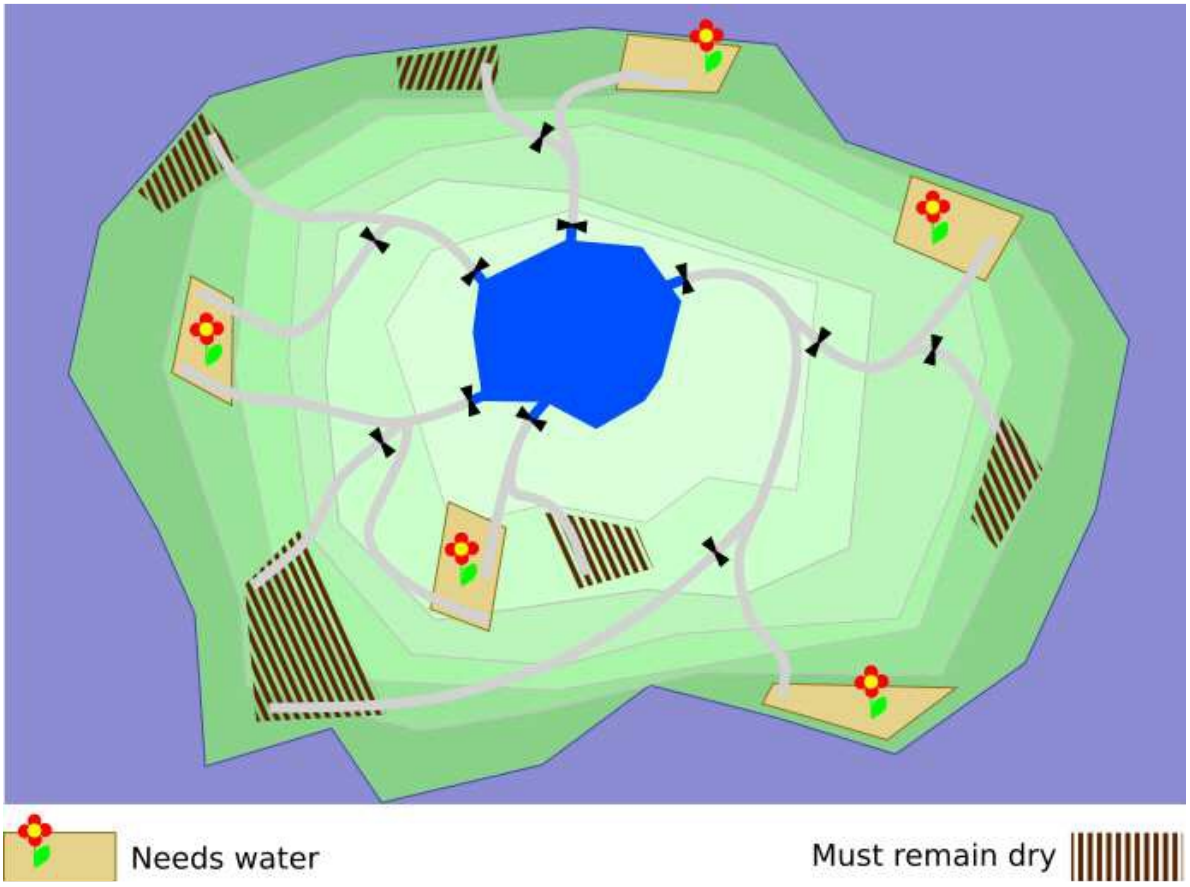
Tasks T1 – T10 carry 3 points each

T1: Beaver Dam

Family Birchtree needs to water their fields. Only the fields with flowers need to be watered. It is possible to open or close a black gate. If it is open, water will flow through the canal to the fields (from the lake at the top of the mountain to the bottom).



Question

Initially all the black gates are closed. How many black gates do you need to open to water **only** the fields with flowers?

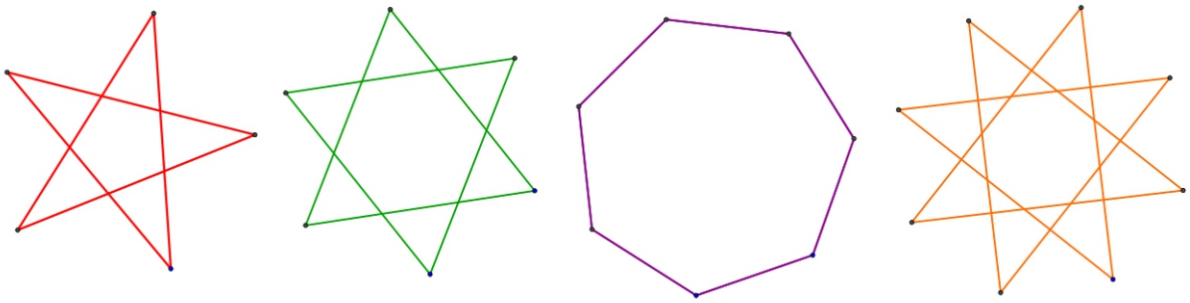
A) 2 Dams have to be opened to complete this task.
B) 3 Dams have to be opened to complete this task.
C) 4 Dams have to be opened to complete this task.
D) 5 Dams have to be opened to complete this task.

T2: Drawing stars

Stella Beaver loves to draw stars. She has devised a system for labelling her stars according to their shape. For that, she uses two numbers:

- The number of vertices of the star.
- The "*length*" of each line drawn from a vertex: If the line goes to the closest vertex, the length is one. If it goes to the second-closest vertex, the length is two, etc.

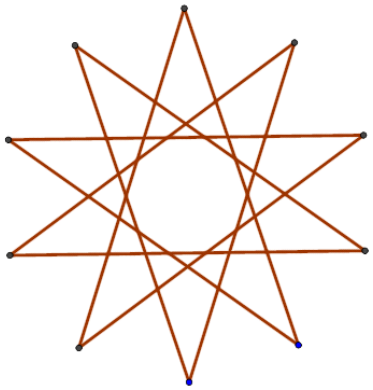
Here are four examples of Stella's labelling system:



5:2 **6:2** **7:1** **8:3**

Question

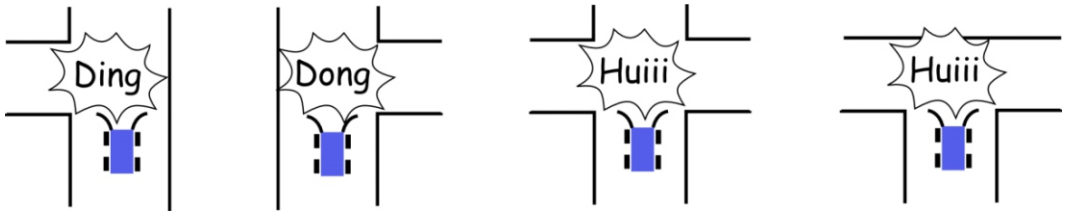
What would Stella call the following star?



A) 9:3 **B)** 9:4
C) 10:4 **D)** 10:5

T3: Robotic Car

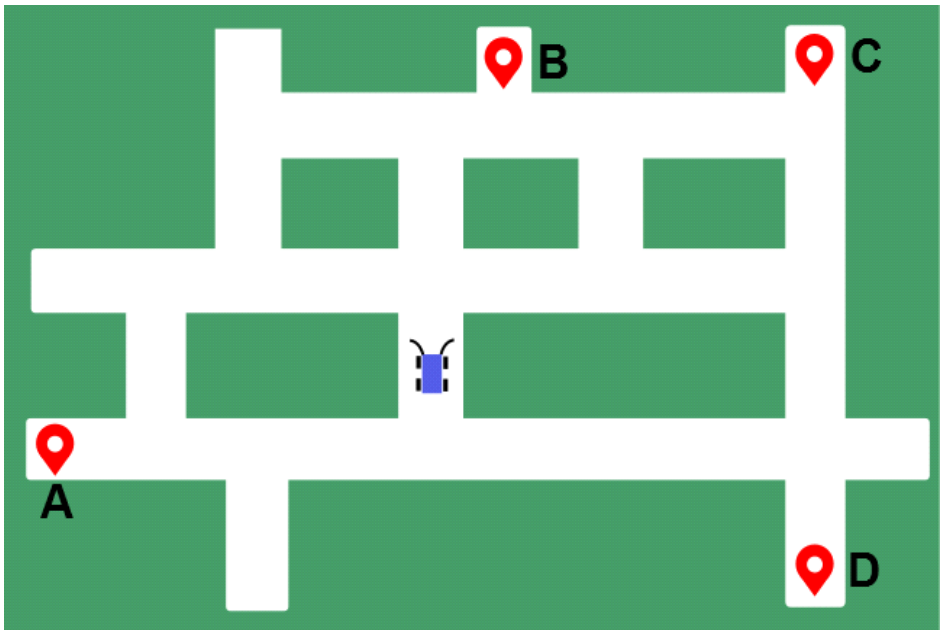
Beavers have developed a robotic car that can be driven by a blind person. It has sensors that detect junctions. It produces the sounds shown below, when it is possible to turn left, right or both directions.



The robotic car cannot make U-turns and cannot reverse. It automatically stops, when it senses an obstacle in front of it. When it is possible to go straight, or turn either left or right, it may take any of these actions, but we don't know which one in advance.

Question

Anna drives the robotic car. It produces the sounds:
Huiii Ding Huiii Dong.

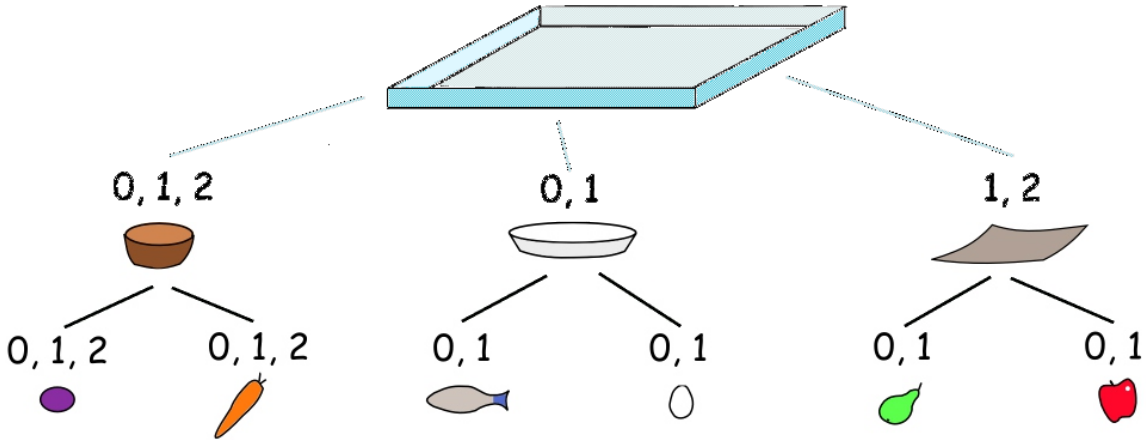


At which location does the car stop?

A) A
B) B
C) C
D) D

T4: Beaver Lunch

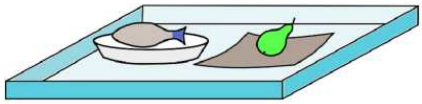
Hm, what to take for lunch today? The cafeteria gives a recommendation on how to compose a Beaver lunch. This recommendation is shown as a diagram: On the tray different types of food container. The numbers indicate how many container of this type you may take. On each container you may put only food items which are depicted below the image of this container. The numbers indicate how many food items of this type you may put on one container of this type.



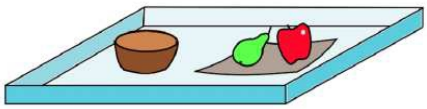
Question

Which one of the following is **not** a beaver lunch according to the diagram?

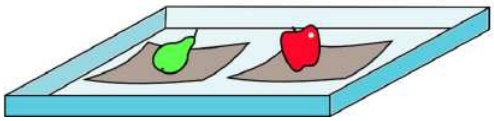
A)



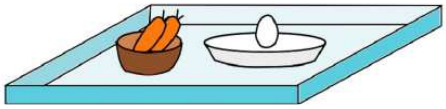
B)



C)



D)



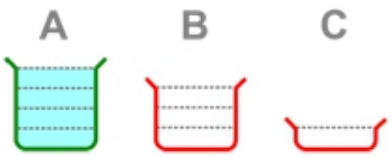
T5: Fair Share

Hamid and Kazim meet in the middle of a desert. Hamid has a jar full with 4 liters of water. Kazim has two empty jars, which may be filled with 3 liters and 1 liter, respectively. Hamid is willing to equally share his water with Kazim.

They can pour water from one jar to another until the latter is full or the former is empty (whatever happens first). For instance, when they do a "pour" A→B from Hamid's full 4-liter jar A to Kazim's empty 3-liter jar B, the result is: 1 liter remains in A, and B is full.

Now, Hamid and Kazim are looking for a sequence of pours that will result in an equal share of water between Hamid and Kazim. Because water may be lost with each pour, they want to do as few pours as possible.

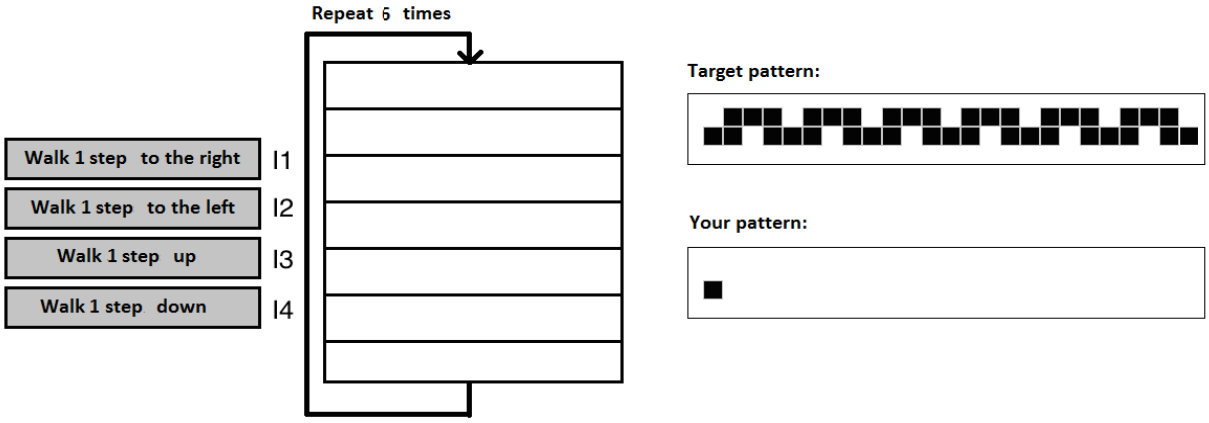
Tell Hamid and Kazim which pours to make.
Below, you see Hamid's jar (named A), and Kazim's jars (named B and C).



Question:
Which of the following pours results in an equal share of water?

A) A→B, B→C, C→A
B) A→B, B→A, C→A
C) A→C, C→B, B→A
D) A→B, C→A, B→C

T6: Copy a pattern
In the image below you are shown a target pattern that you can create by repeating six times a sequence of instructions.



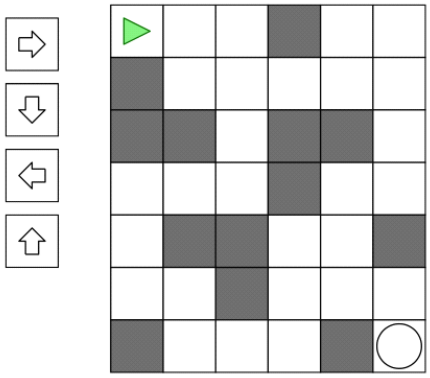
Question
Choose the sequence of instructions that you need to put into the empty boxes in order to draw the target pattern:

A) I1, I1, I3, I1, I4, I1
B) I3, I1, I1, I1, I4, I1
C) I1, I3, I1, I1, I4, I1
D) I1, I1, I4, I2, I3, I1

T7: Placing Arrows

We have a robot that tries to reach a goal (a circle) in a maze. The robot moves straight ahead if possible. If the robot is blocked by a wall (grey cell) in front of it or if reaches the edge of the maze, it turns right.

When the robot arrives on a cell that contains a white arrow, it changes its direction to the direction of the arrow.



Question

What is the minimum number of arrows needed so that the robot reaches the circle?

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

T8: Which suitcases go last?

Three groups of professors are traveling on bus to 3 different destinations. The bus will first stop at the airport, then at the hotel, and finally at the university.

The bus trunk has no partitions and only opens on one side. The bus driver needs to put professors' suitcases into the bus trunk. At each stop, the bus driver likes to be able to take out the suitcases easily.

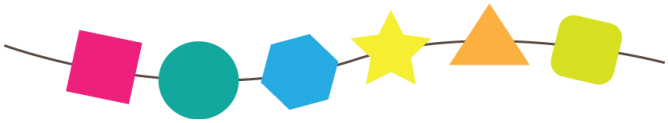
Question

Which group's suitcases should be put into the bus **last**?

A) the professors who will get off the bus at the airport.
B) the professors who will get off the bus at the hotel.
C) the professors who will get off the bus at the university.
D) it does not matter.

T9: Broken bracelet

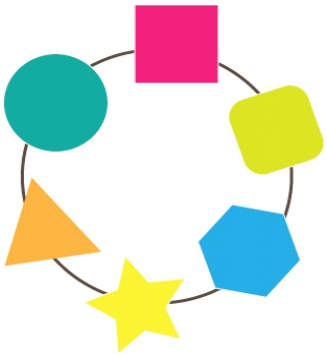
Emily the Beaver has a favorite bracelet made out of colorful beads with different shapes. One day, her bracelet breaks. The broken bracelet looks like this:



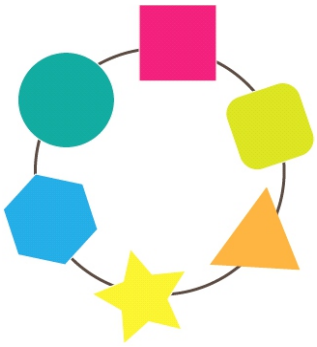
Question

Your task is to help Emily find a new bracelet. Which one of these bracelets could have been the same as Emily's?

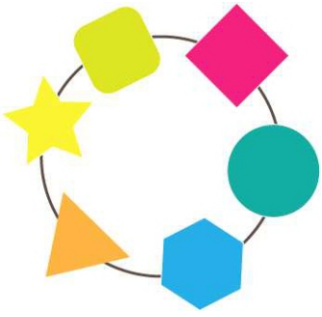
A)



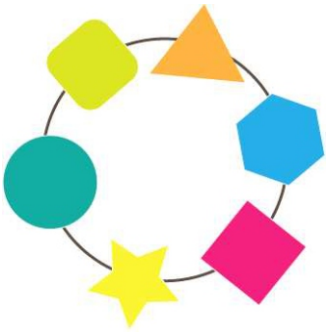
B)



C)

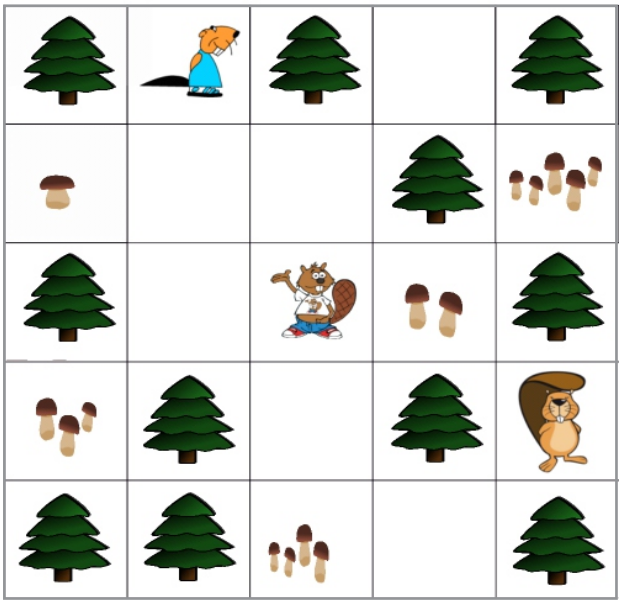


D)

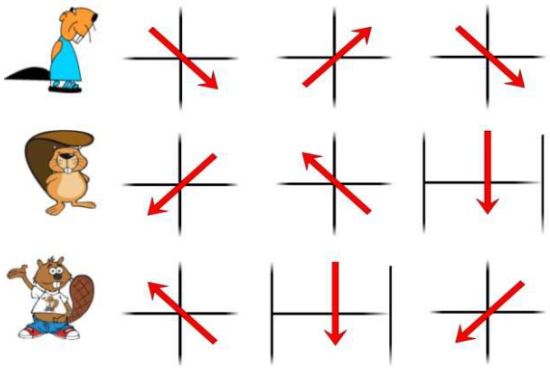


T10: Mushrooms

Three beavers are located in the next cells:



They collect mushrooms, moving by these routes:



Question

How many mushrooms has each beaver collected?



A)	2	4	1
B)	2	4	5
C)	5	4	3
D)	5	4	1

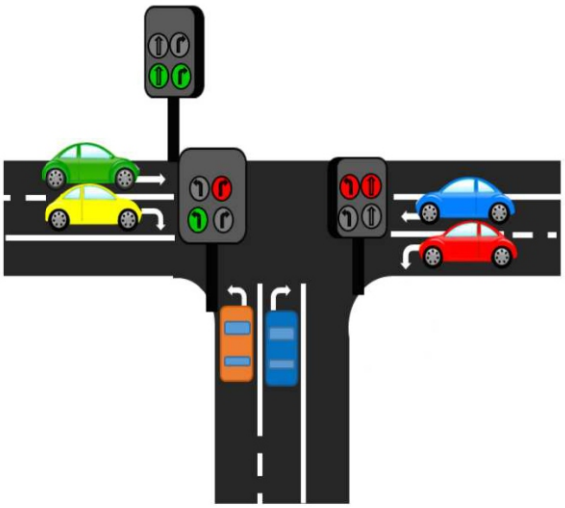
Tasks T11 – T20 carry 4 points each

T11: Traffic lights

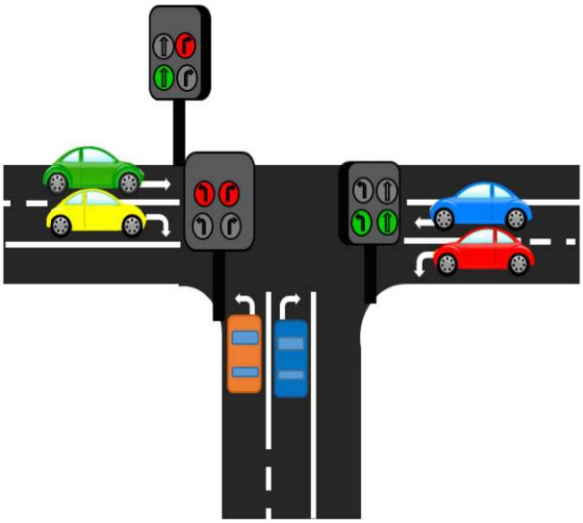
Traffic lights on crossroads where three streets cross often work in loops of three phases according to this rule: in each phase, one street is a "main direction" and cars coming from this street have absolute right of way. The others streets can have some lanes open only when they don't obstruct the main direction.

In these pictures, two phases fulfill this rule.

Phase 1



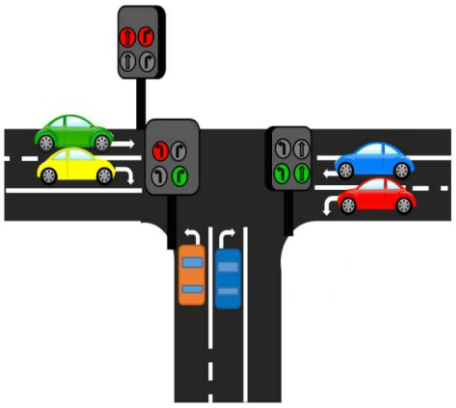
Phase 2



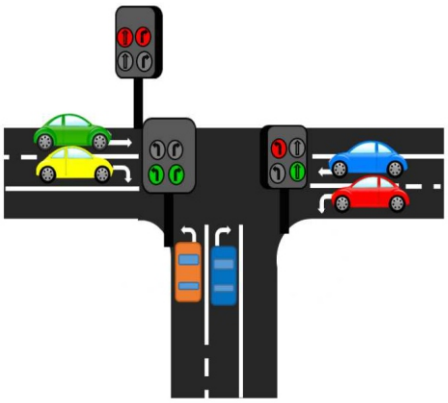
Question

Choose the correct light setup for the 3rd phase to fulfill this rule.

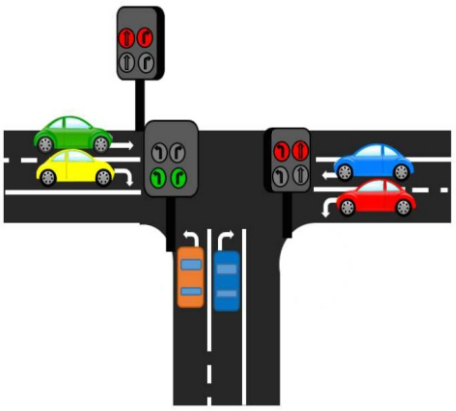
A)



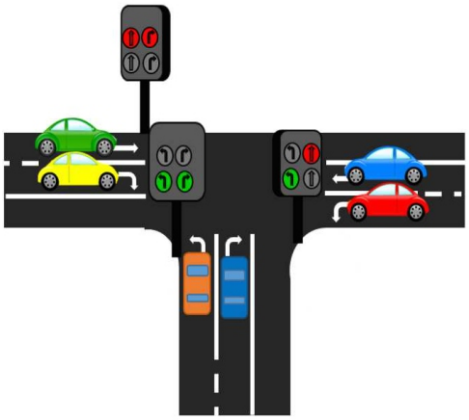
B)



C)

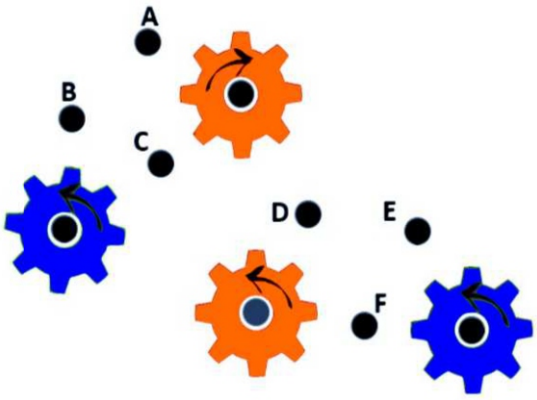


D)



T12: Gears

The beaverboys want to put together an engine that is driven by 2 motors. The motors drive the orange gears (the one next to letter 'A' and the one below letter 'D'), which turn in the directions shown by the arrows.



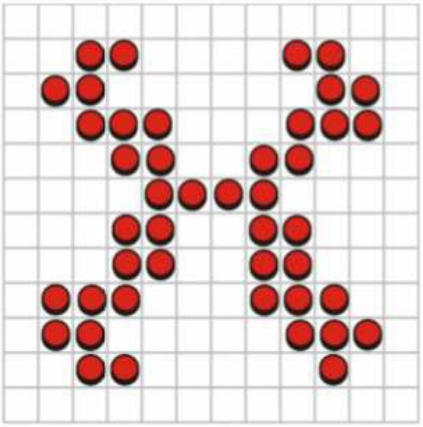
Question

On which axes do they need to put new gears to drive the blue gears as shown by the arrows?

A) A, B, F
B) A, B, D, E
C) C, D, E
D) C, F

T13: Magnets

The Beaver created a symmetric picture (in both horizontal and vertical axis) on the squared magnetic desk, but his little sister transposed some of magnets.



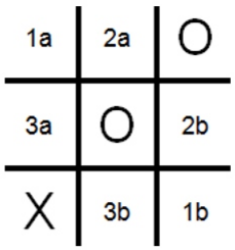
Question

What is the least number of magnets Beaver needs to transpose to get a symmetric picture again?

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

T14: Tic Tac Toe

You are playing a Tic-tac-toe game with your friend. First, your friend placed O, then you put X. You continue playing this way. The player who succeeds in placing three respective marks in a horizontal, vertical or diagonal row wins the game. Here is a picture of the actual board:



Question

It is your turn to put X. At which position would you put it, in order not to loose the game?

A) 1a or 1b
B) 2a or 2b
C) 3a or 3b
D) There is no such position

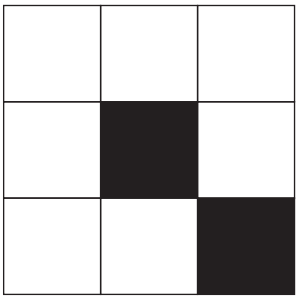
T15: Encode numbers

...	...	...
...	...	8
4	2	1

The beavers want to encode numbers. Therefore they developed the Quick-Beaver-Code (QB-Code). This is a graphical code consisting of 3x3 squares. Every square has a certain value. The squares are filled line by line from the bottom to the top, from right to left. The next square has double the value of the square before. In the example, you see the values of the first four squares.

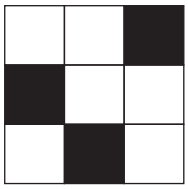
To encode a number the beavers darken some squares. The number encoded is the sum of the values of the dark squares.

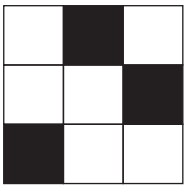
For example, the number encoded in this QB-Code is 17:

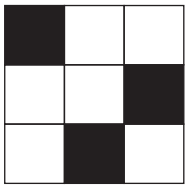


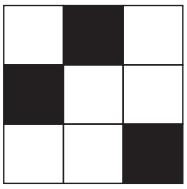
Question

Which of the following rotations of the QB-Code below results in the highest possible number encoded?

A) 

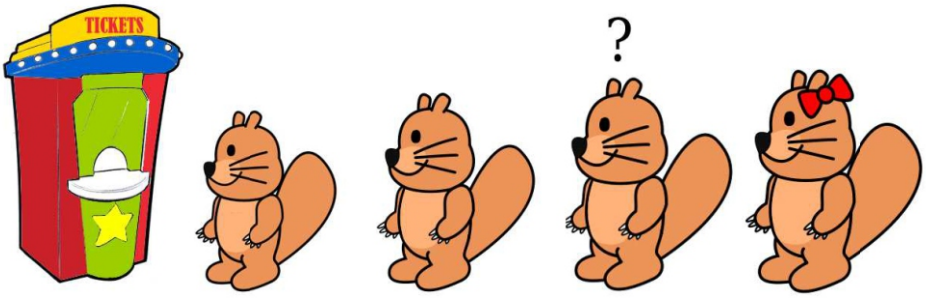
B) 

C) 

D) 

T16: Buying-A-Ticket

Four beavers: Aylin, Efe, Nazan and Hakan are in the queue to get tickets for a movie.



It is known that:
1) Hakan is not the first in the queue.
2) Nazan is just in front of Efe.
3) Aylin is in the queue after Hakan

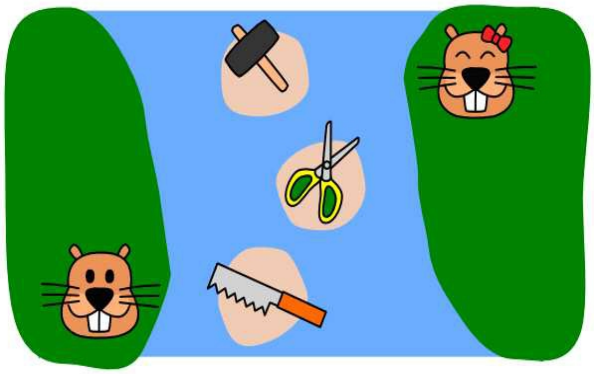
Question

Who is the third in the queue?

A) Efe
B) Nazan
C) Aylin
D) Hakan

T17: Sandbank

Bitaro and Bibako sit on the river working on wooden toys. As tools they share a hammer, a scissor, and a saw. For each type of toy they require two distinctive tools. They take these tools from the sandbank and return them after usage. If a required tool is not on the sandbank they wait until it is returned.



But there are situations where both require a specific tool, which is in use by the other. Then they stop woodworking, return all tools and take a swim.

Question

In which one of the following situations will the beavers definitely take a swim?

A) Bitaro has the hammer and the saw. Bibako has the scissor and requires the hammer.

B) Bitaro has the hammer and requires the saw. Bibako has the saw and requires the hammer.

C) Bitaro has the hammer and requires the saw. Bibako has the saw and the scissor.

D) Bitaro has the hammer and the scissor. Bibako requires the scissor and the saw.

T18: Excursion

There will be an excursion in Beaver School. Kiki is a robot that helps the teacher to select which beaver will go on the excursion. Kiki understands two rules to determine whether a beaver will go on the excursion or not:

- X1 → X2 denotes that if beaver X1 goes on the excursion, then X2 does as well.

- X1 & X2 → X3 denotes that only if both X1 and X2 go to the excursion, then X3 will also go. If either of the two beavers X1 and X2 do not go or have not been selected, then X3 will not go.

Now, Kiki has a mission to determine "who will join the excursion" in one class with 9 beavers (A, B, C, D, E, G, H, J, and L). Teacher Beaver has selected five beavers to go to the excursion: A, C, E, G, H; and teacher gives three orders to Kiki to select more beavers:

- L & B → J
- C & D → L
- A → D

Question

How many beavers will finally join the excursion based on Kiki's inference?

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

T19: Bob the Beaver

Bob the Beaver is a young dam builder. He usually uses his own material and keeps a detailed list of the material he bought and used. On a day when Bob lacks some material, he borrows it from his neighbours.

Purchases			Used material	
Mon 15. 10. 2015	20 m of rope		Wed 17. 10. 2015	30 m of rope
Mon 15. 10. 2015	12 logs		Wed 17. 10. 2015	10 logs
Tue 16. 10. 2015	20 m of rope		Thu 18. 10. 2015	20 m of rope
Thu 18. 10. 2015	100 nails		Fri 19. 10. 2015	50 nails
Fri 19. 10. 2015	50 m of rope		Sat 20. 10. 2015	3 logs
Fri 19. 10. 2015	5 logs		Sun 21. 10. 2015	30 m of rope
Sat 20. 10. 2015	20 m of rope		Sun 21. 10. 2015	3 logs

Question

It is known that Bob went to the shop on the 15. 10. because he had no material left at home at all. Which of the following sentences is correct?

A) Bob borrowed the neighbour's rope on Wednesday.
B) Bob borrowed the neighbour's rope on Thursday.
C) Bob borrowed the neighbour's rope on Sunday.
D) Bob did not borrow the neighbour's rope.

T20: Line Drawing Robot

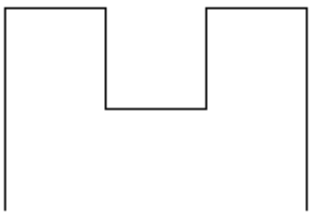
Tom built a drawing robot that can draw vertical and horizontal lines.
The robot is programmed by a sequence of numbers.

- The first number is the length of a line that the robot has to draw vertically (upwards if positive, downwards if negative).
- The second number is the length of a line that the robot has to draw horizontally (to the right if positive or to the left if negative) from the position where the first line ended.
- The third number describes another vertical line, the fourth number another horizontal line and so on...

For example this sequence of numbers

2, 1, -1, 1, 1, 1, -2

makes the robot to draw this figure:



Question

Which of these sequences **does not** make the robot to draw a square?

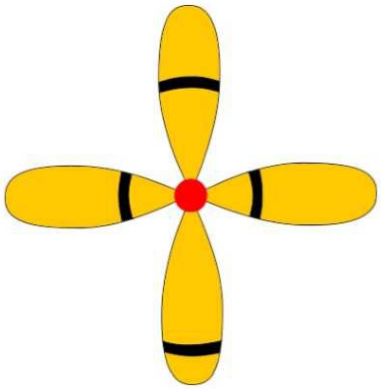
A) 1, 1, -1, -1
B) 1, -1, -1, 1
C) -1, 1, -1, 1
D) -1, -1, 1, 1

Tasks T21 – T30 carry 5 points each

T21: Drone

Four boys from aeromodelling hobby group build their own remote control helicopter models from a building sets. Because models were very similar to each other the boys have coloured propellers by black marker so that they could recognize them.

Karel coloured his propeller this way:



During a test flight, these drons mixed themselves so Karel could not recognize which dron is his own.

Question

Which drone is Karel's?

A)

B)

C)

D)

T22: Lunch boxes

Mother beaver prepared five lunch boxes with different ingredients and special sauces for Beaver Alexis to choose from.

The main ingredients and taste of the special sauces of each lunch box are as follows:

Lunch box	Main Ingredient	Taste of Special Sauces
A	Rice, Fruits	Sweet, Bitter
B	Salmon, Crab	Salty
C	Rice, Pork	Sweet,Salty
D	Anchovy	Bitter,Salty
E	Rice, Bean, Fruits	Salty

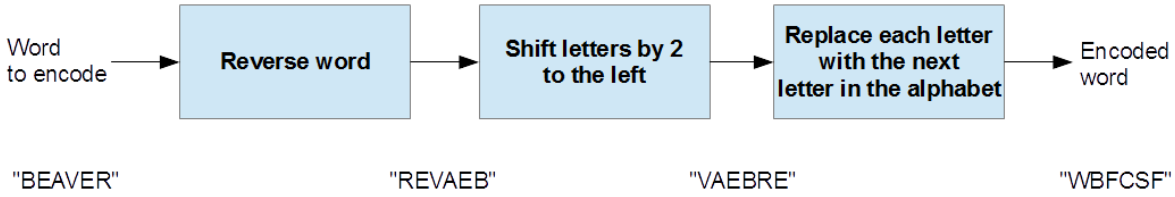
Question

Beaver Alexis lunch preference results in selecting only lunch boxes A, C or E. What is Beaver Alexis's lunch preference?

A) No anchovy **AND** likes having sweet or salty sauces
B) Likes rice **AND** likes having salty sauce
C) Likes fruits **OR** likes having sweet and salty sauces
D) Likes rice and fruits **OR** likes having sweet sauce

T23: Sequence of transformations

Beaver Alex and Beaver Betty send each other messages using the following sequence of transformations on every word.



For example, the word “BEAVER” is transformed to “WBFCSF”.

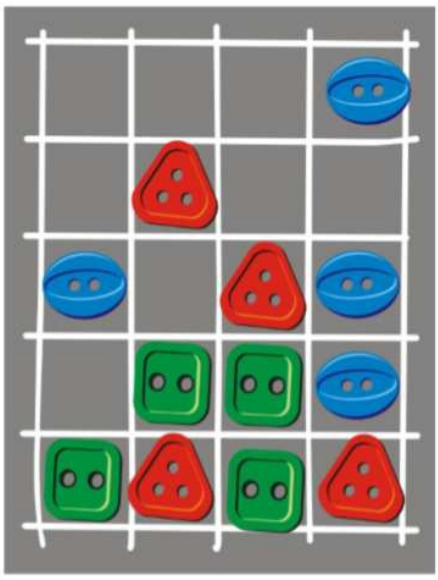
Question

Beaver Alex wants to send the message "FLOOD" to Beaver Betty. What should he send to her?

A) EPMFH **B)** WJSSF
C) PMGEP **D)** POLLD

T24: A button game

You can play this game on the ground. Draw a board and put the coloured buttons. One step means to move one button to top, down, right or left through one box.



Question

What is the least number of steps to put all green squared buttons into one line at the bottom of the board?

A) 7 **B)** 9
C) 10 **D)** 11

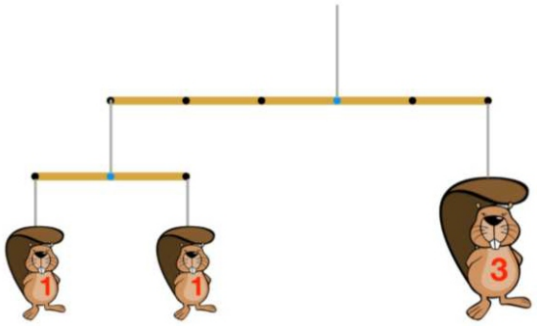
T25: Mobiles

No, this task is not about mobile phones! It is about mobiles, the wonderful artistic objects that might have been hanging from the ceiling of your bedroom when you were a child.

Mobiles consist of sticks and figures. Each stick has a few points where figures or other sticks may be attached to. Also, each stick has a hanging point, from which it

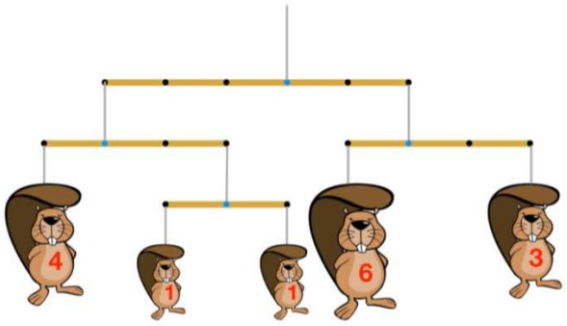
is attached to a stick further above (or, in the case of the upper most stick, directly to the ceiling). Figures carry numbers representing their weight.

The image shows a small sample mobile.



This sample mobile can be fully described using numbers and brackets:
(-3 (-1 1) (1 1)) (2 3)

Now here is another mobile:



Question

How can this mobile be described, using numbers and brackets in the same way as in the example?

A) (-3 (-1 4) (2 (-1 1) (1 1))) (2 (-1 6) (2 3))

B) (4 (1 1)) (6 3)

C) (((-1 4) -3 ((-1 1) 2 (1 1))) ((-1 6) 2 (2 3)))

D) (-3 (-1 4) (2 (-1 1) (1 1) (2 (-1 6) (2 3)

T26: Weather forecasts

Beaver John plans to go to the beach tomorrow, but he will go only if there will be at least three sunny hours between 13:00 and 19:00. He has at hand a file containing the hourly weather forecasts, made up of 24 lines corresponding to each hour of the day, from 00:00-01:00 to 23:00-24:00; each line contains one of the words *sunny*, *cloudy*, *rainy*, or *snowy*. He can use the following commands

- **ONLY** *w* selects from its input only the lines containing the word *w*
- **FIRST** *n* selects from its input the first *n* lines
- **LAST** *m* selects from its input the last *m* lines
- **COUNT** counts the number of lines in its input

Using | as a separator, John can combine these commands in sequence as he likes: the output of any command in the sequence will be the input of the following command. The input to the first command is always the content of the forecasts' file.

Question

How can John arrange the previous commands in order to decide whether or not he will go to the beach?

A) FIRST 19 | LAST 6 | ONLY sunny | COUNT
B) ONLY sunny | FIRST 19 | LAST 6 | COUNT
C) FIRST 20 | LAST 6 | ONLY sunny | COUNT
D) LAST 20 | FIRST 6 | ONLY sunny | COUNT

T27: Journey

Too many beavers lived in Lithuania (picture of bag). Few families have decided to move to Spain (red flower). There is no direct flight therefore they analyze a map and try to find the cheapest way through other countries. Orange little circles mark countries. Countries are connected by lines with numbers, which means how much cost flights (in beavcoins) from one country to another.

Question

How much the cheapest journey through other countries costs to get from Lithuania to Spain?

A) 13 **B)** 14
C) 15 **D)** 16

T28: Travel choices

Bebras works at company of tourism. This company suggests 10 choices of travels.

Type of travel	Country	Type of apartment	Transport	Food included
Business travel	Spain	Hotel room	Airplane	Yes
The weekend break	Canada	Flat	Bus	Yes
Exploration	Malaysia	Hotel room	Bus	Yes
Honeymoon	South Africa	Flat	Airplane	No
Business travel	Spain	Hotel room	Airplane	No
Business travel	Spain	House	Airplane	Yes
Exploration	Malaysia	Hotel room	Bus	No
Honeymoon	South Africa	Hotel room	Bus	Yes
The weekend break	Canada	House	Airplane	No
The weekend break	Canada	Hotel room	Bus	Yes

Question

Here comes a customer! What items should Bebras ask the customer to obtain a single choice?

A) 'Type of travel' and 'Country'
B) 'Type of travel', 'Type of apartment' and 'Transport'
C) 'Country', 'Type of apartment' and 'Food included'
D) 'Type of apartment' and 'Food included'

T29: Lights

There are three spotlights illuminating the stage in the Beaver City Theatre, one is red, one is green and one is blue. The stage color depends on which lights are switched on as shown below:

Red light	Green light	Blue light	Stage color
on	off	off	red
off	on	off	green
off	off	on	blue
on	on	off	yellow
on	off	on	magenta
off	on	on	cyan
on	on	on	white
off	off	off	black

From the beginning of the performance, the lights will be switched on and off in this manner:

- The red light repeats the sequence: one minute off, one minute on.
- The green light repeats the sequence: half minute off, half minute on.
- The blue light repeats the sequence: two minutes on, two minutes off.

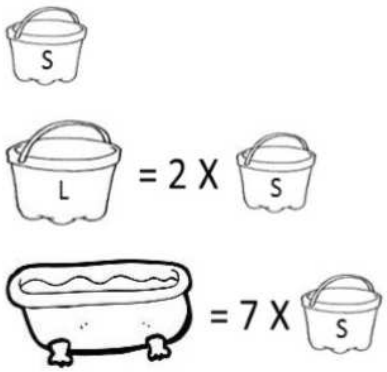
Question

After 1 minute from the beginning of the performance, what will be the color for the next half minute?

A) red **B)** green
C) white **D)** magenta

T30: Taking Water

The governor has implemented a mandatory water restriction due to the drought. Residents in the water-restricting area have to gather water from a water station. Sam's house is in the waterrestricting area. Every day after school, he is in charge of filling the bathtub with water.



Sam's family has two buckets. The big bucket can hold twice the water as the small bucket. The bathtub can hold seven small buckets of water. When Sam walks with a large bucket full of water, he has to take a rest for 1 minute after every 1 minute of walking (except when Sam arrives home; then, no rest is needed). When he walks with a small bucket full of water, he has to take a rest for 1 minute after every 2 minutes of walking.

Question

It takes Sam 3 minutes to walk from his home to the water station with an empty bucket, large or small. How long **at very least** does Sam need to fill the bathtub with water from the water station?

A) 24 minutes **B)** 31 minutes
C) 32 minutes **D)** 37 minutes