



UNIVERSITY OF
WATERLOO



The CENTRE for EDUCATION in
MATHEMATICS and COMPUTING



2025
*Beaver
Computing
Challenge
(Grades 7 & 8)*

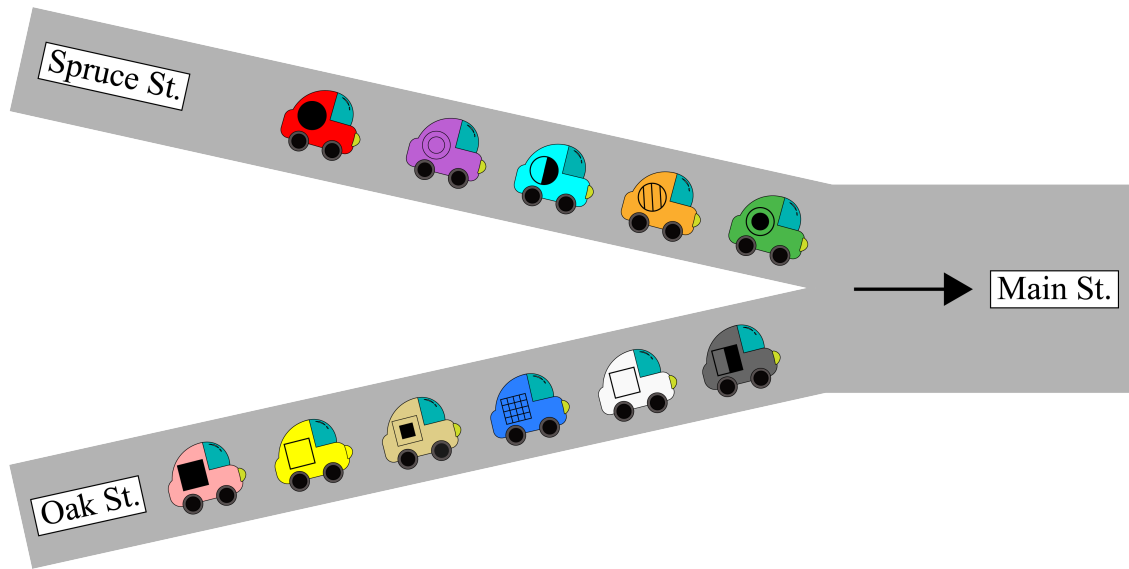
Questions

Part A


Merging Cars

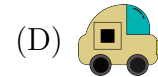
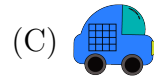
Story

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 ?

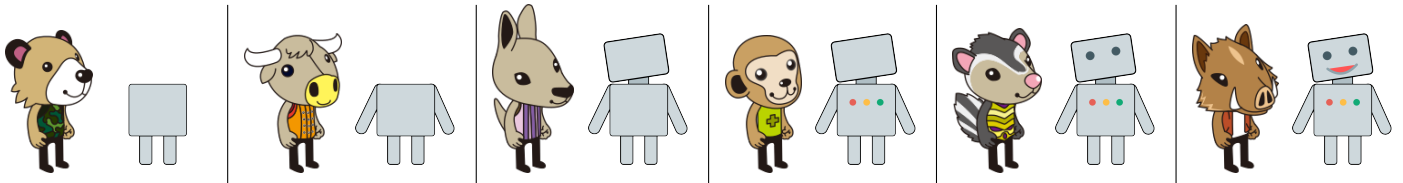


Robot Assembly

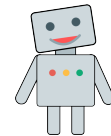
Story

Six animals work on a robot assembly line in order to make toy robots. Each animal has a job attaching certain pieces to certain locations of the robot.

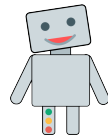
The following image shows what a robot is supposed to look like after each animal does its job.



At the end of the assembly line the toy robots are supposed to look like this:



However, the toy robots actually look like this:



Question

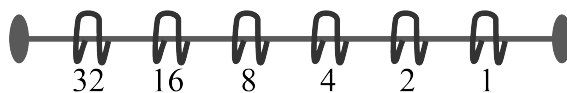
Which animal is not doing their job correctly?

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

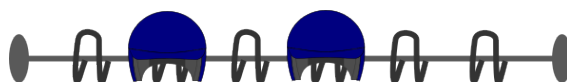
Scoreboard

Story

Two teams are playing baseball. To keep track of their score, each team uses helmets and a row of hooks. The rightmost hook represents a score of 1 and each other hook represents twice the value of the hook to its right, as shown.



Each hook can have at most one helmet, and the total score for a team is the sum of all the scores on the hooks with helmets. For example, the following row of hooks would represent a score of $16 + 4 = 20$.



Question

The final scores for the two teams are shown.



What is the difference between the two scores?

(A) 11





(B) 9

(C) 13

(D) 7

Snack Time

Story

Every afternoon, Lala eats one of four snacks: apple , pear , cookie , or cheese .

She follows two nutritional guidelines:






1. She never eats cookies two days in a row.
2. If she eats cheese one day, then the next day she eats either an apple or a pear.

Lala is planning the snacks that she will eat on five consecutive days.






Question

Which of the following plans matches Lala's guidelines?






(A)

Day	1	2	3	4	5
Snack					






(B)

Day	1	2	3	4	5
Snack					

(C)

Day	1	2	3	4	5
Snack					

(D)

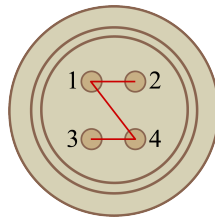
Day	1	2	3	4	5
Snack					

Sewing Buttons

Story

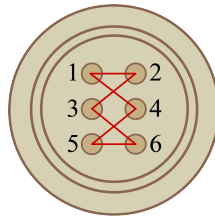
A programmable machine is used to sew decorative buttons on a blanket. Each hole in the button is assigned a number, and when the machine is sent a sequence of numbers, it sews thread along the holes in the order given in the sequence.

For example, if the machine receives the sequence 2 1 4 3, the thread will start at hole 2, then move to 1, then 4, and finish at 3, as shown.



Question

Which of the following sequences of numbers can be sent to the machine so that it sews thread as shown?



(A) 3 4 2 1 6 5 3

(B) 5 4 1 2 3 6 5

(C) 2 3 6 5 1 4 2

(D) 4 1 2 4 3 6 5

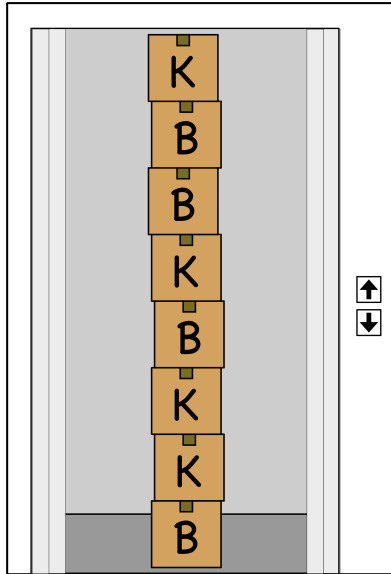
Part B

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

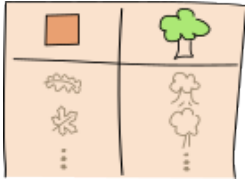
(C) 5

(D) 6

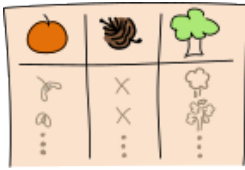
Beaver Timber

Story

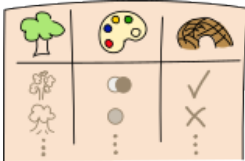
Emil's friends have each recorded different data about all the tree species in a forest. When Emil has a question while hiking in the forest, he knows he can call these friends to find the answer to his question.



Severin records the shape of the leaf for each tree species.



Quirina records the fruit as well as whether or not the tree has cones for each tree species.



Ladina records each tree species along with the colour of its bark and whether or not its wood is suitable for building a beaver lodge.

Question










Emil has found a leaf. He wants to know if it belongs to a tree species whose wood is suitable for building a beaver lodge. Which of his friends must he call?

- (A) Only Ladina
- (B) Only Severin and Quirina
- (C) Only Severin and Ladina
- (D) Severin, Quirina and Ladina

T-shirt Sorting

Story










Baasu works at a t-shirt factory. The t-shirts come in three different patterns: plain, dotted, or striped. For each pattern, there are three different colours: blue, yellow, or green. In total, there are nine different t-shirt choices, as shown:

Plain			Dotted			Striped		
								

Baasu has a machine that sorts t-shirts into three different boxes based on his daily instructions. For example, on Monday, he gave the following instructions:










If the pattern is plain or striped put it in Box 2. Otherwise, if the colour is green, put it in Box 3. Put any other t-shirts in Box 1.

The machine put the t-shirts into boxes as shown:

Box 1		Box 2						Box 3
								

Question

On Tuesday, Baasu wanted the t-shirts to be sorted as follows:

Box 1		Box 2				Box 3		
								

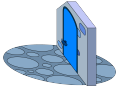
Which of the following instructions would give Baasu the desired result?

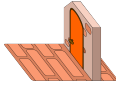
- (A) If the colour is yellow, put it in Box 1. Otherwise, if the pattern is plain, put it in Box 3. Put any other t-shirts in Box 2.
- (B) If the pattern is plain, put it in Box 3. Otherwise, if the colour is yellow, put it in Box 1. Put any other t-shirts in Box 2.
- (C) If the colour is blue or green, put it in Box 2. Otherwise, if the pattern is plain, put it in Box 3. Put any other t-shirts in Box 1.
- (D) If the pattern is not plain and the colour is yellow, put it in Box 1. Otherwise, if the colour is not yellow, put it in Box 2. Put any other t-shirts in Box 3.

Beaver Gates

Story

Gates are placed on two types of platforms.

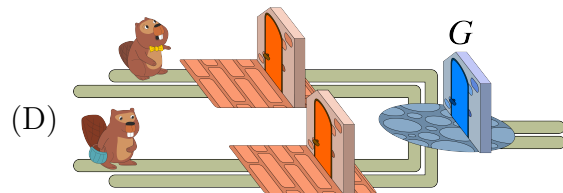
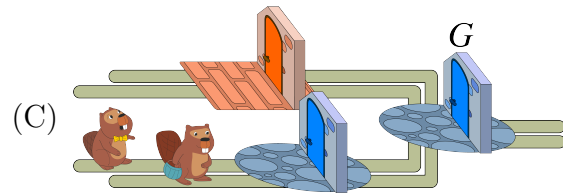
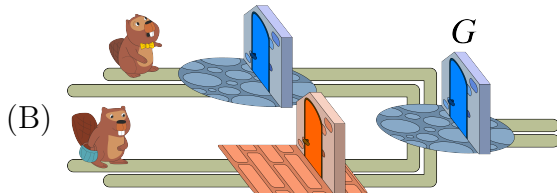
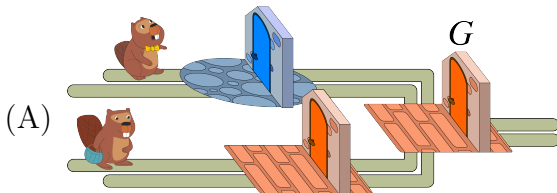
A gate on a circle platform  will only open if there are at least two beavers standing on the circle platform.

A gate on a square platform  will only open if there is at least one beaver standing on the square platform.

Beavers walk along marked paths until they reach a platform. If the gate doesn't open, they wait on the platform. If the gate opens, then all beavers standing on the platform go through the gate and continue walking along the marked paths.

Question

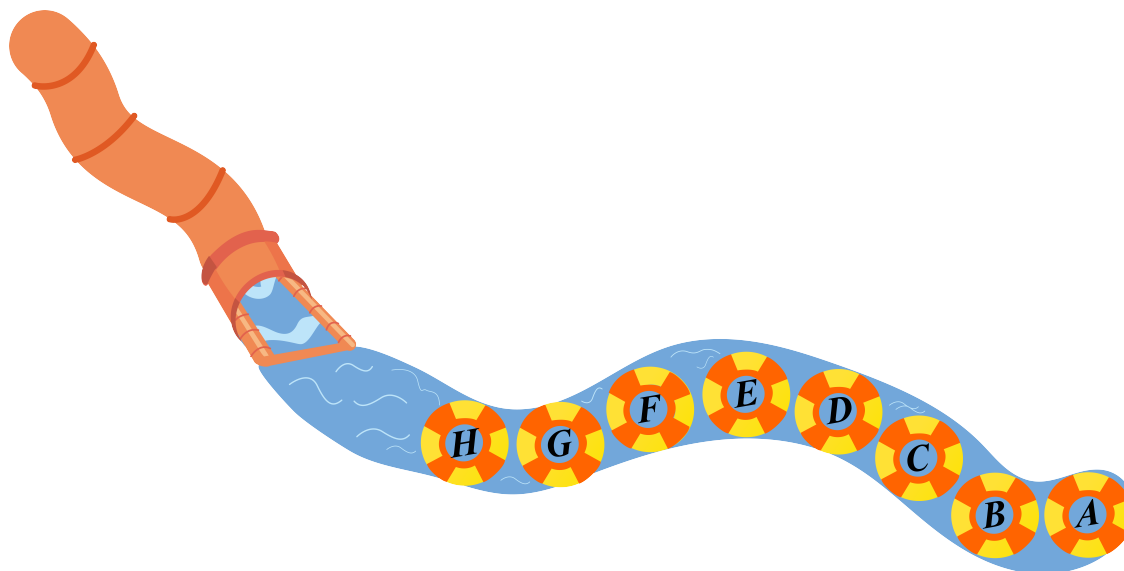
In which situation will the gate labelled G stay closed?



Inner Tubes

Story

After being used on a water slide, inner tubes float in a lazy river and gather in a line as shown.



When an inner tube is pulled out of the water for someone's next ride, each inner tube behind it floats one position downstream (farther from the slide) to fill the gap.

For example, if someone pulls out inner tube F , the two inner tubes G and H float one position downstream. If someone pulls out inner tube A after this, then all six remaining inner tubes will float one position downstream. In this case, the total number of times that an inner tube floats one position downstream is $2 + 6 = 8$.

Question

Eight inner tubes gather as shown above. Then five inner tubes are pulled out of the water in the order B , G , E , D , H . What is the total number of times that an inner tube floats one position downstream?

- (A) 10 (B) 11 (C) 12 (D) 13

Part C

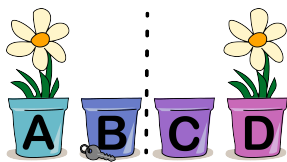
Flower Pots

Story

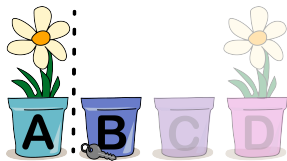
A beaver places a row of flower pots by their front door. They hide a key for their friend under one of the pots and then plant one flower in some of the pots so that their friend can find the key using the following instructions:

“If the total number of flowers is even, the key is hidden in the left half of the pots; otherwise, it is hidden in the right half of the pots. Now consider only the half of the pots where the key is hidden. Repeat these steps until you look at only one pot. That’s where the key is hidden.”

For example, if there are four pots as shown and the key is hidden in pot *B*, this is how a friend can find the key:



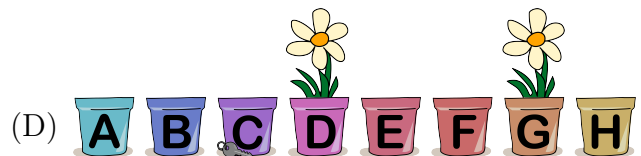
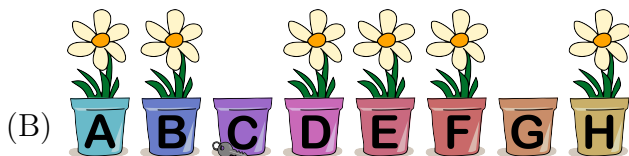
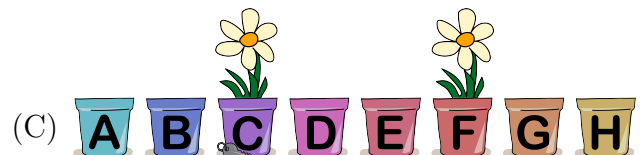
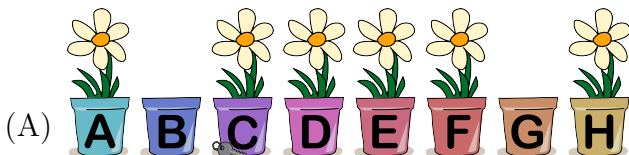
Look at pots *A*, *B*, *C* and *D*. They contain 2 flowers. Since 2 is **even**, the key is hidden in the **left** half: pots *A* and *B*.



Look at pots *A* and *B*. They contain 1 flower. Since 1 is **odd**, the key is hidden in the **right** half: pot *B*.




Question

If there are eight pots labelled *A* to *H* and the beaver hides the key under pot *C*, which of the following rows of pots would guide their friend to find the key?

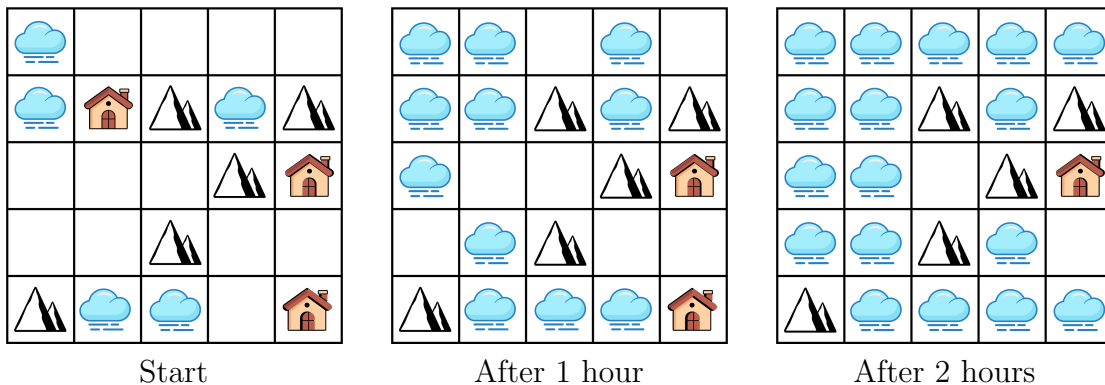


Foggy Day

Story

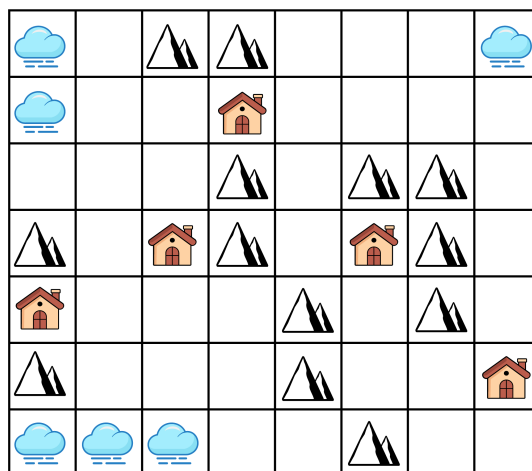
It is a very foggy day on Bebrasland and the fog coverage is expanding. The map of Bebrasland is divided into a grid of squares. Some squares contain mountains  or houses . The fog  starts in certain squares and each hour the fog expands to cover the four neighbouring squares (to the left, right, above, and below), except for any neighbouring squares that contain mountains. When the fog covers a house it can no longer be seen.

For example, the following maps show how the fog expands in an area of Bebrasland over 2 hours.



Question

The following area of Bebrasland shows the starting positions of the fog. How many hours will it take for the fog to cover all of the houses in the area?



(A) 6

(B) 7

(C) 8

(D) 9

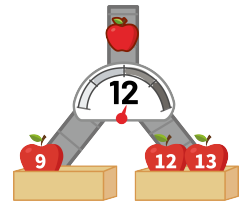
Apple Classification

Story

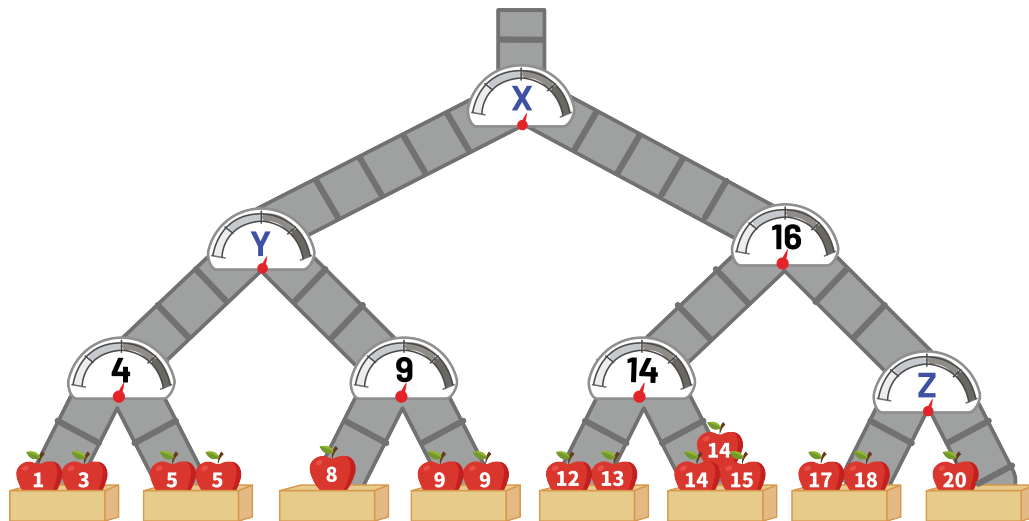
At Beaver Orchard, a machine sorts apples into eight weight-based grades, with apples of the same grade sent to the same packaging area.

Apples are fed into the top of the machine, move through different chutes, and land in one of eight bins at the bottom of the machine. As each apple moves through the machine, it passes weight sensors that determine its path through the chutes. If the weight of an apple is greater than or equal to the sensor's value, then the apple will drop through the right chute; otherwise, it will drop through the left chute.

For example, the given diagram shows the result when apples of weights 9, 12, and 13 pass through a sensor of value 12. The apple of weight 9 will drop through the left chute, while the apples of weights 12 and 13 will drop through the right chute.



The machine has already sorted some apples and the results are shown in the following diagram. The displays on the weight sensors labelled X, Y, and Z are broken and so do not show these sensors' values.



Question

Which of the following are possible values for the weight sensors labelled X, Y, and Z?

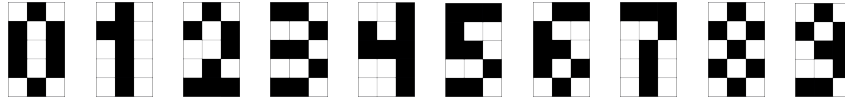
- (A)
- (B)

- (C)
- (D)

Masked Coordinates

Story

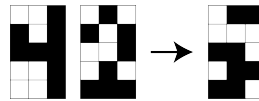
Gemma draws each of the digits 0 through 9 on separate 5×3 grids as shown:



Gemma then invents a way to represent two-digit numbers. She combines the grids for each of the digits in a two-digit number into one new 5×3 grid following this rule:

A square in the new grid is black when exactly one of the two corresponding squares in the original grids is black. Otherwise the square is white.

For example, Gemma's representation of her favourite two-digit number, 42, is shown.



Question

Gemma represented a different two-digit number in the same way and produced the following:



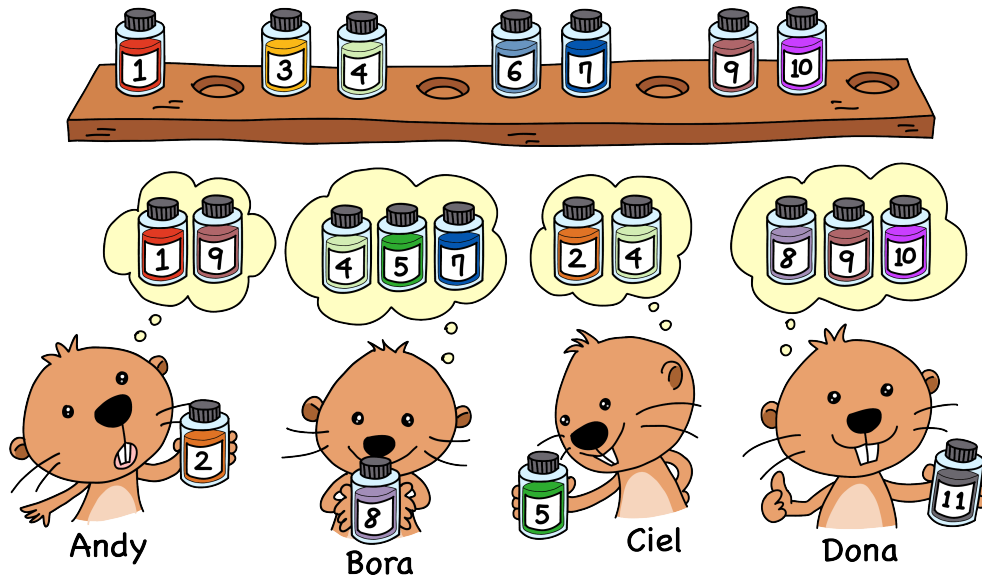
Which of the following two-digit numbers could Gemma have represented?

- (A) 20 (B) 35 (C) 59 (D) 62

Sand Painting

Story

Beavers Andy, Bora, Ciel, and Dona are each making a sand painting. They share eleven numbered jars, each containing a different colour of sand. In the picture, each beaver is holding one of the jars they need for their sand painting, and the clouds above their heads show the other jars they need.



Two beavers cannot use the same jar at the same time. Also a beaver cannot start their sand painting until they have all the jars they need. Each beaver waits until all the jars they need are available, then they take them all and do their sand painting. When they are finished they return all their jars so others can use them.

Question

Which beaver does their sand painting last?

- (A) Andy (B) Bora (C) Ciel (D) Dona