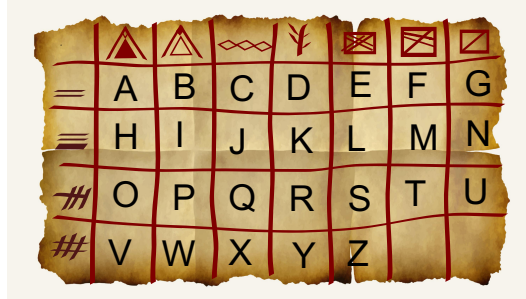


Tasks T1 – T7 carry 3 points each

T1. Al-Qatt Al-Asiri

Saud is a person who is interested in the Asiri heritage and loves encryption. He created an encryption system that is derived from the symbols of the Al-Qatt Al-Asiri.



Question / Challenge

What is the original text of the encrypted text below?



- A) WELCOMETO EVALUATION
C) WELCOMETO ENCRYPTION

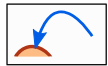
- B) WELCOMETO DECRYPTION
D) WELCOMETO EXHIBITION

T2. Planting carrots

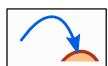
The robotic rabbit is seeding carrots on these four mounds.



He knows these commands:



jump **left** to the next mound



jump **right** to the next mound



place a **carrot seed** on the mound you are on

We have prepared a sequence of commands for the rabbit:



We don't know which mound the rabbit started on, but we do know that when he did this sequence, he placed each of three carrot seeds on different mounds.

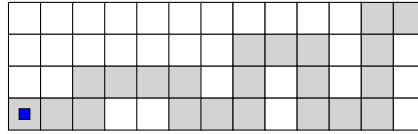
Question / Challenge

Which picture shows the carrot seeds as planted by the rabbit according to the sequence of commands?

- A) B)
C) D)

T3. Robot on the path

We want to program a robot to walk along a path in a park. The path is shown in grey in the picture below. The robot starts at the **left end** of the path, indicated by a blue square.



The robot knows these **commands**:

U move one square up

R move one square right

D move one square down

The robot's memory can hold at most 5 commands. The robot repeats these commands until it reaches the right border of the park.

Question / Challenge

Which sequence of commands will take the robot to the right border of the park moving over **the fewest number** of white squares?

A) RRURR

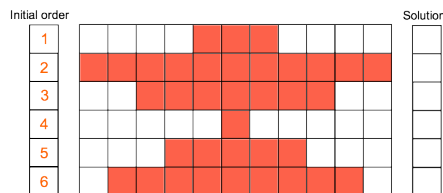
B) RRRUR

C) URRRD

D) RURRR

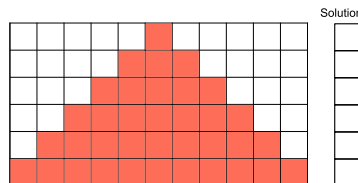
T4. Pyramid

A simple program allows you to order the rows of a graph to get different figures. Each row is indicated by its own number in the below image.



Question / Challenge

What must be the correct order of the rows from top to bottom in order to get the pyramid image?



A) 541362

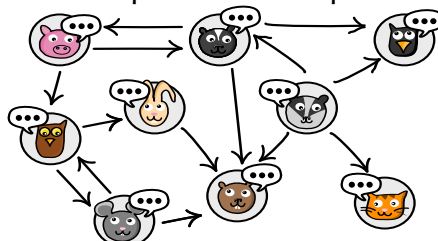
B) 415362

C) 316542

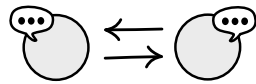
D) 123456

T5. Beaver Book Follower Tracking

Beaver Book is a service for friends, family, and other users to communicate online. Relationships between users can be represented in a picture like the one below.

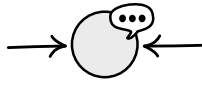


We can gather information about relationships among users as follows:



Both users are friends (they follow each other).

The user may be famous (they have many followers).



The user may be a newcomer (they have no followers).



Question / Challenge

Which of the following statements is false based on the picture above?

- A) User  and User  are following each other.
- B) User  may be famous.
- C) User  may be a newcomer.
- D) Users  and  have two followers.

T6. Beaver Bundles

Pieces in a toy construction set have four characteristics:

- 1) width (values: narrow, average, or wide)
- 2) height (values: short, average, or tall)
- 3) number of semi-circles on top (values: zero, one or two)
- 4) number of semi-circles cut out of the bottom (values: zero, one or two)

A beaver wants to organize the pieces into groups of three according to the following rule:
Each characteristic, when looked at one-by-one, has either the same value for each piece in the group, or a different value for each piece in the group.

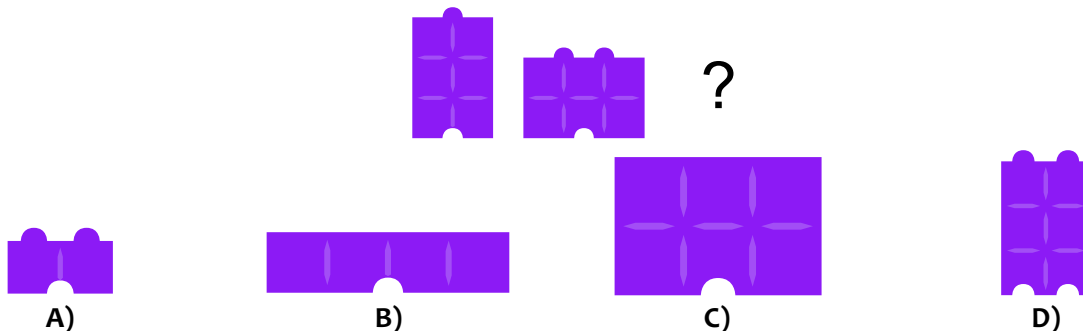


For example, the group above satisfies the rule because:

- each piece in the group has the *same* width value
- each piece in the group has a *different* height value
- each piece in the group has a *different* number of semi-circles on top
- each piece in the group has a *different* number of semi-circles cut out of the bottom

Question / Challenge

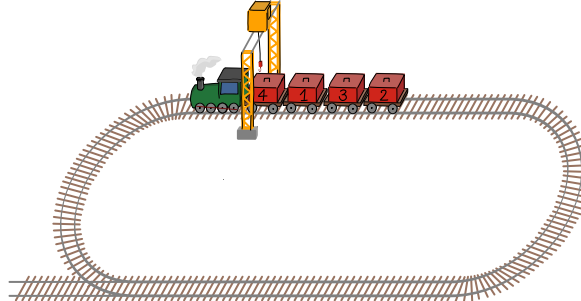
For the following group of pieces, which is the third piece?



T7. Unloading

A freight train has wagons, each with a numbered box. A single crane is used for unloading. The crane is at a fixed position. To unload a box, the box has to be positioned directly below the crane.

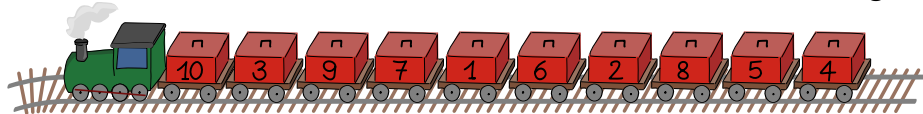
The boxes have to be unloaded in order starting from 1. The train can move only forward. It is on a circular track, so it can go around the track and return so more boxes can be unloaded by the crane.



In the example above, the boxes have to be unloaded in the sequence of 1, 2, 3, 4. In the first round of unloading, the train skips box 4, unloads box 1, skips box 3, and unloads box 2. In the second round, it skips box 4 and unloads box 3. The train has to come back for a third round and unloads the final box, number 4.

Question / Challenge

How many rounds will be needed to unload all the boxes from the following train?



A) 3

B) 5

C) 7

D) 9

Tasks T8 – T14 carry 4 points each

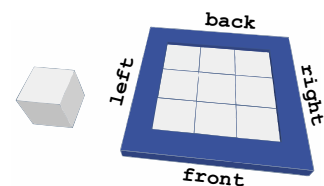
T8. 3D Objects

Multiple cubes can be placed on a board with 9 cells.

The position of the cubes are encoded by putting:

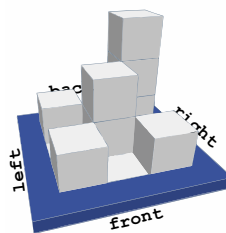
L for left, R for right, B for back, F for front, and M for middle.

So, putting the cube in the front left corner would result in: LF



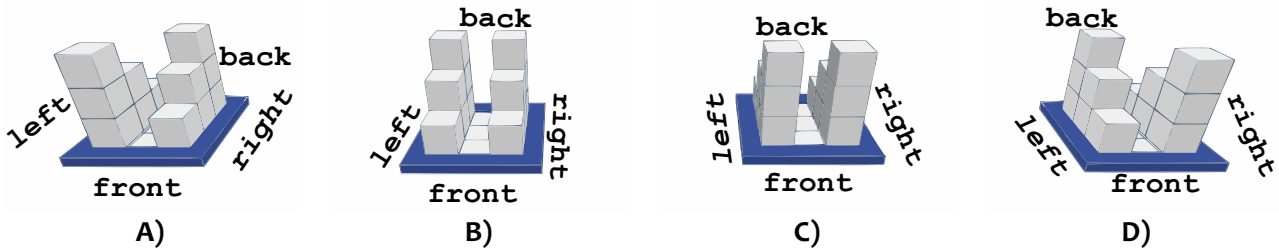
Thus, the object below can be encoded by:

LB RB MM LF RF RB MM RB



Question / Challenge

Which of the following four objects is encoded by:
LB RB LM RM LF RF LB RB LM RM LB RB



T9. Word changery



In the early morning Reto, Dru and Irek meet at the river and lay out a word with wooden letters. Then they leave all together. During the day each animal can visit the word by themselves as many times as they want. When they visit, each animal will perform only one specific action on the word.

Dru always deletes one letter.	Irek always inserts one letter.	Reto always brings a new letter to replace another one.

This morning the word was “LEAVES”. In the evening the word is “BLUEBERRIES”.



Question / Challenge

What is the minimum number of times the river was visited by an animal to change a letter of the word?

- A) 11 times B) 8 times C) 7 times D) 6 times

T10. Are they neighbours?

The old Beaver village was destroyed by a flood. All families are to be moved into a new multi-storey house.

The villagers decided to assign their new homes by following these steps:

- Each beaver family draws a random 10-digit number until every family has a number.
- The beaver chief draws a number (n) from 2 to 8.
- Beaver families whose numbers share the same first n digits in the number get homes on the same floor.

For example:

If beaver families A, B, and C draw the numbers 1002030436, 1002130482, and 1002140432, correspondingly, and the chief's number n is 5, that means that beaver-family B and C move onto the same floor (their first 5 digits are 10021) but beaver family A moves onto another floor (their first 5 digits are 10020).

Five of the beaver families drew these numbers:

1. 1921601203
2. 1921621512
3. 1921625403
4. 1921602302
5. 1921621622

Question / Challenge

What is the smallest possible choice for the chief's number (n) in order for beaver families 2 and 5 to be on the same floor, but for them to be on a different floor to beaver families 1 and 4?

- A) 2 B) 4 C) 6 D) 8

T11. Detective

Sherlock Beaver is about to catch a band of thieves. While visiting their lair he sees a guard at the door asking for a password to get in. He observes another beaver walk toward the entrance. The guard says "twelve" and the beaver replies "six". He is allowed in. Later, he observes another beaver, the guard says "six" and this beaver answers "three". He is allowed in too. Sherlock decides to walk towards the entrance and the guard says to him "sixteen" and Sherlock replies "eight" but he is not allowed in and the thieves discover that he is a spy.



Question / Challenge

Which of the following rules could have been used by the thieves for their passwords?

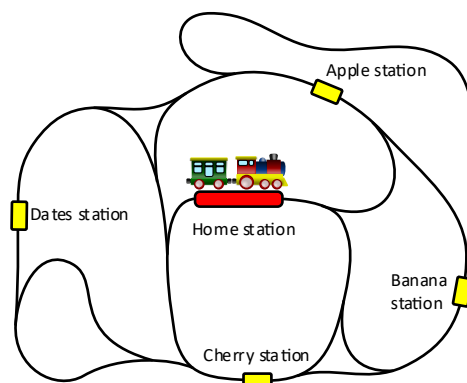
- A) To answer a number that does not start with the first letter of the word the guard says.
B) To divide in half the number the guard says.
C) To count how many letters are in the word the guard says.
D) To answer with a number that has the same number of letters as the word the guard says.

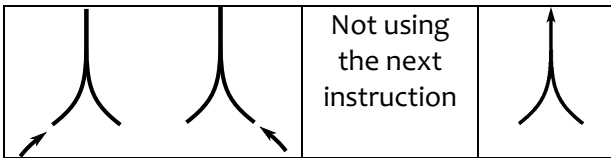
T12. Model Railway

Ondra built a railway model with a *Home* station and 4 other stations. The train is programmable, can execute a sequence of instructions, and turn on railway switches according to the instructions. It also stops at the nearest station after executing all of the instructions.

The instructions can only be the letters **L** and **R**. When the train reaches a railway switch, it chooses where to go based on the following table:

Railway Switch	Next Instruction	Where to go
	L	
	R	





Ondra places the train in the *Home* station with the direction shown in the image. If she gives the instruction **RL**, then the train will stop at *Banana* station.

If Ondra places the train back to the *Home* station with the same direction and gives the instructions **LR** then the train will stop in *Banana* station again.

Question / Challenge

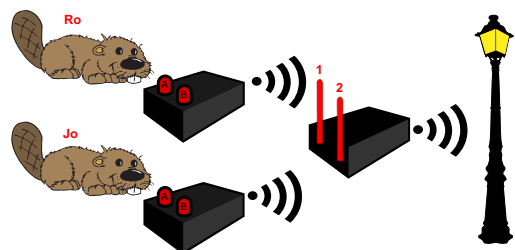
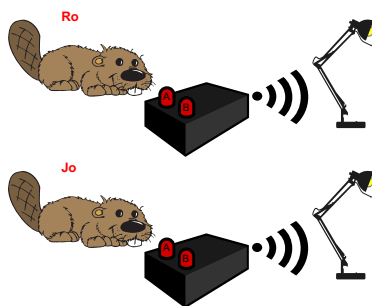
At which station will the train stop after executing the instructions **LLRR** when starting from *Home* station with the same direction as shown in the picture?

- A) Apple station B) Banana station C) Cherry station D) Dates station

T13. Switching Lights

Beavers Ro and Jo found two remote controls, each containing two buttons A and B. Each remote is used to send a signal to light a lamp according to the following table:

Button A	Button B	Lamp
OFF	OFF	ON ☀️
ON	OFF	ON ☀️
OFF	ON	ON ☀️
ON	ON	OFF 🌧️



The two beavers found a third remote, responsible for lighting the garden lamps, which works exactly as their remotes except that it has two antennas instead of the buttons. Antenna 1 becomes ON with an ON signal from Ro's remote, while antenna 2 becomes ON with an ON signal from Jo's remote.

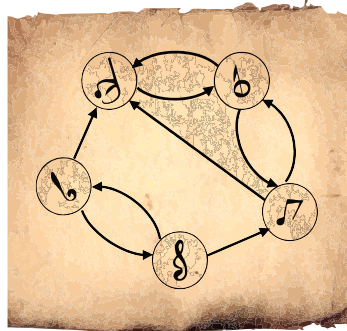
Question / Challenge

If no button is pressed on Ro's remote, which buttons should Jo press on their remote to switch on the garden lamp?

- A) Button A B) Button B C) No buttons D) Both buttons

T14. Restore Ancient Music Sheet

Beaver Jessica has found an ancient music sheet with five notes. The ancient rule of composition uses the diagram below where a next note is selected from an initial note according to the direction of the arrow(s) from the initial note. There is no restriction on the number of times a note appears in a music sheet.



Question / Challenge

The music sheet below has a burnt part. Which of the following pairs are two possible notes that correspond to the burnt part? (The music sheet is read from left to right).

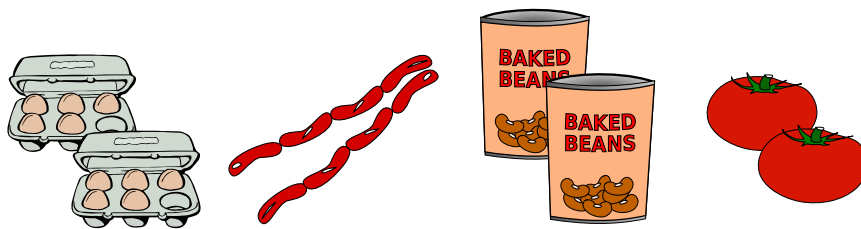


Tasks T15 – T21 carry 5 points each

T15. Breakfast

Áine, Brendan, Cian, and Dearbhla are cooking a big breakfast. They go to the supermarket to buy four ingredients: eggs, sausages, baked beans, and tomatoes.

In total, they buy eight items: two cartons of eggs, two sausage links, two tins of baked beans, and two tomatoes.



Each person buys two different types of ingredients. Also:

- Áine buys eggs, but Brendan does not.
- Cian and Brendan buy baked beans.
- Dearbhla and Cian buy one item in common.
- Brendan does not buy sausages.

Question / Challenge

If Áine and Dearbhla must purchase only one item in common, what item is it?

A) A carton of eggs

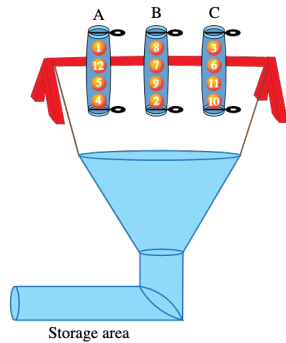
B) A link of sausages

C) A tin of baked beans

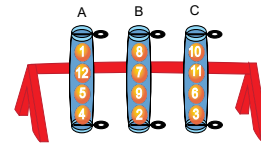
D) A tomato

T16. Rotating Tubes

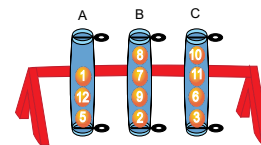
John got a new toy for his birthday. The toy has three tubes containing 4 balls each. John can push one of the 6 buttons on the control console. Buttons RA, RB, and RC will rotate the tube A, B, and C respectively by 180 degrees (upside down). Buttons DA, DB, and DC drop one ball from the corresponding tube to the storage area. See the picture below for an example.



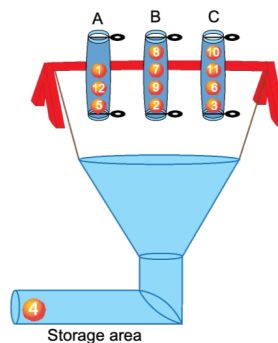
After RC (rotating C)



After DA (drop A)



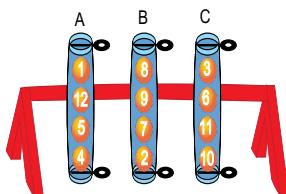
You can see the final state after RC and DA at the picture below:



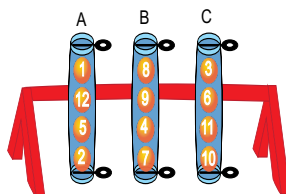
John wants to move all balls from the tubes to the storage area in increasing order, but sometimes the ball position on tubes makes it impossible to achieve this.

Question / Challenge

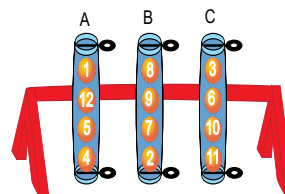
For which one of the following positions is it impossible to achieve John's goal?



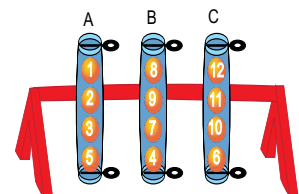
A)



B)



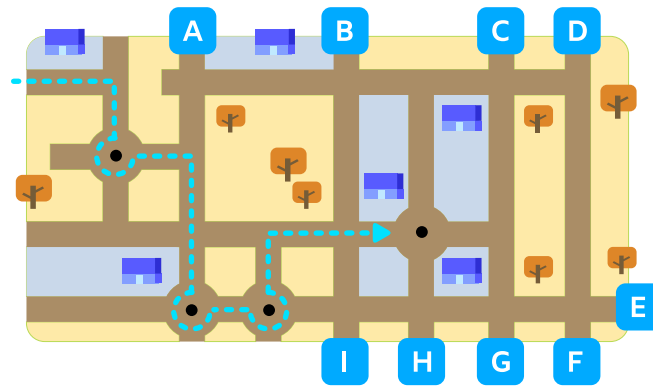
C)



D)

T17. Autonomous Car

Tim is traveling with his autonomous car. A recent software update of the car had a major bug which causes it to make the same turn every time it reaches the same type of intersection as shown below. For example the car takes the third exit in every roundabout.



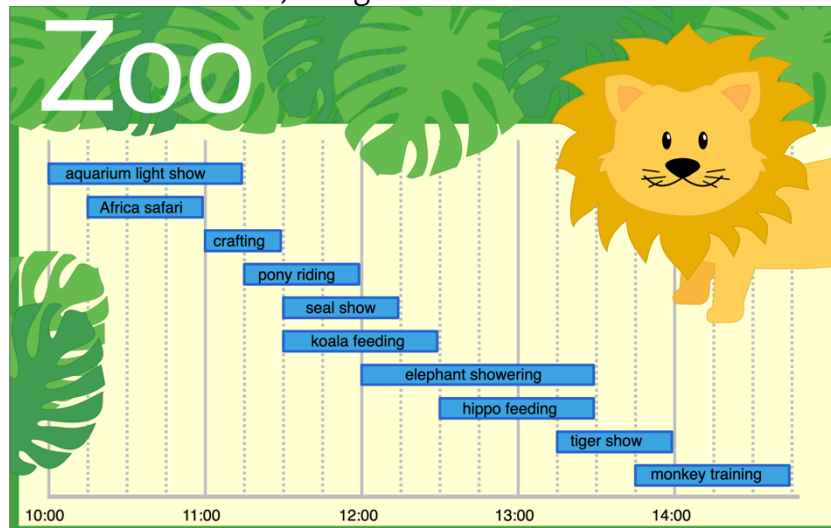
Question / Challenge

Which letter will be reached during Tim's journey?

- A) C B) D C) F D) E

T18. A day at the zoo

Anja spends a day in the zoo. On a flyer she discovers many different activities. Each activity has a start and an end time, and guests cannot leave in the middle of an activity.



Anja wants to attend as many activities as possible, but she can only attend one activity at a time. She can't leave in the middle of an activity, so she has to attend activities from beginning to end. Since some of the activities overlap, Anja cannot attend all activities today.

Question / Challenge

What is the maximum number of activities Anja can attend from beginning to end over the entire day?

- A) 3 B) 4 C) 5 D) 8

T19. Stamp Machines

Peter has the following four machines, that he uses to make designs on papers.



One of the machines colours the whole paper black, another turns the paper 180 degrees,

another stamps  on the paper, and another stamps  on the paper.
These machines can be associated to make special designs. But, at each step, a machine can completely change what was done before.
For example, the machine that colors the paper black can cover stamps made on the paper.

Peter initially puts the white paper in the machines and gets  at the final, as shown below.

The order in which the machines were used



Question / Challenge

Which machine stamps  on the paper ?

- A)  B)  C)  D) 

T20. Delivering Mail

Percy delivers mail to five beavers. When the beavers want to send mail to each other, they leave the mail in their own mailbox for Percy to deliver.

Percy visits the beavers' mailboxes one by one. At each mailbox, Percy does two things:

- He collects any mail in the mailbox and puts it in his bag.
- He delivers all the mail for that beaver from his bag by putting it in their mailbox.

Before Percy delivers any mail, he knows that the beavers' mailboxes contain the following mail.



Percy starts with an empty bag, and must only visit each mailbox exactly once. Therefore, he needs to be clever about the order in which he visits them so that he can deliver all the mails.

Question / Challenge

In order for Percy to deliver all the mails, in which of the following orders must he visit the mailboxes?

- A) Gina → Cato → Leon → Sue → Theo B) Gina → Sue → Cato → Theo → Leon
C) Gina → Cato → Sue → Leon → Theo D) Cato → Gina → Sue → Leon → Theo

T21. ToyFactory

In a toy factory there are three machines, each performing a specific task in the production of toys, in the following order:

The first machine is responsible for creating the toy. The machine gets a command to create a toy based on a random letter and number combination.

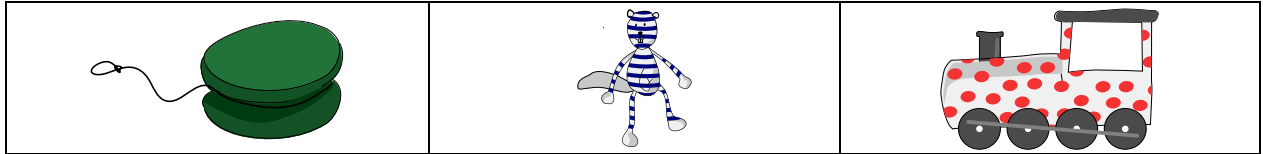
A= build a beaver	1= paint it with blue stripes
B= build a train	2= paint it with red dots

C= build a yo-yo	3= paint it green
------------------	-------------------

For instance: the command [A,2] would create the following toy:



The second machine takes out the toys shown below because marketing research shows children don't like them.



The third machine packs the toys in boxes. Yo-yos take up 1 unit, trains 2 units and beavers 3 units of space in the box. The boxes have **exactly 8 units** of space.

Question / Challenge

Which set of commands would result in a set of toys that completely fill one box?

A) [B,3], [C,2], [B,2], [A,2]

B) [A,1], [A,2], [B,1], [A,3]

C) [A,3], [C,2], [A,1], [B,2]

D) [B,1], [A,2], [A,3], [C,1]

