Bebras Australia Computational Thinking Challenge

2018 Solutions Guide

Adapted by: Allira Storey, Edited by: Sarah Hobson

digitalcareers

CSIRO

How many routes

Year 3+4: **A**
Year 5+6:
Year 7+8:

Year 9+10:
Year 11+12

Beaver Jane regularly walks to school.

Jane likes to change her route each day.
She only walks on paths that take her nearer to the school.

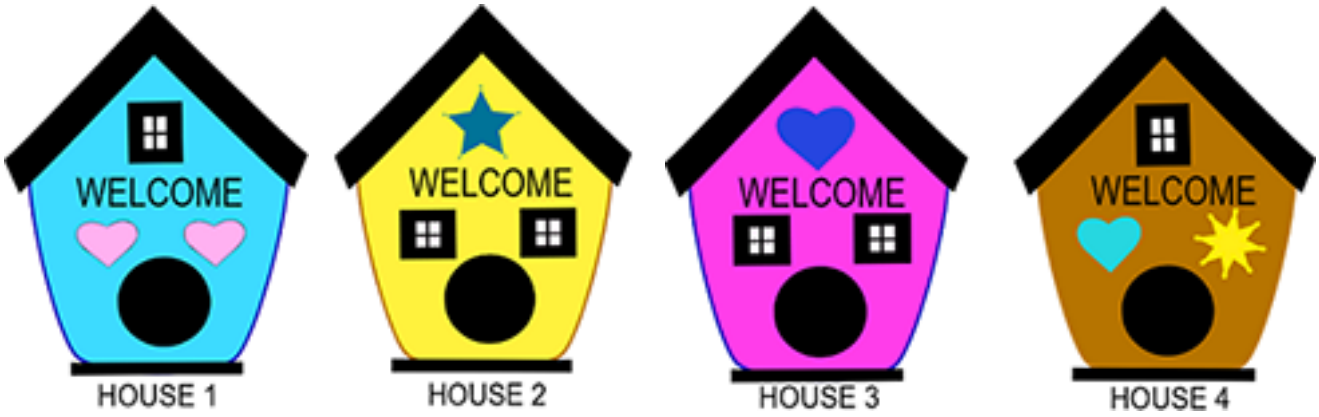
Question:
How many different routes can Jane take to school?

1 2 3 4 5 or 6

Bird house

Year 3+4: **A**
Year 5+6:
Year 7+8:
Year 9+10:
Year 11+12

A beaver wants to buy a bird house for her daughter's birthday.
Her daughter says: "I would like a bird house with 2 windows and a heart".

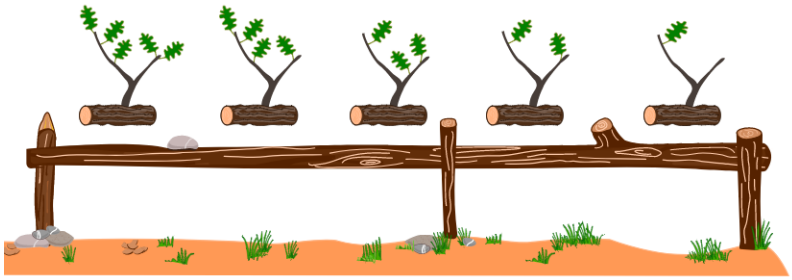


Question:
Which bird house should her Mum buy?

Sorting branches

Year 3+4: **A**
Year 5+6:
Year 7+8:
Year 9+10:
Year 11+12

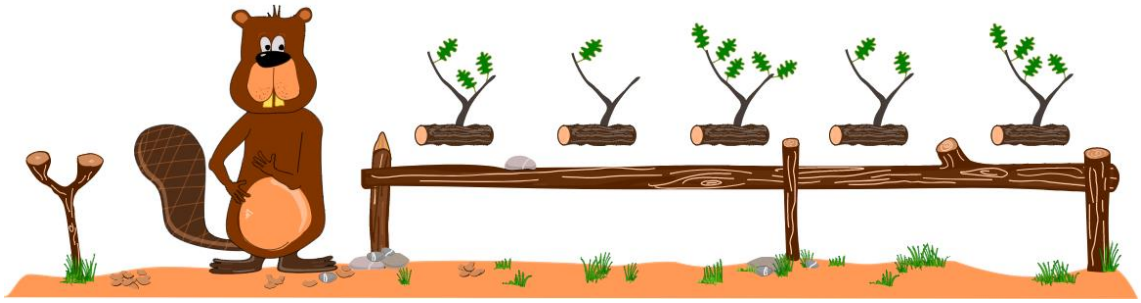
David wants to sort some branches into this order:



He can place one branch on the rickety stick on his right if he needs to.

Question:

Help David sort the branches below by dragging and dropping them into new positions.



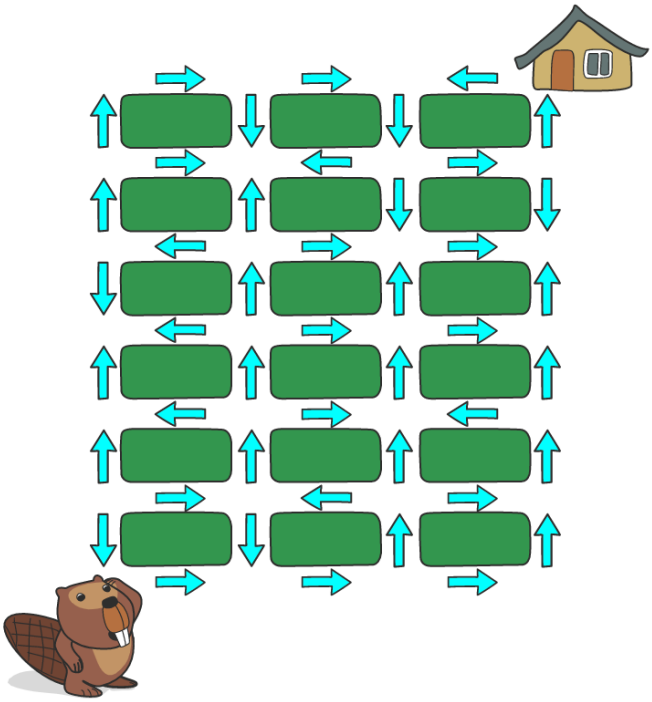
The way home

Year 3+4: **C**
Year 5+6: **B**
Year 7+8:
Year 9+10:
Year 11+12

Mark the path from the beaver to his home.

You can click on one arrow at time to make the correct sequence.

(To delete your choice, click on the arrow a second time.)



Question:
Show the path home without creating any loops.

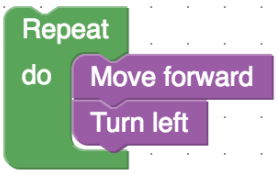
Small program

Year 3+4: **C**
Year 5+6: **B**
Year 7+8: **A**

Year 9+10:
Year 11+12

You can write a program for a robot by dragging and joining commands into the workspace below.

An example program:

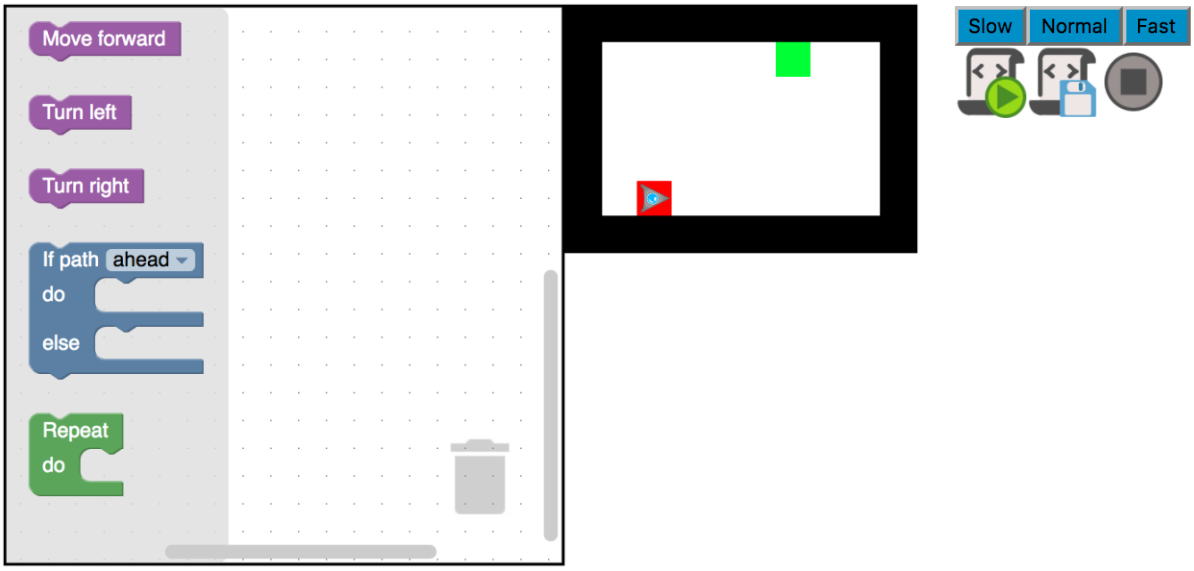


The robot has to move from the red square to the green square.

Question:

Write a program that takes the robot to the green square.

(Your program must be made from 4 blocks or less.)



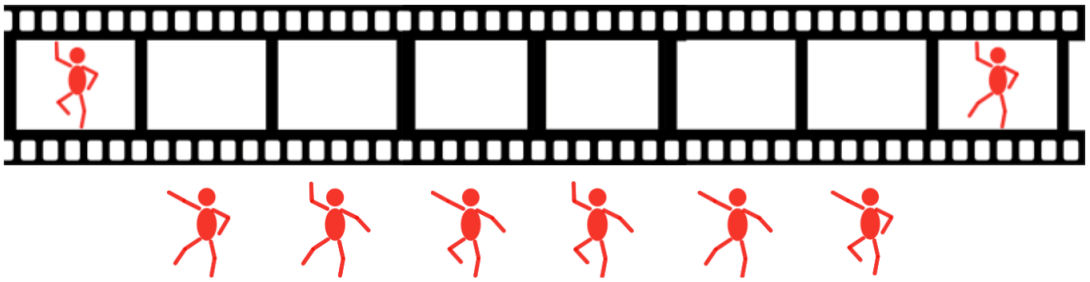
Dancing man

Year 3+4:
Year 5+6:
Year 7+8:
Year 9+10: **A**
Year 11+12

Verity makes an animation of a man dancing. So far she has only completed the first and last frame.

The man can only move one of his arms or legs at a time.
There should be only one difference between film frames that are next to each other.

Question:
Drag and drop the images provided into the correct empty film frames below to complete the animation.



Sudoku

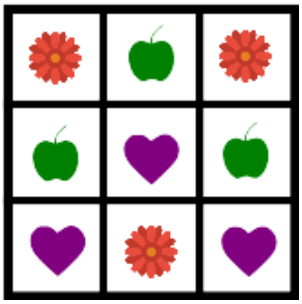
Year 3+4: **A**
Year 5+6:
Year 7+8:
Year 9+10:
Year 11+12

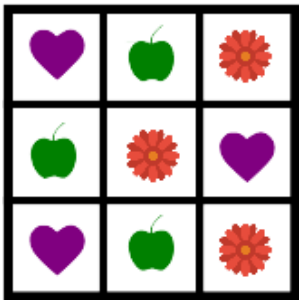
Benjamin is asked to fill a box with different shapes.
The box has 9 sections.

Rules:
There must be only one of the same shape in each row.
There must be only one of the same shape in each column.

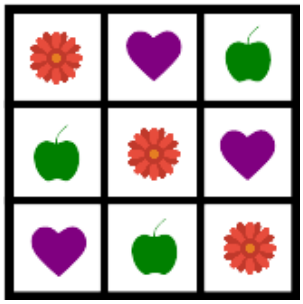
Benjamin has four goes!

Question:
Which of the following boxes is correct?

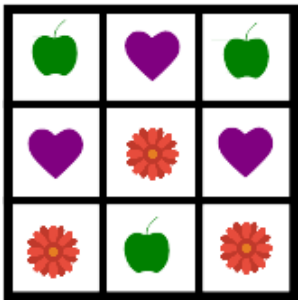




B



C



D

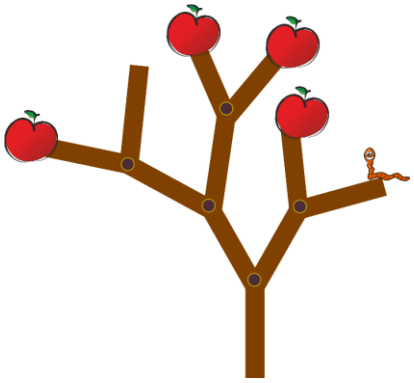
Worm

Year 3+4: **B**
Year 5+6: **A**
Year 7+8:

Year 9+10:
Year 11+12

A worm is sitting at the end of the branch on the tree shown below.

It wants to eat all of the apples by moving through the tree's branches.



(The tree is made of 1m long branch sections.)

Question:
What is the shortest distance, in metres, that the worm has to crawl to eat all of the apples?

4 9 13 or 15

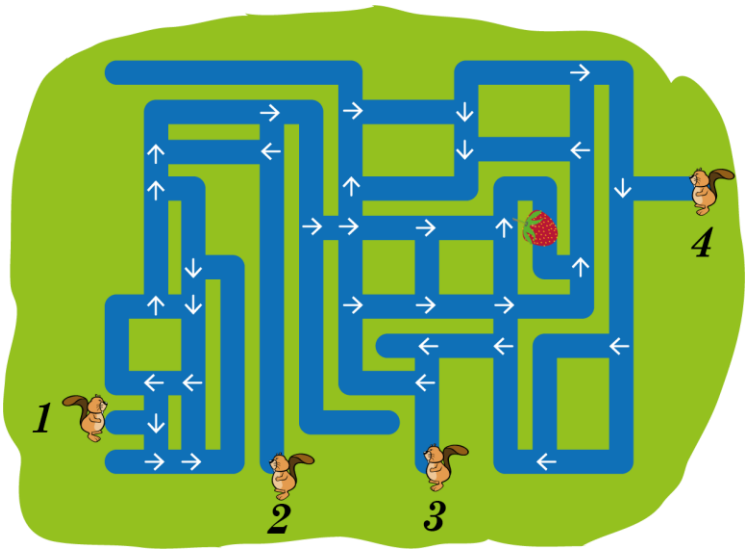
Strawberry hunt

Year 3+4: **B**
Year 5+6: **A**
Year 7+8:

Year 9+10:
Year 11+12

Four beavers start swimming from different places.

They can only swim forwards and always follow the arrows.



Question:

Select all the beavers who will reach the strawberry.

Beaver 1 **Beaver 2** **Beaver 3** **Beaver 4**

Colour paths

Year 3+4: **A**
Year 5+6:
Year 7+8:
Year 9+10:
Year 11+12

John chooses a painting program on his computer to draw a picture of a park.
The park has a blue pond and black paths around it.

He wants to change the colour of the paths to brown.
He chooses the fill tool on his painting program and the brown colour so that he can paint the black paths brown.

Question:
What is the smallest number of clicks he needs to make to paint all the paths brown?

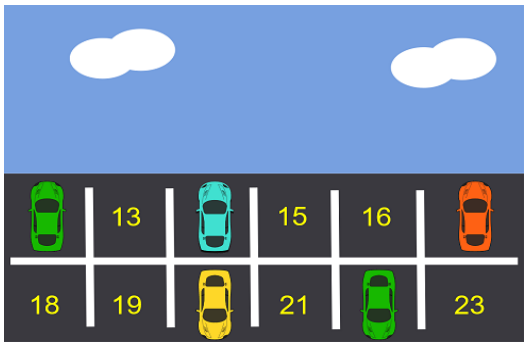
1 **2** **3** **10** **or** **15**

Parking lot

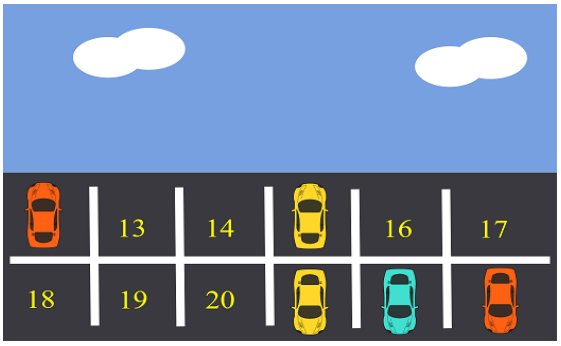
Year 3+4: **B**
Year 5+6: **A**
Year 7+8:
Year 9+10:
Year 11+12

There are 12 spaces for cars in a parking lot. Each space is labelled with a number.
The pictures below show which spaces were used on Monday and which spaces were used on Tuesday.

Monday



Tuesday



Question:

How many parking spaces were empty both on Monday and Tuesday?

3 4 5 or 6

Message service

Year 3+4: **C**
Year 5+6: **B**
Year 7+8: **A**
Year 9+10:
Year 11+12

Violet wants to send a message to Leo with the help of some beavers and some cards.

She breaks the message into groups of, at most, 3 letters on each card. She then gives one card to each beaver.

Violet knows that sometimes the beavers get distracted while transporting their cards, and they arrive at different times. Therefore, Violet also numbers the cards in the correct order before giving them to the beavers. Leo must then put then back in order to read the message.

Example:
To send the message DANCETIME, Violet creates these 3 cards:

1	2	3
DAN	CET	IME

Leo received the following sequence of cards from the beavers:

3	5	2	1	4
KEY	CKS	HOC	GET	STI

Question:
What was the original message that Violet sent to Leo?

GETSTICKYSHOCKS STICKYGETHOOKS GETHOCKEYSTICKS KEYCKSHOCGETSTI

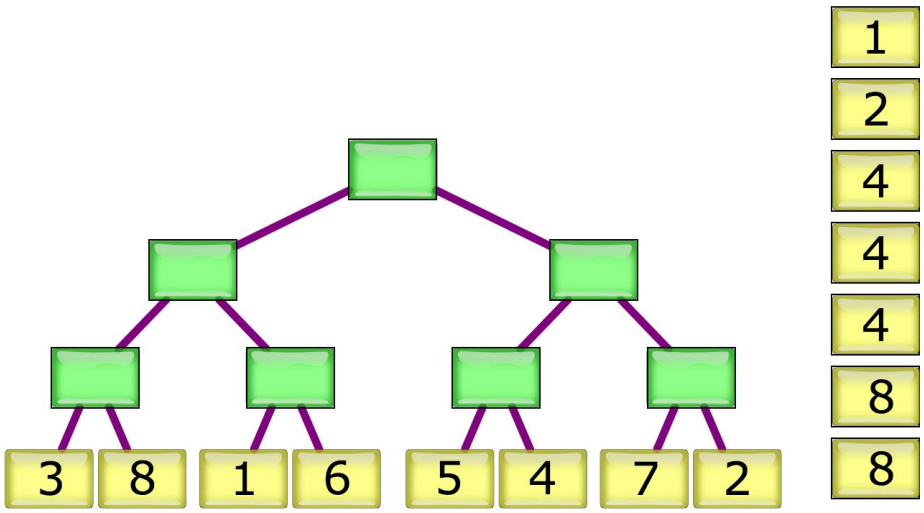
Beaver tournament

Year 3+4: **C**
Year 5+6: **B**
Year 7+8: **A**
Year 9+10:
Year 11+12

Beaver Krešo watched a tournament of races and recorded the winners of each stage on the board below.
The runners wore the same numbers, from 1 to 8, throughout the tournament.
Krešo used numbered cards to represent each runner.

When the tournament was over his younger brother Tomo mixed up all the cards, except those from the first stage of the tournament.

Question:
Can you put the labels in the correct positions?



Grandmother's jam

Year 3+4:
Year 5+6: **C**
Year 7+8: **B**
Year 9+10:
Year 11+12

Anna, Peter and Liza help their grandmother to make jam.

In order to make a jar of jam, they have to do three jobs:

 Wash a jar. This takes 3 minutes.

 Put jam into a jar. This takes 2 minutes.

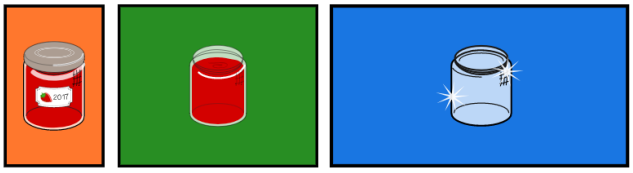
 Close a jar. This takes 1 minute.

They have to be careful: The jar needs to be clean before they can put jam in it and they can only close the jar if it is full of jam.

Question:
Prepare a 10 minute work plan for the children so that they can prepare the maximum number of closed jars filled with jam.

(Drag the jobs into the table.)

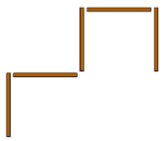
Ann										
Peter										
Liza										



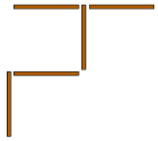
Five sticks

Year 3+4:
Year 5+6: **C**
Year 7+8:
Year 9+10:
Year 11+12

Adam has five sticks. He puts them on the table and creates this shape:



Nola comes to the table. She takes one stick and puts it in a different place:



Then Bob comes to the table, he also takes one stick and puts it in a different place.

Question:

Which shape is Bob not able to make?

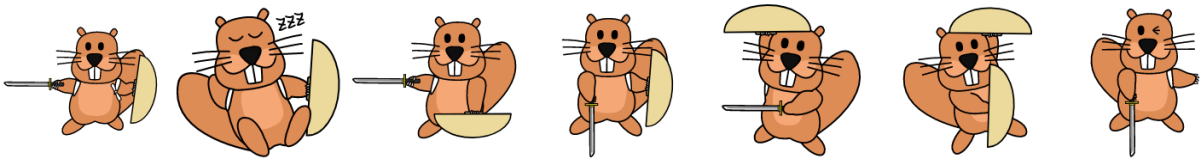
A **B** **C** **D**

Sticks and shields

Year 3+4: **B**
Year 5+6: **A**
Year 7+8: **A**
Year 9+10:
Year 11+12

Lucia is playing Stick and Shields with 7 friends.

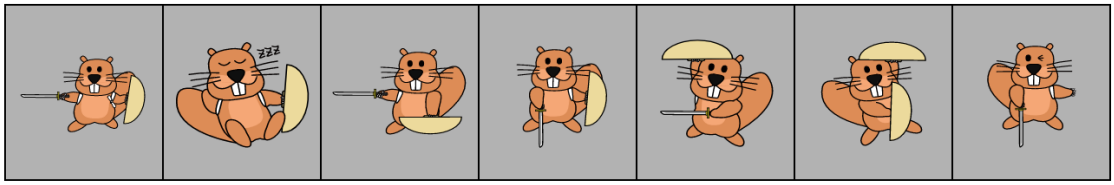
These are her friends' favourite poses:

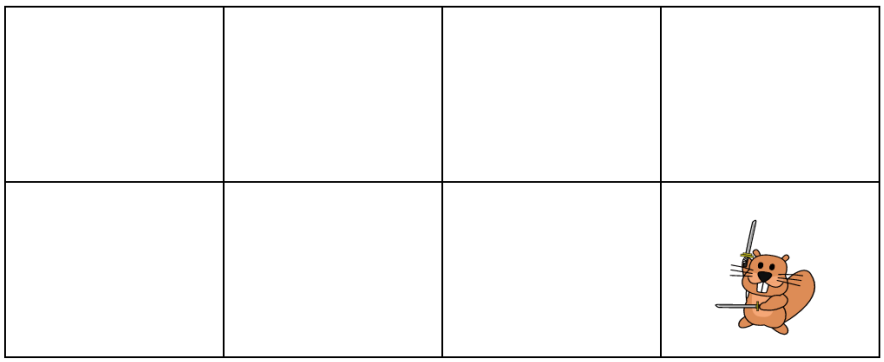


They want to have their picture taken.
In the picture, every stick should point at another beaver, and every shield should block a stick.

Lucia has already taken a spot ready for the picture.

Question:
Drag the friends, shown below, into their correct positions.





Erase walls

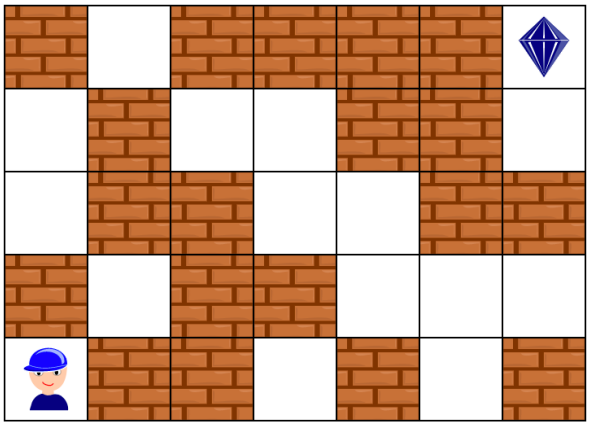
Year 3+4:
Year 5+6: **C**
Year 7+8: **B**
Year 9+10:
Year 11+12

The maze shown consists of empty squares and brick walls.

We can move from one empty square to the neighbouring empty square horizontally or vertically (not diagonally).

Walls can be removed by clicking on them. (It is also possible to rebuild them by clicking on the same square again).

Question:
Remove as few walls as possible so that it is possible to move from the bottom left corner of the maze to the top right corner.



News editing

Year 3+4:
Year 5+6: **C**
Year 7+8:
Year 9+10:
Year 11+12

There are 10 students working on the school's newspaper. Every Friday they write or edit their own articles.

The red cells, on the plan below, show when the students need a computer.
The computers are all the same.
During any one hour, only one student at a time can work on a computer.

Students	Hours						
	8:00	9:00	10:00	11:00	12:00	13:00	14:00
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

Question:
What is the minimum number of computers needed for all of the students to work according to the plan shown above?

4 5 6 or 10

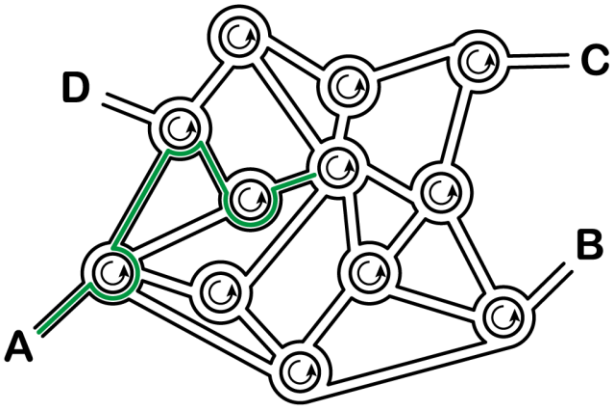
Roundabout city

Year 3+4:
Year 5+6: **C**
Year 7+8:
Year 9+10:
Year 11+12

In Roundabout City, the navigation software does not give instructions like:

- At the next roundabout, take the 4th exit.
- At the next roundabout, take the 1st exit.
- At the next roundabout, take the 2nd exit.

Instead, it gives you a sequence of numbers, like "4 1 2" which would make you go this way:



Question:

If we start from A and follow the sequence 3 1 3 2 3, where will we end up?

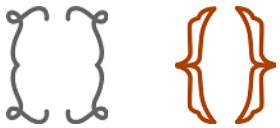
A B C or D

Brackets

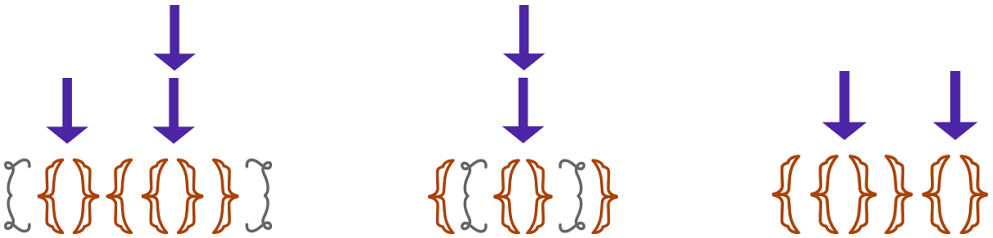
Year 3+4:
Year 5+6:
Year 7+8: **B**
Year 9+10: **A**
Year 11+12

A jewellery shop produces bracelets.

They use bracket-shaped ornaments that come in pairs. To make a bracelet you start with one of these pairs:



Additional bracket pairs are inserted repeatedly at any place in the bracelet, as you can see in the three examples below:



Question:
Which of the following bracelets is made with the method described?

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

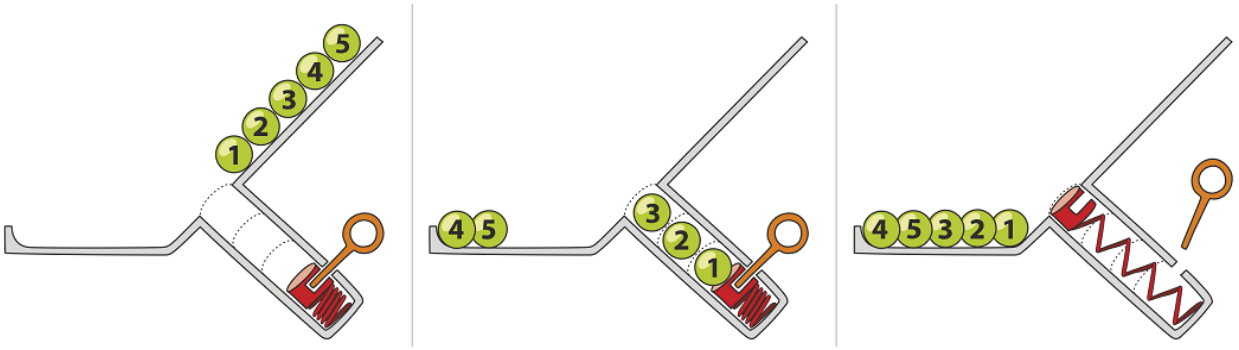
Balls

Year 3+4:
Year 5+6:
Year 7+8: **B**

Year 9+10:
Year 11+12

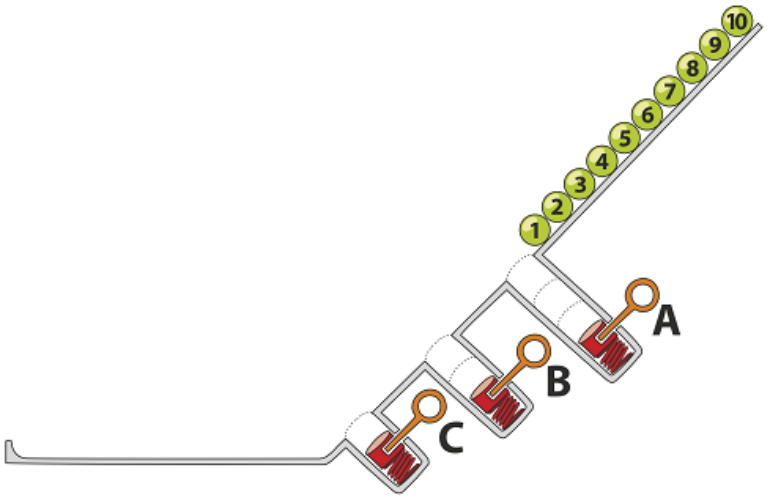
Numbered balls roll down ramps. The order of the balls changes as they fall into holes. When a ball comes to a hole, if there is enough space, the ball falls in, otherwise, the ball rolls past the hole. A pin at the bottom of each hole can be pulled which ejects the balls.

Here is an example:

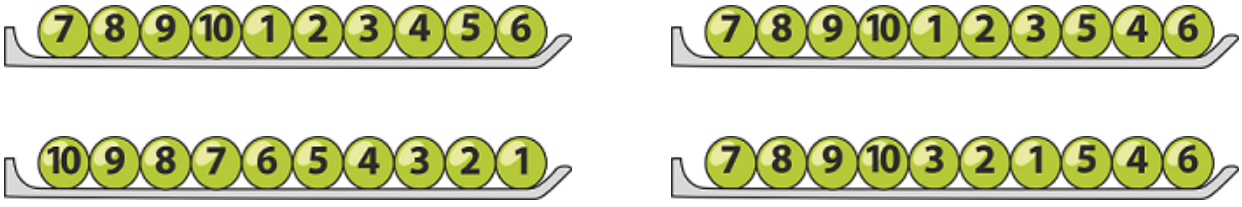


before balls start rolling | after balls have stopped rolling | final result after pulling the pin

Ten balls roll down the ramp shown below.
Three holes A, B and C have space for 3, 2 and 1 balls as shown.
The pins are pulled in the order A, B, C but, each time, only after all the balls have stopped rolling.



Question:
Which of the following is the final result?



Cipher wheel

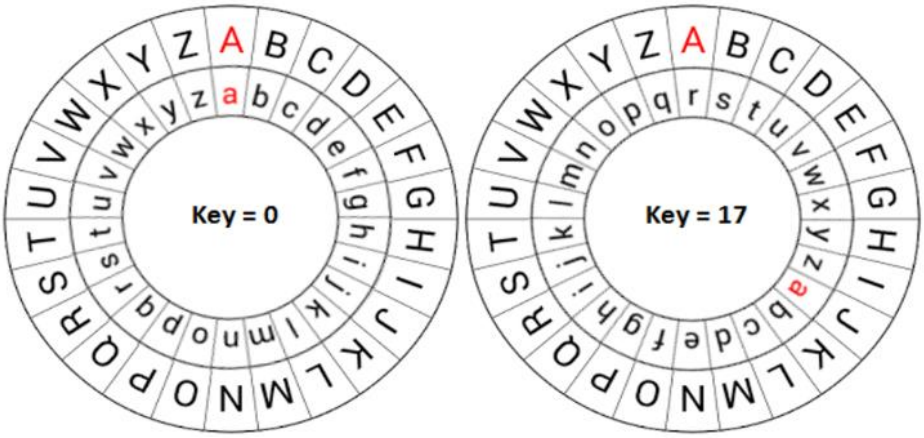
Year 3+4:
Year 5+6:
Year 7+8: **C**
Year 9+10: **B**
Year 11+12

A beaver left a secret message on his tombstone by using a Cipher Wheel and we want to figure out what it means.

The wheel works such that only the inner wheel (with small letters) can be rotated. The outer wheel is for the actual message.

As you can see in the first image, when the key is 0 ‘A’ is encoded as ‘a'.

The second image shows that when the key is 17 (because the inner wheel has been rotated by 17 positions counter-clockwise) 'A' is encoded as 'r'.



With the key equal to 17, we can encode the message WHO ARE YOU as nyf riv pfl

The message j cp fjgcma is received. We know that this was encrypted in a clever way:
For the first letter the key was 1, for the second letter the key was 2, the key for the third letter was 3, etc.

Question:

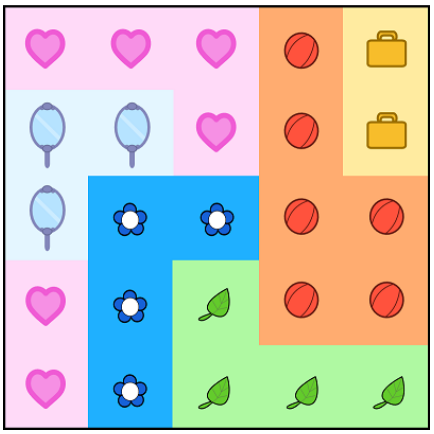
Decipher the encrypted message and enter the original message as your answer.

Painting wallpaper

Year 3+4: **C**
Year 5+6: **B**
Year 7+8: **A**
Year 9+10:
Year 11+12

Robyn is wallpapering.

She uses rectangular wallpaper pieces of different sizes.
Each wallpaper piece has only one colour with one pattern on it.
She never puts wallpaper beyond the edge of the wall.



Sometimes, Robyn covers part of one piece of wallpaper with a new rectangular piece of a different colour.

Question:
In which order has Robyn placed the wallpaper?

Railroad

Year 3+4:
Year 5+6:
Year 7+8:

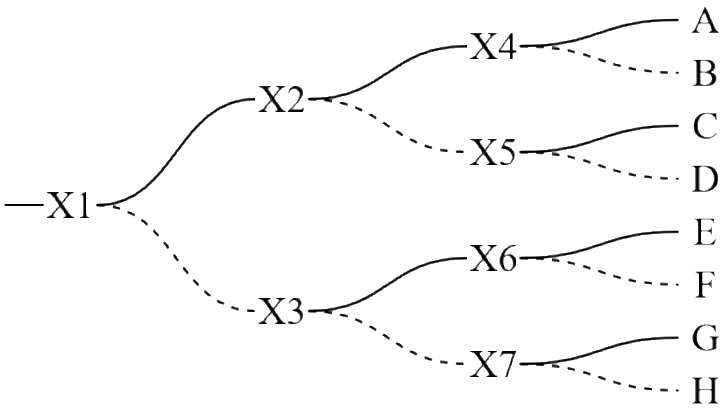
Year 9+10: **A**
Year 11+12

8 trains (named a to h) enter the switch X1 from the left on the figure below.

Train a needs to go to station A, train b to station B, train c to station C, etc.

Each of the switches X1 to X7 are initially set to direct trains to the left.
After a train has passed a switch, the switch reverts to the other direction.

The Railroad Director needs to ensure that all the trains go to their correct stations.



Question:
What is the correct order for the trains to pass through switch X1?

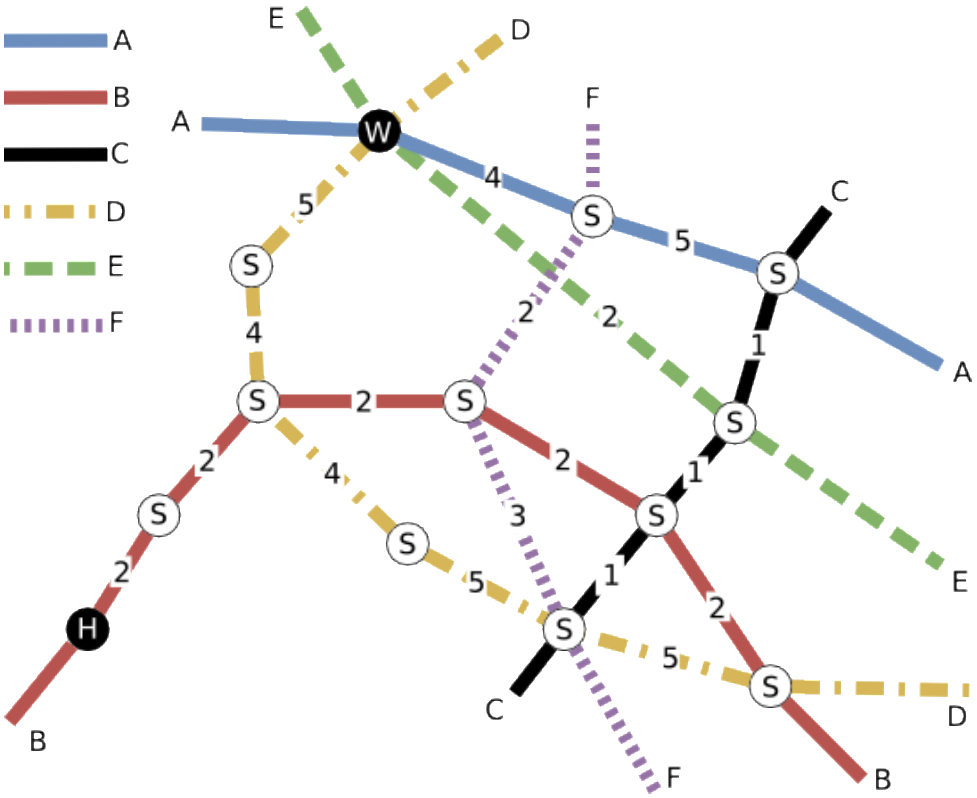
aecgbfdh **adcgbfeh** **agcdbfeh** **or** **acedfghb**

Commuting

Year 3+4:
Year 5+6:
Year 7+8:

Year 9+10:
Year 11+12: **A**

Beaver Martina goes to work by train every day. There is no direct line, so Martina has to switch between several lines. The map below shows the available lines, with the travel time between any two stations (Martina's home is marked with “H”, her workplace is marked with “W”, and the stations, where it is possible to change line, are marked with “S”).



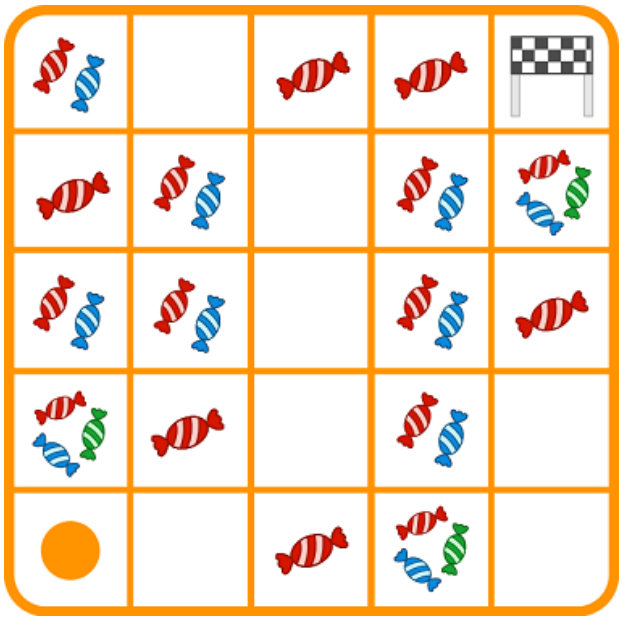
Question:
Assuming that changing line takes no time, which lines should Martina take in order to arrive at work as fast as possible?

Candy maze

Year 3+4:
Year 5+6:
Year 7+8: **C**
Year 9+10:
Year 11+12: **A**

A robot is programmed to collect as many sweets as possible. It does this while walking through cells. Each cell in the grid on the right has either 0, 1, 2 or 3 sweets.

The robot begins in the bottom-left and ends in the top-right. The robot can only move to the right or upwards.



Question:

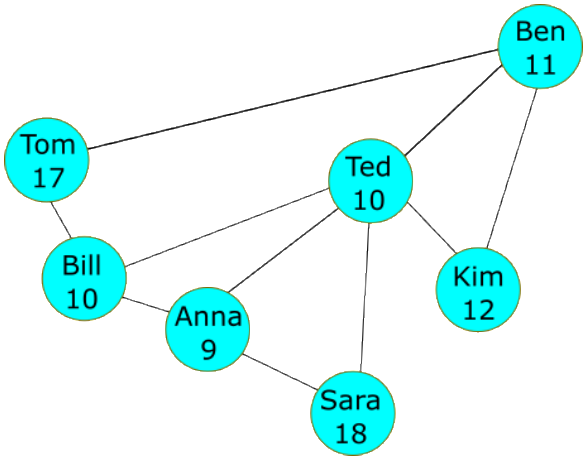
How many sweets will the robot collect in this grid?

10 12 14 or 16

Book-sharing club

Year 3+4:
Year 5+6:
Year 7+8:
Year 9+10: **A**
Year 11+12:

This diagram shows the relationship between 7 students in a book-sharing club. Their names and ages are also shown.



The club has some regulations for members:

When you receive a book you read it (if you haven't already done so) and then pass it to the youngest friend who has not read it yet. If, however, all your friends have read the book then you should pass it to the friend who first gave it to you.

Now Ben has read a new book and wants to share it with his friends.

Question:
Who will read the book last?

Tom Sara Bill or Kim

One too many

Year 3+4:
Year 5+6:
Year 7+8:

Year 9+10: **B**
Year 11+12: **A**

I recently discovered a silly mistake I made in a long piece of alphanumeric text.

All 1's should be 11's and all 11's should be 1's. Luckily, I can be rather smart and I have an editor which enables me to replace a sequence of characters with another sequence.

See what happops in a soptopce in which I replace all occuropces (except the last one) of en with op! Of, wofse, feplacing all occuffences of r (except the last one) with f.

Question:
What should I do to fix my text?

Replace all 11's with 1's and then all 1's with 11's

Replace all 1's with 11's and then all 11's with 1's

Replace all 1's with $s and then all $s with 11's and then all 11's with 1's

Replace all 11's with $s and then all 1's with 11's and then all $s with 1's

Sports

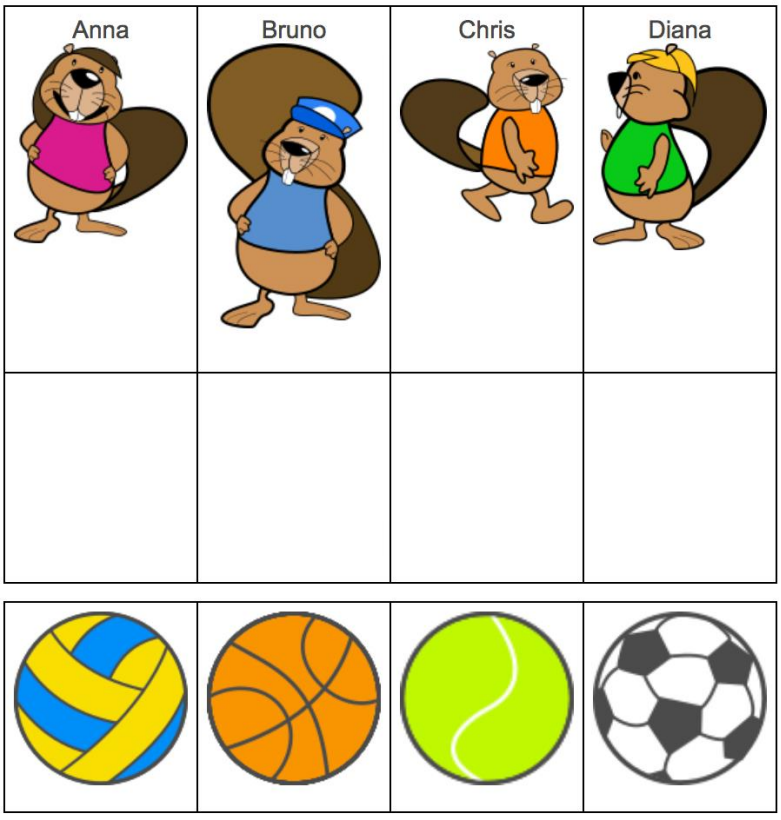
Year 3+4:
Year 5+6:
Year 7+8: **B**
Year 9+10: **A**
Year 11+12:

The *BebraFitness* sports centre 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* to 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 match. In the mornings, Bruno and the footballer go for a run. Diana lives in the same den with the tennis player.

Question:
Match the players with their favourite sports by dragging the correct balls into the spaces below them.

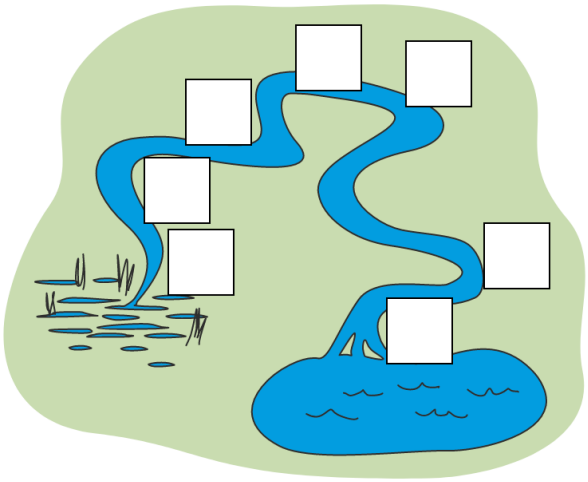


Stream

Year 3+4: **B**
Year 5+6: **A**
Year 7+8:

Year 9+10:
Year 11+12:

A river flows from a swamp to a lake. Half way down the river is a pier with a cafe. Visitors at the cafe enjoy a view of branches on the river next to the pier. At the café, visitors can also book a steamboat trip to the carousel which is located by the mouth of the river. On the return trip from the lake to the pier the steamboat will stop at a barbecue near the carousel for a lunch of smoked fish. As the steamboat returns to the pier, to the left, visitors will enjoy a view of the hundred year old oak tree which is in the swamp and a hill which is located between the pier and a windmill.



Question:

Drag and drop the objects below to their correct places along the river bank above.

oak tree	barbecue	windmill	carousel	branches	pier	hill
						

Super hero

Year 3+4:
Year 5+6:
Year 7+8:

Year 9+10: **B**
Year 11+12: **B**

A super hero watches over Beaver City from a straight path across the river.
From every point along the path, the super hero needs to be able to see the point in the city directly across the river.

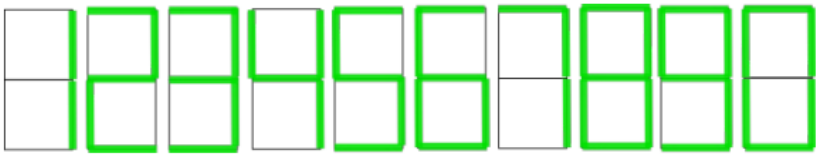
Unfortunately, 16 walls of varying lengths stand between the river and the city.
Fortunately, the super hero has X-ray vision and can see through a wall.
Unfortunately, the super hero can only see through one wall at a time.
Fortunately, the super hero is strong enough to destroy walls.
Unfortunately, destroying a wall makes the super hero very tired.

Question:
Click on the walls below to remove the least number of walls that the super hero needs to destroy.

Digit recognition

Year 3+4:
Year 5+6:
Year 7+8: **C**
Year 9+10:
Year 11+12: **B**

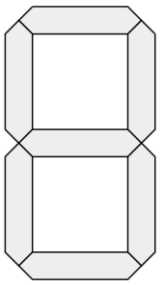
A digit recognition system understands digits that look like these:



Each digit is made up of up to 7 segments.

Not all segments are necessary to recognise a digit. It is possible to understand a digit if only some of the segments are visible.

Question:
Select those segments that are absolutely necessary to identify all of the ten digits (0...9) unambiguously.



Arabot's walk

Year 3+4:
Year 5+6:
Year 7+8:

Year 9+10: **B**
Year 11+12: **A**

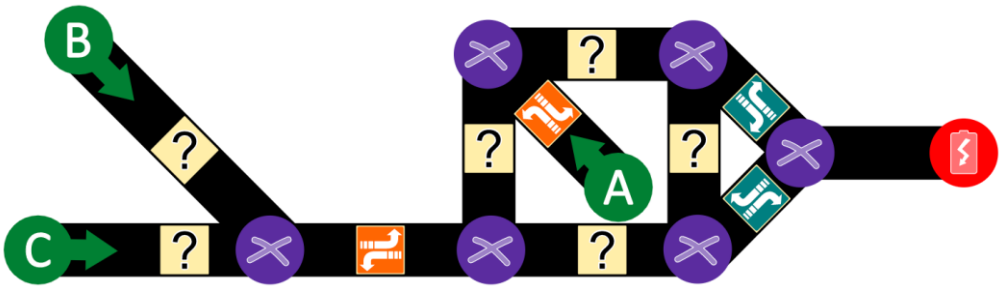
An Arabot is a robot that can follow black lines drawn on a piece of paper.

On every line there is a label, which tells it to turn left ( ) or right ( ) at the next junction ( ).
Some labels are already chosen, but there are still some labels left to choose.

Jane wants to be able to start her Arabot at A, B or C.
She also wants her Arabot to always end up at the charging station ( ).

If the Arabot ends up at A, B or C, it doesn't know how to continue and turns itself off.

Question:
Help Jane finish labelling the lines so that the Arabot always ends up at the charging station ( ).
(Labels can be placed or removed by repeatedly clicking on the question marks.)



Levenshtein distance

Year 3+4:
Year 5+6:
Year 7+8:
Year 9+10: **C**
Year 11+12: **B**

We define a basic operation as one of the following:

- insert one character into a word,
- remove one character from a word,
- replace one character with another.

We define the distance between two words as the minimum number of basic operations which allows us to change the first word into the second.

For example, the distance between kitten and sitting is equal to 3. The basic operations necessary are:

1. kitten → sitten (change k to s),
2. sitten → sittin (change i to e),
3. sittin → sitting (insert g at the end).

Question:
What is the minimum distance between length and french?

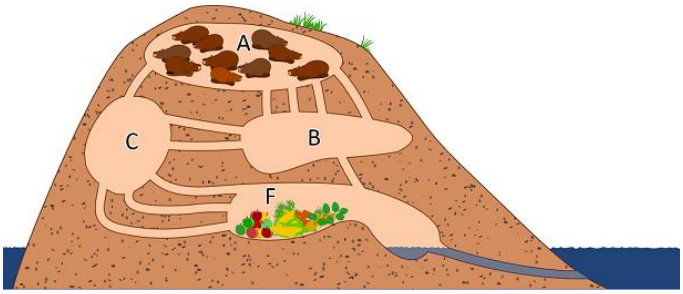
Tunnels of the homestead dam

Year 3+4:
Year 5+6:
Year 7+8:

Year 9+10: **C**
Year 11+12: **B**

Homestead Dam has tunnels that connect four rooms: A, B, C, and F.

A, B, and C are living rooms.
F is where food is stored. (see image)



10 beavers are staying in room A, they are becoming hungry and they want to go to room F to eat. Since all the beavers are very hungry, they all want to arrive in the food storage as soon as possible.

It takes 1 minute to get through a tunnel and only one beaver may do this at the same time (not several beavers following each other).

The connections between the rooms consist of a certain number of tunnels:

- Between A and B: 4 tunnels.
- Between A and C: 1 tunnel.
- Between B and C: 2 tunnels.
- Between B and F: 1 tunnel.
- Between C and F: 3 tunnels.

All the rooms can fit as many of the beavers as want to be there.

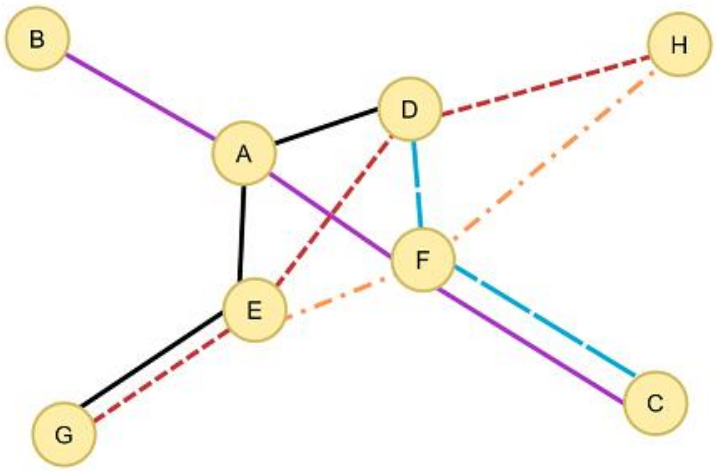
Question:
In the best case, after how many minutes can all the beavers be in the food storage?

Cost reduction

Year 3+4:
Year 5+6:
Year 7+8: **C**
Year 9+10: **B**
Year 11+12: **B**

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.



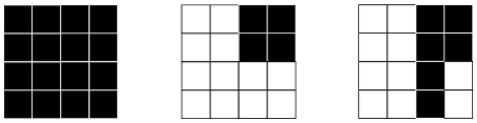
Question:

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

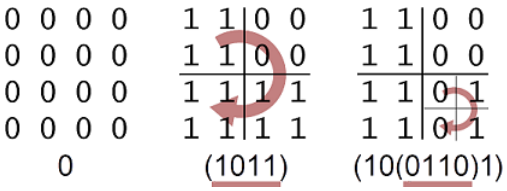
Icon image compression

Year 3+4:
Year 5+6:
Year 7+8:
Year 9+10: **C**
Year 11+12: **C**

Look at the following 4x4 black and white pixel images:



This could be stored using binary digits: “1” for white pixels and “0” for black pixels.
For a 4x4 image we would have to store 16 digits. The following image compression method allows us to store images using less space, especially for simple patterns:



The binary digits are arranged in a grid like the pixels in the images.

The compression method is applied to this grid as follows, producing a string of digits:

1. If all the digits in the grid are 0, the result is ”0” (see left image).
   If all the digits in the grid are 1, the result is ”1”.
2. Otherwise, the grid is divided into quarters. The compression method is applied to each quarter sub-grid from the top left in clockwise order. The results are combined and surrounded by round brackets. Two different examples can be seen in the centre and on the right above.

Note that a sub-grid may consist of one digit only; see the right image, bottom right corner.
In this case, the method will use step 1 only.

Question:

On the right is the binary digit grid for an 8×8 image.
The above compression method is applied to this grid.
Which string of digits can represent this image?

1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1
1 1 1 0 1 1 1 1
1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1

(1110)

(11(1011)1)

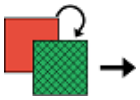
(111(1(1101)11))

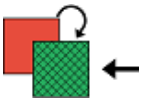
(111(1(1011)11))

Robot

Year 3+4:
Year 5+6:
Year 7+8:
Year 9+10: **C**
Year 11+12: **C**

Milan has built a robot that reads coloured squares, changes their colours and moves one square to the left or one square to the right.
The robot acts according to rules like these:


If you see a red square, change its colour to green and move one square to the right.


If you see a red square, change its colour to green and move one square to the left.

At the beginning, the robot is standing on the leftmost square. It detects the colour of the square, finds the rule that starts with this colour, changes the colour of the square according to the rule and moves according to the rule. Then, the robot repeats the same procedure for the square that it is standing on, and so on. If it doesn't find an appropriate rule or it goes outside of the squares, it stops.

The robot was given this sequence of squares:

and these four rules:

Question:
What will the squares look like when the robot stops?




Funtime school

Year 3+4:
Year 5+6:
Year 7+8: **C**
Year 9+10:
Year 11+12: **A**

The teachers at Funtime School like to include games in their lessons.

At the end of one day, one teacher invites his students to play a game. The winner gets to leave school before the others are dismissed.

Rules of the game:
The school has one corridor with five doors in a row. The students form a queue and take turns to walk down the corridor. When they get to an open door, they must close it and move to the next door, When they get to a closed door, they must open it, go into the classroom, leave the door open and wait there until the teacher dismisses them.

At the start of the game all the doors are closed.

If a student finds all the doors are open, after shutting each of them, they can head home for their dinner.

Question:
If the students are numbered 1 to 35, which student gets to leave school first?

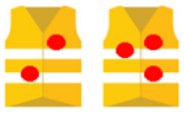
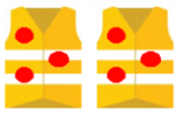
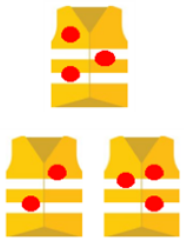
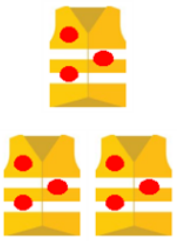
Wash the uniforms

Year 3+4:
Year 5+6:
Year 7+8:
Year 9+10:
Year 11+12: **C**

All uniforms used at a tomato festival need to be washed using a single washing machine. The washing machine can wash up to three uniforms at the same time during each wash cycle.

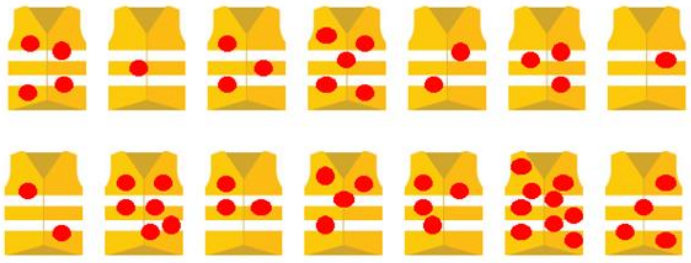
- The number of hours it takes to wash a single uniform is exactly the same as the number of tomato stains on that uniform.
- The number of hours it takes to wash two uniforms at the same time is the same as the number of tomato stains on the dirtier uniform of the two.
- The number of hours it takes to wash three uniforms at the same time is the same as the number of tomato stains on the second dirtiest of the three.

The following table shows possible examples of a laundry process that takes three hours.

1 uniform	2 uniforms	2 uniforms	3 uniforms	3 uniforms
				

Question:

How long does it take to wash the 14 uniforms (shown below) in the quickest way?



Perfect partners

Year 3+4:
Year 5+6:
Year 7+8:
Year 9+10:
Year 11+12: **C**

Andy, Bert, Chris, David and Eric are professional male ballroom dancers that take part in a TV show.

Amy, Brenda, Carol, Dianna and Emma are female contestants that will learn to dance during this show.

Each professional will be assigned a single contestant to teach.

Before the show, the producer organises a party where everybody meets.

After the party the professionals and contestants fill out a questionnaire:

- each professional ranks the contestants in the order that he thinks they can be successful
- each contestant ranks the professionals in the order of how fast she can learn from him

(1 = 1st choice, 2 = 2nd choice, etc.)

Here are the results of these choices:

Professional dancers' preferences

	Amy	Brenda	Carol	Dianna	Emma
Andy	1	3	2	5	4
Bert	1	2	3	4	5
Chris	2	1	4	5	3
David	5	4	3	2	1
Eric	4	5	2	3	1

Contestants' preferences

	Andy	Bert	Chris	David	Eric
Amy	4	3	5	2	1
Brenda	3	4	1	2	5
Carol	2	4	1	5	3
Dianna	5	2	3	4	1
Emma	5	2	3	1	4

The producers want to match the professionals with the contestants in such a way that there will not be any envy.

You are asked to match the professionals with the contestants so that every beaver has a partner. You must also make sure that all unmatched beaver pairs would not be happier if they were actually matched together.

Question:

When you have finished assigning partners, who is Eric's partner?

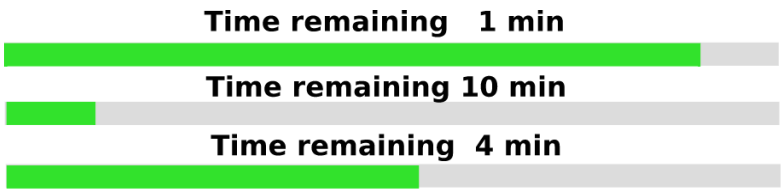
Amy Brenda Carol or Dianna

Downloads

Year 3+4:
Year 5+6:
Year 7+8:
Year 9+10: **C**
Year 11+12: **C**

When downloading files from a server, the download speed is limited.
For example, when 10 files are downloaded simultaneously, the download speed for each file is 10 times slower than it would be for only one file.

A user simultaneously downloads three files from a server.
The picture below shows the current download state.



Note that the time remaining for each file is computed based only on the current speed and does not depend on any history.

Question:
How many minutes will it take to download all the files?