Tasks T1 – T8 carry 3 points each

T1. Similar dishes

Chef wants to prepare 2 dishes for dinner. He does not want them to be similar.
Two dishes are called similar if at least 2 of ingredients are the same.

Pasta	Egg salad	Walnut salad	Chicken soup	Cake

Question/Challenge:

Which dishes are similar?

A) Chicken soup and Pasta

B) Chicken soup and Walnut salad

C) Chicken soup and Egg salad

D) Walnut salad and Cake

T2. Machine

Miley sits on top of the mountain. The mountain has three different waterfalls. The waterfalls flow down through a river.

Miley can drop either a carrot or a fish in one of the waterfalls.
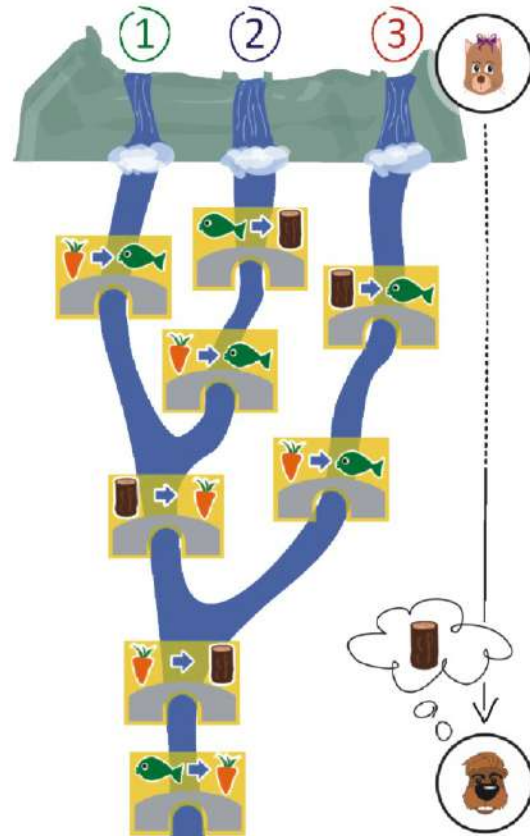
The river contains several bridges, each with trolls. The trolls replace items that pass under bridges.

For example, when a carrot passes under a bridge like the one above, the trolls replaces the carrot with a fish.

Justin Beaver sits at the end of the river.

Question/Challenge:

If Justin wants to receive wood, which item should Miley drop and where should she drop it in?

A) Drop a fish 🐟 on Waterfall 1.

B) Drop a fish 🐟 on Waterfall 2.

C) Drop a carrot 🥕 on Waterfall 2.

D) Drop a carrot 🥕 on Waterfall 3.

T3. Robots

LEA   MOE   BOB

Here are five statements describing the three robots above:
1. Bob and Moe are smiling.
2. Bob, Moe and Lea each have two legs.
3. Moe has a round head and Lea has two legs.
4. All three robots have five fingers.
5. Lea or Bob have their hands raised.

Question/Challenge:

Which of these five statements are true?

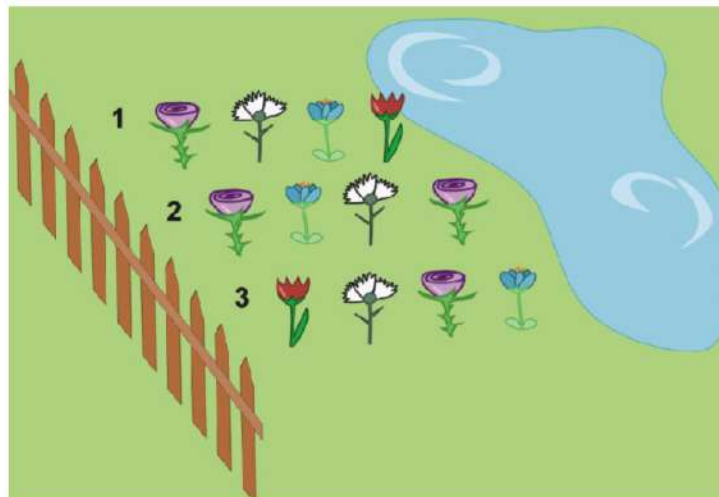**A)** 2 and 3   **B)** 1 and 3   **C)** 1 and 5   **D)** None

T4. Flowerbed

Children planted some flowers in three rows, 4 flowers in each row.

Mother wished that in each row the white flower is closer to the fence than the

blue flower .

Question/Challenge:
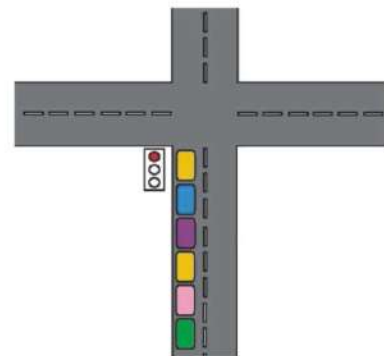
Which rows are planted according to mother's wish?

A) Only 1   **B)** 1 and 2   **C)** 1 and 3   **D)** All

T5. Signal Light

Mutusamy drives a blue car and has to stop at a red traffic light.
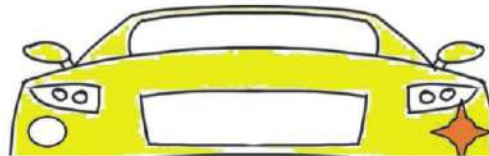There is one car in front of him and four cars behind him.
He looks at both of his side mirrors and sees that some of the cars turn on their signal light to go left or right.
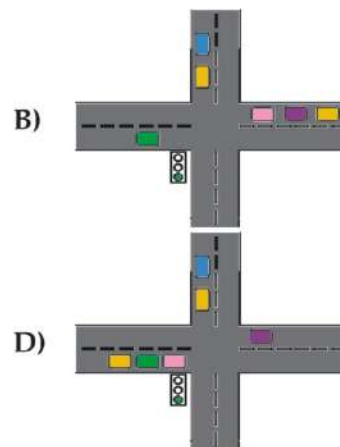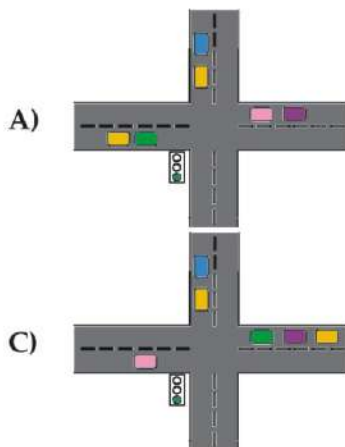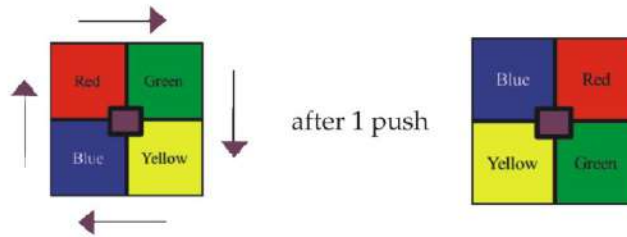

Left-mirror view   *Right-mirror view*

Front view

Question/Challenge:

Mutusamy wants to go straight. In what place will all the cars be after the light turns green?

A)

B)

C)

D)

T6. Simon Says

When a button is pushed, colors move as shown below.

after 1 push

Question/Challenge:

If we push the button one more time, where would you place the blue, green and yellow squares?
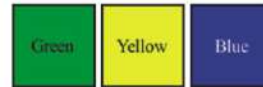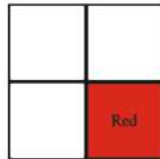
A)

B)

C)

D)

T7. Books in a box

Anna has a new bookshelf she would like to put her books on. She'll use an empty box to store the books until the shelf is ready. She puts books in the box one at a time, lying them flat on top of each other. (The last book added is going to be seen from the top.)

Anna takes the first book from the top of the box, then one by one she stands them up (places them vertically) on the bookshelf, until the box is empty.
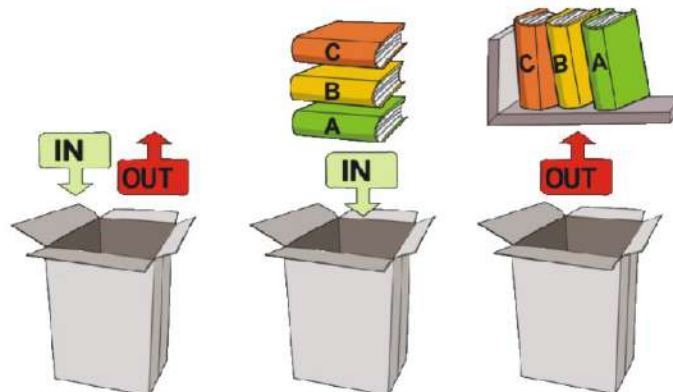
Question/Challenge:

Anna placed the books into the box in this order: G, N, I, O, D, C.
What is the correct order of the books on the bookshelf?

A) G, N, I, O, D, C **B)** C, O, D, I, N, G
C) C, D, O, I, N, G **D)** C, O, D, I, G, N

T8. Trains

There are 4 metro lines starting at stations
A, B, C, and D .

There are also three transfer stations
T1, T2, and T3 to change from one metro line
to another.
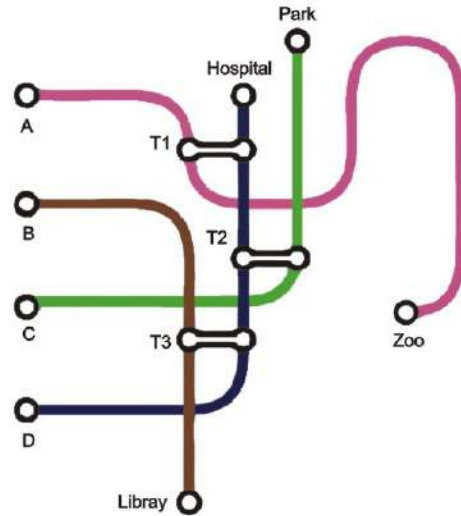
Question/Challenge:

John went to the Zoo. He changed lines
exactly once. On which station did John
start his tour?

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

Tasks T9 – T16 carry 4 points each

T9. Islands and bridges

People of Kastoria use only one condition to decide where the bridges are to be
built: if the sum of populations between two islands is more than a *chosen number*,
the bridge between them will be built.

The figure shows four built bridges between six islands and their populations.
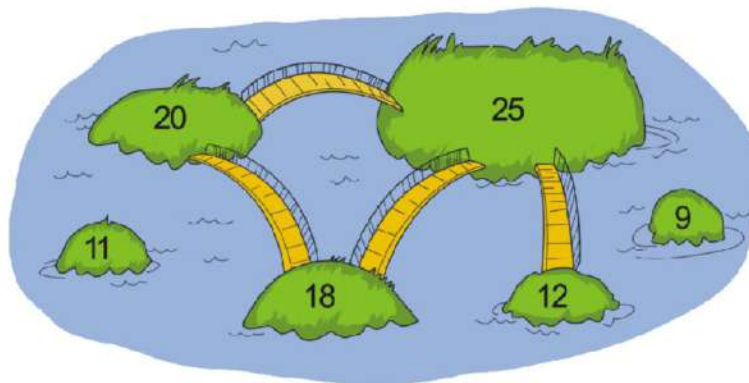
Question/Challenge:

What number did they choose?

A) 37 **B)** 36 **C)** 45 **D)** 20

T10. Ada and crayons

Ada has a box of 10 crayons, some crayons are pointing upwards and some downwards. Ada thinks that a box of crayons looks beautiful only if all the crayons are pointing in the same direction.
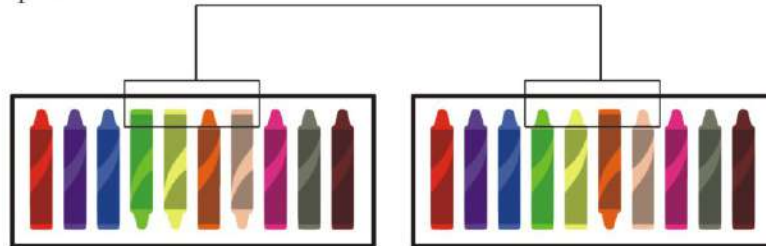
In one step she can flip any row of crayons as long as they lie next to one another. After flipping a row like this, all crayons that were pointing downwards will now point upwards (and those that were pointing upwards will now point downwards) as shown in the picture.

Question/Challenge:

Look at the box in the picture on the left, what is the minimum number of steps needed to make this box beautiful?

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

T11. Car-plate recognition

Beaver Joe has a parking lot. Joe wants to allow only the cars with the plates that follow certain rules. This work can be done by a computer, via a webcam that can read the number plate on the car and restrict the access in the parking lot.

Only the cars with the number plate complying with the following rules are allowed to enter:

- Must start with two characters that are in the range "A" to "Z" followed by a dash (-).
- Then, match any two digits in the range 0-9 followed by a dash (-).
- Then, match three characters that are in the range "A" to "Z".

Question/Challenge:
Which of the cars in the image can enter the parking lot?

A) The red car and the green car
B) The blue car and the green car
C) The red car and the blue car
D) Only the red car

T12. Draw 5 Cards

Angel, Brian, Cindy and Danny were playing a card game. Each person received five cards with values 3,4,5,6, and 7 arranged as shown below.

Players cannot rearrange the cards, and must play them in order.

	Player 1	Player 2	Player 3	Player 4
1st card	6	3	7	4
2nd card	5	5	6	5
3rd card	7	4	5	6
4th card	3	6	4	3
5th card	4	7	3	7

During each of five rounds,
1. Each player plays their next card.
2. If only one player plays the card with the greatest value, then this player earns 2 points.
3. If more than one player plays a card with the greatest value, then each of these players earns 1 point.

The goal of the game is to get as many points as possible. The result is shown below.

Angel	Brian	Cindy	Danny
4th place	1st place	2nd place	3rd place

Question/Challenge:
Which set of cards belongs to which player ?

A) Angel is Player 4, Brian is Player 3, Cindy is Player 2 and Danny is Player 1
B) Brian is Player 4, Angel is Player 3, Cindy is Player 2 and Danny is Player 1
C) Brian is Player 4, Cindy is Player 3, Angel is Player 2 and Danny is Player 1
D) Danny is Player 4, Brian is Player 3, Cindy is Player 2 and Angel is Player 1

T13. Beaver Lake

Beavers collect the wood in the lake with boat. The lake is divided into 26 fields. The trees are on the islands, and the beavers have to avoid the fields in which the rocks are located.

Notice, from fields 1, they can pick up wood from the islands 5 and 2.

Question/Challenge:

What is the smallest number of fields through which they must pass to pick up all the wood in the lake? Do not count the starting and ending positions.

A) 13   **B)** 11   **C)** 14   **D)** 10

T14. Pairing

A family of six beavers want to take a tour around the Cypriot Mount Olympus. There are three aerial balloons which hold two persons each.

Load-carrying capacity of the balloon A equals 14 kilograms, balloon B-15 kg, balloon C-19 kg, respectively.

Question/Challenge:

Beaver Name	Beaver Weight (kg)
Arthur	10
Aisha	12
Bob	3
Bonnie	6
Archie	8
Jesse	9

The weights for the beavers are shown in the table above. How are the beavers distributed in the balloons ?

A) *Balloon A*: Bob and Archie, *Balloon B*: Bonnie and Aisha, *Balloon C*: Arthur and Jesse

B) *Balloon A*: Bonnie and Archie, *Balloon B*: Bob and Aisha, *Balloon C*: Arthur and Jesse

C) *Balloon A*: Jesse and Archie, *Balloon B*: Arthur and Aisha, *Balloon C*: Bob and Bonnie

D) *Balloon A*: Arthur and Aisha, *Balloon B*: Bob and Archie, *Balloon C*: Bonnie and Jesse

T15. Two 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, when using the English alphabet which has 26 letters?

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

T16. Bracelet Code
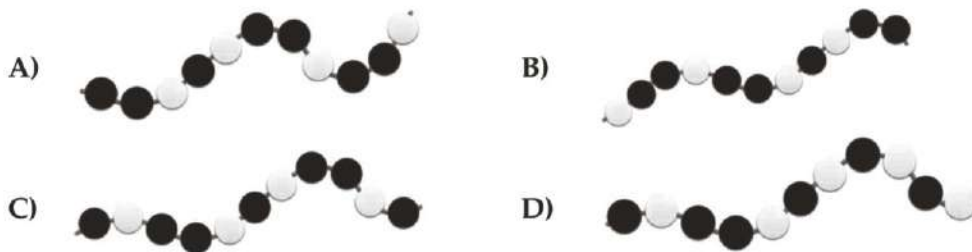
Bruce and Beatrix are playing a beading game. Bruce uses a code.

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)

Tasks T17 – T24 carry 5 points each

T17. Dustmen robots

The picture shows the map of a park divided into squares. The number in each square represents the number of pieces of trash which were left there by visitors. Dustmen have two robots, Anton and Boris, which will collect all the trash from a square when they enter it.

First, we sent robot Anton: ↑ = upwards   ↑ = upwards   ← = left

Next, we sent robot Boris: ↑ = upwards   ↑ = upwards   ← = left

1	3	1
0	2	6
0	1	3
1	Anton	Boris

Question / Challenge:

How many pieces of trash will Boris collect using these instructions?

A) 3   **B)** 9   **C)** 11   **D)** 12

T18. Cinderella's Ball

The king and queen are helping their daughter Princess Cinderella choose a husband. They organise a ball for Cinderella to meet some princes. You have to decide in which order the princes will meet Cinderella. Here is your list of rules:

- Florian before Charming
- Florian before Kristoff
- Kristoff before Milo
- Kristoff before Heracles
- Milo before Heracles

Question / Challenge:

Which ordering of princes follows these rules?

A) Florian - Kristoff - Milo - Heracles – Charming
B) Florian - Heracles - Kristoff - Milo - Charming
C) Florian - Charming - Kristoff - Heracles - Milo
D) Florian - Charming - Milo - Kristoff - Heracles

T19. Drawing Game

Beaver Joe plays a drawing game that uses logs to draw shapes. There are four commands that he can use:

- **PUT_FLAG** – to mark the starting point and **start painting**
- **LOG_UP** – to draw a log pointing **upward**
- **LOG_RIGHT** – to draw a log lying horizontally to the **right**
- **GOTO_FLAG** – to **go to flag** and continue drawing from the flag
-

For example, to draw a vertical log, Joe types the command: **PUT_FLAG, LOG_UP**:

To draw the following form, Joe types: **PUT_FLAG, LOG_UP, LOG_RIGHT**:

Question/Challenge

What is the sequence of commands that Joe should type to draw a square?

A) PUT_FLAG, LOG_UP, LOG_RIGHT, LOG_RIGHT, LOG_RIGHT
B) PUT_FLAG, LOG_UP, LOG_RIGHT, LOG_UP, LOG_RIGHT
C) PUT_FLAG, LOG_UP, LOG_RIGHT, GOTO_FLAG, LOG_UP, LOG_RIGHT
D) PUT_FLAG, LOG_UP, LOG_RIGHT, GOTO_FLAG, LOG_RIGHT, LOG_UP

T20. Pile of Clothes

Mama beaver takes care of her little son Bruno and she carefully arranges his clothes in a pile on the table.

Bruno always dresses them in sequence starting from the topmost item. Bruno likes all his clothes but he absolutely doesn't want to wear the braces under a shirt.

Question / Challenge:

Which **ones** of the following piles are in the right order and ready for Bruno's dressing?
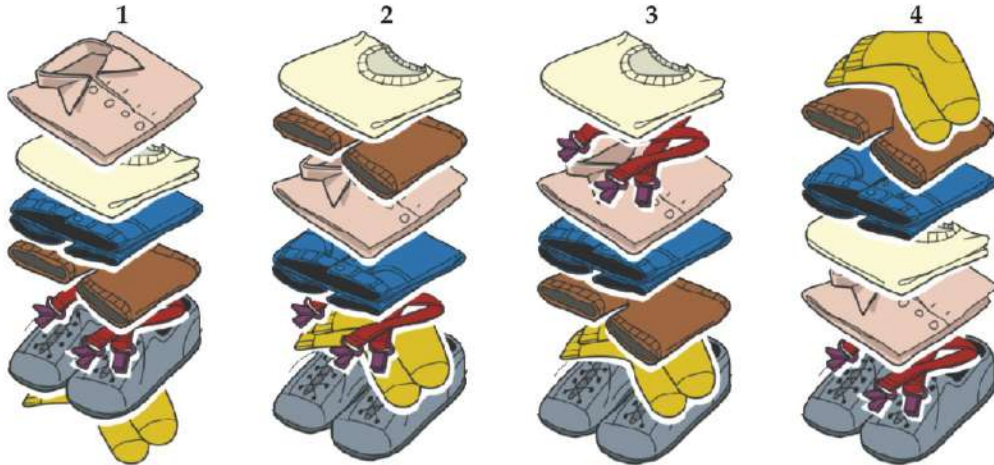

A) 1 and 2   **B)** 1 and 3

C) 2 and 3   **D)** 2 and 4

T21. Balloons

Bella is from the planet Belena. Bella is given many balloons. She always puts them in a line so that the colors are in the same order from either end. They look the same forwards and backwards.

However, she can only see 4 separate colors: green, yellow, red, and blue. For her, purple (P) looks the same as yellow (Y). She could make these lines because she would see them as the same from either end.
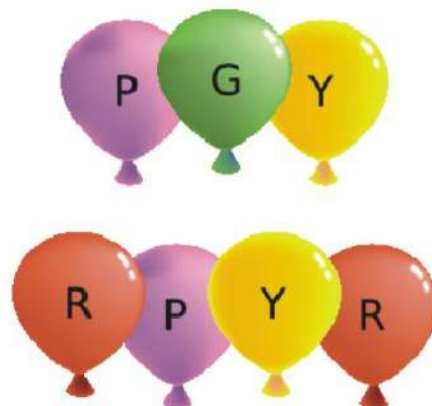
Question / Challenge:

What line of ballons respects Belena's order?
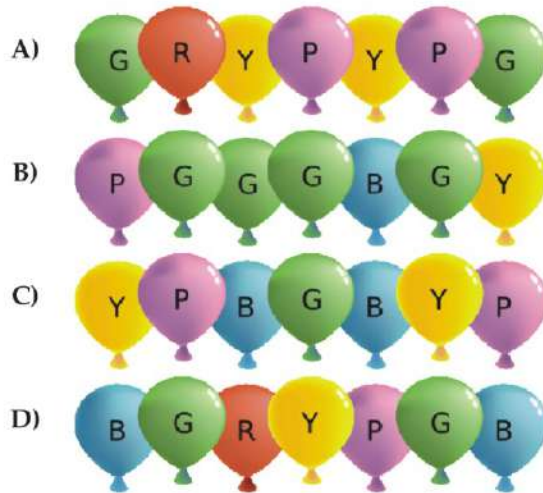
T22. BSBN

All the books in the beaver library have a Beaver Standard Book Number (BSBN) on the cover. A BSBN is composed of 13 digits for each position starting from left to right. Digits are 0, 1, 2, ..., 9. The 13th (rightmost) digit which is called 'check digit' can be calculated according to the following steps:

1. Calculate A = the sum of all the digits in odd (1st, 3rd, 5th, 7th, 9th, and 11th) positions.
2. Calculate B = the sum of all the digits in even (2nd, 4th, 6th, 8th, 10th, and 12th) positions.
3. Calculate C = A + (3 x B).
4. Take the rightmost digit of C as the check digit.

There is a book with the BSBN as the figure below. Unfortunately, the check digit was missing.

BSBN 978604803078**?**

Question / Challenge:

What is the missing digit?

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

T23. Observing beavers

Floris and Rosa are observing beavers. They are in different locations, observing different families of beavers. To compare their results, Floris and Rosa ask each other questions that they reply either with ALWAYS, OFTEN, RARELY or NEVER. Since these replies are always the same and since they want to save effort, they agreed on the following code:

ALWAYS	OFTEN	RARELY	NEVER
11111	11100	00011	00000

In case they receive a code that is different from the agreed codes in the table, for example 10000, they check whether this code is similar to one of the codes they agreed on. As for 10000, it is possible to change the first position and the result is 00000, which means NEVER. In case they cannot find a match with one single change, they have to ask their question again.

Floris asks Rosa: Do the beavers cut down trees in winter?

Floris receives the following reply from Rosa: 00111

Question/Challenge:

What was the most probable answer of Rosa?

A) The beavers ALWAYS fell trees in winter.
B) The beavers OFTEN fell trees in winter.
C) The beavers RARELY fell trees in winter
D) The beavers NEVER fell trees in winter

T24. Dams 1

The major of Beaverton has tasks for maintaining three dams everyday. The dams are randomly located in town. There are three beavers about to be assigned to the tasks. Meanwhile, the beavers' houses are also randomly located in town. The major wants to assign one beaver for one dam exclusively. As an illustration, the following figure illustrates the case.
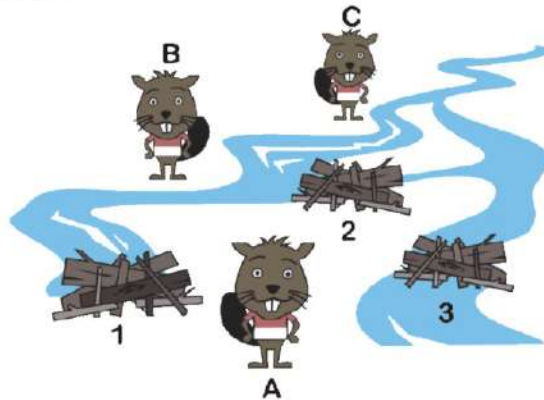
The wages related to the tasks will be based on the distances from their house to respective assigned dams. Hence, the major wants to find out the optimal assignments that requires the smallest total distances (or wages). Fortunately, the major has already had a table that lists the distances from each beaver's house to every dam's location as in the following table (in meters).

	Dam 1	Dam 2	Dam 3
A	125	125	130
B	125	110	110
C	150	175	175

Question/Challenge:

According to the above table, what is the smaller total distance (in meters)?

A) 385   B) 300   C) 425   D) 275

Good Luck!