UNIVERSITY OF WATERLOO

The CENTRE for EDUCATION in MATHEMATICS and COMPUTING

2025 Beaver Computing Challenge (Grades 9 & 10)

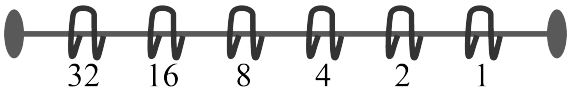
Questions

Part A

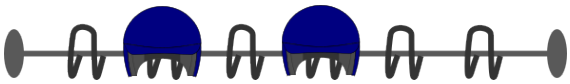
Scoreboard

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.

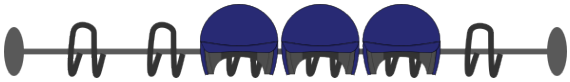


Each hook can have at most one helmet, and the total score for a team is the sum of all the scores on the hooks with helmets. For example, the following row of hooks would represent a score of $16 + 4 = 20$.



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

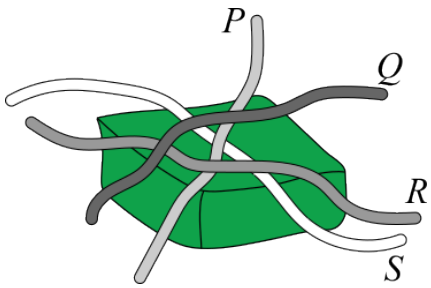
Chung Cake

Story

Banh Chung is a traditional rice cake dish eaten in Vietnam to celebrate the Lunar New Year. These rice cakes are cut using strings placed on the cake one at a time and in different directions.

Question

In what order were the four strings placed on the rice cake shown below?



(A) S, P, Q, R (B) Q, S, P, R (C) R, P, S, Q (D) S, P, R, Q

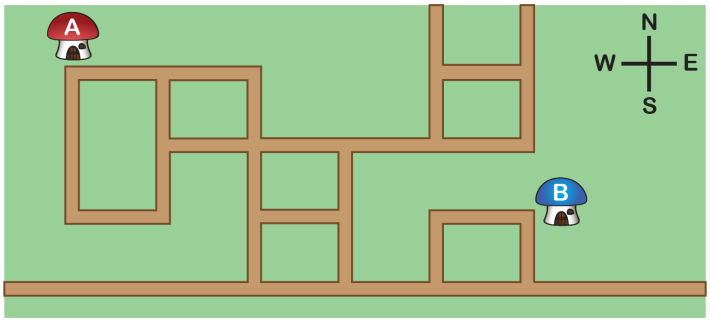
A Wrong Step

Story

Aira is walking from her house 

to her friend Bo's house 

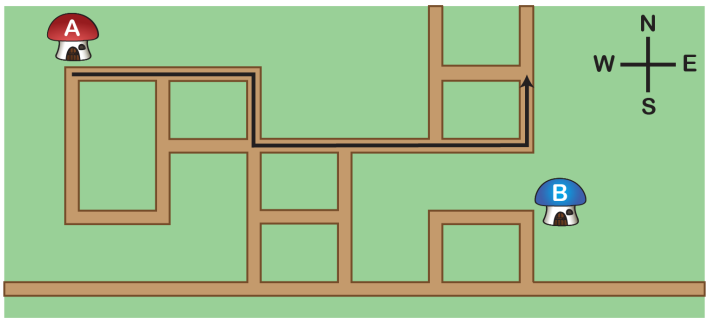
for the first time. A map of the streets between their houses is shown. All streets go either east/west or north/south.



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

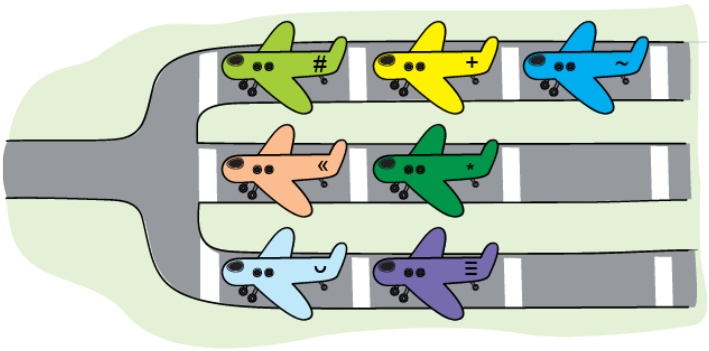
Which step did Aira **not** follow correctly?

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

Planes

Story

Seven planes are lined up for take-off using a single shared runway. A plane cannot take off if there is a plane waiting directly in front of it.



The following table shows the take-off schedule, but some of the planes are missing from the schedule.

Time	**10:45**	**10:52**	**10:55**	**10:59**	**11:03**	**11:10**	**11:16**
Plane							

Question

If all the planes take off as scheduled, which plane takes off at 11:03?

(A) 

(B) 

(C) 

(D) 

Favourite Fruit

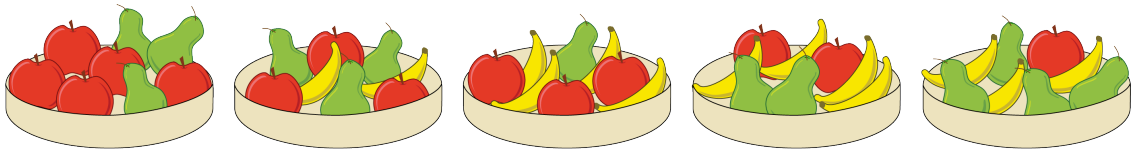
Story

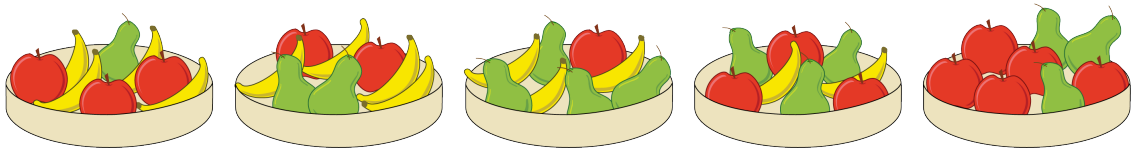
Apples, bananas and pears are placed in five baskets so that each basket has eight pieces of fruit.

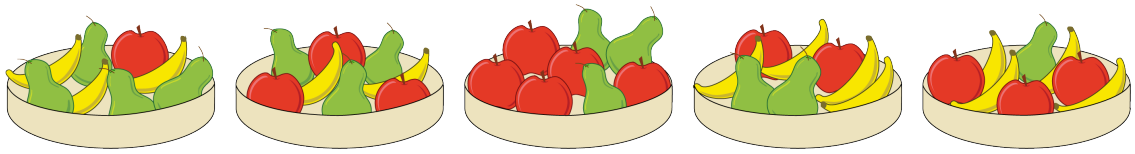
Given any two baskets, Blake always prefers the basket with more apples. If two baskets have the same number of apples, then Blake prefers the basket with more bananas.

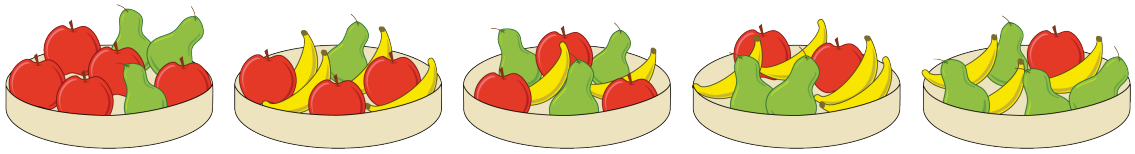
Question

Which of the following shows the five baskets ordered from Blake's most preferred to least preferred from left to right?

(A) 

(B) 

(C) 

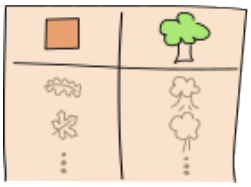
(D) 

Part B

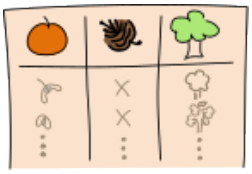
Beaver Timber

Story

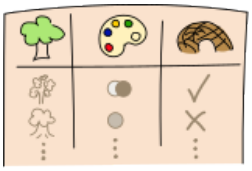
Emil's friends have each recorded different data about all the tree species in a forest. When Emil has a question while hiking in the forest, he knows he can call these friends to find the answer to his question.



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

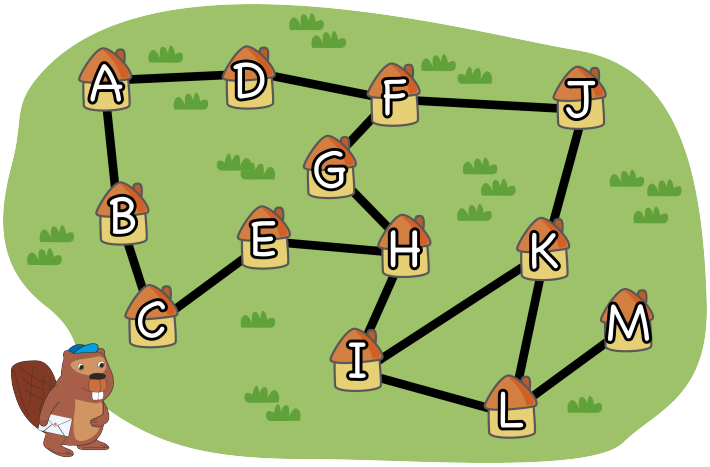
(C) Only Severin and Ladina

(D) Severin, Quirina and Ladina

Beaver Island Broadcast

Story

There are 13 villages on Beaver Island connected by roads, as shown.



Messages are delivered between villages regularly. After a message is sent from one village, it takes one day to reach its immediate neighbours.

If a village wants to broadcast a message to the entire island, they first send the message to all their immediate neighbours. Then each village who receives the message sends it on to their immediate neighbours the same day. This continues until all villages have received the message.

For example, if Village B broadcasts a message, it takes 1 day to reach Villages A and C, and 2 days to reach villages D and E.

Question

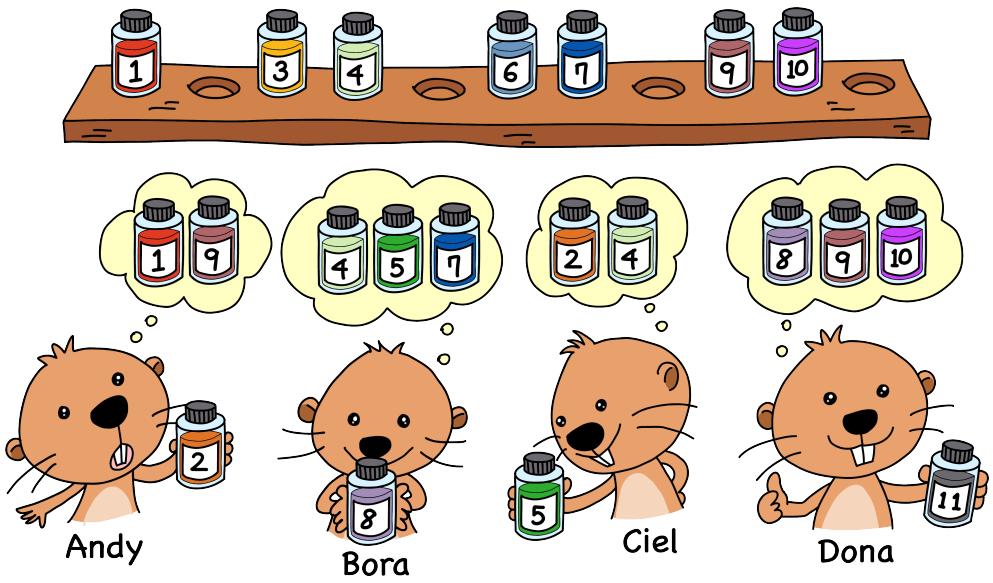
If Village H broadcasts a message, how many days will it take for the message to reach all the villages?

(A) 3 (B) 4 (C) 5 (D) 6

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

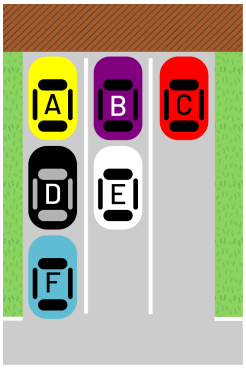
Parking at the Party

Story

Mia's friends drive to her house to attend parties. Her driveway can fit nine cars parked in three columns with three cars in each column, one behind the other.

When a friend arrives, they park at the front of a column or directly behind another car. A friend cannot leave the party until all the cars behind them in their column have left.

For example, given the six parked cars shown below, Car A must have arrived before both Cars D and F. Also, Car E must leave before Car B.



Question

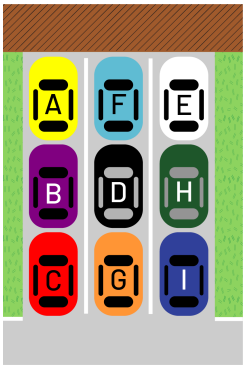
For another party, cars arrive in the order

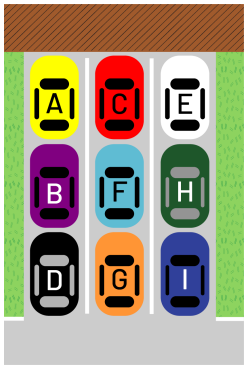
$$A, B, C, D, E, F, G, H, I$$

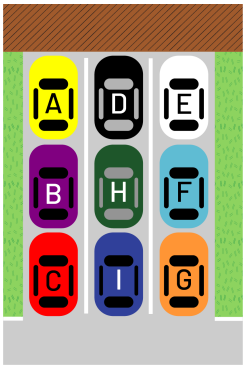
and leave in the order

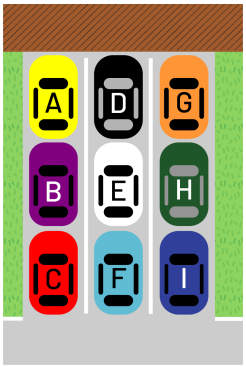
$$G, D, F, I, H, C, B, A, E.$$

Which of the following could have been how these cars parked in Mia's driveway?

(A)


(B)


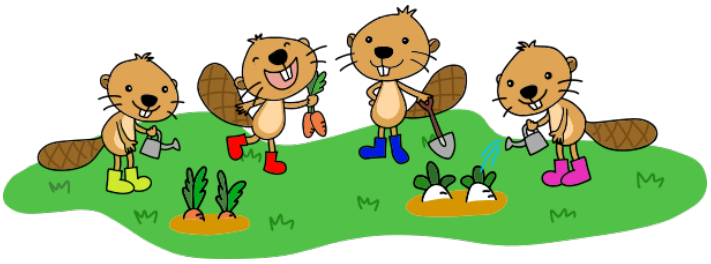
(C)


(D)


Dure

Story

Villagers follow a Korean agricultural cooperative tradition called *dure*.



The villagers need to choose three dure farming days per week, according to the following rules:

1. Each dure farming day must have at least four villagers participating.
2. Each villager must participate in at least one dure farming day per week.
3. No villager can participate in all three dure farming days in a week.

In the following table, each villager has put a checkmark (✓) under the days they're available for dure.

Name	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Ain	✓		✓		✓	✓	
Boa	✓	✓	✓				
Chaewon		✓			✓		
Doyun			✓	✓		✓	
Eunwoo	✓			✓			✓
Felix		✓		✓		✓	
Gaon	✓		✓				✓
Hana		✓			✓	✓	

Question

Which days should the villagers choose for their dure farming days?

(A) Monday, Tuesday, Wednesday

(B) Monday, Tuesday, Saturday

(C) Tuesday, Wednesday, Thursday

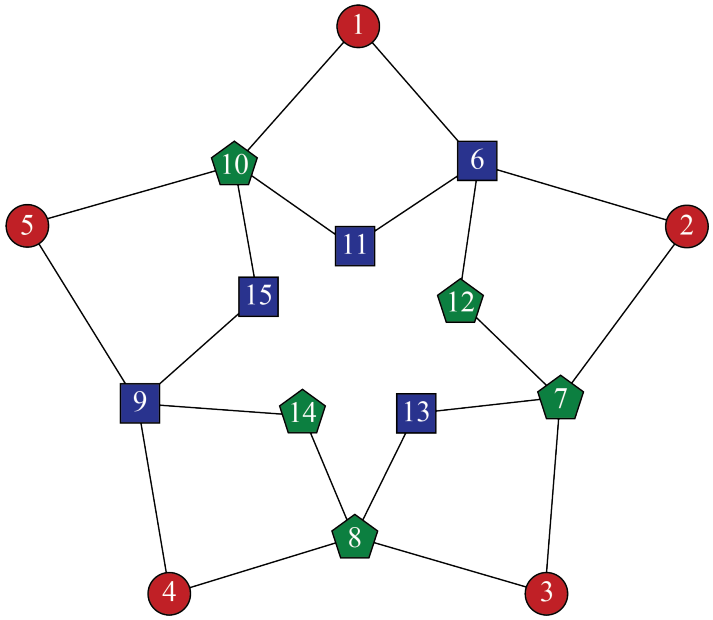
(D) Tuesday, Wednesday, Saturday

Part C

Lights

Story

Sofia has 15 programmable lights of three types (●, ■, and ⬟). She numbers them from 1 to 15 and connects them in a star shape as shown.



Each ● light is controlled with a switch and Sofia programs the other lights as follows:

- Each ■ light turns on if the two lower-numbered lights connected to it are **both** on.
- Each ⬟ light turns on if **exactly one** of the two lower-numbered lights connected to it is on. In other words, one of these lower-numbered lights is on but the other is not.

Question

All the lights are off and then Sofia turns on lights 1, 2, and 4 at the same time. Which of the five lights closest to the centre (lights 11, 12, 13, 14, and 15) will turn on?

(A) Lights 11, 12, 13, 14, and 15

(B) Only lights 12, 13, and 15

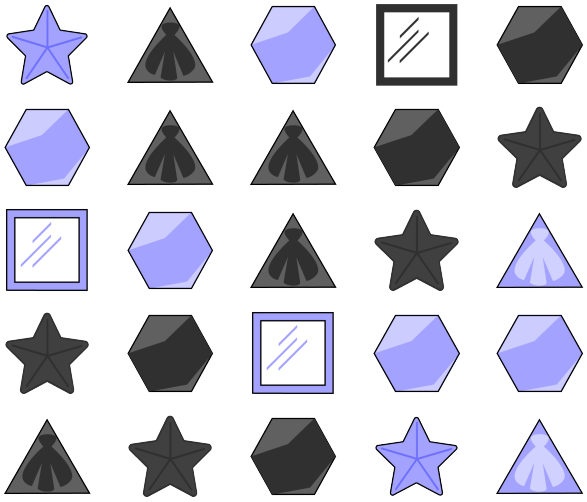
(C) Only lights 11, 12, 13, and 14

(D) Only lights 11, 13, and 14

Mosaic

Story

The arrangement below uses light purple and dark grey shapes. Each shape has 3, 4, 5, or 6 outer points.



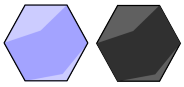
A grumpy beaver didn't like the arrangement above. So, at two locations it removed the shape and then replaced it with a different shape. After doing this, every row and every column had:

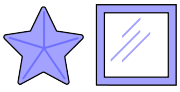
- an odd number of light purple shapes, and
- an odd number of total outer points.

Question

Which of the following two new shapes might the beaver have used?

(A) 

(B) 

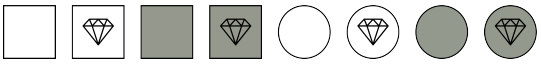
(C) 

(D) 

Third Game

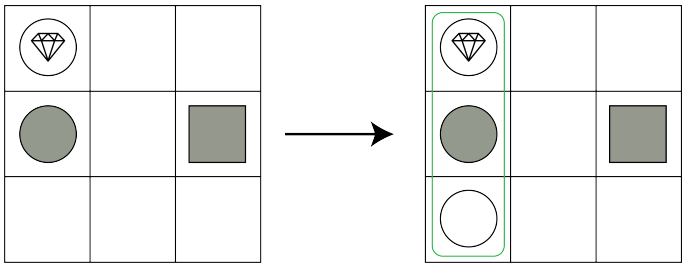
Story

Beavers Anna and Bento are playing a two-player game called Third. The game is played on a 3×3 board using a total of eight pieces. Each piece has three defining attributes: shape (square or circle), colour (grey or white), and marking (diamond or plain). The eight pieces are shown.



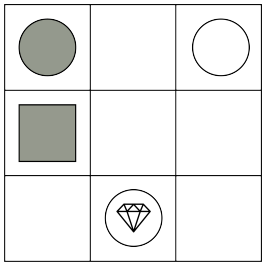
The game begins with an empty board. The two players take turns placing pieces on the board, however, each piece is selected by their opponent (from the pieces not currently on the board). The player then places this piece on any available square on the board. The winner is the first player to place the third piece in a row or a column so that all three pieces have the same colour, shape, or marking.

For example, suppose the game board is as shown, and Bento chooses the ◯ piece for Anna. If she places this piece in the bottom-left corner, then she will win the game because she will have placed the third piece in a column with all circles.

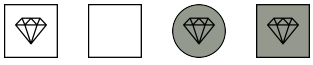


Question

Bento and Anna are playing Third and after each player has placed two pieces, the board is as shown.



It is now Bento's turn. How many of the following four pieces could Anna select for Bento if she wants to ensure that Bento **cannot** win the game on his turn?



(A) 0 (B) 1 (C) 2 (D) 3

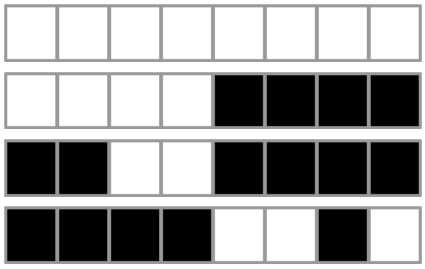
Describing Sequences

Story

Sarah has a very specific procedure for describing sequences of black and white squares:

- If all the squares of a sequence are white, she writes **W** to describe the sequence.
- If all the squares of a sequence are black, she writes **B** to describe the sequence.
- Otherwise, to describe the sequence, she writes **X**, and then
  - follows her procedure for describing the left half of the sequence, and after it is complete,
  - follows her procedure for describing the right half of the sequence.

Below are four examples of sequences and what Sarah writes to describe each of them using her procedure.



W

XWB

XXBWB

XBXWXBW

Question

What does Sarah write when using her procedure to describe the following sequence?

(A) **XXXWBWXBXBW**

(B) **XXXWBXWWXXBBXBW**

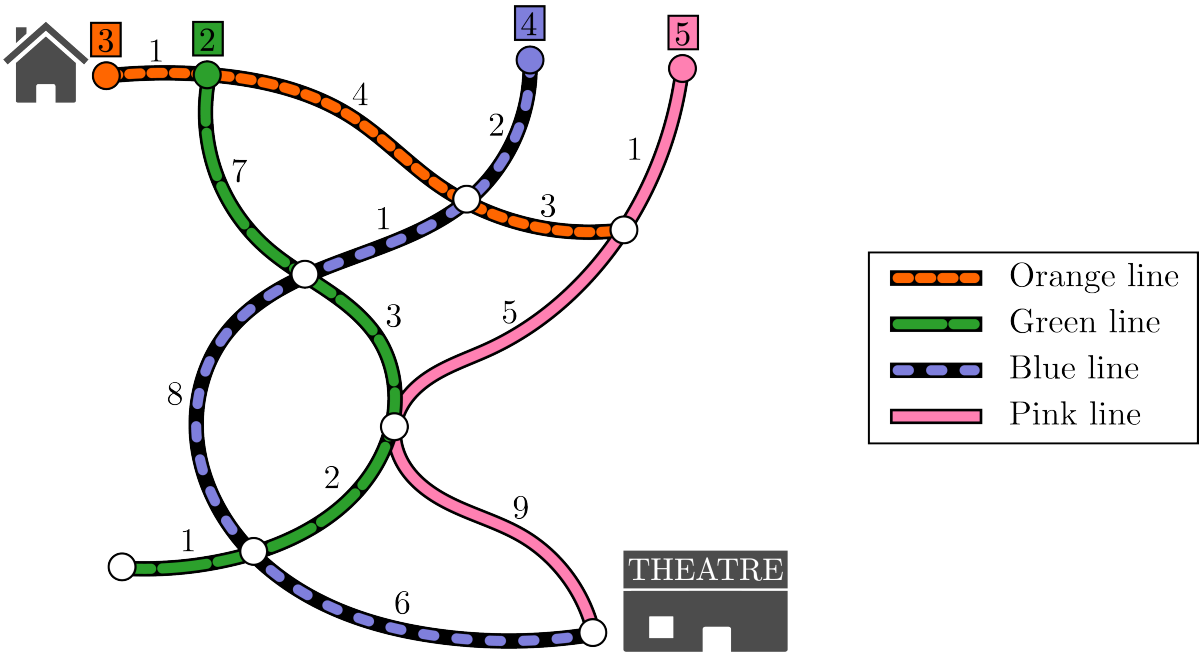
(C) **XWBWXBBW**

(D) **XXXBWBXWXWB**

Public Transport

Story

Marcus wants to go from his home to the theatre by bus. The following map shows Marcus's home, the theatre, and four bus lines with circles representing bus stops.



Each bus departs from the top of the map. The first bus on each of the four lines departs at the same time. After that, buses depart on each line at the time intervals shown in the squares. For example, a bus departs on the orange line leaving Marcus's home every 3 minutes.

Each line segment between two bus stops is labeled with the number of minutes it takes to travel between the two stops. For simplicity, assume that stopping at a bus stop to load and unload passengers takes no time (0 minutes).

Stops with two or more bus lines intersecting can be used to change buses. If Marcus arrives at an intersection point, he can change to a bus that arrives there at the same time or later.

Question

If Marcus departs his home on the first bus on the orange line, what is the shortest time, in minutes, needed for him to reach the theatre?

(A) 18 (B) 19 (C) 20 (D) 21