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# Engineering Games 2016

Machine specifications

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**ÉTS**

Le génie pour l'industrie

# Révision

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Version	Date	Description du changement
1.0	2015-06-23	First version
1.1	2015-09-14	Official version
		Limits, precisions, Yes and No's retouched

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# Context

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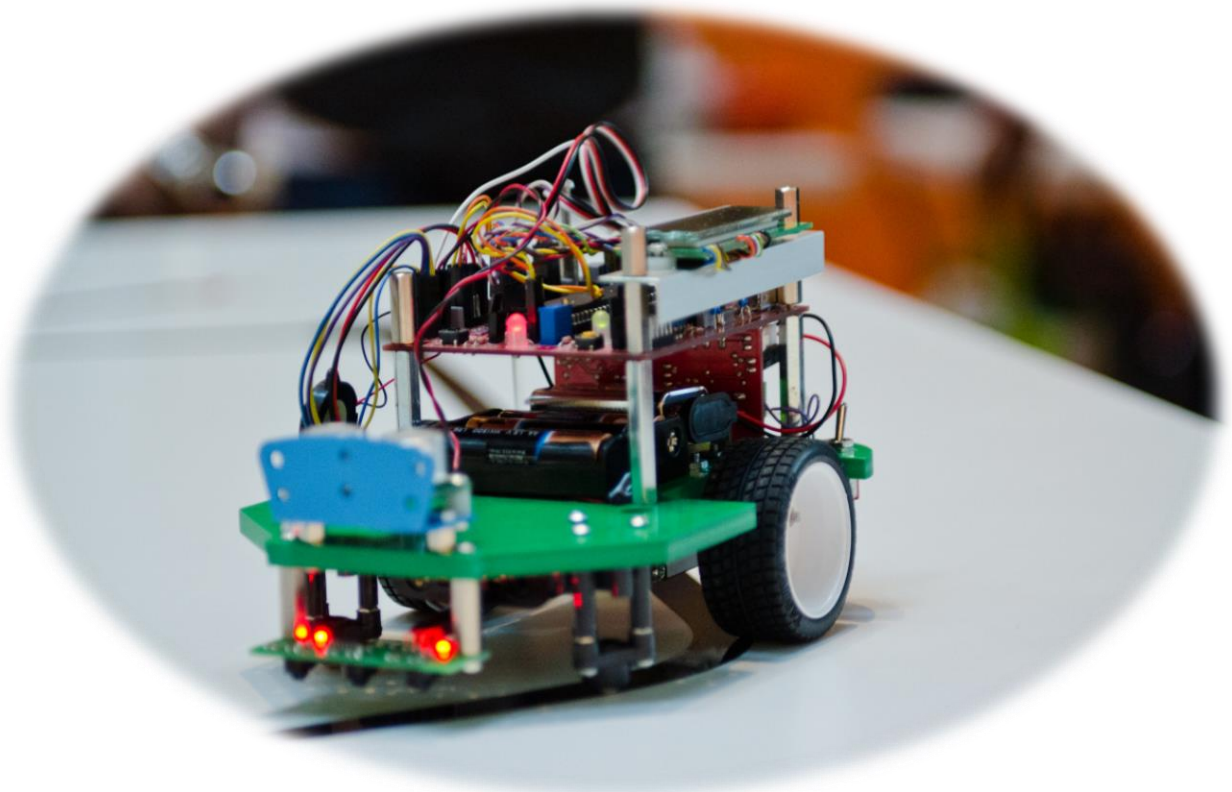
Childhood, so many moments to remember... Moments of camaraderie, rivalry, frivolity and discoveries. Your first ROV, those days spent playing Super Smash bros with your friends, quests for treasures, the lava floor you ABSOLUTELY needed to avoid. Fighting with your peers to be the one playing with that awesome toy, the magic capes... we never seemed to have enough Lego blocks! The only moment where destroying stuff was tolerated because it teaches you boundaries. All of those simple experiences that made us grow into the person we are now.

Wouldn't it be nice to live it all over again?

Well, this year's machine challenge includes all of those aspects from your childhood. We're going back to basics, basics with a little twist though, because it includes all of the technical knowledge you learned along the way.

Theme: The Lord of the rings!

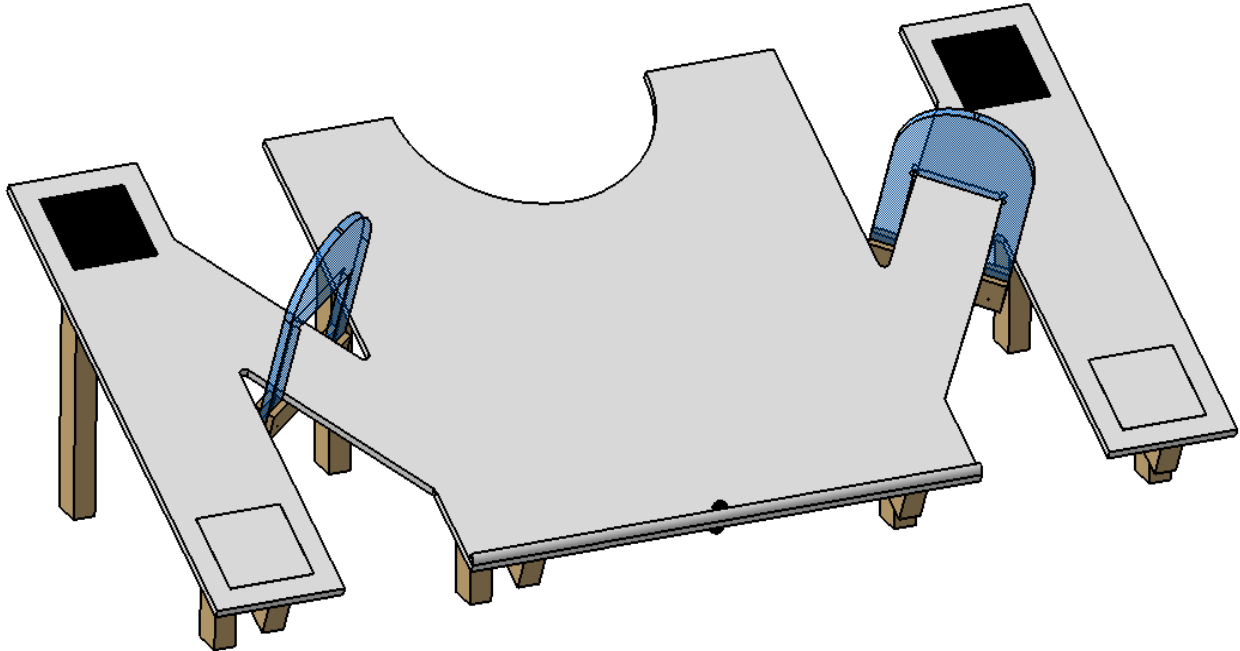
Welcome to the machine challenge of Engineering Games 2016!



## Course's presentation

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The course this year will be an inclined plane on which two teams will compete at the same time. Your machine will have to get the most objects possible and make the farthest distance possible on the route. The surface of the course will canvas for a projection during the rounds and it will be animated all competition long.



## New this year

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- The course will be delivered to the address you provided between September 5-7th.
- No teams will be penalized if the course is damaged during a round.
- If the course is damaged during a round, it will be replaced upon team request.
- A controller similar to wireless PlayStation controller with DB9 receiver will be provided to the teams at the same time as the course to control the prototypes.  
<http://www.robotshop.com/ca/fr/controleur-robot-ps2-v3-lynxmotion.html>



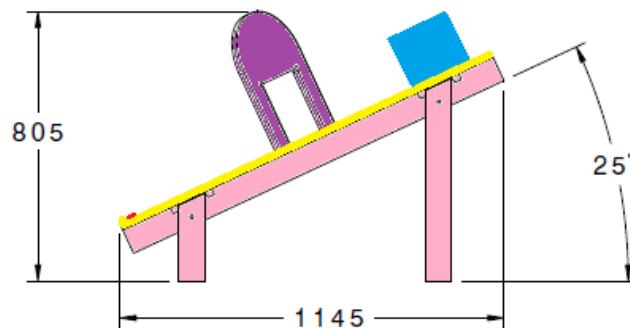
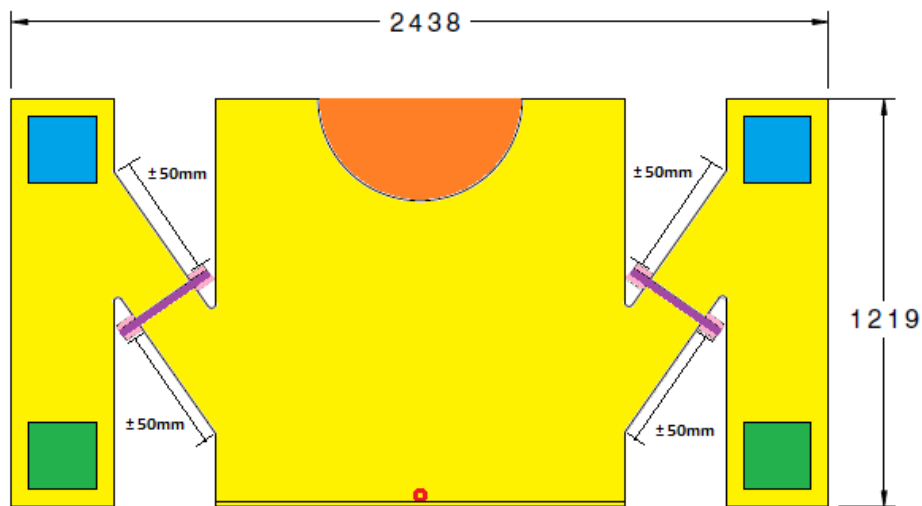
# Dimensions et sections du parcours

A 3D 'STP' format is available on the machine section of the website. Here is the geometrical constraint:  $\text{R} \pm 6\text{MM}$

For assembly, please refer to Annex A.

- |                 |                      |                 |                                 |
|-----------------|----------------------|-----------------|---------------------------------|
| <b>Yellow :</b> | Chemin de l'aventure | <b>Blue :</b>   | Section de départ               |
| <b>Green :</b>  | Veste de mithril     | <b>Purple :</b> | Tunnel de la Moria              |
| <b>Red :</b>    | L'anneau de pouvoir  | <b>Orange :</b> | Volcan de la Montagne du Destin |

## Dimensions in mm



# Objects and course's specifications

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## Adventure path

Made from 19 mm thick plywood select Home Depot and painted with PREMIUM CIL white. Like any good adventure, the suggested path is not always the better one.

## Departure section

The departure section is 20cm x 20cm x 20cm cube. All parts of the prototype must be inside the cube at the beginning of each round, except for Sam and Frodo. Every good hero eventually grows during its quest.

## Mithril shirt

20 cm x 20 cm piece of tissue given with the adventure path

## Moria tunnel

The tunnel is made with a 19 mm board covered on the two sides by 0.76 mm polycarbonate. The tunnel is the only part of the route that is forbidden to alter or damage during a round. Entrance of the tunnel size: 20 cm x 20 cm.

## L'anneau de pouvoir

The ring is a 6/6 black nylon nut from McMaster-Carr ( <http://www.mcmaster.com/#96557a144/=xr9mtz> )

## Amon Amarth Volcano

Le demi-cercle en haut du parcours, délimité par la surface supérieure du contre-plaqué, représente la fin de l'épreuve une fois que l'adversaire y est tombé. La lave de la montagne du destin ne laisse aucun survivant.

## Sam et Frodon

Two standard Lego figurines are provided at each round. They must stand on a Lego block 2x4, thin or thick, placed in the middle of the highest surface of the robot ( $\pm 1$  cm, see Annex B).



# Challenge's description

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## Step by step

- 1) Go down to get the Mithril shirt
- 2) Go through Moria tunnel
- 3) Prendre Take the power ring
- 4) Protéger Protect Frodo and Sam at any price.  
They must stand on the lego 2x4 part until the end of the round
- 5) Fight the enemy to keep your precious!
- 6) Go towards Amon Amarth (as close as possible)
- 7) Fight and throw your opponent and the ring into the volcano



# Stages of the competition

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## First round

- 4 to 6 minutes by team are allowed to show the videos
- Each team has a maximum of 4 minutes to describe the prototype to the cheering crowd
- Both teams have 2 minutes to prepare the prototype and install Frodo and Sam in the departure zone
- Duration of the first round: **8 minutes**



## Second round

- Both teams have 1 minute to prepare the prototype and install Frodo and Sam in the departure zone.
- Duration of the second round: **7 minutes**



## Final confrontation

- The two teams with the highest score from the first two rounds will go all-in for a mortal duel where anything is possible. No objects need to be retrieved in this round. Basically, it's a Sumo combat: last prototype standing on the course wins
- Final confrontation consists in **3 rounds of 5 minutes**
- **2 out of 3** or until one of the prototypes get out of service



## Particular case

- In case of a tie, the lightest prototype wins
- Since there is an odd number of teams, the team with the most points out of the ones that lost the first round will have the chance to try again for the 6th round
- See **Annexe B** for a visual description of the stage of the competition





# Rounds description



## General rules

- Each team receives two Lego figurines that they need to put on the 2x4 Lego block, without any tools or glue
- Both teams install their prototype in the departure zone.
- A volunteer makes sure that the prototypes are well placed in the departure zone.
- Each team chooses a pilot for the round.
- The vehicles are started one after the other and the controller are given to each driver.
- Once the round started, nobody is allowed to touch the prototypes until the end of the round.
- If a team does not have a prototype or broke theirs in an earlier round, a vehicle will be lent to the team (Trust me, you don't want that vehicle!!)
- The round ends when the time is up or when one of the two players fell into the volcano.
  - We consider that the vehicle fell into the volcano when one or many parts of the vehicle fell below the path going through the half circle.
  - If the two players fall one after another, they both lose points for falling off the field.



## Particular case

- A robot is not considered fallen if the fallen component is liquid.
- If the ring gets out of the course without falling into the volcano, it is automatically replaced with a worm drive placed below the path (this is the only component that is not supplied with the course we provide you in September)
- In case one of the prototypes breaks following a collision with the opponent during the first two rounds, the judges will investigate whether the attack was premeditated or if the victim was too fragile for this kind of competition. If the attack is judged as premeditated and the victim is considered robust enough, the attacker will lose all of its machine points. Basically, just build a solid prototype and don't mess with the rules, you can do it, we believe in you! In other words, you can push the opponent, touch it, alter the route but not attack the opponent except for the final match.



# Limits, precisions, Yes and No's



## For the prototype

- Batteries are the same for everybody: **10 AA LR6 Alkaline batteries**. No other power source is allowed.
- Any gas under pressure cannot be over 3 Atm.
- Fire is forbidden as well as animals, you know... no dragons.
- Any mechanical energy is accepted, excepted for thermal machines.
- Dimensions of the machine cannot be greater than 20 cm x 20 cm x 20 cm at the beginning of the course and cannot be greater than 30 cm x 30 cm x 30 cm during the run.
- Only one prototype by team shall be used for all rounds. 75% of the prototype must remain the same between games
- The machine must not be light sensitive since the course will be illuminated from all sides during the competition.
- Weight has to be between 1kg and 2kg  $\pm 0.05\text{kg}$ . Otherwise, disqualified. Parts of the controller does not count
- It is forbidden to test your machine with other teams before the official competition.
- A protection mechanism have be installed to block the attack of the last round mechanism.



## For the course

- It is authorized to push or drag the opponent
- It is authorized to damage the course.
- It is forbidden for the first two rounds to voluntarily damage the opponent's robot or to blur its transmission frequencies.
- It is forbidden to move or damage the Moria tunnel.
- It is authorized to steal your opponent 's Sam, Frodo, Mithril shirt and ring of power.



# Evaluation criterias

Here are the criterias used to evaluate the machines. The example presented here shows the maximum points a machine can actually earn for each round.



## Actions

Take the Mithril shirt	2	-The shirt is not on its point of origin
Go through the Moria	2	- Without moving or damaging it
Take the power ring	4	-Touch the ring with a solid part of the vehicle
Power ring into the volcano	5	- You are the last one to touch the ring before it fell down the hole
Opponent in the volcano	6	- If your opponent fell in the hole
Fall into the volcano	-6	- If you fall in the hole you lose points.
Touch your opponent's Mithril shirt	-3	- Number of times doesn't change the score   1x = -3   20x = -3



## Gains at the end of the round

Mithril shirt	2
Opponent's Mithril shirt	6
The Power ring	3
Frodo still standing on the Lego	2
Sam still standing on the Lego	2
Each captured figurine	2

Les points action et gain sont multipliés par cette formule;

$$\frac{2}{(\text{Poids de la machine en Kg au départ}) + 1}$$



## Design and aestheticism

Originality and innovation	7
Reliability and durability	7
General appearance	6

For a maximum of **100 points** cumulating in the two rounds, the video and the mid-step report scores. The winner of the final will automatically gain **70 points** for action and gain without considering the other rounds or its weight.



# Video

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You need to produce an explanatory video of your machine that will be evaluated by the judges. This video counts for a total of 5 points in the final score of the machine competition.

## Evaluation criterias



### Content

- Name of the delegation and prototype **1 point**
- Presentation of the team machine **1 point**
- Presentation of the machine **1 point**
- Originality **1 point**
- Quality of the video **1 point**



### Encoding

Formatting compliance: **USB key**

Encoding compliance: **MPEG-4**

Duration: **4 to 6 minutes**

Handed over at the delegation arrival on January 3<sup>rd</sup>



### Note

- All videos lasting more than 6 minutes will get a score of 0 and will be stopped at 6 minutes during the public presentation.
- All videos delivered late (late as in after the first machine meeting) will get a score of 0 but can still be presented in front of the public.
- All videos not complying with the encoding and format requested will get a score of 0 and will not be presented in front of the public.



# Mid-step report

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A mid-step fabrication report has to be handed out at the latest **November 29<sup>th</sup> at Noon**. Those reports will be evaluated by the steering committee and have to be sent at: **machine@jeuxdegenie.qc.ca**. This report is worth 5 points of your total score for the machine competition. Points will be given based on the similarity of the final product to the description in the report.



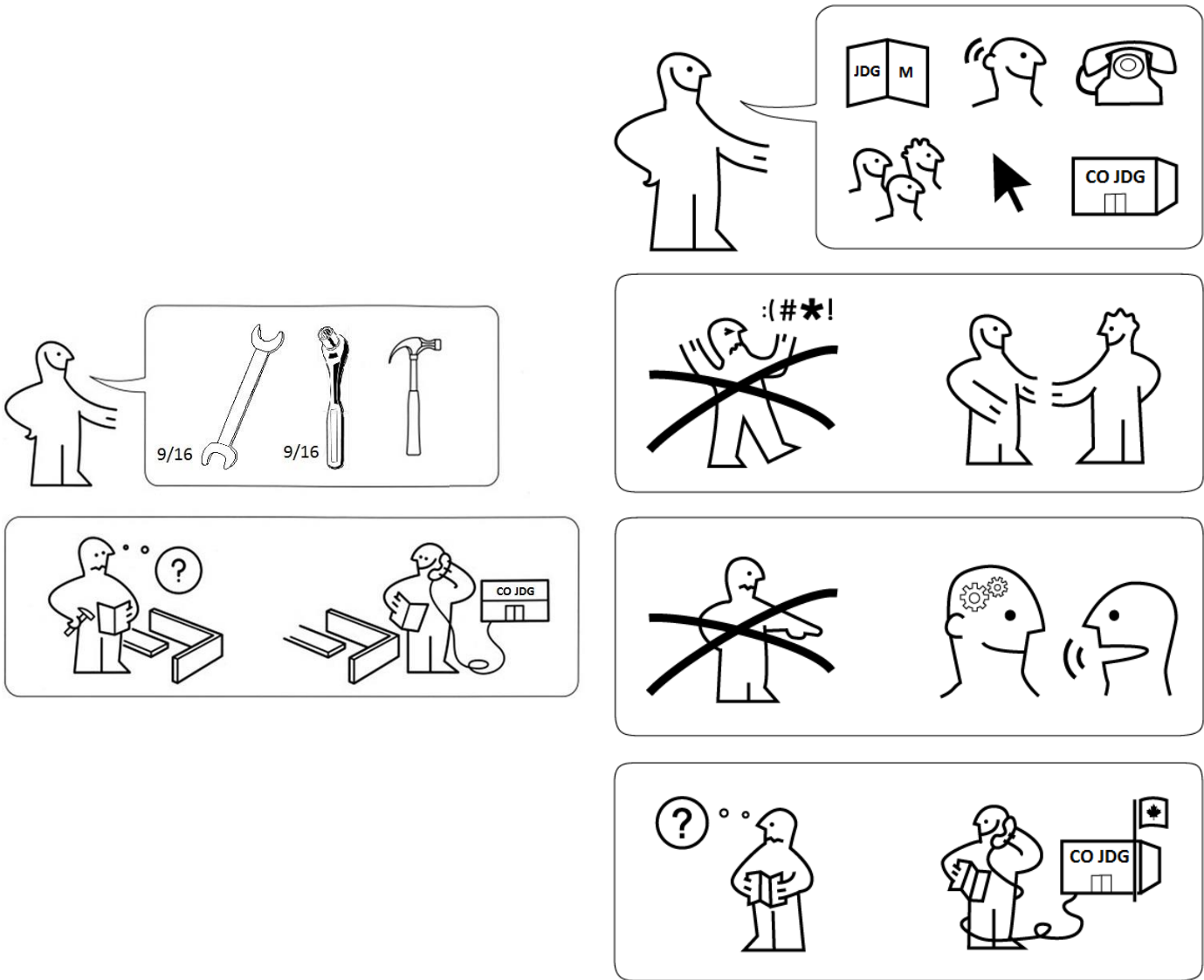
## Content

- Plan of the machine (3 views and isometric) **1 point**
- Chosen strategy for confrontation **1 point**
- Placement of Frodo and Sam on the prototype **1 point**
- Estimated weight of the prototype **2 points**

**Note : All reports handed after noon on November 29<sup>th</sup> will be scored 0**



# Annexe A



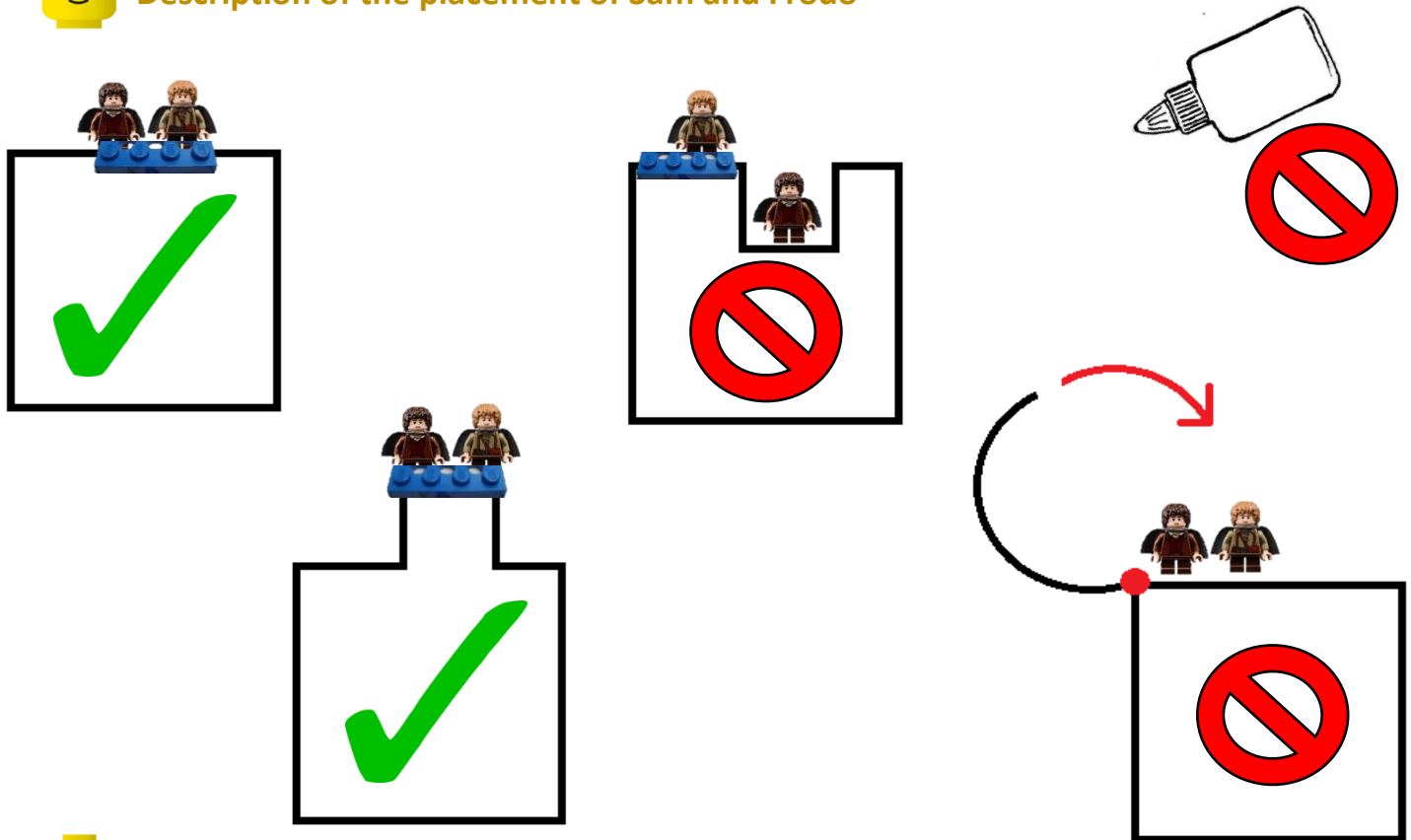
ansirealityip.com



# Annexe B



## Description of the placement of Sam and Frodo



## Stages of the competition

