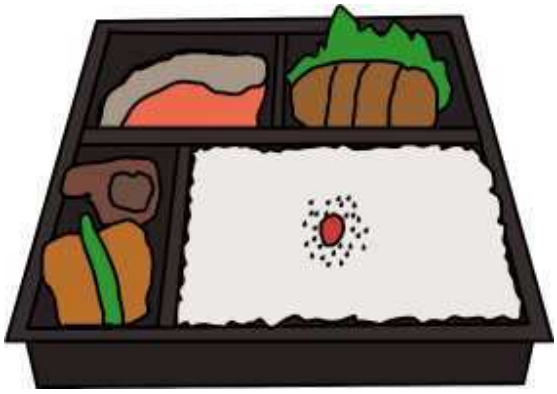
Tasks T1 – T10 carry 3 points each

T1: 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

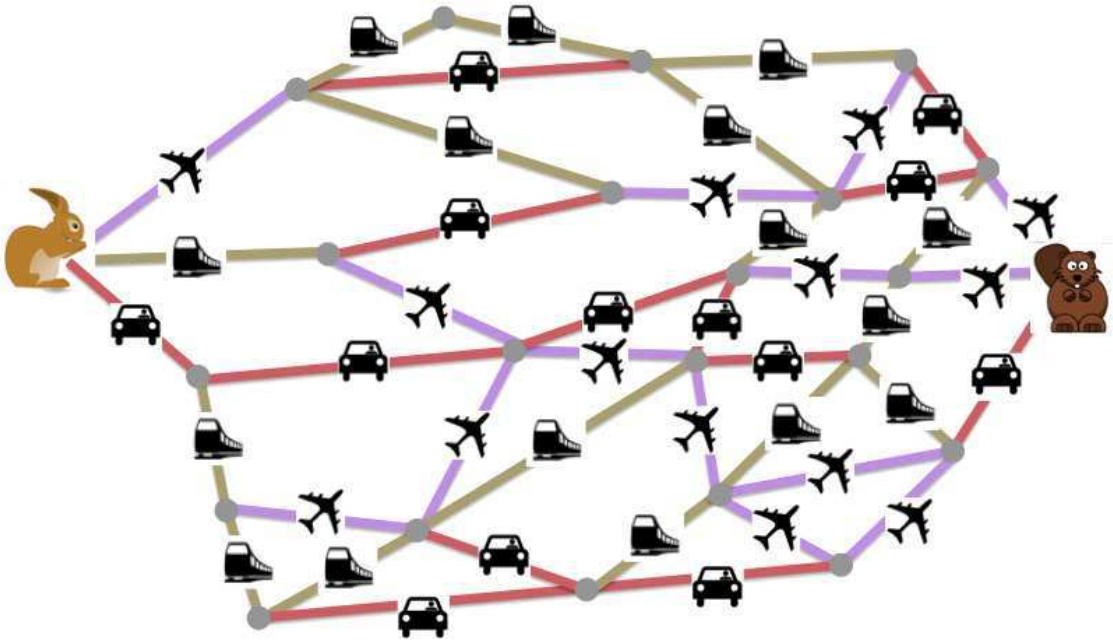
Beaver Alexis lunch preference resulted in selecting either lunch box A, C or E. What is Beaver Alexis's lunch preference?

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

T2: Beavers Holidays

Rob the rabbit would like to visit his friend Bell the beaver. The map shows several possible travel paths that Rob can take.

Different symbols stand for different means of transportation. Traveling one step by airplane costs five ecology points, traveling one step by car costs three ecology points, and traveling one step by train costs one ecology point.



Question

What is the **minimum** number of ecology points that Rob must spend to reach his friend Bell?

A) 10 **B)** 12
C) 14 **D)** 16

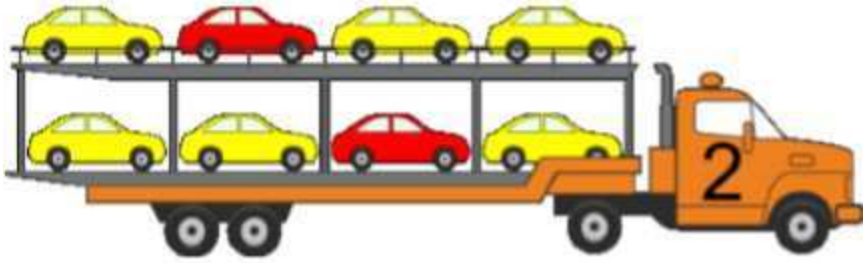
T3: Car transportation

Car factory with 2 manufacturing lines produces red (dark) and yellow (light) cars. A new red car leaves its line every 7 minutes and a new yellow car leaves its line every 3 minutes. An employee parks these cars in car transporters in order they have left their manufacturing lines. In case two cars leave their lines the same time, yellow car is parked first. Top floor of the car transporter is always loaded first. Both manufacturing lines start working the same time.

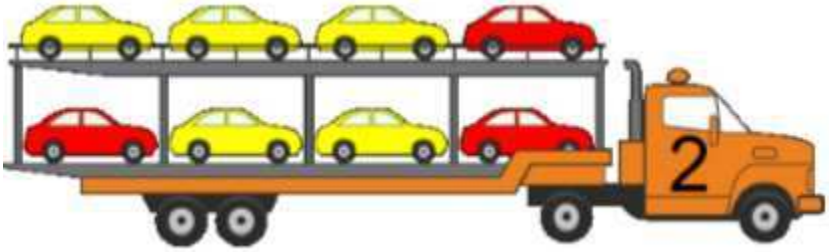
Question

How the second car transporter will look after loading?

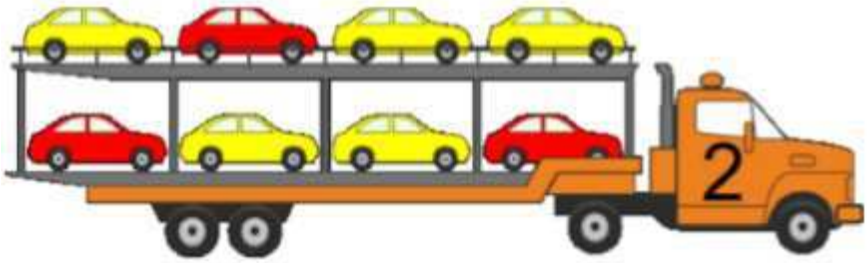
A)



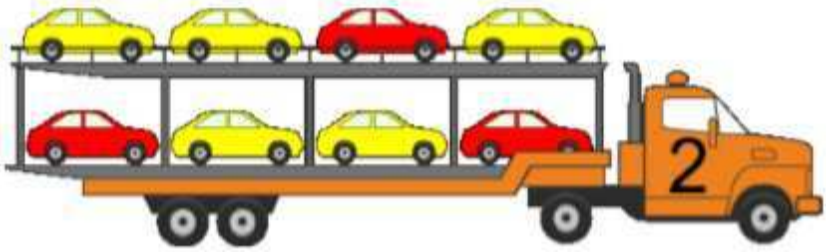
B)



C)

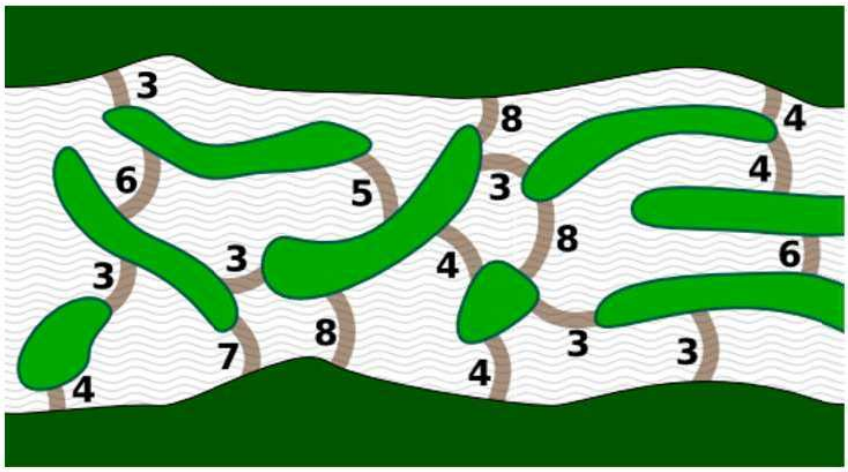


D)



T4: Beaver dam

The beaver community designs a new dam on the river. They want to use the lowest possible amount of wooden logs. They are smart, so they want to take advantage of the small islands. On the image you see the situation: the river, the islands, and the number of logs needed to dam up each part of the river.



Question:

What is the least number of logs necessary for the new dam?

A) 14 logs **B)** 15 logs
C) 16 logs **D)** 17 logs

T5: Throw the dice

After school the young beavers are used to play together.

To avoid quarrels, where to play, they throw a dice with sides from 1 to 6.

The decision is found according to this rule:

```
1 IF the first throw is greater than the second throw
2 THEN we go to play in the woods
3 ELSE
4     IF the third throw is less than the fist throw
5     THEN we go to play at the river
6     ELSE we go to play on the sport field
```

Question

Which sequence of throws will send the young beavers to the sports field?

A) First throw  , second throw  , third throw 

B) First throw  , second throw  , third throw 

C) First throw  , second throw  , third throw 

D) First throw  , second throw  , third throw 

T6: 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.

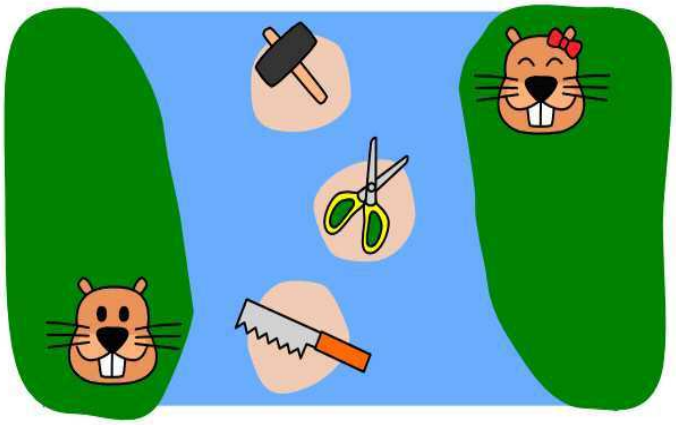
Question

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

T7: Woodwork

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.

T8: 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

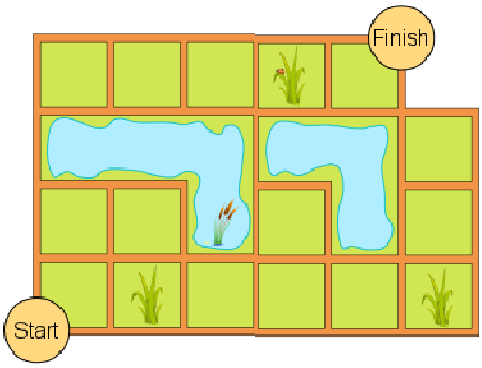
Question

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'

T9: You must turn

The king loves long travels in his coach, so he orders his coachman to never go straight on while passing the crossroads. That is the coachman must turn either right or left if he comes to any crossroad. This applies even for crossroads with tree roads.



On the image to the right you see a road map of the country. All roads connecting two adjacent crossroads have the same length of 1 km.

The king needs to go from the bottom left corner to the up right corner: both locations are marked with circles. The coachman however, wants to get to the destination as quickly as possible...

Question

Find a shortest path for the coachmen from start to the finish that does not break the rule. What length does it have?

A) 11 km
B) 13 km
C) 15 km
D) It is not possible to get to the destination without breaking the rule

T10: Nuts land

Beaver that lives in Nuts land has to take certain buses for transportation. Bus numbers that routes to Ağaç, Orman and Akarsu districts are given below. Bus numbers are arranged according to the letters in district names.

Ağaç	9397
Orman	12496
Akarsu	989205

Question

In order to go to "Çamur" district, which bus should Beaver take?

A) 79452
B) 78524
C) 60983
D) 69431

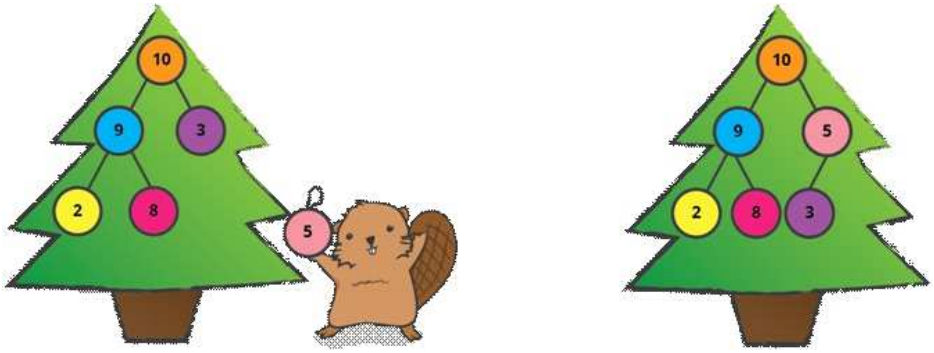
Tasks T11 – T20 carry 4 points each

T11: Christmass Tree

Every year, beavers decorate a large Christmas tree with decorative balls of different weights. Beavers always make sure that the heaviest ball is at the top, otherwise the tree might collapse. Because of that, they created some rules for decorating the tree:

1. Balls must hang from only one ball, except for the topmost one.
2. One ball can have at most two other balls hanging below it.
3. When a new ball is added, it is always added directly below the highest and leftmost ball that does not already have two balls hanging from it.
4. After that new ball is added, beavers must check to see if the new ball weighs less than the ball directly above it. If it is not, then the new ball must be swapped places with the ball above it. This can happen until they reach the topmost ball.

For example, here is how the tree will look like before (left) and after (right) our Beaver adds a ball with weight 5.



Question

Which one of these Christmas trees could have been created by the beavers?

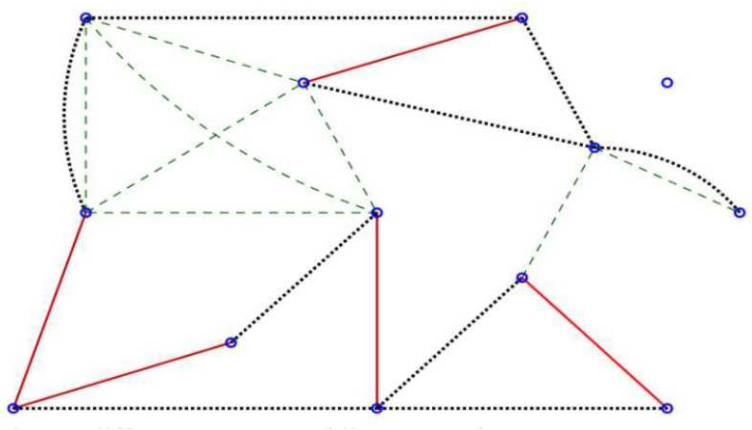
A)

B)

C)

D)

T12: Relationships among passengers



Peter, Jiří and Václav were doing a school project on relationships between people. They asked people traveling on a bus about their relationships. They found three types of relationships: twins (siblings), friends and classmates. Peter connected twins with red solid lines, Jiří connected friends with black dotted lines and Václav connected classmates with green dashed lines.

The boys' teacher said that only one of the students were correct with their part of the project.

Question

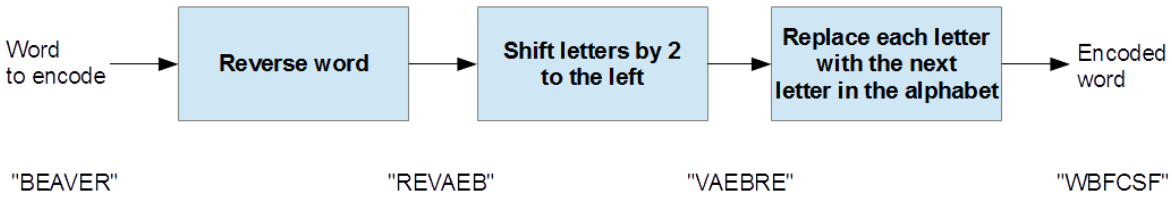
Which type of relationship is presented correctly in the schema?

A) twins _____ **B)** friends ----------

C) classmates ..... **D)** The teacher was wrong. More than one boy displayed his part correctly.

T13: You won't find it

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

T14: Jumping

A beaver moves in strange ways.
He will make exactly 5 moves.
He starts at position S, and will move alternatingly between R and L: that is, first he moves towards R, then toward L, then towards R, then towards L, and finally, towards R.

When the beaver makes a move, he can move either 1, 2, 3, 4 or 5 spaces. However, once he has moved one of those numbers (1,2,3,4,5), he cannot move that amount on any other move.

For example, the beaver can end up at the space labelled X by:

- moving one space toward R
- moving two spaces toward L
- moving three spaces toward R
- moving five spaces toward L
- moving four spaces toward R

Question

Which of these positions can the beaver not finish on?

A) Space labelled A **B)** Space labelled B
C) Space labelled C **D)** Space labelled D

T15: Lollipops 2

A single lollipop costs 12 beuros.
A package with two lollipops costs 20 beuros.
A package with four costs 44 beuros.
A package with eight costs 72 beuros.
A box with sixteen costs 150 beuros.

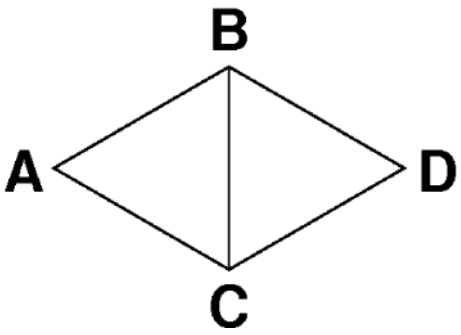
Question

What is the minimal amount of money that we need in order to buy 21 lollipops? It is allowed to buy more than you need and give some lollipops away.

A) 190 **B)** 196
C) 200 **D)** 214

T16: Swimming competition

Lisa Beaver is organizing a swimming competition in her favorite lake. She has marked out four control points (A, B, C, and D) that are arranged as shown in the figure below.



To avoid crowding she wants each competitor to follow its own course with the following characteristics:

- It should visit each of the four control points exactly once, starting at one of them and finish at another.
- It should follow the lines connecting the control points in the figure (so going directly from A to D is not allowed).

For example, the course D → C → B → A is one possibility.

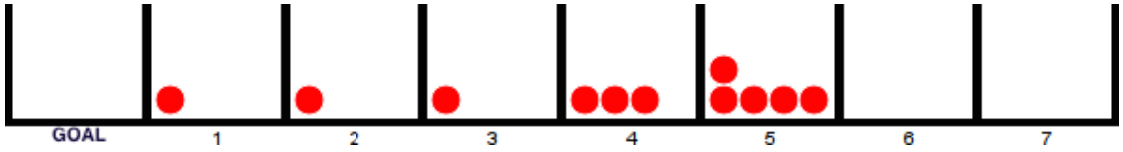
Question

How many different courses can Lisa construct?

A) 8 **B)** 12
C) 16 **D)** 24

T17: A pebble game

The goal of this game is to move all the pebbles to the GOAL box by following one simple rule: a box numbered from 1 to 7 can be emptied only if the number of pebbles in the box is equal to the box number itself; its pebbles are distributed equally on all the boxes to its left, one pebble per box. The game is won when all the pebbles are successfully moved into the GOAL box.



Question

The game above can be won. Which are the last four boxes that you would empty as part of the winning strategy? (The last emptied box appears at the end)

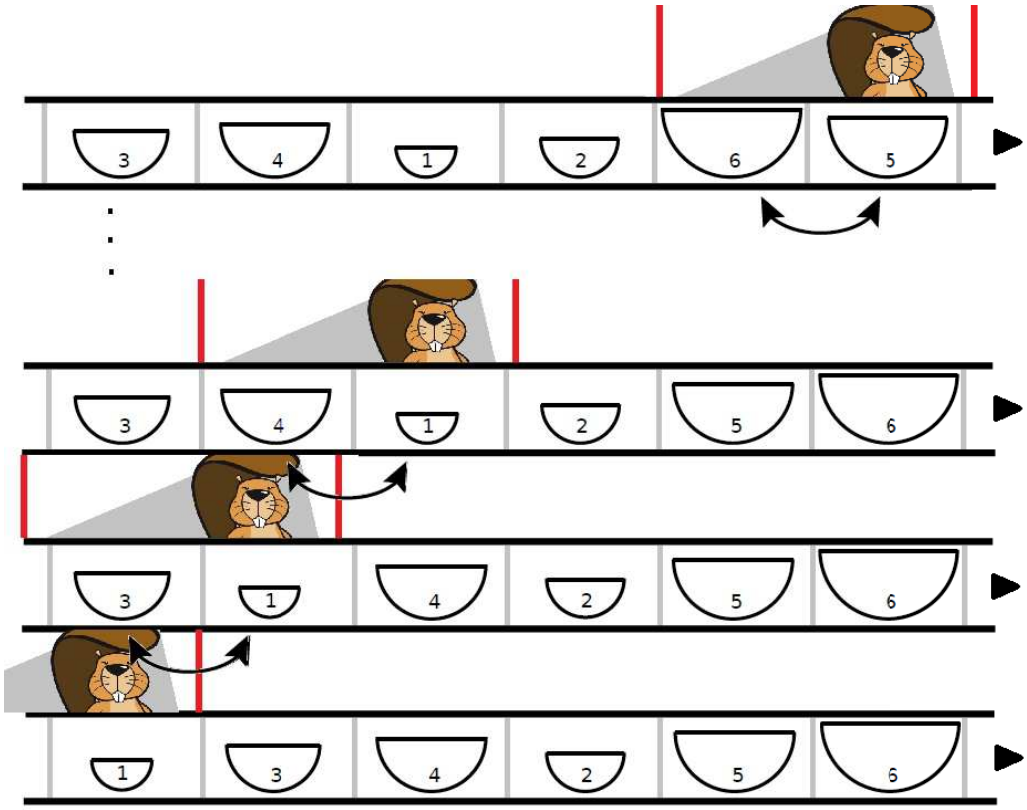
A) 2 – 3 – 4 – 5 **B)** 3 – 1 – 2 – 1
C) 4 – 3 – 2 – 1 **D)** 1 – 2 – 3 – 4

T18: Bowl Factory

A factory produces sets of 6 bowls of different sizes. A long conveyor belt moves the bowls one by one, from left to right.

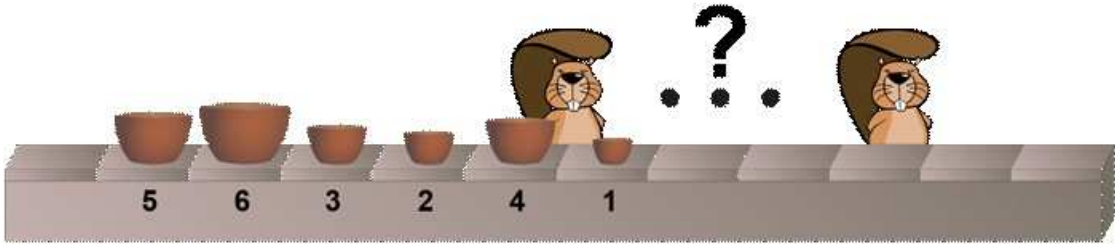
Bowl production places the 6 bowls of each set on the belt grouped together, but in arbitrary order. Before packing the bowls, they need to be sorted like this:

To help with the sorting, the factory places beaver workers along the conveyor belt. When a set of bowls passes a worker, he will swap any two neighboring bowls that are in the wrong order. See how the order of a set of bowls changes as it passes **one worker**:



Question

How many workers does this set of bowls have to pass in order to get sorted?

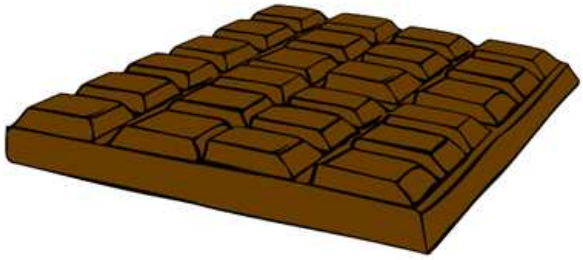


A) 3 **B)** 4
C) 5 **D)** 6

T19: Chocolate bar

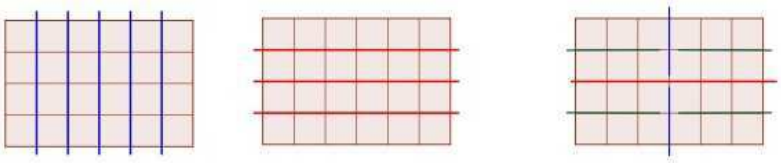
Gerald has a chocolate bar of size 6 x 4 and wants to break it into 24 single cells so that he could share it with his friends at the workshop. He wants to make as least breaks as possible.

The chocolate is impossible to break other way than along the lines between cells.



Question

How to break the chocolate bar into single cells so that to minimize the number of breaks?



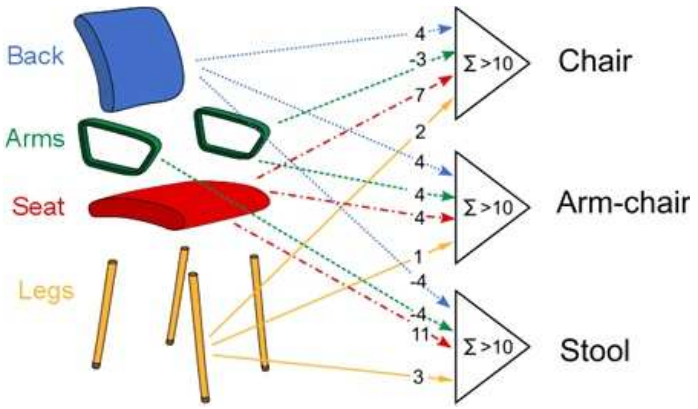
A) Break the bar along the longer side into 4 rows of size 6 x 1 first and then break these rows into cells (left image).

B) Break the bar along the shorter side into 6 rows of size 4 x 1 first and then break these rows into cells (center image).

C) Follow these instructions: take one of biggest bars and break it into two bars of the same size (or most similar size) across the longer side of the bar (right image). Repeat this until you have 24 single cells.

D) It does not mater how you break the chocolate bar.

T20: A chair or an armchair?



The Beaver Research Center for Artificial Indolence has devised a recognition system for resting furniture based on 3 "neurons". They consider the parts of the object by summing up points (accordingly to the numbers shown in the left picture) if it has a back, arms, a seat, or legs. Neurons recognize *chairs*, *arm-chairs*, or *stools* when for one of the neurons the sum exceeds 10, and for others it is less or equal than 10.

For example, the object on the right has a back, no arms, a seat and legs. Hence, it gives 13 points on first neuron, 9 on the second and 10 on the third. Therefore it will be recognized as a *"chair"*.

Question

Which of the following objects will NOT be recognized by the recognition system?

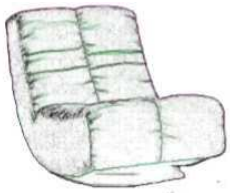
A)

(back, arms, seat)

B)

(arms, seat, legs)

C)



(back, seat)

D)

(seat)

Tasks T21 – T30 carry 5 points each

T21: Safe Password

A friend of yours wants to setup an account on the social network Beaverbook and needs your help choosing a secure password which is hard to crack.

Question

What would be your best advise to your friend?

A) Use your name and birthday since numbers and letters are used.
B) The user name and password should be the same, because you can easily remember it and nobody will think of that.
C) Take a password with eight random upper and lower case letters or digits, assuming there are 26 different letters.
D) Take the dictionary and use four random words from it, assuming there are roughly 8000 words in the dictionary.

T22: Send a secret

Beaver Louis would like to communicate secretly with his friends. For that, he put in place a custom technique to encrypt a message, based on a secret information only known by the recipient, referred to as **the cipher key**.

The message uses the English alphabet (A to Z).
The characters are numbered from 1 to 26 as shown in the table below:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Then the message is ciphered letter by letter. If a letter number is even, then it is shifted to the right (increased) by the cipher key, if the letter number is odd then it is shifted to the left (decreased) by the cipher key. The cipher key is the last resulting ciphered letter.

If the shifting operation would result in passing the end of the alphabet then the shift goes to the opposite end of the alphabet. If shift is out to the right (>26), we subtract 26. If shift is out to the left (<0), we add 26.

For example: Y (25) shifted by 5 to the right will be D (4), because 25+5 = 30 and 30-26 = 4 (Y, Z, A, B, C, D). Similarly D shifted by 5 to the left will be Y because 4-5 = -1 and -1+26 = 25 (D, C, B, A, Z, Y).

The ciphered value of a letter is the cipher key for the next letter.

For example, let's take the message "OLE" and 2 as cipher key.

- The first letter O is 15 (odd) and then ciphered into 15 – 2 = 13 (M);
- The second letter L is 12 (even) and ciphered into 12 + 13 = 25 (Y);
- The last letter E is 5 (odd) and ciphered into 5 – 25 = 6 (F).

The "OLE" message is then ciphered into "MYF" when sent to the friend with 2 as cipher key.

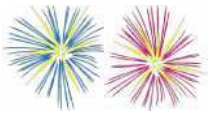
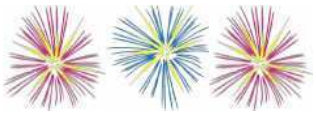
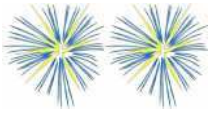
Question

What's the last letter of the ciphering of the message "ZOO" if sent to Beaver Béatrice who has 4 as cipher key?

A) D **B)** Z
C) K **D)** O

T23: Fireworks

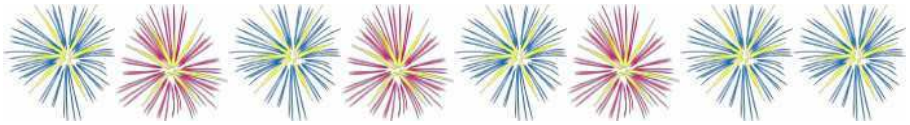
Two beavers live in lodges separated by a large forest. They decide to send messages to each other by shooting fireworks into the sky above the trees. Each message is a sequence of words, though the beavers only know five of them. So they shoot two types of fireworks one after the other according to the following code.

Word	*Code*
log	
tree	
rock	
river	
food	

For example, to send the (strange) message food, log, food, a beaver would shoot pink fireworks, then blue fireworks, then pink fireworks and then pink fireworks again.

Question

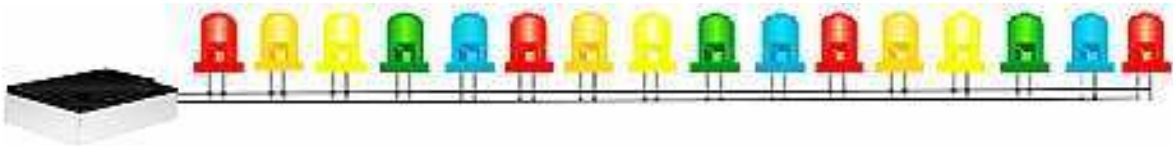
How many different messages can the following sequence of fireworks mean?



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

T24: Sixteen Diodes

Bob experiments with a controller that gives signals to 16 light-emitting diodes labeled from 1 to 16.



When the controller gives a signal to a diode, the diode changes its state: If it is currently off, it will be switched on. If it is currently on, it will be switched off.

Bob wrote a continuous program. Every second, the program gives a signal to some of 16 diodes: in the 1st second to all of the diodes, in the 2nd second to every second diodes, in 3rd second to every third diodes, and so on.

Question

Initially, all of the diodes were switched off.
After running the program for several minutes, which of the diodes will be switched on?

A) 1, 3, 5, 7 **B)** 1, 4, 8, 16
C) 1, 4, 9, 16 **D)** 1, 4, 7, 10

T25: Card Match

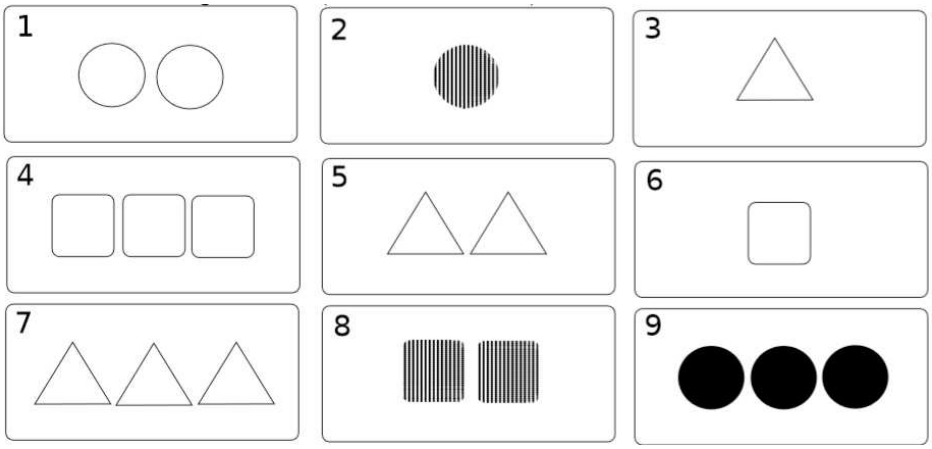
Each of the nine cards below has three attributes:

- The shape of the objects (triangle, square or circle)
- The number of objects (1, 2 or 3 objects)
- The fill style of the objects (empty, striped, solid)

A *group* is a collection of three cards such that the three cards satisfy **all** of the following three conditions:

- The objects on the three cards either all have the same shape, or all have a different shape
- All three cards have the same number of objects, or there is different number of objects on each card
- The objects on the three cards have the same fill style, or the objects on the cards all have a different fill style.

Consider the following nine cards (numbered from 1 to 9):



Notice that cards 1,2,9 are a group since:

- they have the same shape (circle)
- they have a different number of shapes on each card
- they have a different fill type on each card

Each group is described by a list of increasing numbers of cards, so we cannot describe the group 1, 2, 9 as 2, 9, 1.

Question

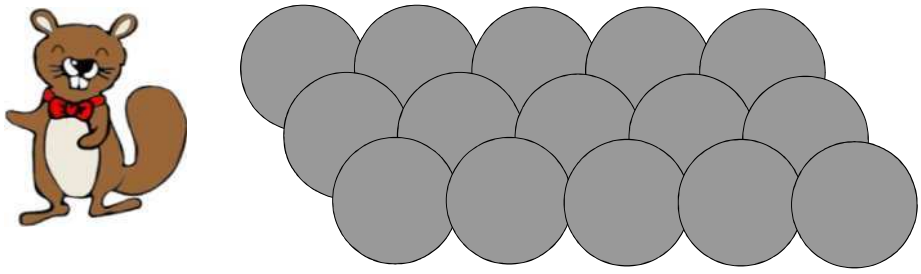
Allowing a card to appear in any number of groups, how many groups can be formed with the cards above (including the group 1, 2, 9)?

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

T26: Pick up stones

You are playing a game with a beaver. In this game, there are some stones, and players take turns picking up stones. On each turn, a player can pick up 1, 2, or 3 stones. The player who picks up the last stone wins.

The game was originally played with 9 stones, and the history shows that the first player always can win the game by starting with taking 1 stone, no matter what the opponent do next. Now, you and the beaver are going to play with 15 stones.



Question

You are starting the game. How many stones should you pick up to surely win the game?

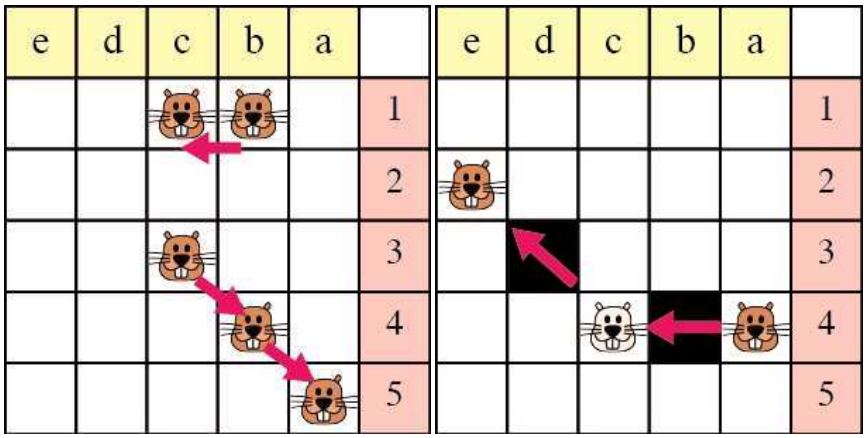
A) 1 **B)** 2
C) 3 **D)** There is no such a strategy for you to surely win the game.

T27: Short Way

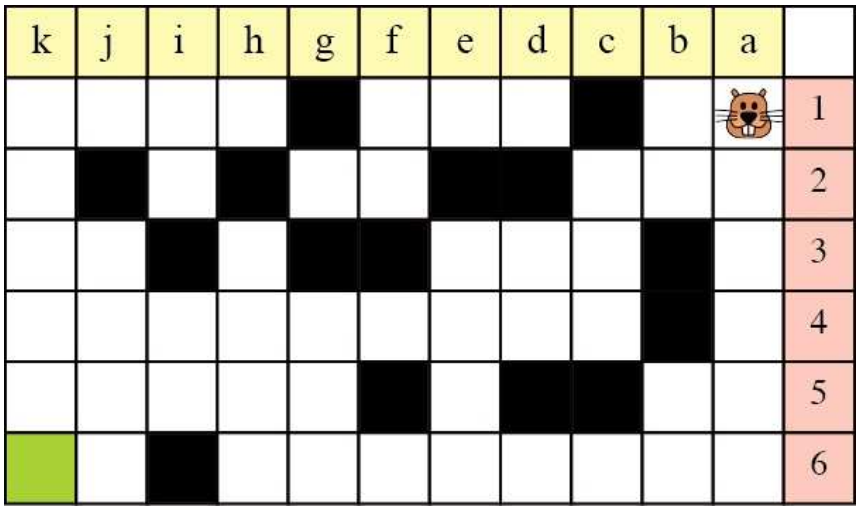
A board consists of black and white squares. A beaver can only stand on white squares. He can walk from a white square to any adjacent white square (horizontally, vertically or diagonally). When he walks this is counted as a single move.

Beaver can also jump over a black square. This can only happen if there is a white square directly behind the black square in the same direction. If beaver can make one or more jumps right after each other without walking in between, these jumps together are counted as a single move.

The following drawings illustrate this:
Left picture - From b1 to c1 is one move and from c3 to a5 is two moves.
Right picture - From a4 to e2 via c4 is one move.



Beaver stands in the upper right corner and wants to get to the bottom left corner.



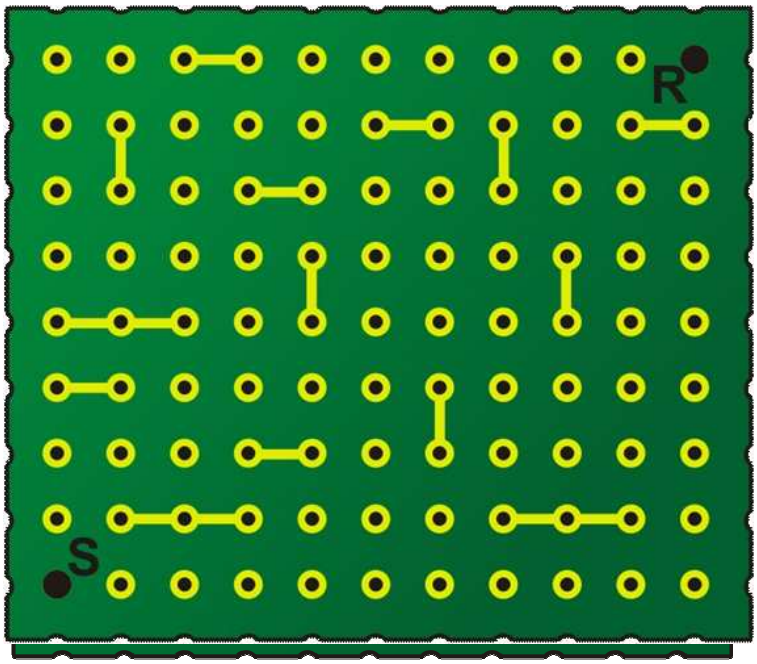
Question

What is the lowest number of moves beaver has to make to reach his destination?

A) 4 **B)** 5
C) 6 **D)** 7

T28: Building a chip I

Nowadays, integrated circuits (chips) are used in all electronic equipment and they have revolutionized the world of electronics. A chip can be made very compact, having up to several billion transistors and other components in an area the size of a fingernail. A small plate contains many transistors arranged in a grid (marked as dots) and few partitions (marked as line segments). Transistors can be connected using segments of connectors. Connectors can be built vertically or horizontally and cannot touch any partition.



Question

How many segments do we need **at least** in order to connect S and R?

A) 18 **B)** 20
C) 21 **D)** 22

T29: LED lights

Lights are arranged into a rectangular table, as shown below. Some of the lights are on (light yellow squares), some of them are off (dark gray squares).

A touch on a particular square changes the state of all the lights in the same row and the same column.

Question

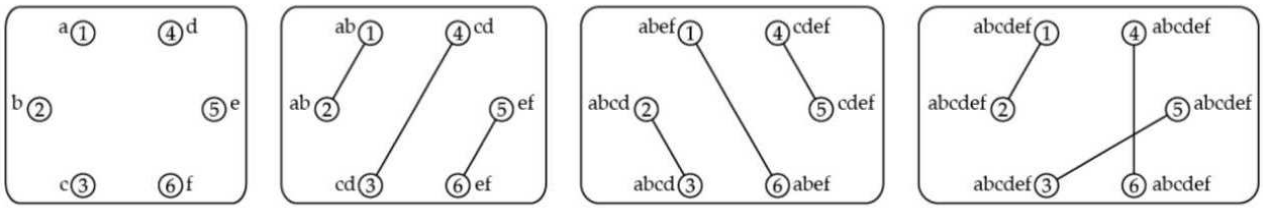
What is the smallest number of touches required to turn off all the lights?

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

T30: Spies

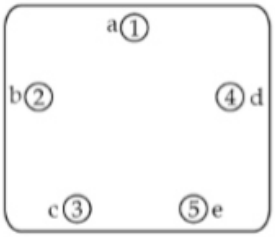
Every Friday, six spies exchange all the information they've gathered in the week. A spy can never be seen with more than one other spy at the same time. So they have to conduct several rounds of meetings where they meet up in pairs and share all information they have at that point.

The group of 6 spies needs only three rounds to distribute all secrets: Before the meetings each spy holds a single piece of information (spy 1 knows 'a', spy 2 knows 'b, etc.). In the first round spies 1 and 2 meet and exchange information so now both know 'ab'. The diagram shows which spies meet in each round with a line. It also shows which pieces of information they all have. After three rounds all information has been distributed.



Question

After an international incident one spy has stopped attending the meetings. What is the minimum number of rounds needed for the five remaining spies to exchange all information?



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