UNIVERSITY OF WATERLOO

The CENTRE for EDUCATION in MATHEMATICS and COMPUTING

2025 Beaver Computing Challenge (Grades 5 & 6)

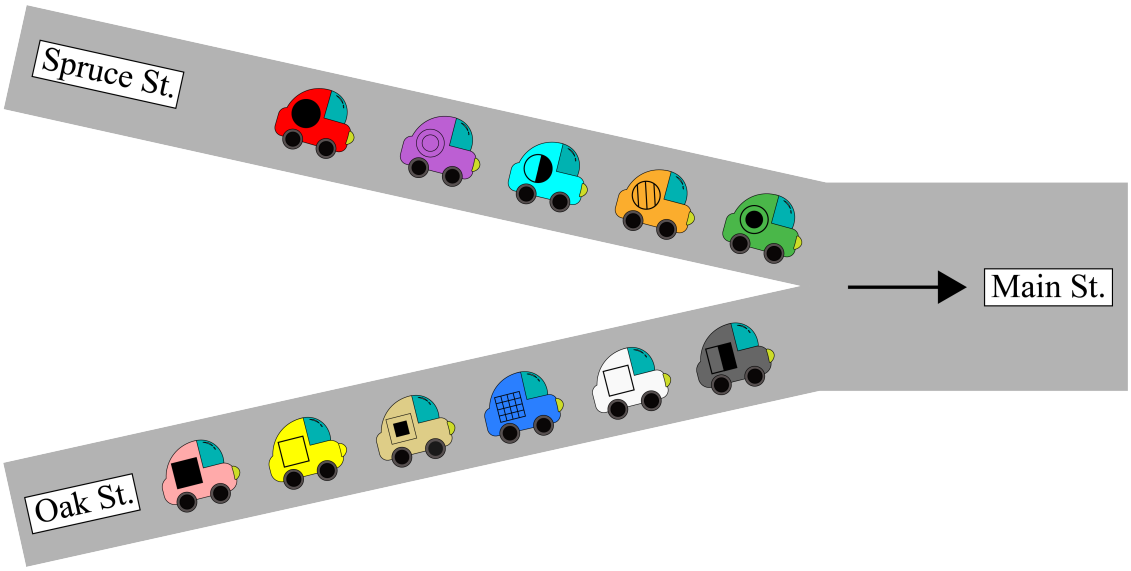
Questions, Answers, and Explanations

Part A

Merging Cars

Story

Cars waiting to enter Main Street are shown. The cars take turns coming from Spruce Street and Oak Street.



Question

If the first car comes from Spruce Street, which car will enter Main Street immediately after  ?

(A) 

(B) 

(C) 

(D) 

Answer

(D) 

Explanation of Answer

Assuming no more cars arrive, the cars shown will enter Main Street from right to left as shown:

We can see that  enters Main Street immediately after  .

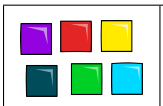
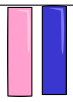
Country of Original Author

Montenegro

Building Instructions

Story

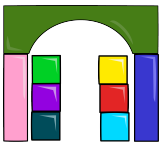
You have the following blocks:

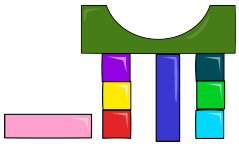
		
six cubes	one bridge	two rectangular prisms

Your friend gives you the following building instructions:

1. Take three cubes and place them on top of each other to form a tower.
2. Form a separate tower with the three remaining cubes.
3. Place the two rectangular prisms next to the cube towers.
4. Place the bridge on top of some of the blocks.

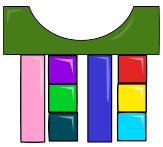
These instructions allow you to build many different structures. Here are two examples:

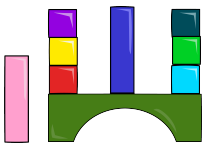


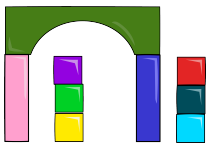


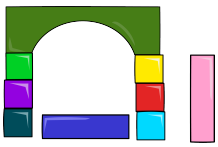
Question

Which of the following structures **cannot** be built by following the instructions?

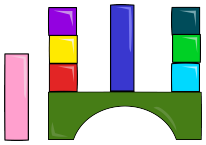
(A) 

(B) 

(C) 

(D) 

Answer

(B) 

Explanation of Answer

To determine which of the structures cannot be built by following the instructions, we go through the instructions in order.

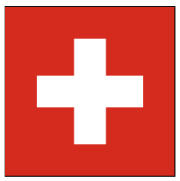
After following instructions 1 and 2, we should have two towers, each with three blocks stacked on top of each other. This matches all four of the given structures, so we can move on to the next instruction.

After following instruction 3, there should be two rectangular prisms placed next to the cube towers. Note that they could be on either side of the cube towers, and could be placed either vertically or horizontally, as this is not specified in the instruction. All four of the given structures have two rectangular prisms placed next to the cube towers, so we can move on to the final instruction.

After following instruction 4, the bridge should be on top of some of the blocks. This is true for the structures in Options A, C, and D, which tells us they can be built by following the instructions. However, the bridge in the structure in Option B is not on top of any blocks. Therefore, this structure could not have been built by following the instructions.

Country of Original Author

Switzerland



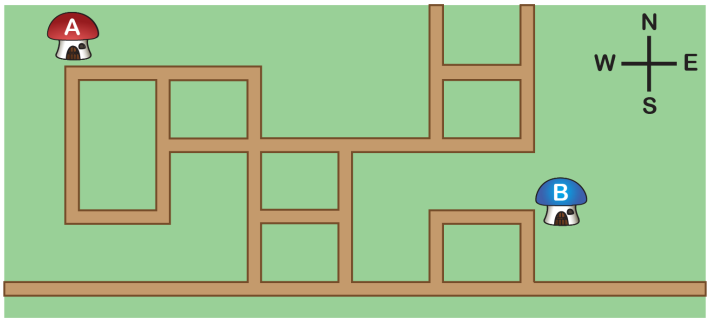
A Wrong Step

Story

Aira is walking from her house 

to her friend Bo's house 

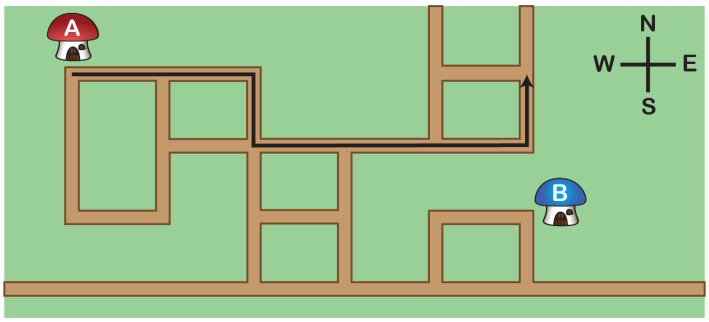
for the first time. A map of the streets between their houses is shown. All streets go either east/west or north/south.



Bo gave Aira the following instructions, where walking one *block* means walking straight until you reach the next street.

Step 1: Walk two blocks east (E).
Step 2: Walk three blocks south (S).
Step 3: Walk three blocks east (E).
Step 4: Walk one block north (N).

However, Aira made a mistake with one of the steps and did not arrive at Bo's house. Her route is shown.



Question

Which step did Aira **not** follow correctly?

(A) Step 1 (B) Step 2 (C) Step 3 (D) Step 4

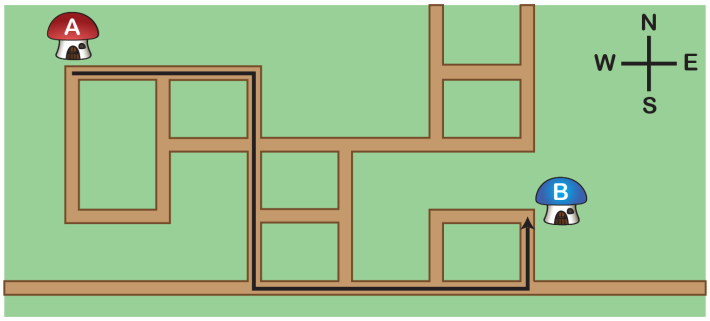
Answer

(B) Step 2

Explanation of Answer

Aira's route shows that she first walked two blocks east, which matches Step 1. She then walked one block south, but this does not match Step 2 because in Step 2 Aira was supposed to walk three blocks south. She then walked three blocks east, which matches Step 3. Finally she walked one block north, which matches Step 4. Thus, the only step that Aira did not follow correctly is Step 2.

The correct route using Bo's instructions is shown. We can verify that this route does take Aira from her house to Bo's house.



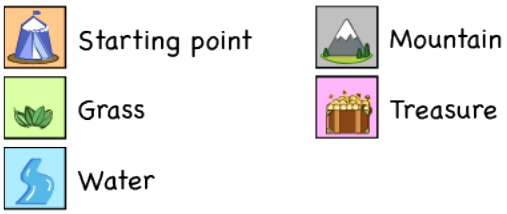
Country of Original Author

Canada

Alex's Treasure

Story

Alex the explorer has found a treasure map. The map has a grid with different symbols, as shown.



Alex must reach the treasure from the starting point, while following these three rules:

1. They cannot step on water.
2. They must cross at least one mountain.
3. They can only move one square at a time. They can move up (↑), down (↓), left (←), and right (→). They cannot move diagonally.

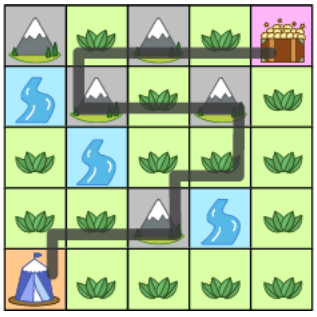
Question

Four paths are shown below. Which path leads Alex to the treasure while following all the rules?

(A)

(C)

(B)



(D)

Answer

(B) 

Explanation of Answer

In this task, Alex must reach the treasure and also follow the three rules. We can examine each path one by one.

The path in Option A goes through the water, however Rule 1 states that Alex cannot step on water. Thus, Option A is not correct.

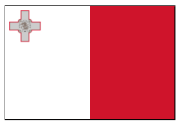
The path in Option C moves diagonally, however Rule 3 states that Alex cannot move diagonally. Thus, Option C is not correct.

The path in Option D does not cross a mountain, however Rule 2 states that Alex must cross at least one mountain. Thus, Option D is not correct.

The path in Option B follows all three rules and reaches the treasure, so this is the correct path.

Country of Original Author

Malta

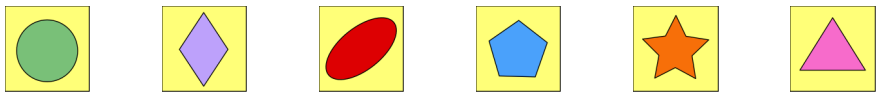


Part B

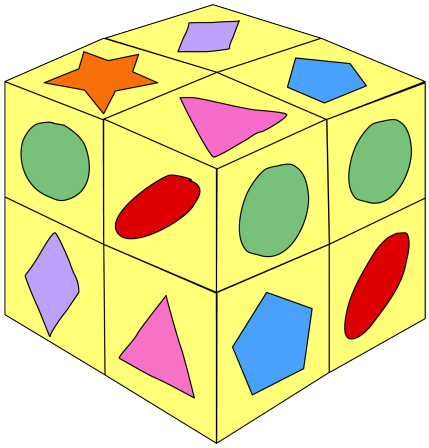
Cube

Story

A Bebras cube has a different shape on each face. The six shapes on a Bebras cube are shown.



Eight identical Bebras cubes are stacked together to form a larger $2 \times 2 \times 2$ cube, as shown.



Question

On a Bebras cube, what shape is on the face opposite the  ?

(A) 

(B) 

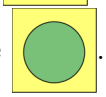
(C) 

(D) 

Answer

(C) 

Explanation of Answer

In the larger $2 \times 2 \times 2$ cube, we see the following shapes next to the  :  ,  ,  , and  . None of these can be opposite the  .

Thus, the  must be on the face opposite the  .

Country of Original Author

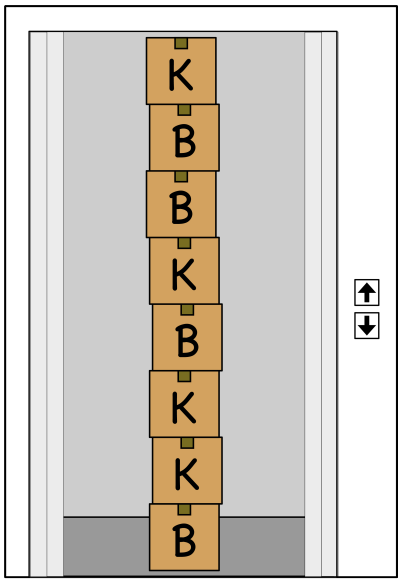
India

Elevator

Story

Biwako and Kai live on different floors of the same apartment building.

They each have several boxes being delivered. Biwako's boxes are labeled B, and Kai's boxes are labeled K. However the boxes were mixed up and stacked in the elevator as shown.



Biwako and Kai each stay on their own floor. When the elevator arrives on their floor, they take all of their boxes that are on the top of the stack. Then the elevator moves directly to the other person's floor. The elevator continues to move back and forth between Biwako and Kai's floors until all the boxes have been taken.

The elevator first stops on Kai's floor.

Question

In total, how many times does the elevator stop before all the boxes have been taken?

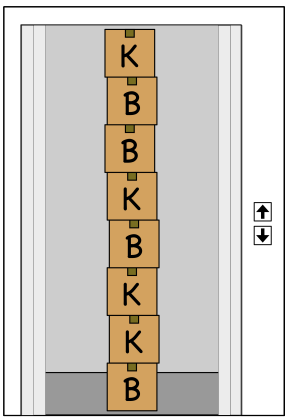
(A) 2 (B) 3 (C) 5 (D) 6

Answer

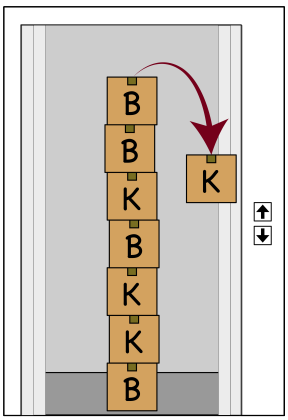
(D) 6

Explanation of Answer

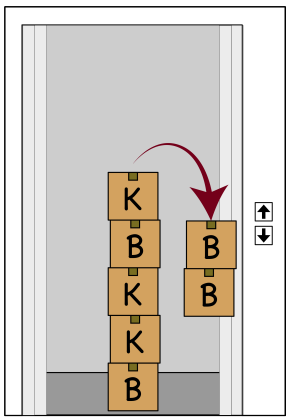
We show the boxes in the elevator after each stop.



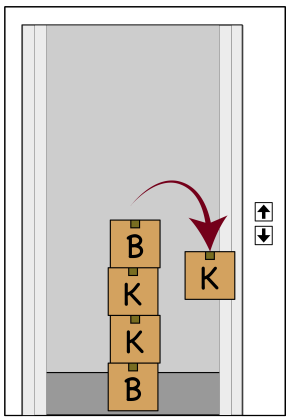
Start



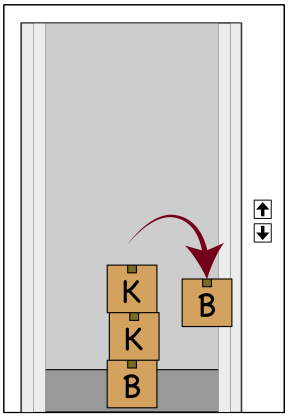
Stop 1: Kai takes 1 box.



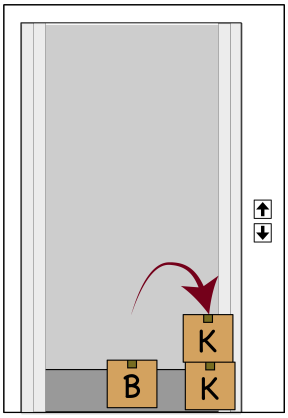
Stop 2: Biwako takes 2 boxes.



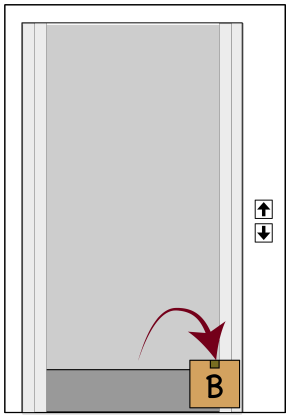
Stop 3: Kai takes 1 box.



Stop 4: Biwako takes 1 box.



Stop 5: Kai takes 2 boxes.

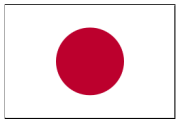


Stop 6: Biwako takes 1 box.

Therefore, the elevator stops a total of 6 times before all the boxes are taken.

Country of Original Author

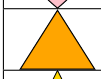
Japan



Banner Making

Story

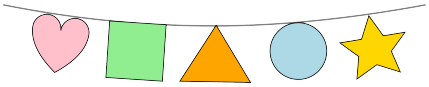
Beaver Arnie makes decorative banners using different shapes cut out of fabric. However he is very particular about the order of the shapes in the banner. In the following table, a ✓ between two shapes means they can be placed next to each other in a banner, and an X means they cannot be placed next to each other in a banner.

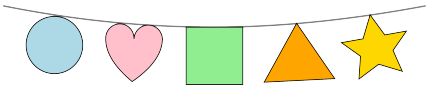
					
	X	X	✓	X	✓
	X	X	✓	✓	X
	✓	✓	X	X	X
	X	✓	X	X	✓
	✓	X	X	✓	X

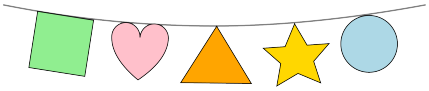
Question

Which of the following banners follows Beaver Arnie's rules?

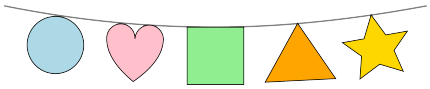
(A) 

(B) 

(C) 

(D) 

Answer

(C) 

Explanation of Answer

The banner in Option C follows all the rules in the table.

One reason that the banner in Option A does not follow the rules because the  is next to the  .

One reason that the banner in Option B does not follow the rules because the  is next to the  .

One reason that the banner in Option D does not follow the rules because the  is next to the  .

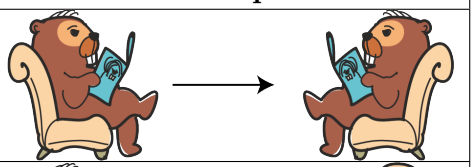
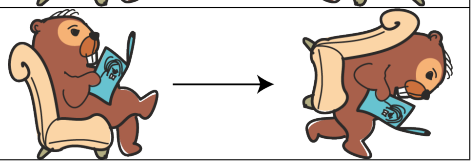
Country of Original Author

Armenia 

Transforming Photos

Story

Ximena is exploring a photo editing app on her phone. She transforms photos using the operations **M** and **R**, which are explained below.

Operation	Description	Example
M	Mirror reflection from left to right	
R	Rotation 90 degrees clockwise	

Ximena can also do multiple operations in a row. For example,

Now, Ximena starts with this photo: 

She then performs all of the following operations in order from left to right: **R R R R M R M**

Question

How will the photo look when Ximena is done performing all the operations?

(A) 

(B) 

(C) 

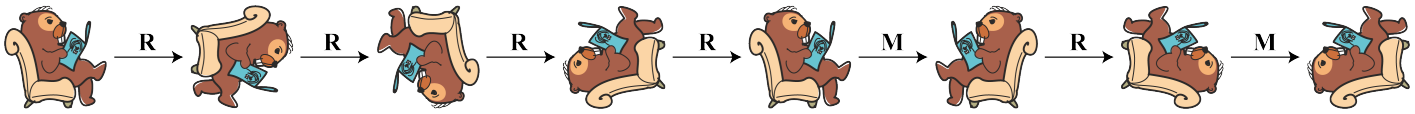
(D) 

Answer

(A) 

Explanation of Answer

The diagram below shows the photo before and after each operation.

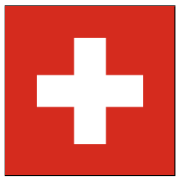


The photo in Option A is the final photo after Ximena is done performing all the operations.

As a shortcut, you might notice that four consecutive rotations result in the original photo, so we can ignore the first four **R** operations and do only the operations **M R M**.

Country of Original Author

Switzerland

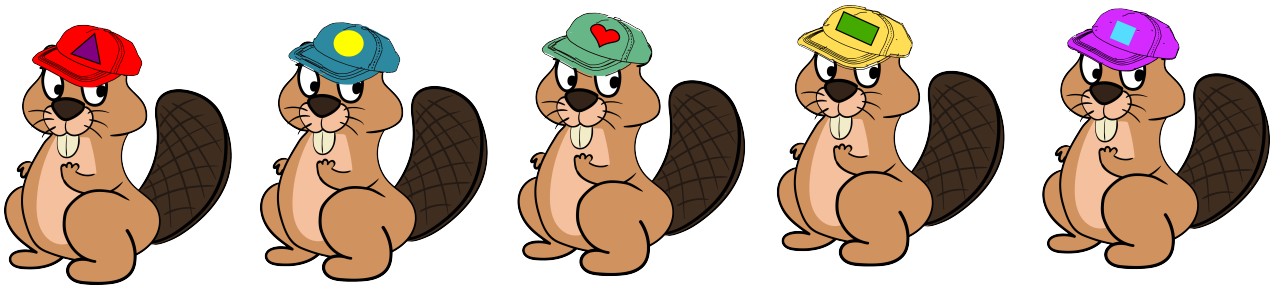


Part C

Beaver Race

Story

Five beavers ran a race. Each beaver wore a hat with a different symbol on it. One minute into the race, the beaver wearing  was in last place. The order of the five beavers at that time is shown below.



After that, exactly three changes in position occurred:

- First, the beaver wearing  moved forward two places.
- Next, the beaver wearing  moved forward one place.
- Finally, the beaver wearing  moved forward two places.

Question

Which hat was the beaver who finished the race last wearing?

(A) 

(B) 

(C) 

(D) 

Answer

(C) 

Explanation of Answer

We represent beavers by their hats.

We are given that one minute into the race, the order of the beavers from front to back was:

After the beaver wearing  moved forward two places, the order became:

After the beaver wearing  moved forward one place, the order became:

After the beaver wearing  moved forward two places, the order became:

Thus, the beaver wearing  finished the race last.

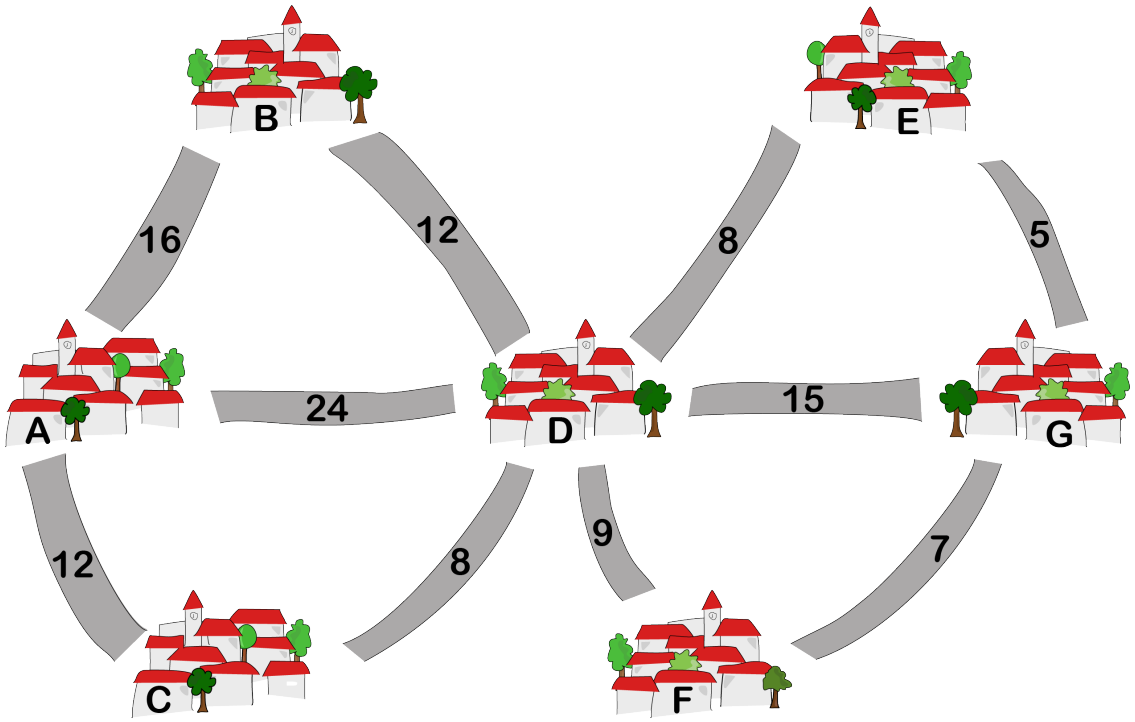
Country of Original Author

Croatia

Visiting Grandparents

Story

Adriana wants to travel to her grandparents house by bus. In the map shown, there are seven cities and the cost of a bus ticket between two cities is written on the road connecting them. Adriana lives in the city labelled A, while her grandparents live in the city labelled G.



Question

What is the least expensive total price for bus tickets from Adriana's city to her grandparents' city?

(A) 33 (B) 39 (C) 29 (D) 36

Answer

(A) 33

Explanation of Answer

Any route from A to G must pass through D, since there is no direct connection from A, B, or C to E, F, or G. So we can separate Adriana's journey into two parts: A to D and D to G.

For the first part from A to D, we have the following 3 options:

- $A \to D$, price: 24
- $A \to B \to D$, price: $16 + 12 = 28$
- $A \to C \to D$, price: $12 + 8 = 20$

Thus, the least expensive option is the route $A \to C \to D$ with a price of 20.

For the second part from D to G, we have the following 3 options:

- $D \to G$, price: 15
- $D \to E \to G$, price: $8 + 5 = 13$
- $D \to F \to G$, price: $9 + 7 = 16$

Thus, the least expensive option is the route $D \to E \to G$ with a price of 13.

Therefore, the least expensive total price for bus tickets from Adriana's city to her grandparents' city is $20 + 13 = 33$.

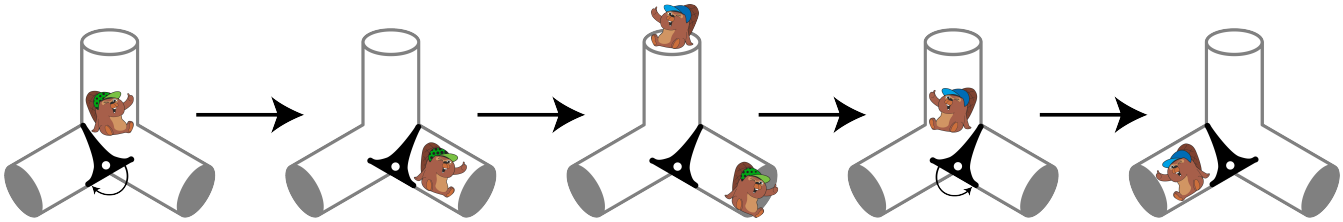
Country of Original Author

Macedonia

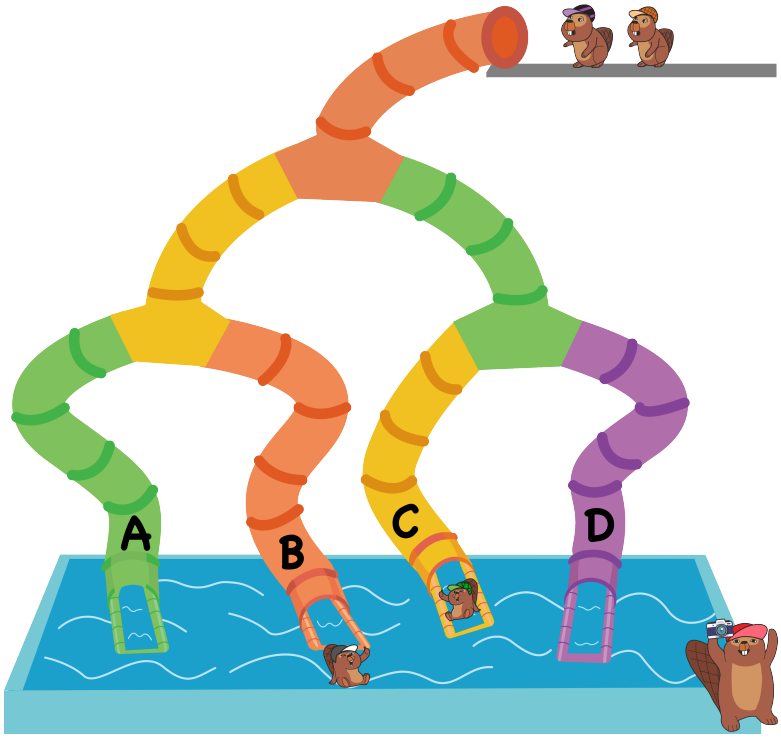
Exciting Water Slide

Story

A dynamic waterslide has three gates. When a beaver reaches a gate, the beaver is sent either left or right. This causes the gate to flip, sending the next beaver the other direction, as shown.



Little beaver Dan wants to try the waterslide. Mama beaver wants to know which slide Dan will come out of so that she can take a good picture. There were three beavers ahead of Dan. The first beaver came out of slide B and the second beaver came out of slide C, as shown.



Question

Which slide will Dan come out of?

(A) Slide A (B) Slide B (C) Slide C (D) Slide D

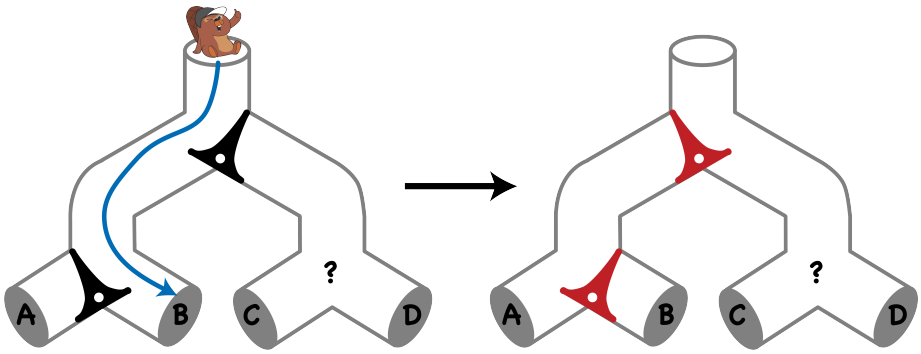
Answer

(D) Slide D

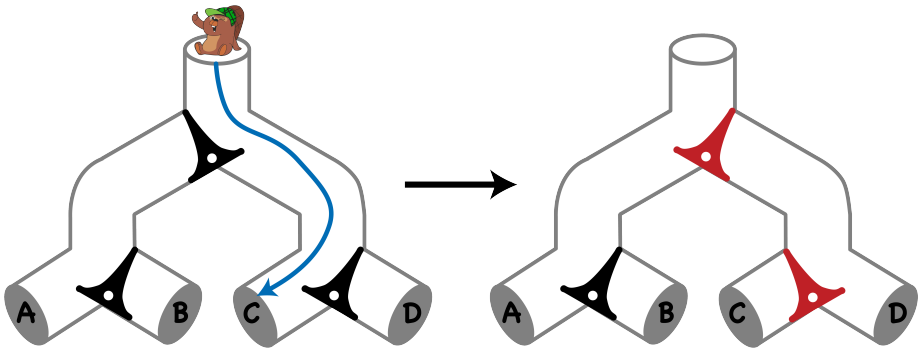
Explanation of Answer

Since a gate flips every time a beaver passes through it, we can determine the direction of the gates after the first two beavers pass. We note that there are three gates in total, but each beaver will pass through only two of them.

We know the first beaver came out of slide B. Thus, this beaver must have gone left at the first gate and right at the second gate. This tells us the initial direction of these two gates. After this beaver passes through the gates, their directions change, as shown. At this point, we have no information about the direction of the other gate.

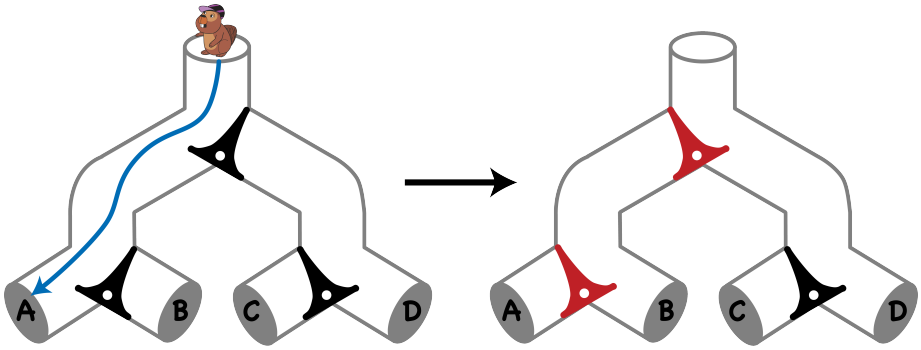


We know the second beaver came out of slide C. Thus, this beaver must have gone right at the first gate and left at the second gate. This tells us the initial direction of the last gate. After this beaver passes through the gates, their directions change, as shown.

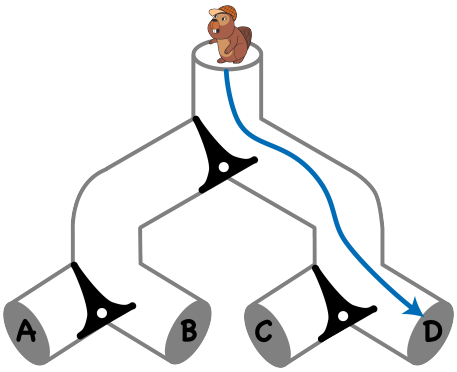


Explanation of Answer Continued

We now know the direction of all three gates, so we can determine that the third beaver will go left at the first gate and left at the second gate, to exit from slide A. After this beaver passes through the gates, their directions change, as shown.

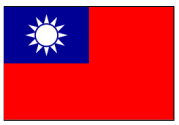


Since Dan is next in line, we can determine that he will go right at the first gate and right at the second gate, to exit from slide D, as shown.



Country of Original Author

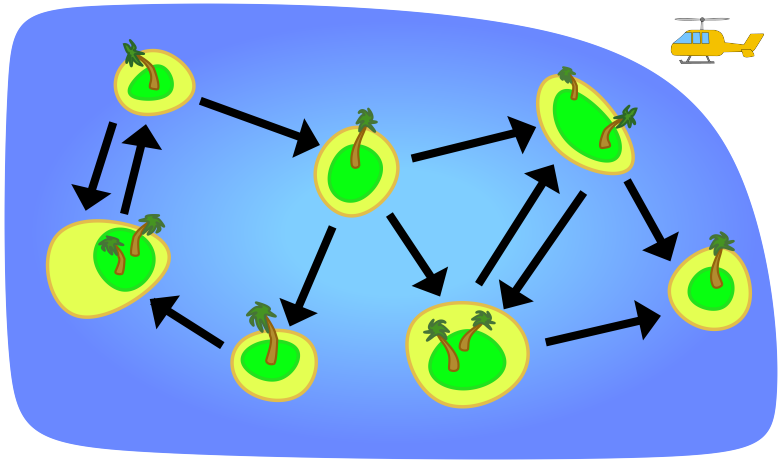
Taiwan



Research Expeditions

Story

A research team needs to investigate some islands. The map shows all seven islands they need to investigate as well as the ferry routes between islands. Arrows indicate the directions of the ferries.



During a research trip, the team lands by helicopter on an island of their choice, takes ferries to other islands, and returns to the original island where the helicopter is located. To visit every island at least once, it will take the team more than 1 research trip.

Question

What is the minimum number of research trips needed to visit every island at least once?

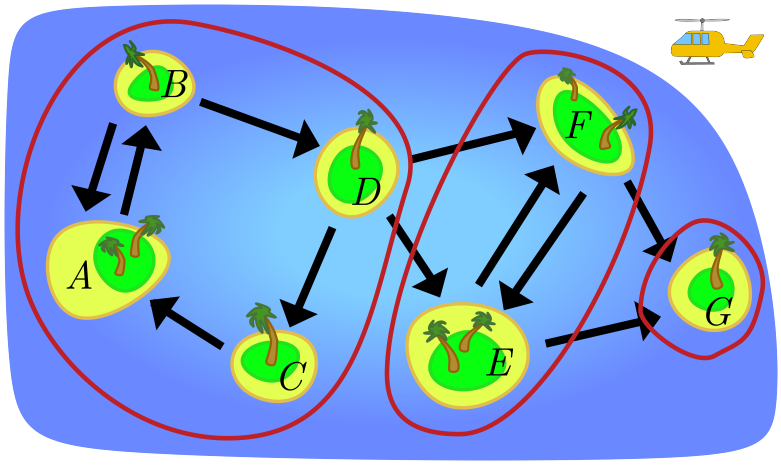
(A) 2 (B) 3 (C) 4 (D) 5

Answer

(B) 3

Explanation of Answer

It is possible for the team to visit every island at least once with 3 research trips. One way to do this is to group islands into 3 trips as shown below.



The trip containing islands A, B, C, and D can start on island B. The team can then take ferries in a clockwise order, visiting islands D, C, and A before returning to island B. The trip containing islands E and F can start on island F, then the team can ferry to island E and back. The other trip only requires visiting island G.

It is not possible for the team to visit every island at least once with fewer than 3 trips. To understand why, first notice that there are no ferries into the set of islands A, B, C and D. This means that at least one trip must remain within this set of four islands, otherwise the team will not be able to return to the island first visited on such a trip.

Next, notice that no ferries leave island G so because a trip must return to the first island visited on a trip, island G must be visited on its own as one separate trip.

We have shown that there must be at least two trips that do not visit islands E and F which means there must be at least 3 research trips in total if every island is visited at least once.

Country of Original Author

Austria