



# UC IRVINE MATH CEO

Community Educational Outreach



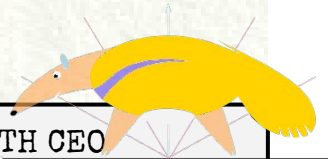
Meeting 16 Student's Booklet

## Lazy Lasers, Senseless Words and other silly Math Games

March 2 2016 © UCI

### Contents

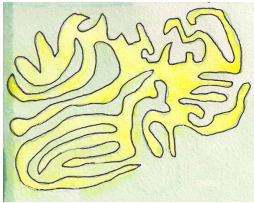
- 1 In-N-Out
- 2 Lazy Lasers
- 3 Downloading, please wait
- 4 Post the Answer
- 5 Senseless Words
- 6 A Mean Enigma



UC IRVINE MATH CEO  
<http://www.math.uci.edu/mathceo/>

Students play in teams of 5-7 students each. Points are assigned to the entire team.  
Points are assigned only after the solution is checked and verified.

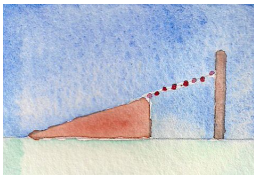
## Grading Rules



### Problem 1:

**1 point** : 6 or more correct answers

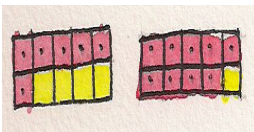
**2 points** : All answers are correct



### Problem 2:

**1 point** : If they answer drawing a line

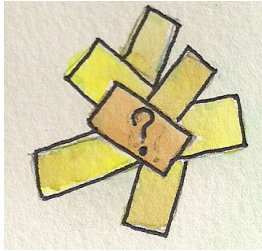
**2 points** : If they answer without drawing a line



### Problem 3:

**1 point** : If they answer one of the questions correctly

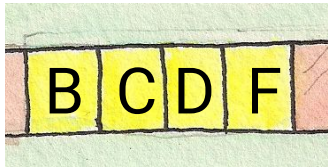
**2 points** : If they answer both questions correctly



**Problem 4:**

**1 point :** If they put three or more in the correct position

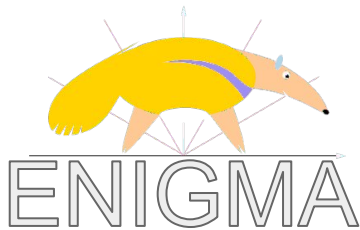
**2 points :** If all of them are in the correct position



**Problem 5:**

**1 point :** if they get exactly one of the required scores (a word with lowest score or a word with highest score)

**2 points :** if they get both words



**Problem 6:**

**2 points :** If everything is correct.

**Challenges (1 point per challenge)**

**Problem 1:** 1 point

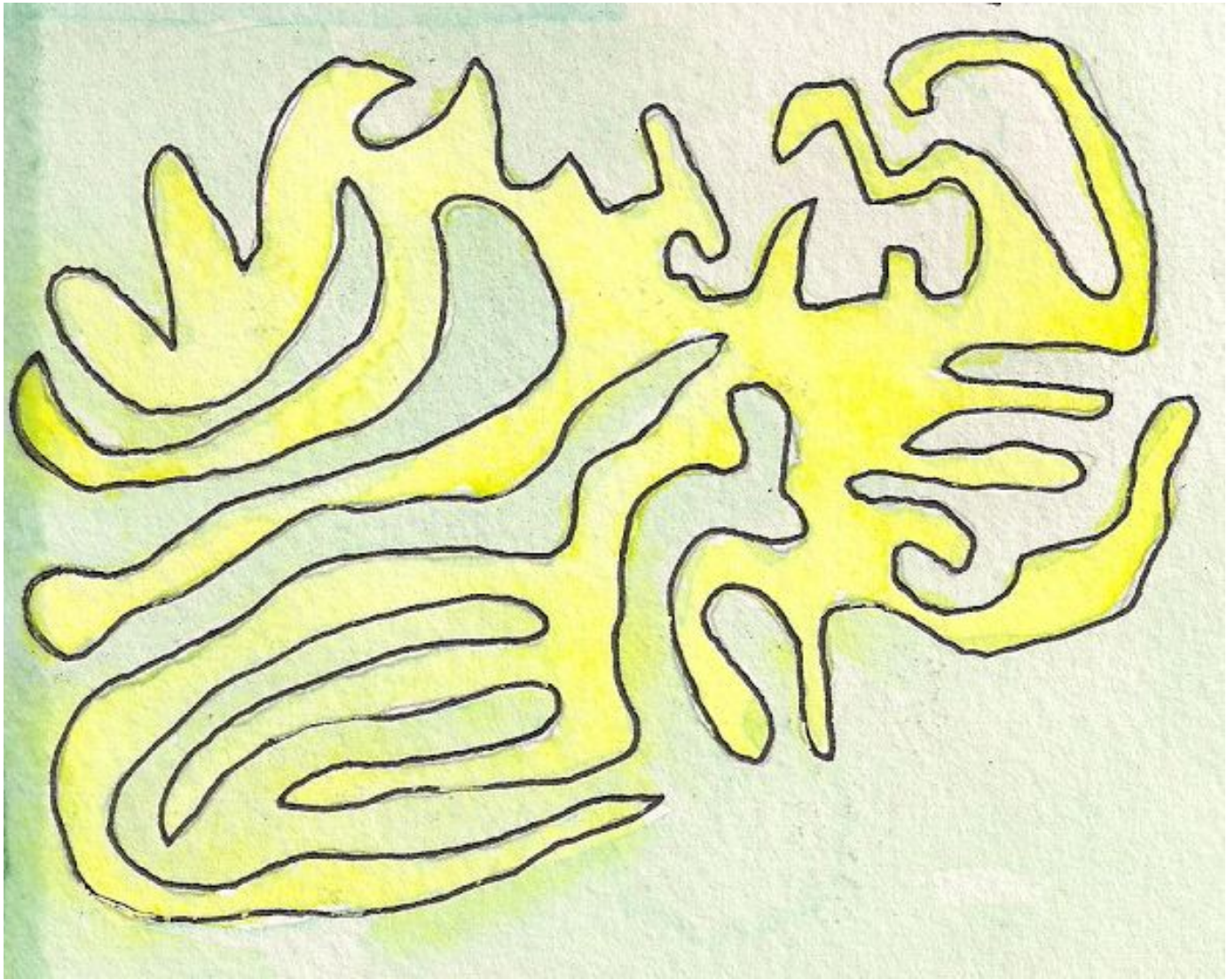
**Problem 2:** 1 point

**Problem 3:** 1 point

**Problem 4:** 1 point

**Problem 5:** 1 point

**Problem 6:** 1 point



# Problem 1

## IN-N-OUT



Time:

**8**

**minutes**  
to complete  
this task

Time:

**+2**

**minutes**  
to discuss with  
your group

Time:

**+2**

**minutes**  
to explain it to  
the volunteer

## 1 IN-N-OUT



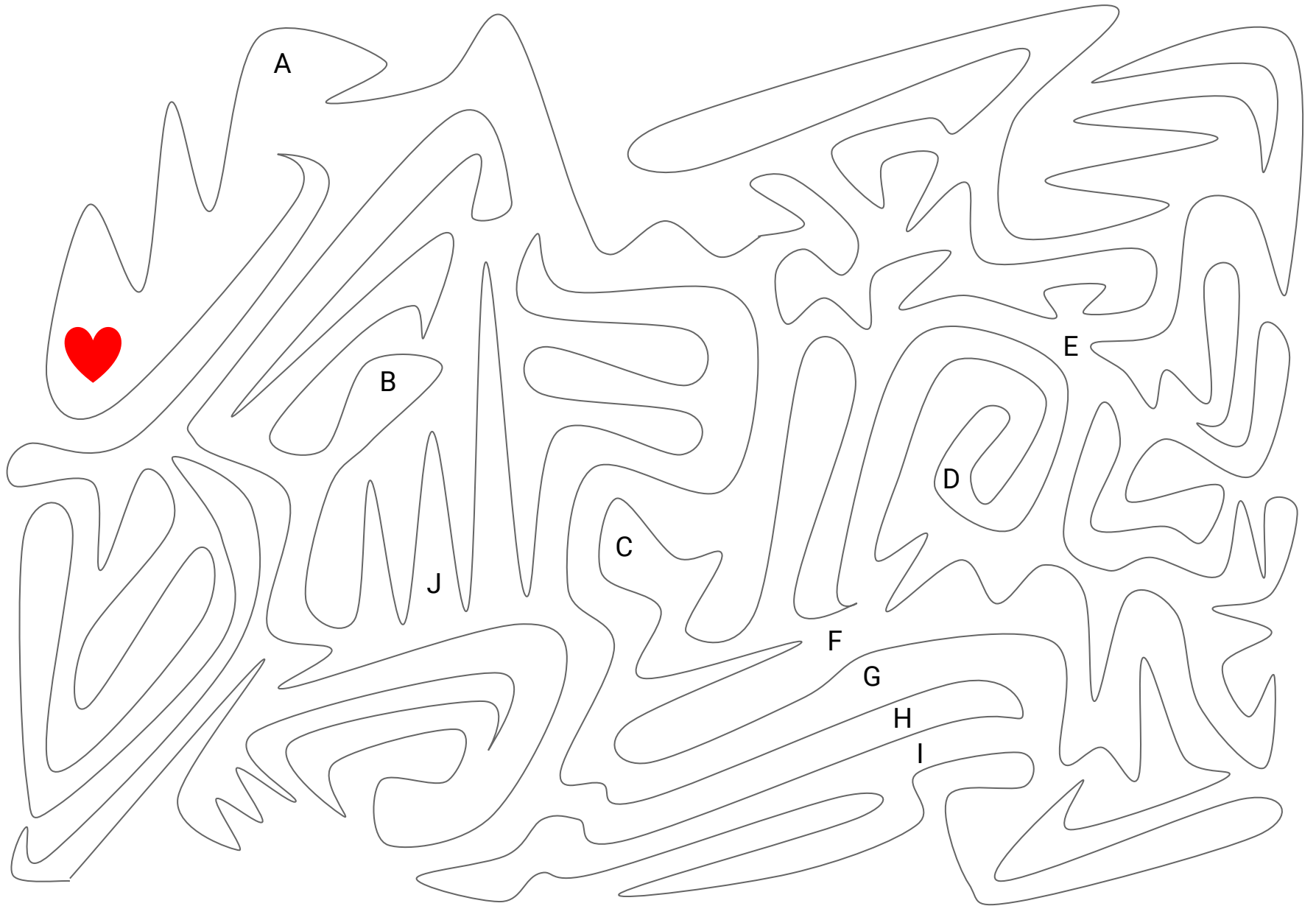
In the figure next page, the heart is inside some closed region. Each letter represents a man who may or may not be inside the region.

Your task is to find out who is inside and who's outside.

PERSON	IN	OUT
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		

**1 point** : 6 or more answers are correct

**2 points** : All answers are correct



A



B

J

C

D

E

F

G

H

I

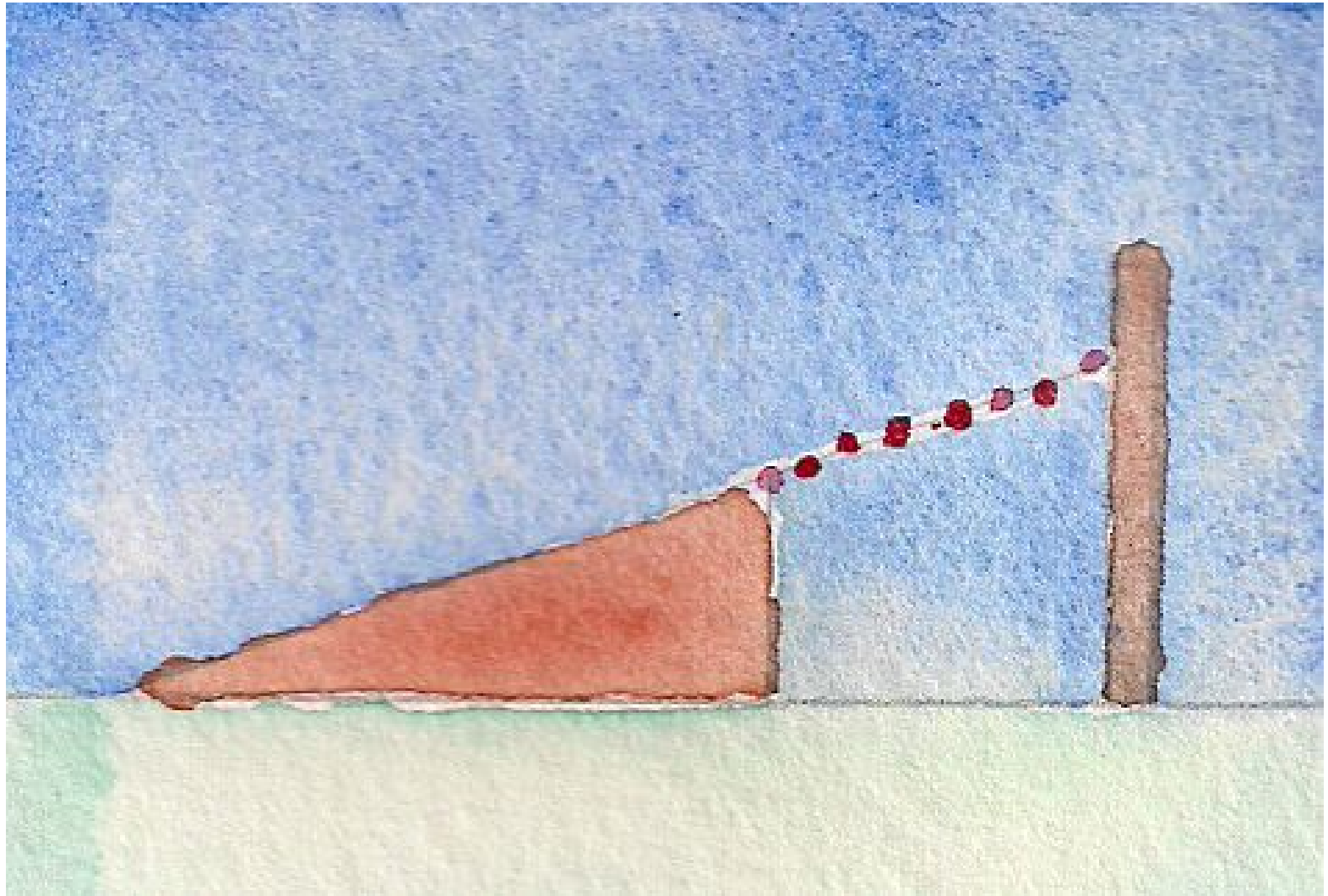
# 1 Challenge: IN-N-OUT

1 point

We think of the inside region as connected corridors for people to walk place two men X and Y inside the region that are as apart as possible in terms of walking. Draw a curve inside the region connecting them.







# Problem 2

## LAZY LASERS

Time:  
**8**  
**minutes**  
to complete  
this task

Time:  
**+2**  
**minutes**  
to discuss with  
your group

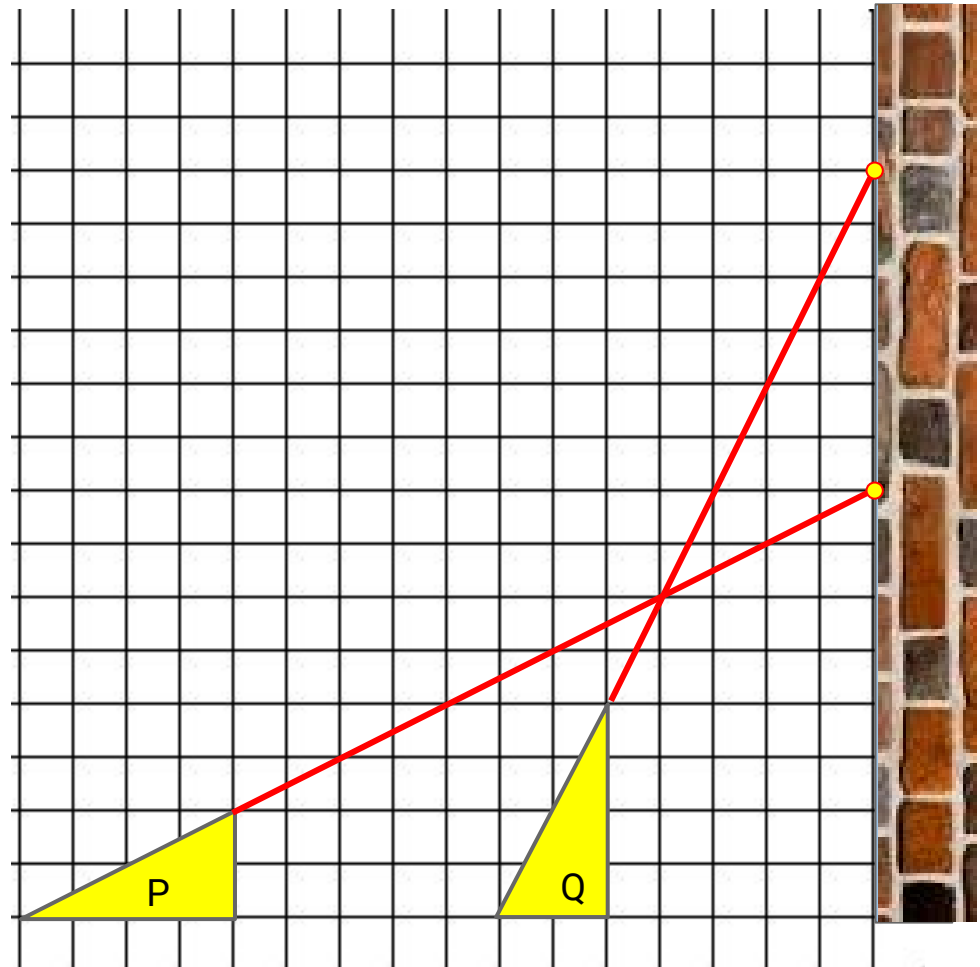
Time:  
**+2**  
**minutes**  
to explain it to  
the volunteer

## 2 LAZY LASERS

In the figure 2 laser machines are shown. They are triangles which release a laser with the same slope as the diagonal of the triangle.

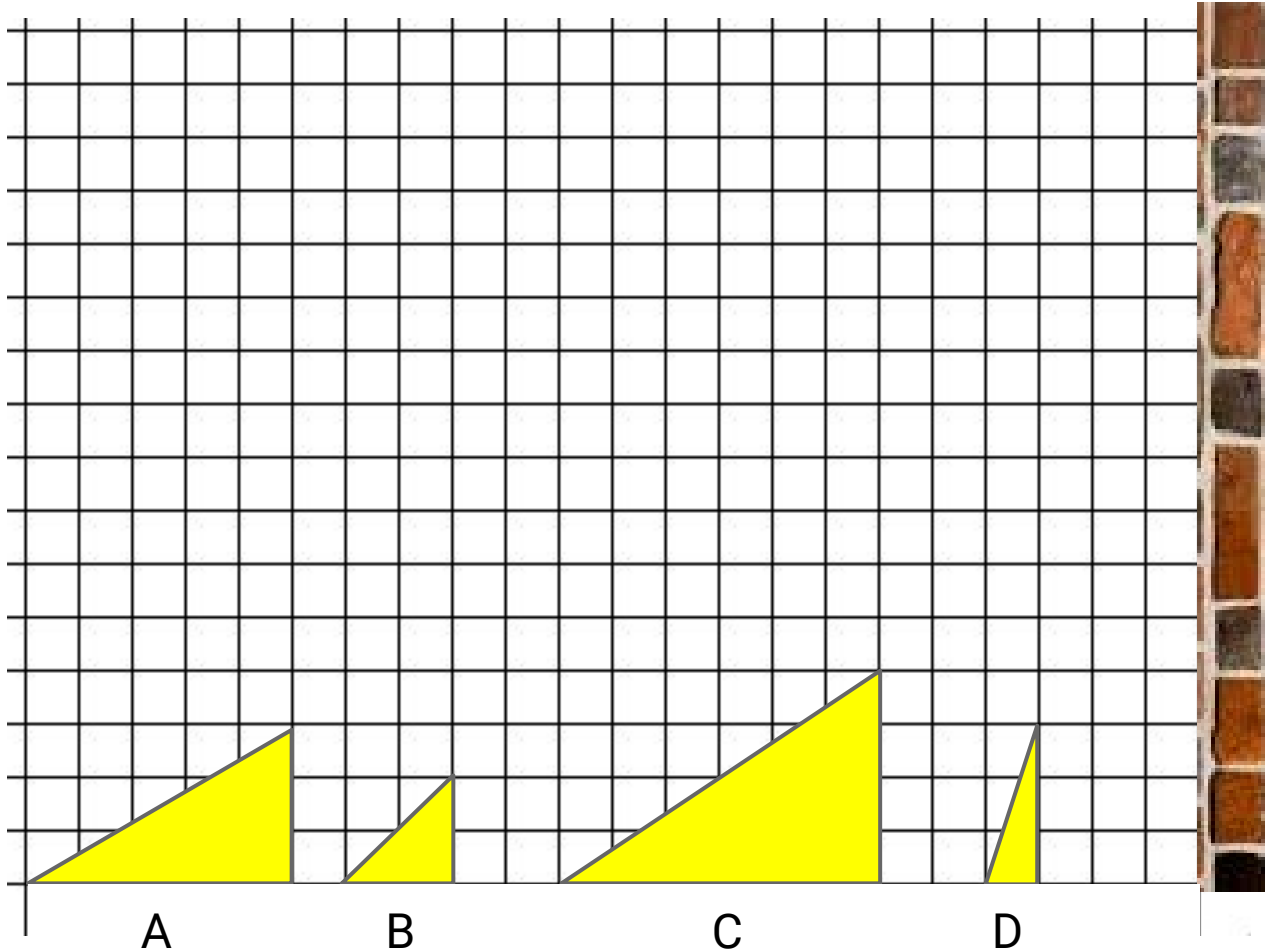
The picture shows the laser lines. In this case, machine Q hits the wall at a higher point than machine P.

In the next page, four machines are given. Your task is simple: determine the machine that hits the wall highest with its laser.





Task: determine the machine that hits the wall highest with its laser:

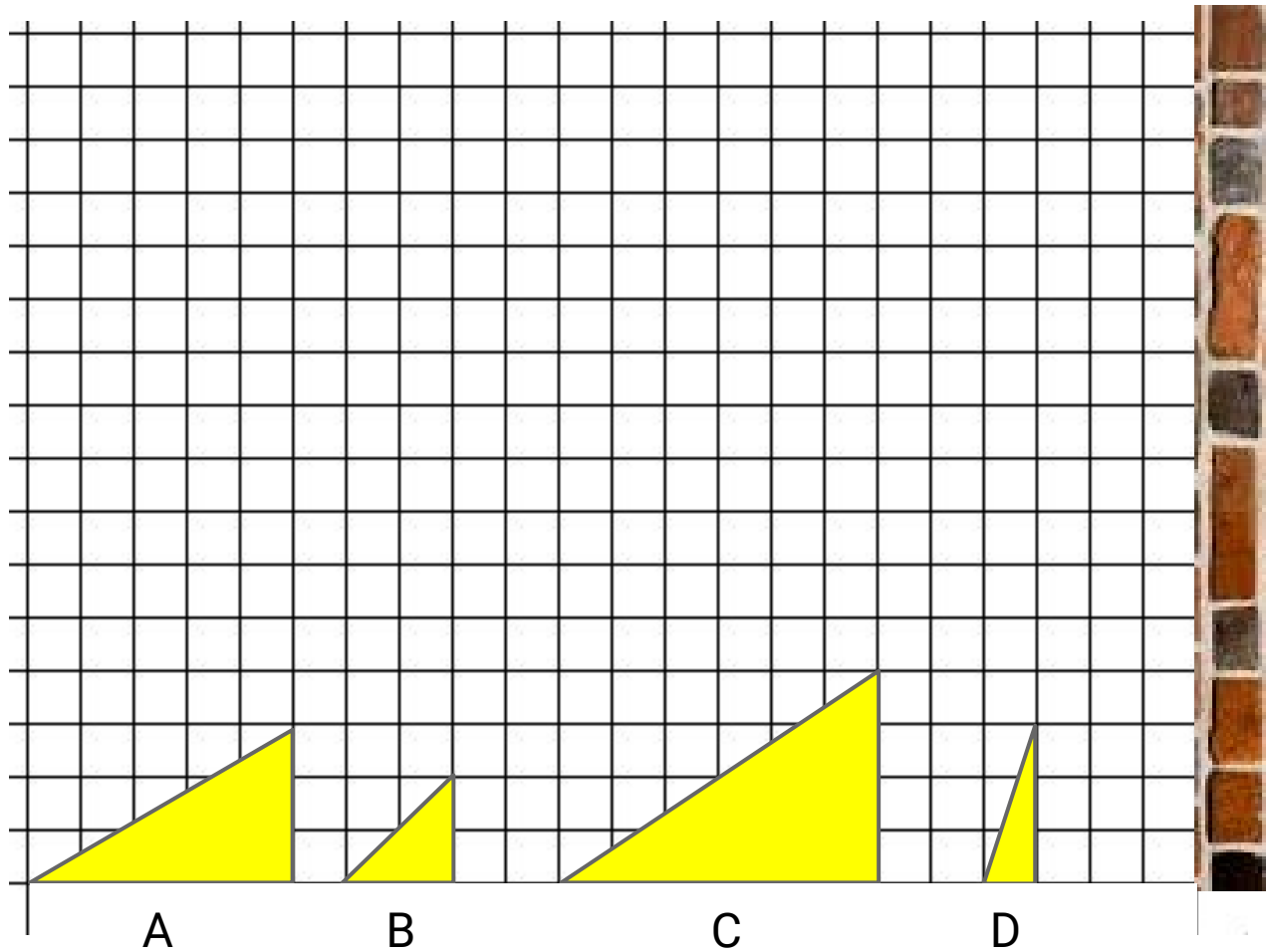


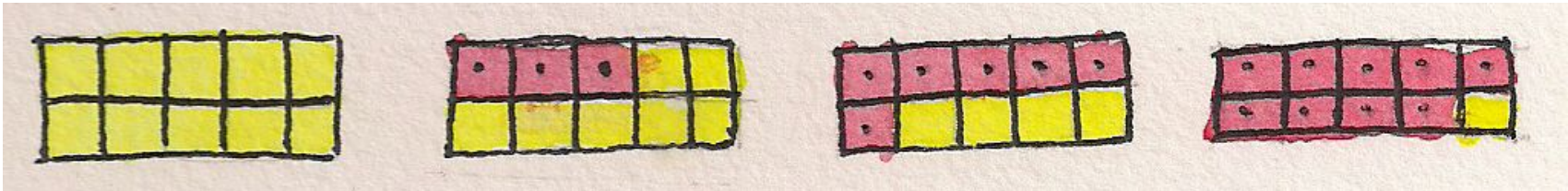
**1 point** : If you answer drawing a line  
**2 points** : If you answer without drawing a line



# 2 Challenge: LAZY LASERS

Sort the slopes of the triangles in increasing order:







# Problem 3

Downloading, please wait...

Time:  
**8**  
**minutes**  
to complete  
this task

Time:  
**+2**  
**minutes**  
to discuss with  
your group

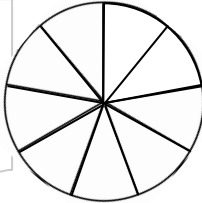
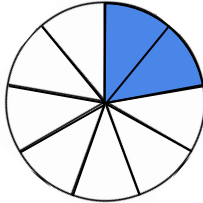
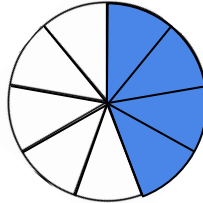
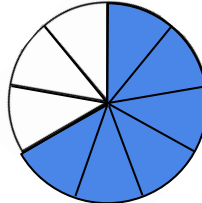




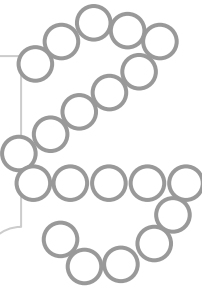
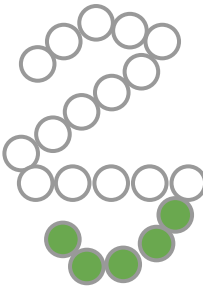
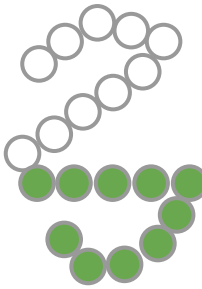
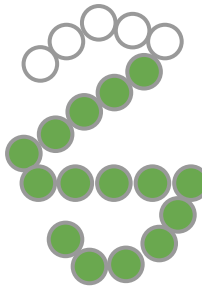
Time:  
**+2**  
**minutes**  
to explain it to  
the volunteer

# 3 DOWNLOADING, PLEASE WAIT

Three files a,b and c are being downloaded. You can see the progress by the hour. Find which files will be downloaded first!

**1 point** : If you answer one of the questions correctly

**2 points** : If you answer both questions correctly

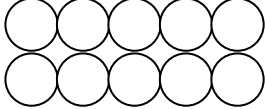
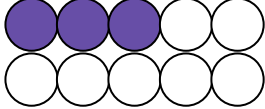
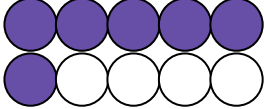
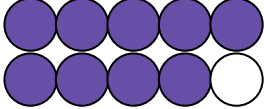
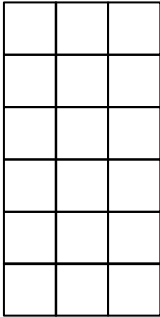
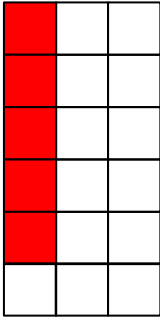
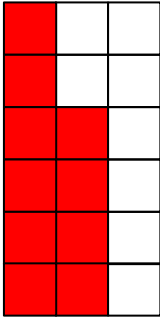
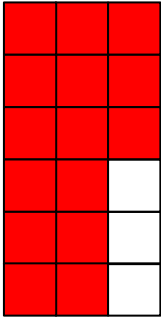
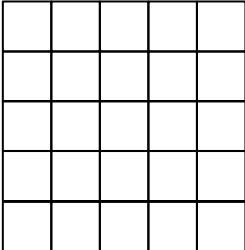
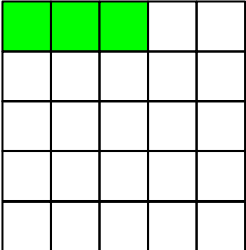
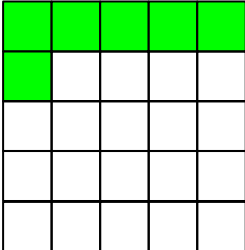
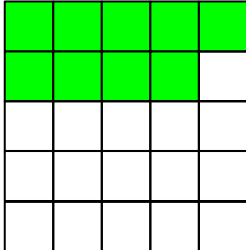
	1 PM	2 PM	3 PM	4 PM ...
<b>a.</b>				
<b>b.</b>				
<b>c.</b>				
	First:	Last:		

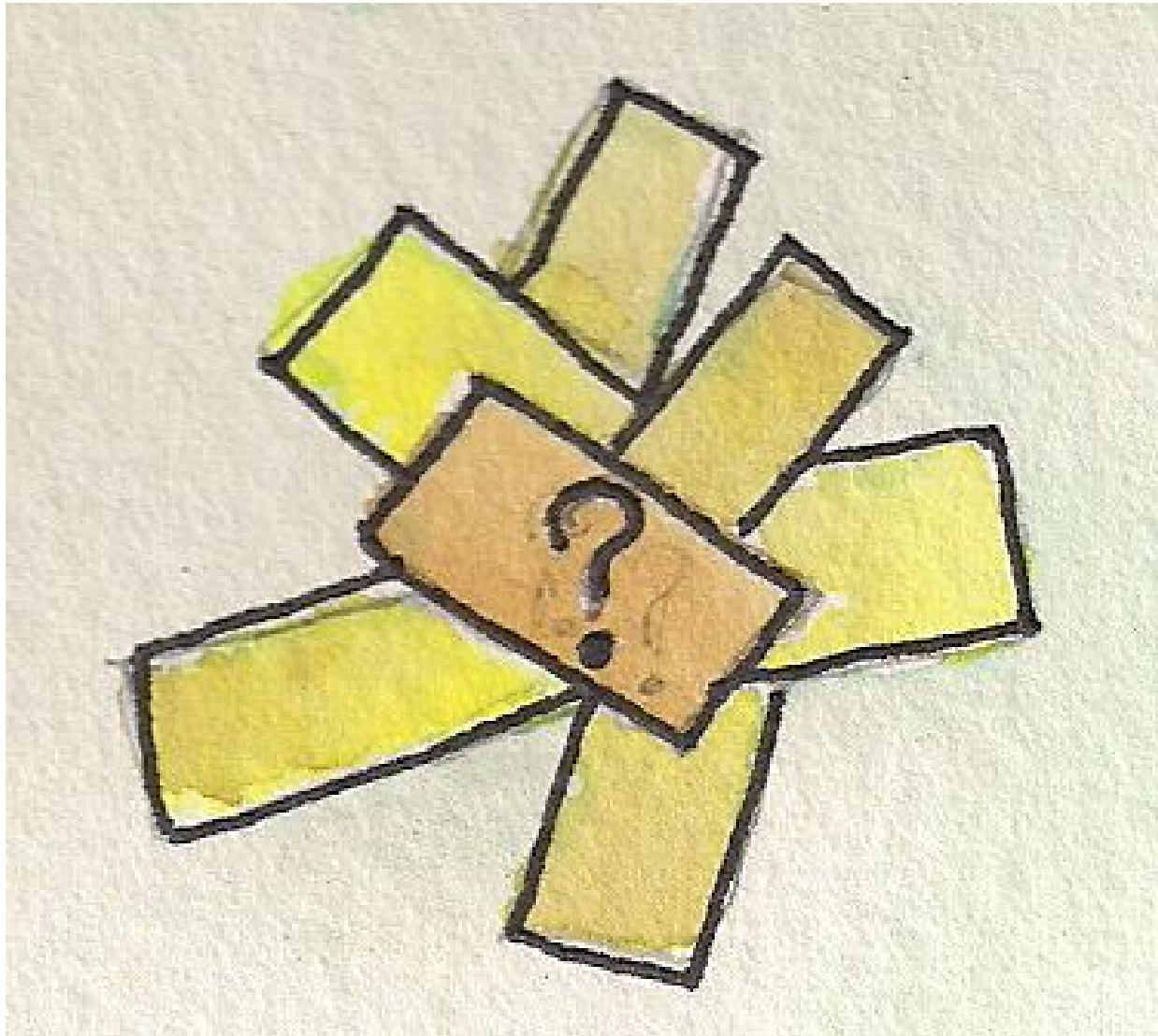


# 3 Challenge : DOWNLOADING, PLEASE WAIT

**1 point**

Three files d,e and f are being downloaded. You can see the progress by the hour. Find the finishing times for each file:

	6 AM	7 AM	8 AM	9 AM ...	Finishing time:
d.					<div style="border: 1px solid black; width: 60px; height: 60px; margin: 0 auto;"></div>
e.					<div style="border: 1px solid black; width: 60px; height: 60px; margin: 0 auto;"></div>
f.					<div style="border: 1px solid black; width: 60px; height: 60px; margin: 0 auto;"></div>



# Problem 4

## Post the answer

Time:  
**8**  
**minutes**  
to complete  
this task

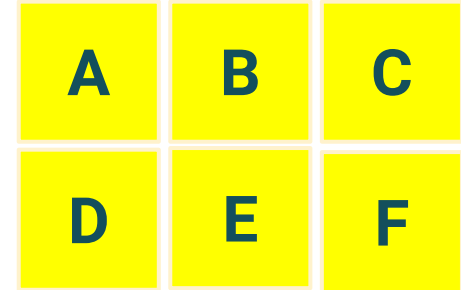
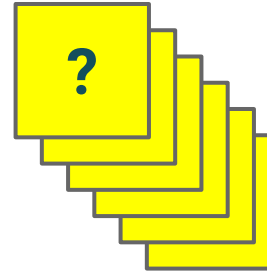
Time:  
**+2**  
**minutes**  
to discuss with  
your group

Time:  
**+2**  
**minutes**  
to explain it to  
the volunteer



# 4 POST THE ANSWER

Six *Post it* notes labeled A to F were stacked in certain order but someone separated them. Put them back by following the 12 clues. Read them in order, and stop as soon as you find the answer.



- |   |                                      |
|---|--------------------------------------|
| (1) C was lower than A                  | (7) B was lower than E               |
| (2) C was higher than D                 | (8) F and D were next to each other  |
| (3) F and B were next to each other     | (9) A and C were next to each other  |
| (4) D was lower than B                  | (10) D was on the bottom             |
| (5) C and E were next to each other     | (11) E and B were next to each other |
| (6) B and C were not next to each other | (12) A was on the top                |

**a.**  
Stack back the sticky notes:



**1 point :** If you put three or more in the correct position

**2 points :** If you put all of them in the correct position

# 4 Challenge : POST THE ANSWER

**1 point**

Six *Post it* notes labeled A to F were stacked in certain order but someone separated them. Put them back by following the 12 clues. There is a minimum number of clues that you need. Your goal is to stack back the sticky notes using the minimum possible number of clues.

(1) C was lower than A

(7) B was lower than E

(2) C was higher than D

(8) F and D were next to each other

(3) F and B were next to each other

(9) A and C were next to each other

(4) D was lower than B

(10) D was on the bottom

(5) C and E were next to each other

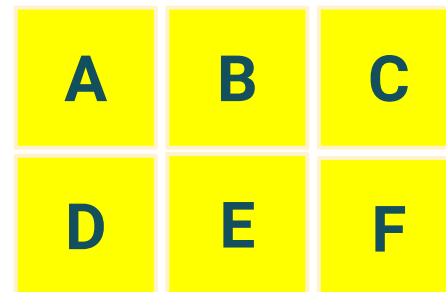
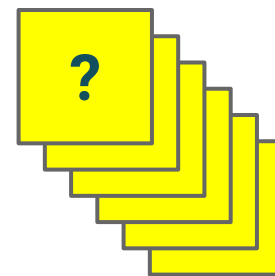
(11) E and B were next to each other

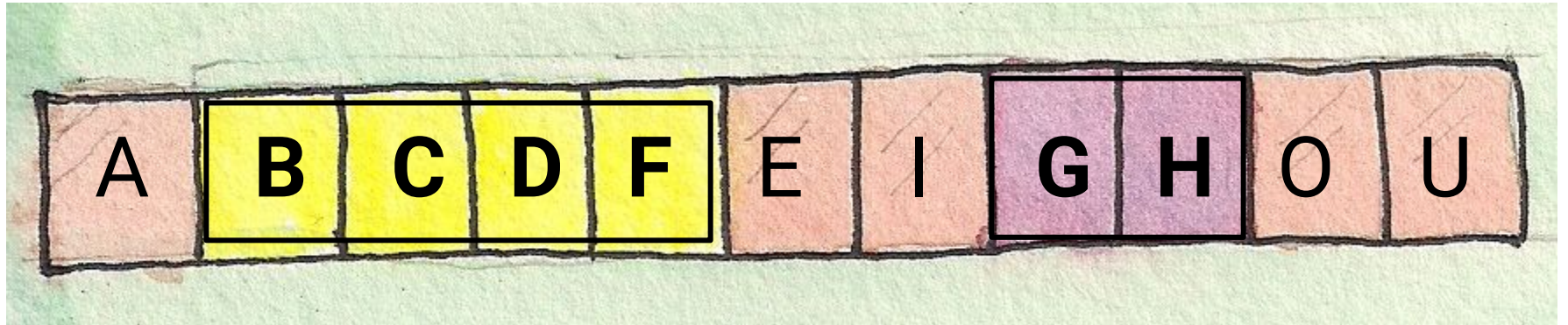
(6) B and C were not next to each other

(12) A was on the top

**a.**

How many clues are you using?





A

B

C

D

F

E

I

G

H

O

U

# Problem 5

## Senseless Words

Time:  
**8**  
**minutes**  
to complete  
this task

Time:  
**+2**  
**minutes**  
to discuss with  
your group

Time:  
**+2**  
**minutes**  
to explain it to  
the volunteer

# 5 SENSELESS WORDS

In the game of *Senseless Words*, you are given a small alphabet:

A E I O U B C D F G H

and your job is to create 11-letter “words” that contain every one of the above letters exactly once (no repeating letters allowed).

**We do not expect your “words” to make sense. For example**

I	B	D	C	G	A	E	F	H	O	U
---	---	---	---	---	---	---	---	---	---	---

**is an acceptable “word”.**

We give points to each “word”, as follows:

- You get 6 points for each block of consonants.
- In addition, you get  $n^2 = n \times n$  points for each block of  $n$  consecutive consonants.

For example, the word “IBDCGAEFGOU” above has 2 blocks of consonants (BDCG, of length 4, and FG, of length 2), so the score for this word is  $6 + 6 + 4^2 + 2^2 = 12 + 16 + 4 = 32$  points.

Your task is to create 2 words: one that gives you as many points as possible, and one that gives you as few points as possible.

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**1 point** : if you get exactly one of the required scores (a word with lowest score or a word with highest score)

**2 points** : if you get both words



## 5 Challenge : SENSELESS WORDS

1 point

In the game of *Senseless Words*, we create 11-letter words, without repeating letters, from a small alphabet:



**To create a word, we must use each letter exactly once.**

Each word has a value, calculated as follows:

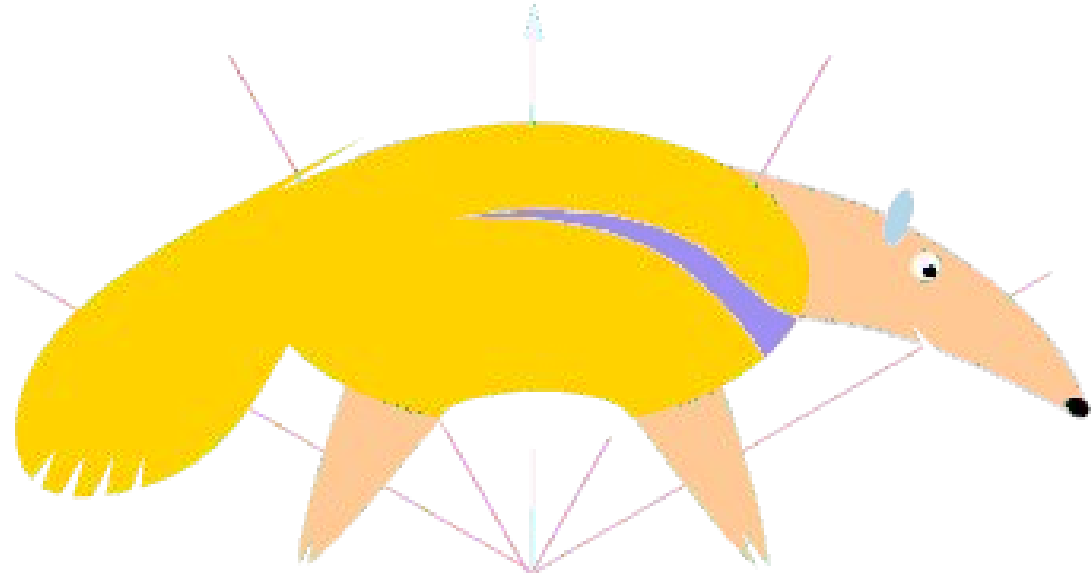
- You get 6 points for each block of consonants.
- In addition, you get  $n^2 = n \times n$  points for each block of  $n$  consecutive consonants.

For example, the word “IBDCGAEFGOU” has 2 blocks of consonants (BDCG, of length 4, and FG, of length 2), so the score for this word is  $6 + 6 + 4^2 + 2^2 = 32$  points.

**NOTE: The words you create DOES NOT HAVE to make sense.**

Find 2 words of score equal to 36: \_\_\_\_\_

\_\_\_\_\_



ENIGMA

# Problem 6

## Mean Enigma

Time:  
**8**  
**minutes**  
to complete  
this task

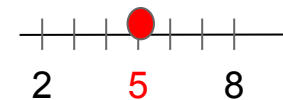
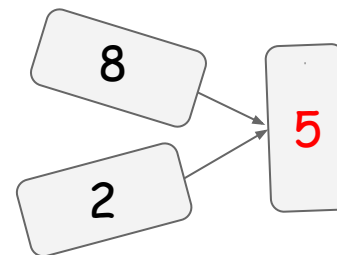
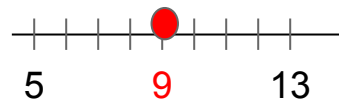
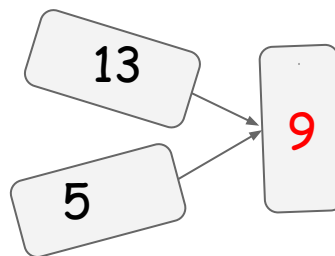
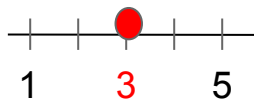
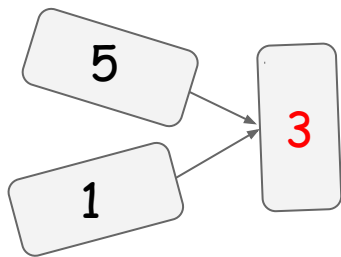
Time:  
**+2**  
**minutes**  
to discuss with  
your group

Time:  
**+2**  
**minutes**  
to explain it to  
the volunteer

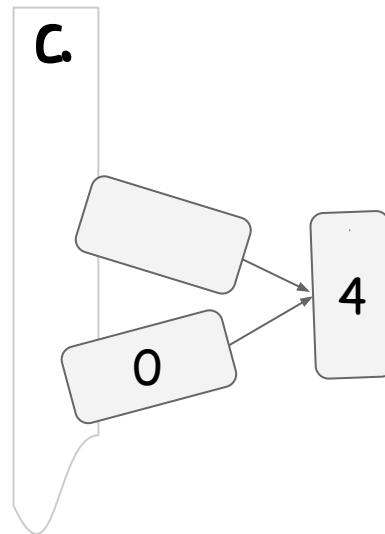
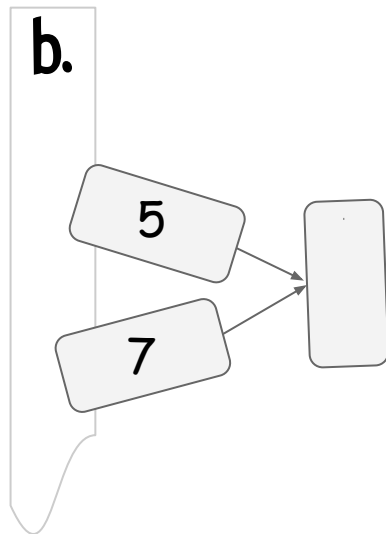
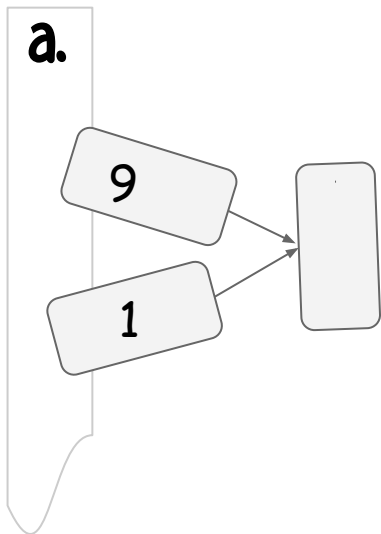
# 6 A MEAN ENIGMA

The three examples that you see use certain procedure to produce a number from other two. *Can you discover which procedure?*

Examples:



Based on the pattern found in the examples, complete the following diagrams:

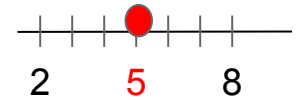
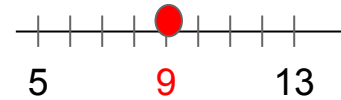
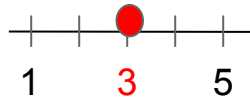
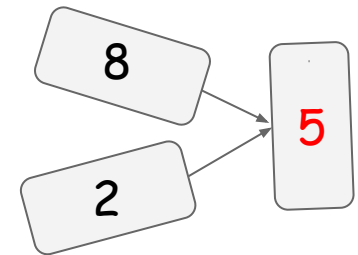
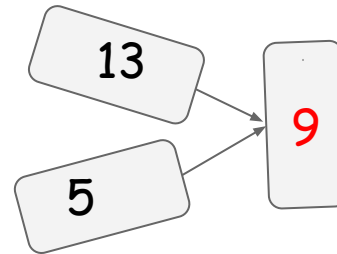
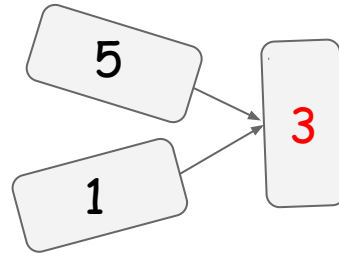


**2 points** : If everything is correct.

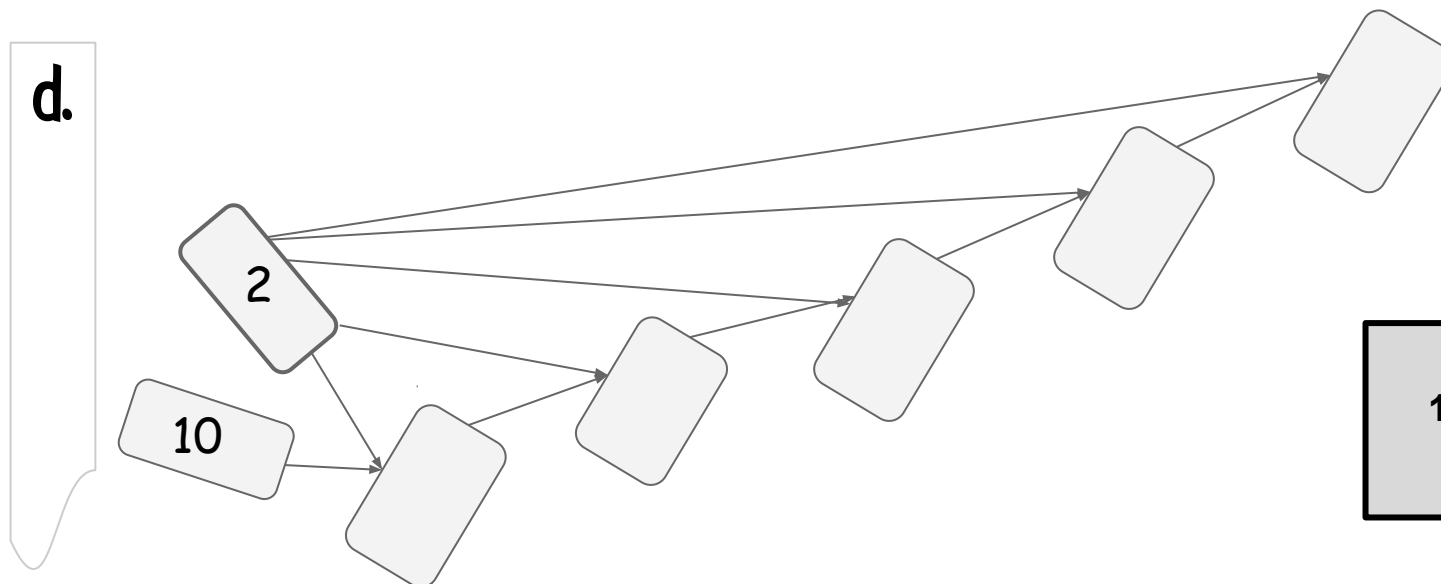
# 6 Challenge : A MEAN ENIGMA

Examples:

The three examples that you see use certain procedure to produce a number from other two. Can you discover which procedure?



Complete the following diagram, following the same pattern as before:



1 point