (4, 3, 8, 7, 5, 6, 1, 2) B) 3, (3, 2, 5, 4, 1) C) 4, (2, 4, 3, 1) D) 5, (2, 3, 1)

T19. Logs to the warehouse

Beavers Alf and Bob have to carry logs – one at a time! – from the river bank to the warehouse on the left. To make their job more enjoyable, they decide to take turns at work. Whoever is on duty selects a log and carries it to the left, until he comes across another log or he reaches the warehouse. Whoever of them is forced to carry the last remaining log to the warehouse loses the game.

We say that a beaver has a winning strategy if there is a way for him to play and always win, no matter how the opponent plays.



Today they have to carry four logs, arranged as shown, and Alf is first on duty.

Question / Challenge

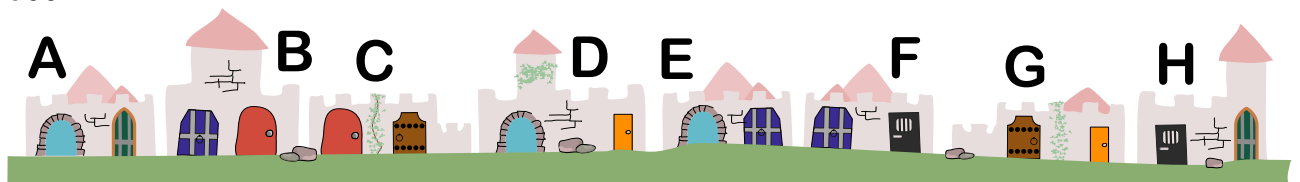
Only one of the following statements is true: which one?

- A) Alf has a winning strategy and must start by carrying one of the two logs from A to the warehouse.
- B) Alf has a winning strategy and must start by carrying the log in B next to the two logs in A.
- C) Alf has a winning strategy and must start by carrying the log in C next to the log in B.
- D) None of the Alf's strategies from the options 1, 2, 3 is winning.

T20. Rooms and doors

In a castle there are 8 rooms and 6 types of doors. If you go through a door, you move to a room with a door of the same type as the one you entered. For example, room A has a

blue door , so you can move to either room D or room E, which also have a blue door .



Question / Challenge

Move from room A to room C in such a way as to pass through the least number of rooms. How many rooms will you visit?

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

T21. Correcting error

In one country, a phone number consists of 11 digits. However, people tend to make mistakes when writing them down, so there is a rule to correct ONE mistake – all phone numbers must satisfy the following:

- 8th digit = the last digit of the sum of the first 7 digits (1st-7th).
- 9th digit = the last digit of the sum of the first 4 digits (1st-4th).
- 10th digit = the last digit of the sum of the 1st, 2nd, 5th & 6th digits.
- 11th digit = the last digit of the sum of the 1st, 3rd, 5th & 7th digits.



For example, 12345678046 is a correct phone number, because

- the 8th digit is 8 ($1+2+3+4+5+6+7 = 28$)
- the 9th digit is 0 ($1+2+3+4 = 10$)
- the 10th digit is 4 ($1+2+5+6 = 14$)
- the 11th digit is 6 ($1+3+5+7 = 16$)

Question / Challenge

Someone made ONE mistake and wrote down a phone number 12312316710. What was the correct phone number?

A) 12312313710

B) 12312316780

C) 12315316710

D) 32322316710

