Time Allowed: **150 minutes**

Tasks T1 – T10 carry 3 points each

T1. Gathering

Candy the Robot is programmed to collect as many sweets as possible. It does this while walking through cells. Each cell in the grid below has either 0, 1, 2 or 3 sweets. Candy begins at cell *S* (for start) in the bottom-left and ends at cell *F* (for finish) in the top-right. Candy the Robot can only move to the right or upwards

2	0	1	1	*F*
1	2	0	2	3
2	2	0	2	1
3	1	0	2	0
S	0	1	3	0

↑ →

Question / Challenge

How many sweets will the Robot collect in this grid?

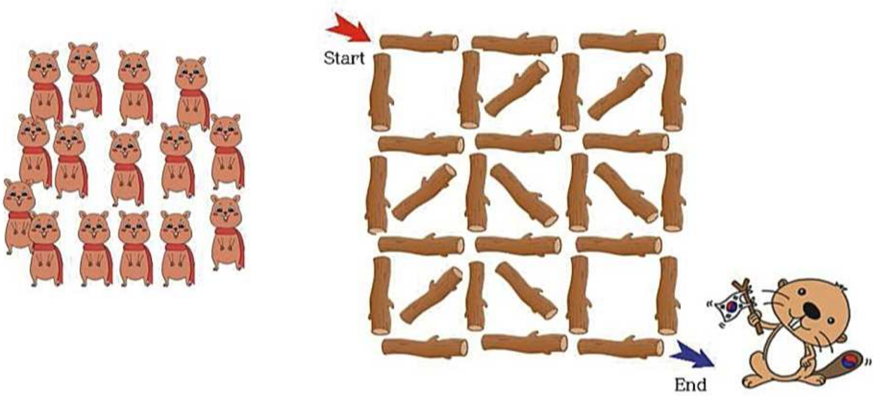
A) 10 **B)** 12 **C)** 14 **D)** 16

T2. Log Running

Little beavers play the 'Log Running' game with their teacher.

The game follows these rules:

- First, the teacher places logs into a 3 by 3 square as shown in the picture below.
- The teacher determines the number of logs the beavers must use as a path to run from 'Start' to 'End'.
- The beavers must then cross the square one by one, running over the exact number of logs as determined by the teacher.



The little beavers will receive a fruit reward if they run to the end using a path that has (partly) not been used before.

Time Allowed: **150 minutes**

Question / Challenge

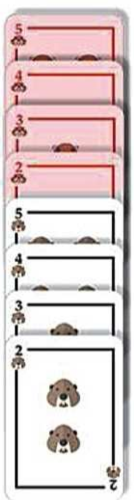
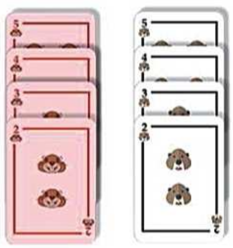
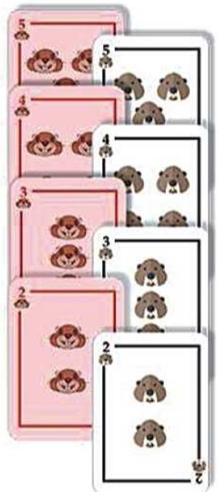
The teacher says the beavers should use exactly 5 logs. What is the maximum number of beavers that can receive a fruit reward?

A) 9 **B)** 10 **C)** 11 **D)** 12

T3. Perfect Shuffle

Farah has a deck of 8 beaver cards. They are arranged in such a way that all the **red cards** are in decreasing order, followed by the **black cards** in decreasing order.

Farah is learning how to do the *perfect shuffle*. To do one perfect shuffle, Farah needs to shuffle the cards using the steps below.

Initial arrangement (before a shuffle)	**Step 1** Divide the cards into two equal-sized groups without changing the order of the cards. The top 4 cards go into group 1, while the bottom 4 cards go into group 2, as shown.	**Step 2** Mix the cards from group 1 and group 2 alternately, starting from group 1, as shown.	**Final arrangement** (after one shuffle)
			

Question / Challenge

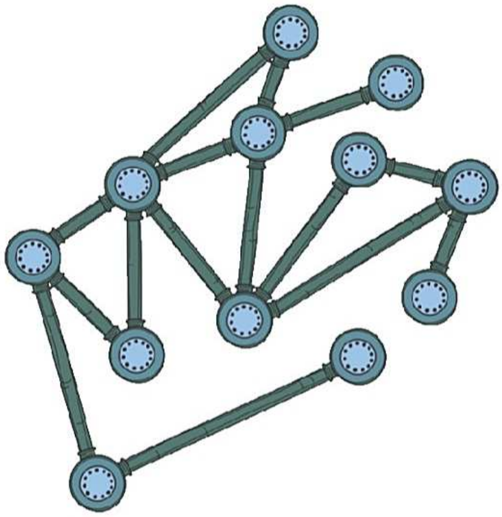
After repeating the perfect shuffle a few times, Farah notices that the cards end up back in the original order. In total, how many perfect shuffles must Farah do to get back the original order?

A) 2 perfect shuffles **B)** 3 perfect shuffles
C) 4 perfect shuffles **D)** 5 perfect shuffles

T4. Pipe Network

Bobi Bebras is the only plumber of the city. Unfortunately, he has lost an important map of the city's pipe network on which he marked some important nodes. If those nodes stop working, the pipe network will split into two separated parts (with at least one isolated node).

Help him mark the important nodes on this new map.



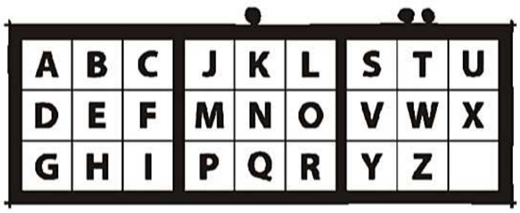
Question / Challenge

How many important nodes are in the network ?

A) 6 **B)** 9 **C)** 11 **D)** 12

T5. Grid alphabet

Beaver Sophia likes to create word puzzles. She found a nice scheme in a newspaper to describe a word puzzle with three 3×3 grids of letters:



For example, the word BEAVER is encoded to 

She has encoded another word:

Question / Challenge

Can you work out the encoded word?

A) CREATIVE **B)** MAXIMIZE
C) CAFFEINE **D)** SCENARIO

Time Allowed: **150 minutes**

T6. Sports

The BebraFitness sports center has a volleyball court, a basketball court, a tennis court and a football field.

Four beaver friends, Anna, Bruno, Chris and Diana, occasionally come to BebraFitness and play their favourite games.

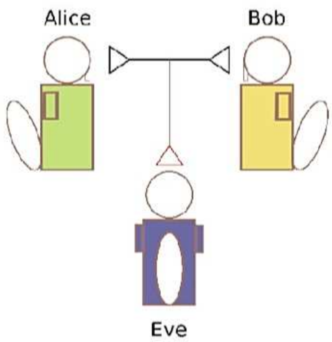
It is known that Anna and Chris do not use rackets. The volleyballer, the footballer and Diana have their trainings on the same day. The footballer plans to watch Chris's tournament. In the mornings, Bruno and the footballer go for a run. Diana lives in the same den with the tennis player.

Question / Challenge

What are the favorite sports for the players?

A) Anna: tennis; Bruno: football; Chris: volleyball; Diana: basketball
B) Anna: football; Bruno: tennis; Chris: volleyball; Diana: basketball
C) Anna: volleyball; Bruno: basketball; Chris: football; Diana: tennis
D) Anna: basketball; Bruno: tennis; Chris: volleyball; Diana: football

T7. Alice's Secret



Beaver Alice and Beaver Bob are best friends. They recently found out that Beaver Eve tries to read the messages they send to each other.

To prevent that, Alice suggests following method:

A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	2	3	4	5	6	7	8	9	10	11	12	13	14

O	P	Q	R	S	T	U	V	W	X	Y	Z
15	16	17	18	19	20	21	22	23	24	25	26

Whenever they send each other a message, they send a number and four potential messages of which only one is correct. The other 3 messages are mock messages.

The number is determined by adding all individual numbers, for example:

```
I    W  A  N  T    T  O
9   +23+1 +14+20  +20+15=102
```

Question / Challenge

Which one is the correct message for Bob, if he receives the following four messages together with the number 49?

A) BYE BYE **B)** LOVE YOU **C)** I AM OK **D)** NO WAY

Time Allowed: **150 minutes**

T8. 2 simple Ciphers

1) A simple substitution cipher is if you write the letters of the alphabet and in the line underneath either a scrambled alphabet or a shifted alphabet:

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
h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	a	b	c	d	e	f	g

The latter case is called a Caesar cipher or rot-n where the "n" gives the number of positions shifted. The example given would be a rot-7. Encryption works by looking up the letter in the upper line and encrypting it to the letter below. Let's encrypt the following text:

"Meet me at nine at the station."

Traditionally spaces, punctuation marks and upper case are omitted to make decryption more difficult. So we get:

meetmeatnineatthestation and finally: **tllatlhaupulhaaolzahapvu**

2) A columnar transposition cipher is also very simple. Let's take the same text as before:

meetmeatnineatthestation

The text is then arranged in blocks of even length, in this example we choose 4 (let's call this col-trans-4):

meet
meat
nine
atth
esta
tion

The encrypted text is obtained by reading down the columns:

mmnaeteeitsieanttottehan

Question / Challenge

Which combination is certainly **not** useful as a cipher?

A) first apply rot-7 then apply rot-4
B) first apply col-trans-3 then apply rot-9
C) first apply rot-13 then apply rot-13
D) first apply rot-9 then apply col-trans-3

Time Allowed: **150 minutes**

T9. Bracelet Code - 2

Bruce and Beatrix are playing a beading game. Bruce uses a code.

Bruce Says:	Beatrix threads this colour bead onto the string:
OFF	BLACK
ON	WHITE

Bruce repeats the following code words until the string is full: "ON OFF OFF ON OFF OFF ON OFF"

Question / Challenge

If Beatrix follows Bruce's instructions, which one of these bracelet sections could NOT be made?

A) 

B) 

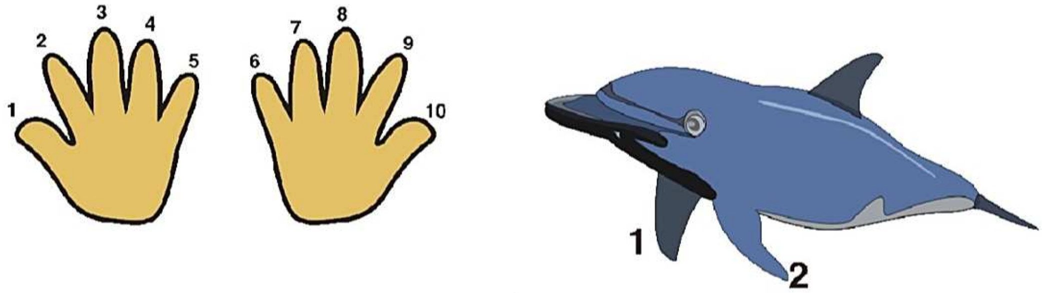
C) 

D) 

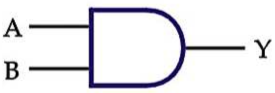
Time Allowed: **150 minutes**

T10. Dolphin calculator

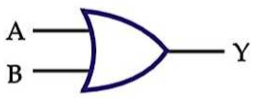
We - human beings can count by fingers up to 10 as we do have 10 fingers, dolphins can count by fingers up to 2 as they have only two fingers. So dolphins use binary system and binary calculator as well.



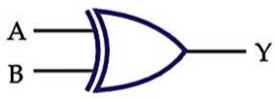
Please help dolphins to make a calculator using these devices:



A	B	Y
0	0	
0	1	
1	0	
1	1	



A	B	Y
0	0	
0	1	
1	0	
1	1	



A	B	Y
0	0	
0	1	
1	0	
1	1	

Time Allowed: **150 minutes**

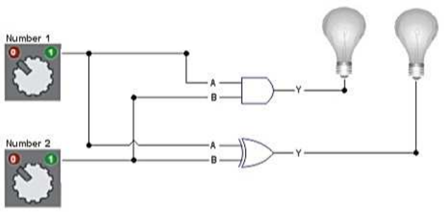
The dolphin calculator use two lightbulbs to display the number:

0	
1	
2	

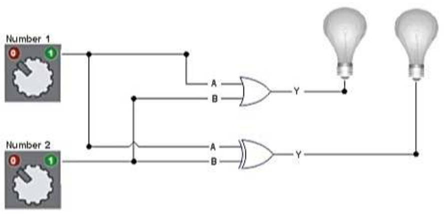
Question / Challenge

Which of the following will work correct for finding the sum of two binary digit?

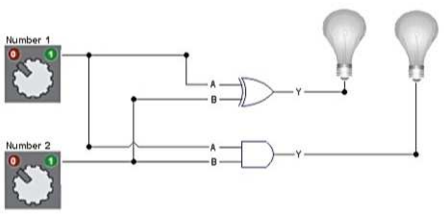
A)



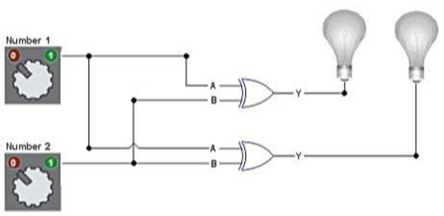
B)



C)



D)



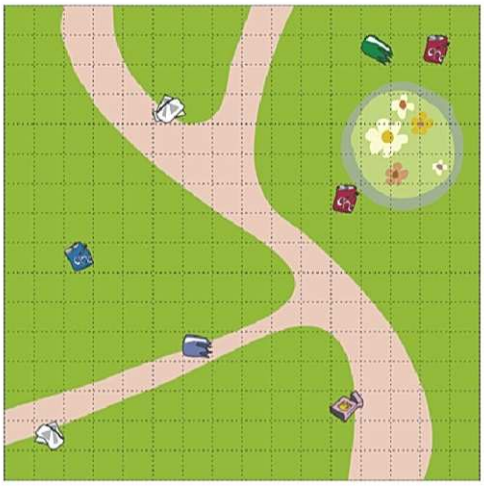
Time Allowed: **150 minutes**

Tasks T11 – T20 carry 4 points each

T11. Robot Search

Beaver Town has a park which is divided into a 256 segments, in a 16x16 grid. Unfortunately, there is litter scattered throughout the park which needs to be cleaned up.Lucy has a collection of robots cleaners that can search one square region and find exactly one piece of litter to pick up. However, these robots will only do the litter pick up if there is a robot in each square region of the park, even if there is no litter there.Lucy will divide the area into square regions of sizes 1x1, 2x2, 4x4 and 8x8, and place one robot into each square region.

The park with the litters is shown below:



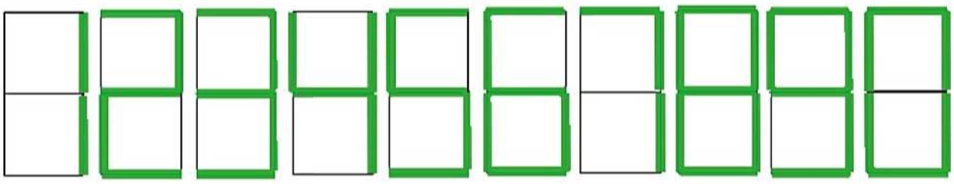
Question / Challenge

What is the least number of robots needed so that all litter can be picked up?

A) 9 **B)** 13 **C)** 16 **D)** 64

T12. Digit recognition

A digit recognition system understand digits that look as follows:

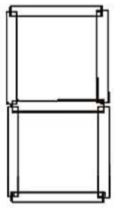


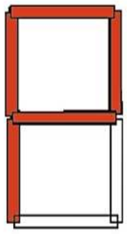
Each digit is made up of up to 7 segments. To recognize a digit, not all the segments are necessary, it is possible to understand a digit if only a some of the segments are visible.

Time Allowed: **150 minutes**

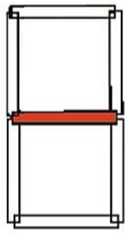
Question / Challenge

What segments are absolutely necessary to identify all of the ten digits (0…9) unambiguously?

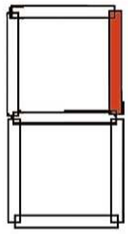




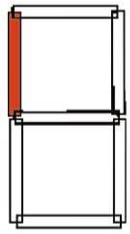
A)



B)



C)



D)

T13. Sleeping Potion

Dr. Beaver accidentally misplaced a bottle of his newly-developed sleeping potion among dozens of bottles of water in the laboratory. Because all the bottles look the same, and both sleeping potion and water are colorless and tasteless, there is no way to identify them by appearance. In order to find the sleeping potion as soon as possible, Dr. Beaver asks some assistants to drink a small amount of liquid taken from one or more of the bottles (liquids can be mixed together) and then monitors the results. The sleeping potion is strong: any beaver who drinks even a little of it will fall asleep within 30 minutes. Any beaver who drinks only pure water will of course stay awake.

An example: **TWO** assistant beavers participate in the test; beaver A drinks a mixture of liquids from **the first** and **the third** bottle; beaver B drinks a mixture of liquids from **the second** and **the third** bottle.

- If only beaver A falls asleep, we know that the first bottle is the sleeping potion while the rest contain pure water.
- If only beaver B falls asleep, we know that the second bottle is the sleeping potion.
- If beaver A and B both falls asleep, we know that the third bottle is the sleeping potion.
- If neither of the beavers falls asleep, then all three bottles contain pure water. In this case, the number of bottles tested is three.

Question / Challenge

Let's suppose **THREE** beaver researchers participate in the experiment. What is the maximum number of liquid bottles tested when each assistant drinks a mixture of liquid exactly once?

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

T14. Crossing Stepping Stones

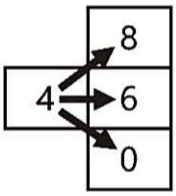
Young beavers play a game. They draw a grid on the ground as shown in the picture below. The grid consists of 6 columns and 5 rows. Each cell in the grid contains a number from 0 to 9.

4	1	2	0	4	2
5	3	5	1	8	7
1	2	7	1	1	9
2	8	1	2	0	0
3	2	4	9	1	3

The rules of the game are as follows.

Start at any row in the leftmost column.

On each step, move from the current cell to one cell diagonally above, one cell diagonally below, or to one cell straight as shown in the picture below. However, in the top and bottom rows, you cannot leave the grid.



When moving through the grid in this way, the sum of the numbers of the cells you visited is your score. The player with the highest score wins.

Question / Challenge

What is the highest possible score a beaver could achieve in this game?

A) 28 **B)** 33 **C)** 36 **D)** 40

Time Allowed: **150 minutes**

T15. Game with Toothpicks

Helga and Bob play a game with toothpicks:
There are two piles of toothpicks on the table. Helga and Bob take turns playing the game.

1. A player completely takes away one of the piles on the table.
2. The player then splits the remaining pile into two piles.

If a player leaves two piles of exactly one toothpick, this player wins.
Helga plays first.

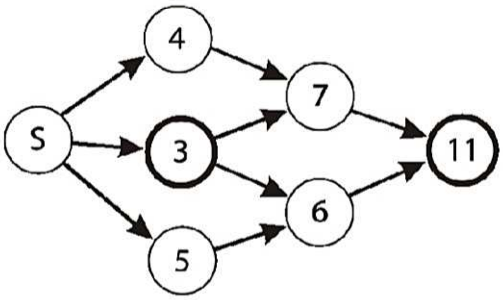
Question / Challenge

The game starts with 24 toothpicks split into two piles. In which of the following starting configurations is Helga able to win?

A) 11 and 13
B) 12 and 12
C) 7 and 17
D) 11 and 15

T16. Shortest distance

In the picture an unidirectional network of roads is shown. The number in each node represents the shortest distance from S to that node.



Question / Challenge

Which of the following statements about the two nodes with the fat edge is true?

A) The shortest distance between these nodes is exactly 8
B) The shortest distance between these nodes is 8 or less
C) The shortest distance between these nodes is 8 or more
D) None of the other answers is correct

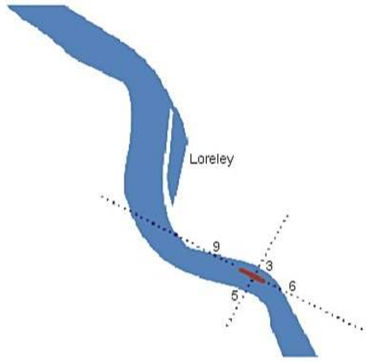
T17. Ship on the Rhine River

An automatically controlled ship is travelling along the Rhine River from South to North (bottom to top on the map) while keeping a safe distance from the banks.

Four sensors are constantly measuring the distance to the next object above the water surface in front, on the right hand side, in the back and on the left hand side. The computer uses the sensor data to control the engine and the rudder. Every minute the data are logged in a table. The image depicts the position of the ship in minute 120.

Time Allowed: **150 minutes**

Minute	Front	Back	Left	Right
120	9	6	5	3
121	16	10	6	2
122	12	8	4	4
123	24	10	6	4
124	5	14	4	6
125	28	16	5	5
126	16	28	6	4
127	12	16	7	4
128	8	14	6	4



Question / Challenge

At a certain time a ferry crossed the river in front of the ship. The ship automatically turned to that side at which there was more space on the river.

In which minute did the ship encounter the ferry?

A) 124 **B)** 125 **C)** 126 **D)** 127

T18. Levenshtein distance

We define a basic operation as one of the following:
* insert one character into the string,
* remove one character from the string,
* change one character onto another.

We define that the distance between two strings is the minimal number of basic operations, which allows us to change the first string into the second one. For example, the distance between kitten and sitting is equal to 3, the corresponding operations are
1. *kitten* → *sitten* (change k to s),
2. *sitten* → *sittin* (change i to e),
3. *sittin* → *sitting* (insert g at the end).

Question / Challenge

What is the minimum distance between *length* and *french*?

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

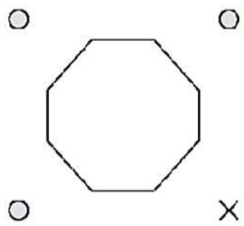
T19. Colorful Building

In the Bebras City, there is a building with eight different color faces.

The colors are: cyan, blue, green, orange, pink, red, violet and yellow. The order of the colors may differ on the walls.

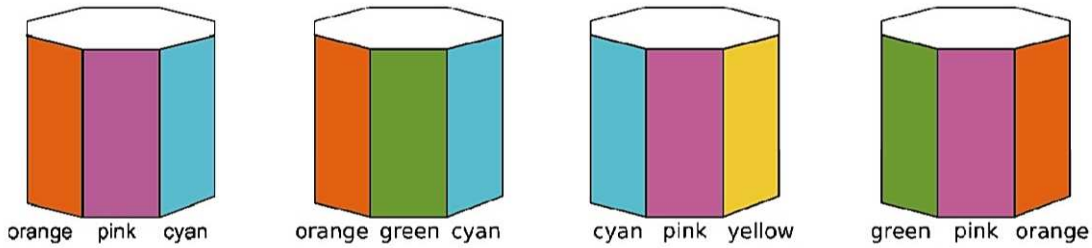
Anna, Bob and Chris are standing at different points around the building:
- You are located on the cross.
- Anna can see the cyan, violet and yellow walls
- Bob can see the red, blue and violet walls and
- Chris can see the green, red and orange walls

The colors are not necessary in order.



Question / Challenge

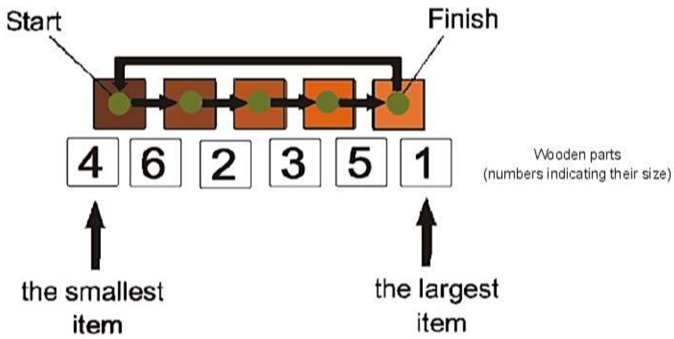
What color walls can you see from your point of view?



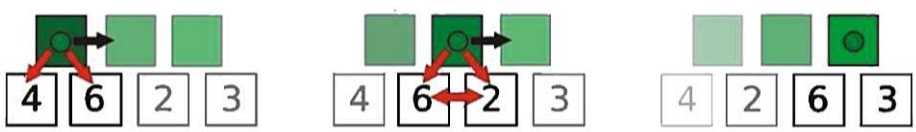
A) **B)** **C)** **D)**

T20. LUMOS

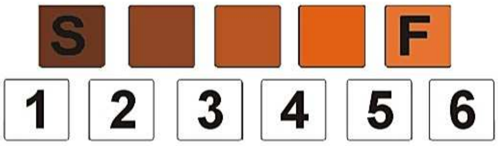
The LUMOS (Lumber Module Sorter) is a huge machine that helps the beavers pack the lumber into boxes depending on their size. Part of its job looks as the following: it takes 6 pieces of wood and sorts them in ascending order, then gives them to the next part of the machine.



The current algorithm works as the following: the machine goes from the first (start) piece to the last but one (finish) and compares the actual with the next one. If the next one is larger or equal, then it goes to the next pair. If its smaller, it switches the two of the pair and then goes further.



This procedure goes on till the machine needs no pairs to switch. Then the order is ascending right.



Dr. Beaver Bubble engineer states that knows a quicker solution by setting the finish item one earlier after every cycle.

Question / Challenge

Is he right?

A) Its not the finish that should be set earlier but the start should be set later.
B) He is wrong, because it has no effect on the sorting.
C) Yes, the machine can finish quicker this way.
D) It does not matter, because it takes the same time anyway.

Tasks T21 – T30 carry 5 points each

T21. Tandems

We will call a sub-string "TANDEM" if it represented by two identical character sequences, one after another. The number of characters in a *tandem* is named as its *length*. For example the string AABABA has three tandems AA (length 2), ABAB and BABA (length 4).

Question / Challenge

What is the length of the longest tandem in the string below?

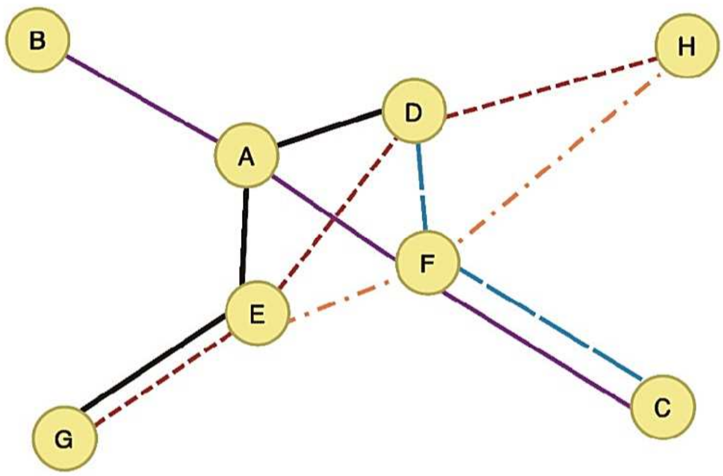
TCTACTAACCTACTAACAC

A) 4 **B)** 6 **C)** 8 **D)** 10 or more

T22. Cost reduction

Beaverland has eight railway stations and five railway lines. The lines are shown in the diagram below, each with a different colour. Note that it is possible to travel from any station to any other station using at most one train transfer. For example, to get from B to H one could follow the purple line from B to F, transfer to the orange line and go to H.

Because the railway company wants to reduce costs, they plan to shut down one or more rail lines. They must do this in such a way that all stations stay connected to the railway network and that travelling from any station to any other station can still be done using at most one train transfer.



Question / Challenge

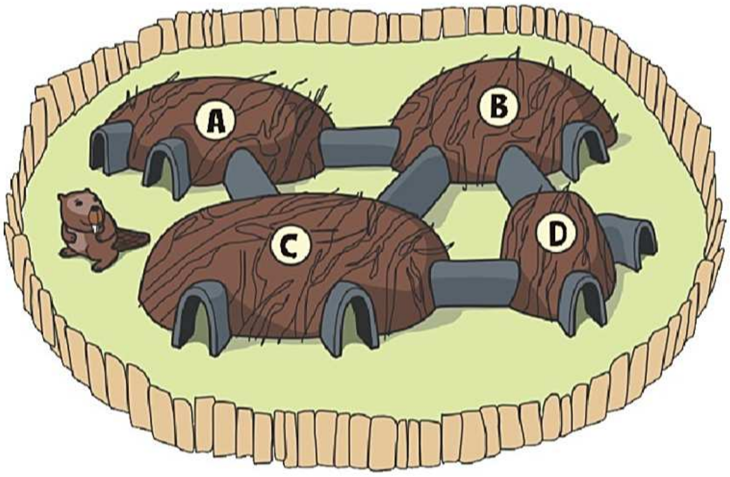
How many railway lines can at most be shut down by the railway company?

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

T23. Room Puzzle

Beaver family has built a lodge with 4 rooms and 5 tunnels between them, and 7 doorways to the garden.

Beaver children have noticed that it is possible to run along a path passing through the tunnels and the doorways without walking through any doorway or tunnel twice.



Question / Challenge

In which room shall the little beaver start running to make such a path?

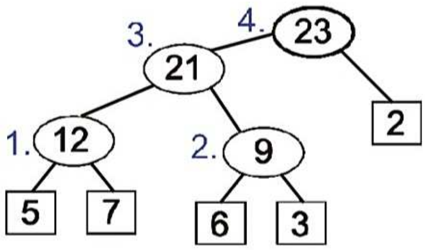
A) Room A **B)** Room B **C)** Room C **D)** Room D

Time Allowed: **150 minutes**

T24. Making a Gold Bullion

Pieces of gold are often found in a river that passes through the village of Beaver. Goldie the beaver wants to melt the pieces of gold she found into a single gold bullion. A blacksmith tells Goldie that only two pieces of gold can be melted together at a time and that each melting costs one cent per one gram of gold.

For example, assume there are five pieces of gold with weights of 5g, 7g, 6g, 3g, and 2g, respectively, and they are melted into a single gold bullion by the following four meltings (also see the figure):



1. Melt 5g and 7g pieces together into a 12g piece. This melting costs 12 cents.
2. Melt 6g and 3g pieces into a 9g piece. This melting costs 9 cents.
3. Melt 12g and 9g pieces (created by the previous meltings) into a 21g piece. This melting costs 21 cents.
4. Melt 21g and 2g pieces into a 23g piece. This melting costs 23 cents. Now all gold pieces have been melted together into a single piece (bullion).

The total melting cost is 12 + 9 + 21 + 23 = 65 cents.

The same end result (a single 23g bullion) can be achieved also by the four meltings involving gold piece weights '5g + 7g = 12g', '3g + 2g = 5g', '12g + 5g = 17g' and '17g + 6g = 23g'. The total melting cost in this case will be only 12 + 5 + 17 + 23 = 57 cents.

Question / Challenge

Assume that Goldie the beaver has eight pieces of gold with weights:

7g, 1g, 3g, 2g, 6g, 2g, 5g, 4g

What is the minimum total melting cost for melting all eight pieces of gold into a single gold bullion?

A) 80 cents **B)** 85 cents **C)** 90 cents **D)** 95 cents

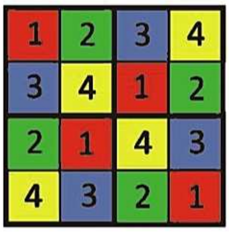
Time Allowed: **150 minutes**

T25. Coloured Shidoku

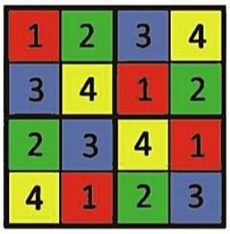
Gary and Sylvia have fun composing final schemes of Shidoku, the 4x4 Sudoku, using small blocks of four colours (1 = red, 2 = green, 3 = blue, 4 = yellow).

The four colours (digits) are to appear in each row, in each column and in each of the four 2x2 boxes that make up a scheme.

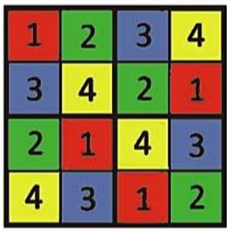
They have made these five schemes.



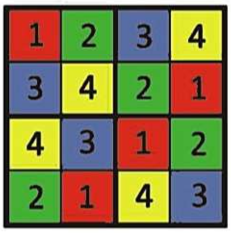
A



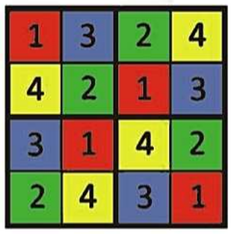
B



C



D

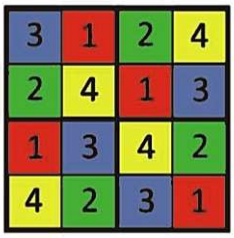


E

Sylvia notes that each of the patterns C, D, E can be transformed into *one and only one* of the patterns A and B, by performing *no more than four* (and once each) of the following operations:

- exchange all the small blocks of one colour with all the small blocks of another colour
(for example, swap all 1 = red with all 2 = green)
- swap row 1 with row 2
- swap row 3 with row 4
- swap column 1 with column 2
- swap column 3 with column 4
- reflect along the horizontal axis (upside-down)
- rotate 90 degrees clockwise.

For example, starting from the following pattern



and performing the sequence of these three operations: reflection along the horizontal axis, rotation of 90 degrees clockwise, and swapping red with blue, you get B.

Question/Challenge

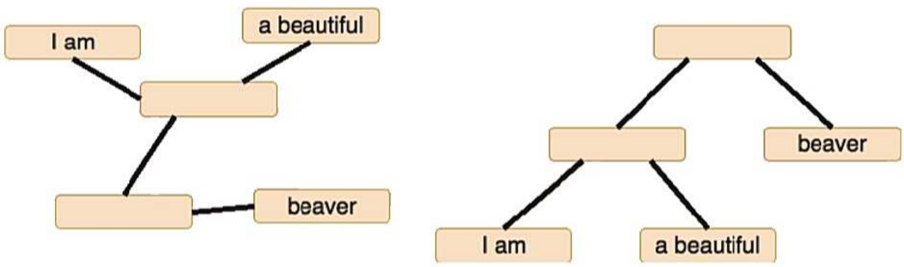
Which are the correct observations made by Sylvia?

A) All of (C,D,E) can be transformed into A.
B) All of (C,D,E) can be transformed into B.
C) (C, D) can be transformed into B and E into A.
D) C can be transformed into A, but D and E into B.

T26. Catch the rope

Beaver Moff wants to communicate with Beaver Manu. For that, he only has logs that can be attached together with ropes. Each log is attached to one, two or three other logs with a rope.

Words are written on logs attached to only one another log, as shown below. There is only one log attached to two other logs and if you hold it, you can shape the assembly as in the right:

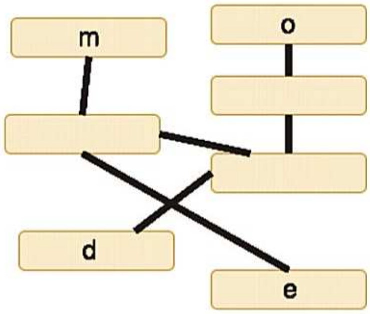


The figure on the right is not the unique way to shape the assembly, but it is the only one that results in a readable and meaningful sentence which is "I am a beautiful beaver" if you read the words from left to right.

Time Allowed: **150 minutes**

Question / Challenge

What is the English word represented by the following assembly if keep again as the top log the one connecting to two other logs and we read letters from left to right?



A) mode **B)** demo **C)** dome **D)** edom

T27. Replace letters

Lara likes strings. She defines *uniformity* as difference between number of occurrence most frequent symbol and number of occurrence least frequent symbol. For example, *uniformity* of string **abacaba** is 4-1=3. After 2 symbol changes, Lara can produce string **abbccba** with uniformity 1. When Lara change symbols in a string she can use any lowercase latin letters.

Lara now has the string **ababaaaaaaccabc**. She can change up to 6 symbols. Her aim is minimizing *uniformity* after this changes.

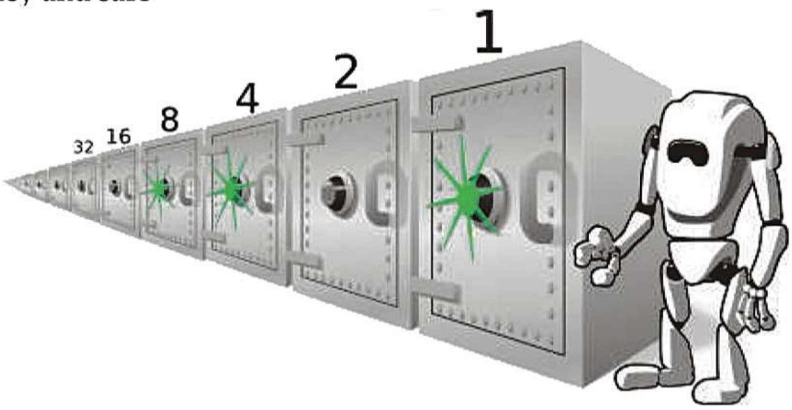
Question / Challenge

What is minimal *uniformity* she can achieve?

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

Time Allowed: **150 minutes**

T28. Robot, key and safe



A long line of safes stands in a bank. There is 1 gold coin in the first safe, 2 coins in second, 4 coins in 3-rd, 8 coins in 4-th and twice more in every next safe (see picture). Turning a key in a safe You can lock unlocked safe and unlock locked safe. Unlocked safes light and coins in these safes are unprotected.

Example in the picture: there are safes No, 1, 3 and 4 unlocked with 13 unprotected coins together.

A robot walks along the line of safes every hour and always starts from the 1-st safe. It turns the key in safe according these rules:

1. if the safe is locked, it turns the key and goes to the next safe
2. if the safe is unlocked, it turns the key and returns to the start, it does not turn any key more.

Consider that the line of safes is so long that always at least 1 safe is locked.

The robot has been doing its walks the whole week and after each walk different number of coins was unprotected. Nobody added or took any coin from any safe during this week.

Question / Challenge

Which one of these claims is true?

A) Number of unprotected coins increases twice after each robot's walk.
B) After several robot's walks the number of unprotected coins will be the same.
C) The number of unprotected coins decreases by 1 after every robot's walk.
D) No of the others claims is true.

Time Allowed: **150 minutes**

T29. Multiplication

Bob's computer knows some basic functions on natural numbers:

- succ(n) will give n + 1 (*succ* is the successor function and *n* is a number)
  Example: succ(1) = 2.
- pred(n) will give n – 1 (*pred* is the predecessor function and n is a number)
  Example: pred(5) = 4.

But Bob implements his own *add* function, which is a binary operation, by means of the *succ* and *prec* functions:

- add(0, b) = b
- add(a, 0) = a
- add(a, b) = succ(add(pred(a), b))
  (where a,b are natural numbers).

Question / Challenge

How can Bob implements the multiplication operation (mul) by means of the *add* operation ?

A) mul(a, 0) = 1
mul(a, b) = add(a, mul(a, pred(a)))

B) mul(a, 0) = 0
mul(a, b) = add(a, mul(a, succ(b)))

C) mul(a, 0) = 0
mul(a, b) = add(a, mul(a, pred(b)))

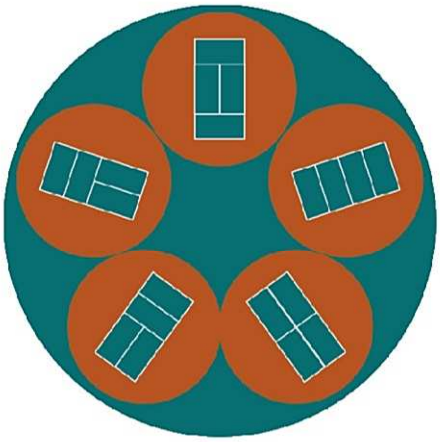
D) mul(a, 0) = 0
mul(a, b) = add(b, mul(a, pred(a)))

T30. Marking Patterns

The Beaverland Assembly consists of exactly 280 beaver representatives. Their sessions take place in the Beaverland Assembly Building. During sessions in the conference room, each and every beaver representative stands (to be faster and more efficient in making decisions) on a spot, marked uniquely (and assigned exclusively) for her/him on the conference room floor. In order to sharpen mind and attention of their beaver representatives, at least when attending their first sessions, conference hall constructors designed special spot marking patterns.

All patterns are of size 4*W* (4 beaver length unit long and of the same width *W*). Each pattern consists of a unique 1×2-tile layout combination. Pattern width *W* is minimum chosen so that there is a unique 1×2-tile layout combination for each of 280 beaver representatives. Here is the example of marking patterns designed in the same way for a table in a smaller caucus office for at most 5 beaver representatives.

Time Allowed: **150 minutes**



Question / Challenge

You can notice that those 5 tile patterns from the example are all unique 1×2-tile layout combinations that can be made in the 4×2 patterns. And how many beaver length units *W* wide are (**at least**) all those spot marking patterns in the Beaverland Assembly Building conference room, so each of 280 beaver representatives can be assigned a unique 1×2-tile layout combination in her/his 4×*W* pattern?

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