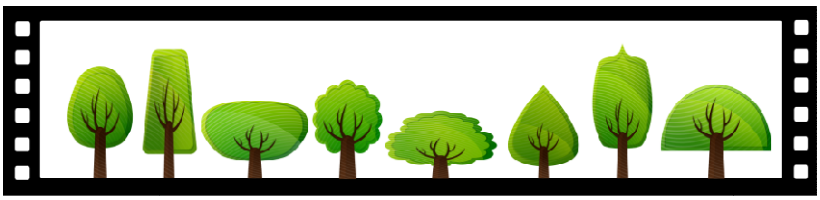
TASKS T1 – T7 CARRY 3 POINTS EACH

T1. FOREST PICTURES

Dai stood in the middle of a circle of eight trees and took a 360 degree photo of them.

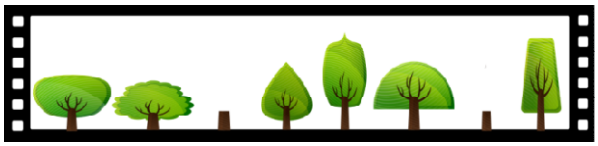


After a few days, Dai returned to the same spot in the forest and took another photo. She saw that two of the trees had been cut down.

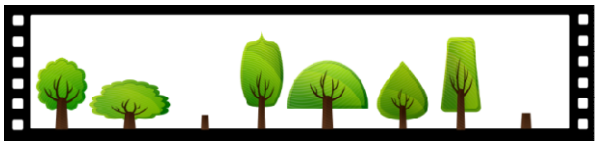
Question / Challenge

Which photo did Dai take?

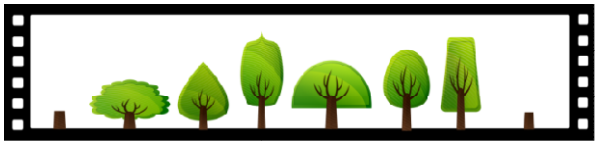
A)



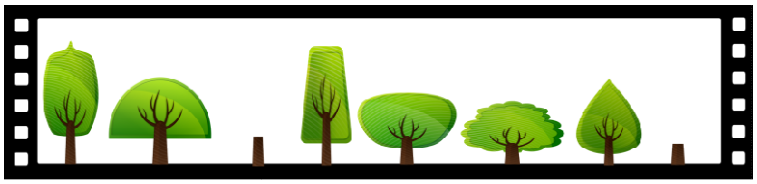
B)



C)



D)



T2. THE GIFT

Gaby's dad gives her four boxes containing four different gifts to choose from: a bracelet, a notebook, a ring, or a perfume. There is only one gift per box: through logic Gaby can keep the one she likes the most. Each box has a label that does not lie.

Question / Challenge

Gaby wants the ring. What box has the ring in it?

A)

B)

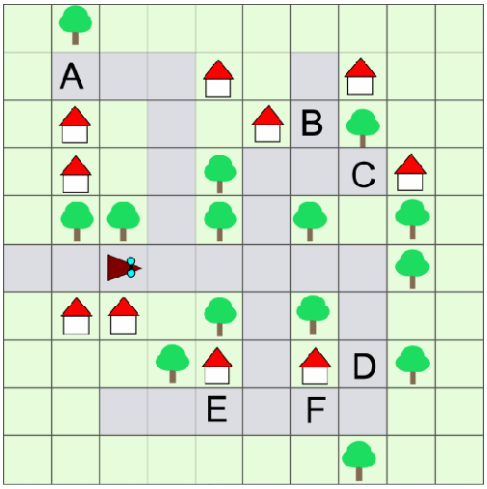
C)

D)

T3. LISTEN AND WALK

Tina, who is blind, walks through the city along the roads, using her talking glasses. The talking glasses have cameras and an intelligent object recognition system. They can recognize the four types of squares of the map below: a house, a tree, a road and lawn. When Tina enters a new road square, the talking glasses tell her – in this order – what is on her left, what is in front of her and what is on her right; for example: "tree road house".

Tina starts (facing the right side of the map) on the road square from row 6, column 3 as shown in the picture and listens to her talking glasses. This is what they tell her (beginning with the starting square):



tree road house,
road road lawn,
tree road tree,
road road road,
tree road tree,
tree house road,
road road tree,
house road tree

At the end, Tina has arrived at one of the squares labeled with a letter.

Question / Challenge

At which one?

A) A **B)** B **C)** E **D)** F

T4. TIC-TAC-TOE FIELDS

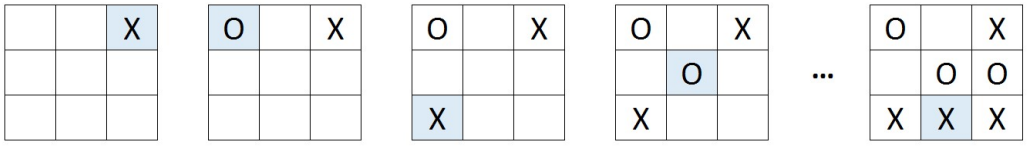
Tic-tac-toe is a paper-and-pencil game for two players.

Rules:

One player starts then both players take turns marking the spaces in a three-by-three grid with an X or an O. The player who succeeds in placing three of their marks in a horizontal, vertical, or diagonal row is the winner. If no one succeeds and all nine boxes are filled, the game ends in a draw.

Example:

The following images show the first moves and last move of a game (the last move of each position was highlighted):



The image on the right representsthe result sheet of a completed game. Not all sheets that are filled randomly with "X" or "O" are valid result sheets according to the rules presented above.

Question / Challenge

Which of the following images is the only valid result sheet of a completed game according to the rules above?

X	O	X
O	X	O
O	O	X

A)

X	O	X
O	X	
O	X	X

B)

X	X	O
	O	X
O	O	X

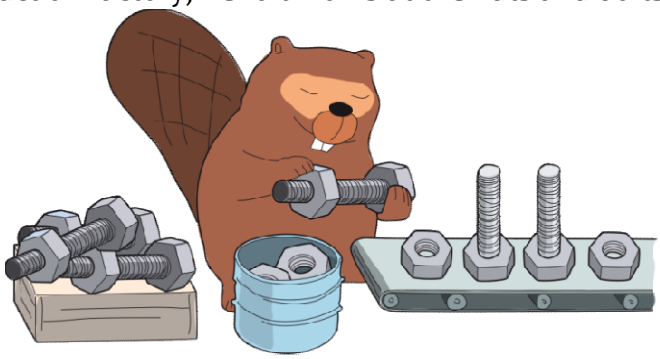
C)

X	O	X
O	X	O
O	X	

D)

T5. NUTS AND BOLTS

At the Beaver Construction factory, Benoit works at the nuts and bolts assembly line.



His job description is as follows:

- Benoit stands at one end of a long conveyor belt, which contains a line of nuts and bolts.
- Benoit's job is to take each element, either a nut or a bolt, off of the conveyor belt.
- If Benoit takes a nut from the conveyor belt, he puts it in the bucket beside him.
- If Benoit takes a bolt from the conveyor belt, he grabs a nut from the bucket beside him, attaches the nut and bolt together, and places the assembled part onto a large box.

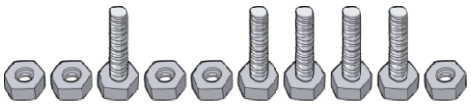
However, things can go wrong for Benoit in two different ways:

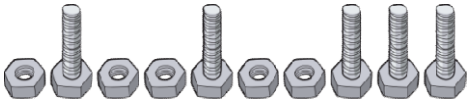
- If Benoit takes a bolt from the conveyor belt, and there is no nut in the bucket to attach.
- If there are no more nuts or bolts on the conveyor belt, and there are still nuts in the bucket.

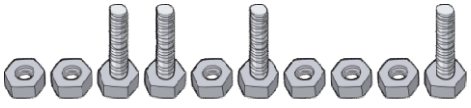
Question / Challenge

Which sequence of nuts  and bolts  , when processed from left-to-right, will **not** cause things to go wrong for Benoit?

A) 

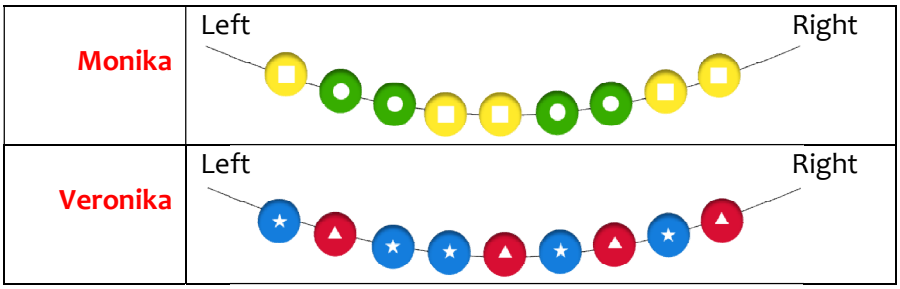
B) 

C) 

D) 

T6. OHRID PEARLS

During their vacation in Ohrid, Monika and Veronika bought Ohrid pearls and made necklaces out of them. Their necklaces are shown below.



They decided to change the pearls in their necklaces using the following steps.

1. Monika and Veronika each take a pearl from the right of their own necklace.

2. If the pearl is yellow (square) or red (triangle) they add it to the left of the other's necklace. If it is one of the other colours, they add it to the left of their own necklace. Monika goes first and then Veronika.

3. If each has given three pearls to the other, they stop, otherwise they go to step 1.

Question / Challenge

What do Monika's and Veronika's necklaces look like after the steps?

A) 

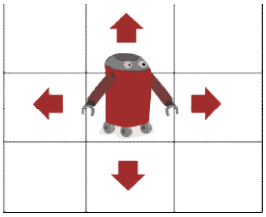
B) 

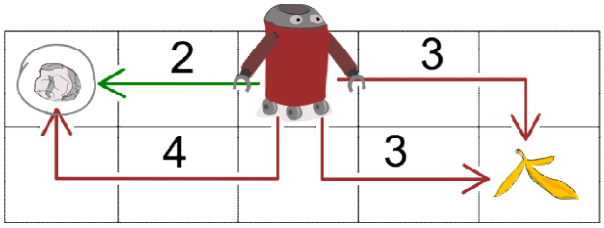
C) 

D) 

T7. AFTER PARTY CLEANING

Anna cleans up after her summer party. Luckily Butch^{95} the robot helps her. Butch^{95} can only move up, down, left or right as shown.





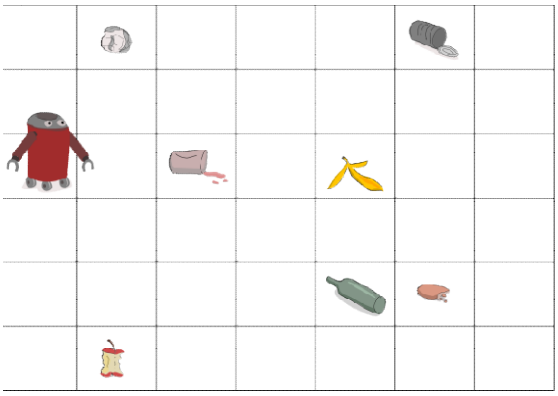
Moving from one square to another counts as 1 move. Butch^{95} automatically detects the nearest garbage, as shown by the image above. Butch^{95} works like this:

- He goes to the nearest garbage (the paper in the image above).
- He picks the garbage up.
- From there he detects again the nearest garbage.

He repeats this until all garbage is picked up.

Question / Challenge

Now Anna starts Butch^{95} to pick up all garbage on the floor below. Which garbage Butch^{95} will pick up last?



A) 

B) 

C) 

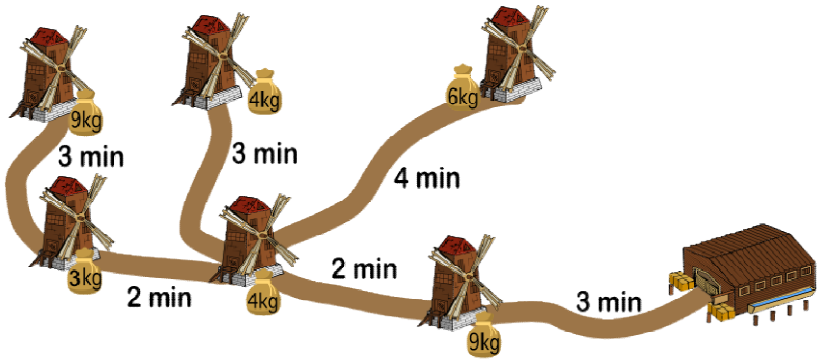
D) 

TASKS T8 – T14 CARRY 4 POINTS EACH

T8. FLOUR STORAGE

The picture shows several mills and the roads connecting them to the storage. Every evening, the mills produce sacks of flour and place them in front of the mills. Willie the beaver is supposed to pick up all the sacks and bring them to the storage before sunset. Willie can carry several sacks at the same time, but the total weight cannot be heavier than 15kg.

The time it takes Willie to travel from one mill to another and to the storage is shown in the picture.



Question / Challenge

Starting from the storage, Willie the beaver wants to bring in all the sacks to the storage as fast as possible. How many minutes does it take him to carry out this task?

A) 50 minutes **B)** 31 minutes **C)** 44 minutes **D)** 54 minutes

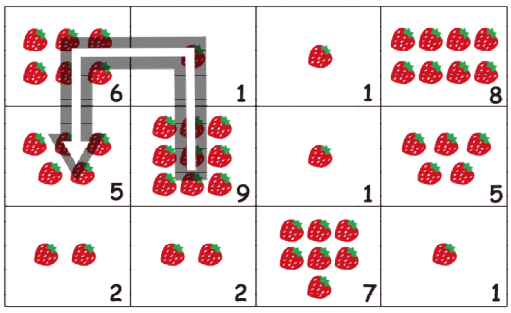
T9. STRAWBERRY

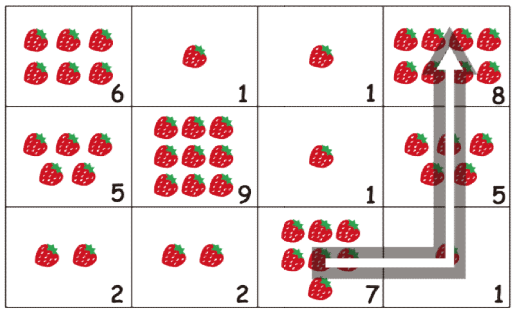
Beavers love to play "strawberry hunt"!

In this game, a different number of strawberries is put on each field of a grid. A beaver can then start from any field and take 3 steps.

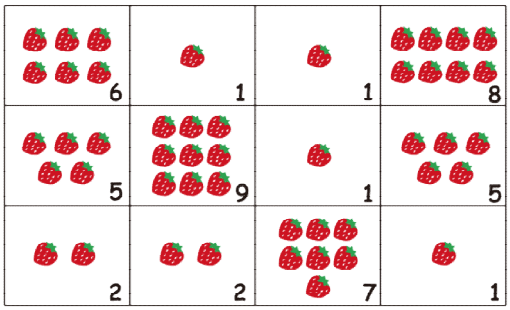
At each step, they can choose to go up, down, right, or left, to a neighboring field. On the chosen path a beaver visits four fields and will eat all strawberries on these fields.

Here are two examples for the same grid:
Choosing the path on the left, a beaver will eat 9 + 1 + 6 + 5 = 21 strawberries. Choosing the path on the right, the beaver will eat 7 + 1 + 5 + 8 = 21 strawberries as well.





Little Beaver is playing on this grid:



Question / Challenge

How many strawberries can Little Beaver eat at most?

A) 15 **B)** 19 **C)** 23 **D)** 34

T10. FAVOURITE GEM

Troy has a collection of gems. He ranks his gems from his overall favourite to his least favourite.
Sarah knows what gems are in Troy's collection, but she does not know how he has ranked them.
Sarah has a plan to find out which gem is Troy's favourite:

- Sarah chooses four of Troy's gems and asks Troy: "Out of this group of four, which gem is your favourite?"
- Sarah chooses a new set of four gems and asks her question again.
- Then she chooses a third set of four gems and asks her question for the last time.

Note:
When Sarah chooses her second and third set of four gems, she may sometimes include gems she has chosen before.

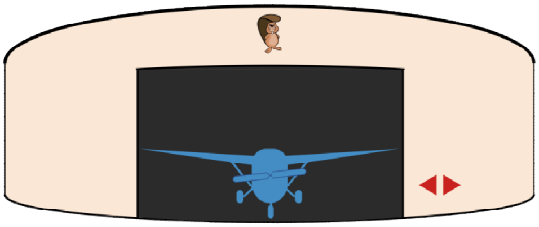
Question / Challenge

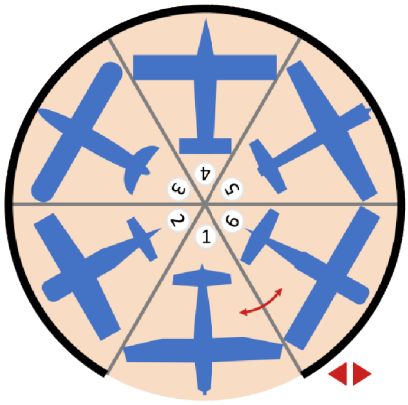
If Sarah is to find Troy's overall favourite gem, what is the largest possible number of gems in Troy's collection?

A) 8 **B)** 10 **C)** 11 **D)** 12

T11. HANGAR CAROUSEL

At Beavertown airfield, six planes are parked on a rotating turntable in the round hangar. The turntable can be rotated to the left or to the right by using a control panel with two arrows ◄►. One button press rotates the turntable exactly one parking position either left or right. The gate of the hangar is wide enough for one plane to roll out. The turntable is very slow to rotate so having fewer button presses will avoid delays.





In the mornings, when pilots come to pick up their planes, the parking position 1 is always at the gate. In the best case, arrow keys need to be pressed five times to get all planes to roll out. In this case pilots want to access the parking positions in order: 1, 2, 3, 4, 5, 6 by pressing ► five times, or in order: 1, 6, 5, 4, 3, 2 by pressing ◄ five times.
But what is the worst case? That is, what order accessing the parking positions will require the maximum number of button presses for all planes to be rolled out?

Question / Challenge

Which one of the following orders is the worst-case order for pilots to access the parking positions 1 – 6?

A) 6 2 4 1 3 5 **B)** 4 1 3 6 2 5 **C)** 3 1 2 4 5 6 **D)** 5 4 1 2 3 6

T12. THE PRINTER

At Anne's workplace there are 3 colleagues who share, within the network, the same printer placed between the offices. When one of the colleagues prints a document, the printer starts and prints the whole document even if, during this time, the order to print another document has been given. Today is a busy day at the office and it is necessary to print many documents with a lot of pages. The following tables show the printing times of each document and when the print order was given, for each colleague. If the printing for a document starts at 10.00 and lasts 2 minutes, then the print will finish at 10.02. No processing (waiting) time is necessary in between two consecutive print jobs.

Colleague 1:

Order no.	Time	Print duration
11	10:00	2 min
12	10:03	1 min
13	10:10	5 min

Colleague 2:

Order no.	Time	Print duration
21	10:01	1 min
22	10:04	3 min
23	10:12	1 min

Colleague 3:

Order no.	Time	Print duration
31	10:08	5 min
32	10:05	3 min
33	10:13	1 min

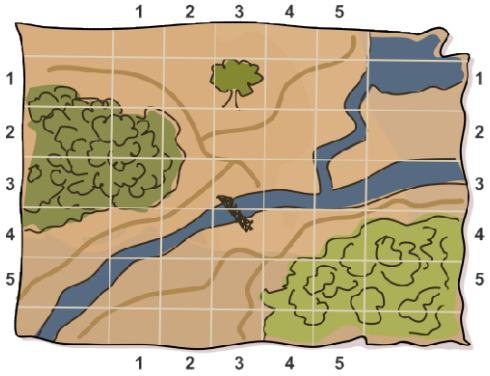
Question / Challenge

In what order will the documents be printed and at what time will the printer finish printing?

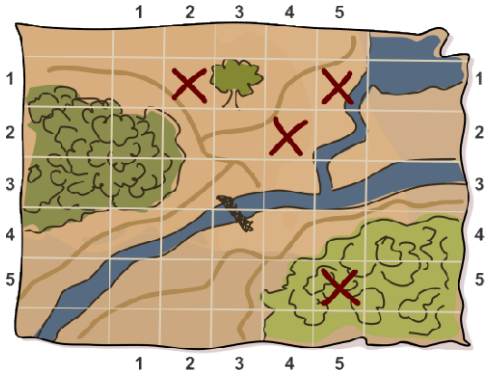
A) 11 12 13 21 22 23 31 32 33 and the finish time will be 10.22
B) 11 21 12 22 32 31 13 23 33 and the finish time will be 10.21
C) 11 12 13 21 22 23 31 32 33 and the finish time will be 10.21
D) 11 21 12 22 32 31 13 23 33 and the finish time will be 10.22

T13. PANTRY MAP

Castorus found two good hiding places for his food. To remember them, he wants to mark the spots on this map with an "X". But if his rival Biberina finds the map, she would know where to look!



To confuse Biberina, Castorus randomly adds some "X"s in other squares of the map, making sure that the total number of "X"s in each row and each column is even (Note: 0 is also an even number). Then he erases the two "X"s showing his hiding places. This is the resulting map:



Question / Challenge

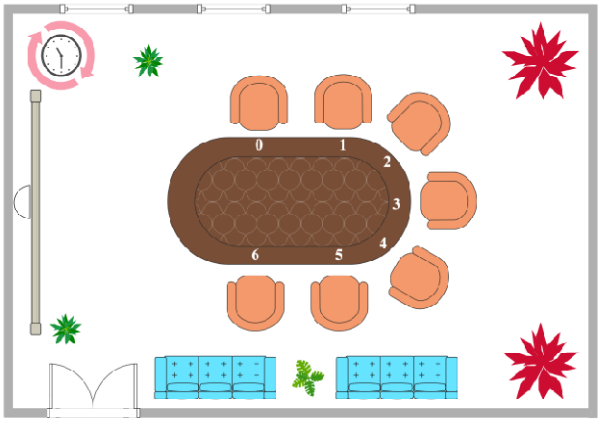
Where are Castorus's two hiding places?

A) (2,2), (5,4) **B)** (5,3), (3,1) **C)** (4,2), (4,5) **D)** (2,3), (4,4)

T14. MOVIE NIGHT

Ms. Naya wishes to organize a movie night for her seven students. She will be using the school round table room.

Name	Joud	Mary	Harry	Mo	Jon	Sara	Emily
Birth Day (DD/MM)	24/12	05/01	08/02	16/04	09/09	02/12	30/01



To avoid seating conflicts, Ms. Naya sets specific seating rules:

1) Birthday rule: each student is assigned a chair numbered as the sum of their birth day value (DD) and their birth month value (MM). If the value is greater than 7, the remainder after dividing by 7 becomes the chair number. For instance, Joud is assigned chair number 1 because 1 is a remainder of 24 + 12, then divided by 7.

2) Collision rule: if one student's chair is already used by another student, they should move to the following numbered chair. For instance: if chair 2 is taken then the student moves to chair number 3. And if chair 2 and 3 are taken then the student moves to 4. Also if chair 6 is taken then the student moves to chair number 0.

Question / Challenge

Students enter the round table room in the following order:

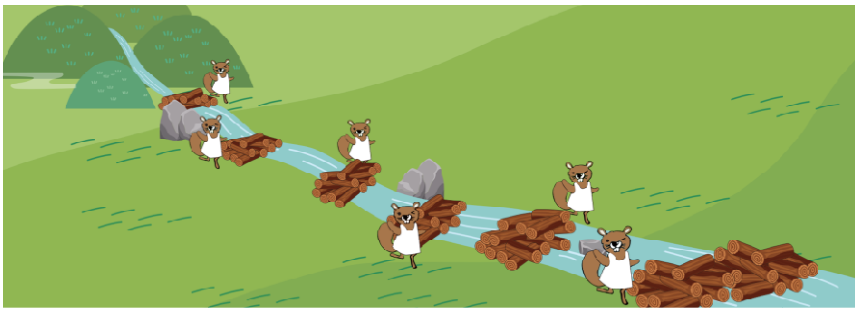
Mary → Harry → Emily → Jon → Joud → Mo → Sara

Which chair will Sara end up sitting on after all students have entered the room?

A) Chair number 0 **B)** Chair number 4 **C)** Chair number 2 **D)** Chair number 5

TASKS T15 – T21 CARRY 5 POINTS EACH

T15. BEAVER DAM



Six beavers (A, B, C, D, E, and F) have each built their own dam along Beaver Stream. One day comes the storm; some woods have been washed off the dams and drifted down the stream. Fortunately, all the woods are marked by dam builders; the woods from the dam built by Beaver A has an "A" on them.

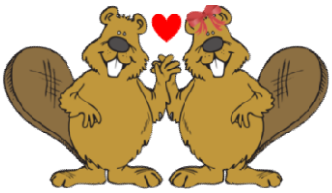
After the storm, every beaver gather around to give back others' woods and recover their own, as shown in the picture below:

Question / Challenge

Judging by the woods each beaver picked up, what is the order of the dam from upstream to downstream?

A) A → B → C → D → E → F
B) C → B → F → A → D → E
C) C → F → B → D → A → E
D) E → C → F → B → A → D

T16. IN LOVE



Beaver Dai secretly received a heart drawing as a gift. It must have been sent by one of her four best friends. Each of them makes a statement:

- John sent the drawing - David said.
- The gift is from James - Replied John.
- I didn't send it - Robert responded.
- John is lying - James finally said.

It is a habit of these four that exactly one of them tells the truth.

Question / Challenge

Who sent the drawing?

A) John **B)** David **C)** James **D)** Robert

T17. MYSTERIA

In a castle called Mysteria there lives a single wizard. This wizard can turn themselves into a fairy, or create a fairy beside them (to the right). The fairy can turn into a potion (on the left) and a dragon (on the right), or turn into a potion (on the left), a wizard (in the center) and a dragon (on the right).

The following table shows the contents of Mysteria both before and after each of the four possible transformations:

Before	After
	
	
	
	

These magical transformations can happen any number of times, in any order. That is, any wizard and any fairy can transform at any time.

Question / Challenge

Starting with the single wizard, which state of Mysteria is **not** possible to obtain?

A) 

B) 

C) 

D) 

T18. FAVORITE MOVIE

A group of friends need to choose which of seven movies to watch. Each friend rates each movie as shown.

	1	2	3	4	5	6	7
Ada	✓	✓	✓	✓	✓	✓	✓
Nancy	•	✓	✓	•	•	✓	✓
Niklaus	✗	✗	✗	•	✗	✗	✗
Grace	✗	•	•	•	✗	•	✗
Edsger	✓	•	✗	✗	•	✓	✓
Rosza	•	✗	•	✗	✓	•	•

The ratings from the best to worst are: ✓, •, ✗.

A movie is called a "favorite movie"if all friends give it their best rating. For example Movie 1 is not a favorite movie because Nikolaus gave his best rating to the Movie 4.

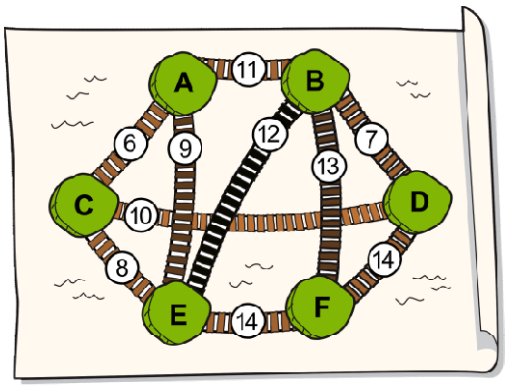
Question / Challenge

What is the smallest possible number of ratings that need to be changed such that there will be a favorite movie?

A) 0 **B)** 1 **C)** 2 **D)** 6

T19. CONNECTION OF ISLANDS

A jungle community, living in six islands, wants to connect these islands by building a network of canopy bridges. A plan of the possible connection of bridges was made. Bridges do not intersect each other. The numbers show costs to build the bridgesfor possible connection of islands.



The community wants to link all the islands so that it is possible to travel from every island to any other island either directly or by going indirectly through one or more islands. At the same time, the community wants to build bridges as cheaply as possible.

Question / Challenge

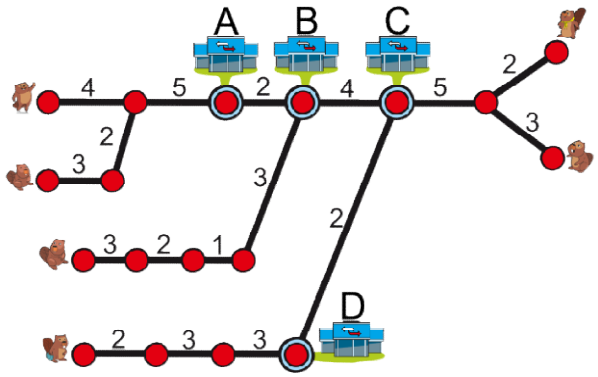
What is the cheapest way to link up all six islands?

A) 34 **B)** 38 **C)** 44 **D)** 46

T20. UNDERGROUND TRAINS NETWORK

Six beaver friends live in different parts of the Beaver City. They use the underground train network to meet up in one of the main stations A, B, C, or D. They want to arrive in the same station in the shortest possible time. They all get on board from different stations at the same time.

The map of trains shows stations (red nodes) on each route and the time it takes to travel between the stations. It takes one minute to load and unload passengers at each station.



Question / Challenge

In what station should the friends meet up so that they can see each other as soon as possible?

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

T21. APPLE PACKING

A beaver went apple picking and gathered 31 apples. He wants to put them into five boxes for storage. Afterwards, he wants to be able to retrieve any possible number of his apples by selecting a subset of the five boxes, taking all the apples from the selected boxes.

Question / Challenge

How many apples should the beaver put in each box?

	Box 1	Box 2	Box 3	Box 4	Box 5
A)	1	3	6	9	12
B)	1	2	4	8	16
C)	6	6	6	6	7
D)	1	2	3	4	5