

# Let's Build! STEM Challenge

## GUIDELINES & TIPS



# Overview

**The Let's Build! STEM Challenge** is open to all primary school children in Malta and Gozo. The challenge aims to stimulate interest in science, technology, engineering, and mathematics (STEM) from an early age.

It is open for entries from **Tuesday 27<sup>th</sup> April** to **Monday 14<sup>th</sup> June 2021**. This is an **Esplora initiative** supported by **robocoach**.

Participants will solve a real-life science problem by making use of materials of their choice to design and build a “chain reaction”.

Participants can work alone or as part of a classroom/school effort.

## Eligibility

To be **eligible**, projects must meet the following criteria:

- Must have been made by children aged between 4 and 10 (some help from educators and guardians is obviously fine!).
- Be original creations; i.e., not copied or replicated.
- Be submitted in the form of a 5-minute (max.) video to the STEM Engagement address below by 14<sup>th</sup> June 2021.

## What is a chain reaction?

The ‘Chain Reaction’ is a hands-on activity inspired by Rube Goldberg’s cartoons. Rube Goldberg was an American inventor well known for his cartoon inventions which illustrated how you can complete an extremely simple task by using a chain reaction. One of his drawings is shown below and it shows how one can open the garage door automatically. It is interesting to note that, he never actually built the inventions he drew. However, he did inspire people all over the world to follow in his footsteps by building the most amazing yet excessively complicated chain reactions!



Figure 1 – A live representation of one of Rube Goldberg’s Chain Reactions. Image by Ryan Somma

# How to take part

## Build your chain reaction

---

- There are multiple ways to build a chain reaction, but the basics always remain the same. One movement needs to trigger the next to solve a particular problem at the end. To get a clearer representation of a chain reaction, I suggest that you visit the website which will assist you to get to know better the history behind chain reactions and to better comprehend what is a chain. **Link:** <https://www.rubegoldberg.com/>
- Here are a few steps of how you can carry out this activity at home – but feel free to change the steps in any way you want!

## Step 1

---

- Use the links below to watch videos of people who built some amazing chain reactions. Observe how each part of the invention is linked to each other and how there is always something moving from one place to another.
- **Sesame Street: Rube Goldberg Machines!**  
<https://www.youtube.com/watch?v=pMpmit5YMcg>
- **Easy Rube Goldberg Ideas: Easy Rube Goldberg Machine for Kids**  
[https://www.youtube.com/watch?v=ICv5owYrW4w&feature=emb\\_logo](https://www.youtube.com/watch?v=ICv5owYrW4w&feature=emb_logo)
- **Design and Build a Rube Goldberg**  
[https://www.youtube.com/watch?v=6aFVbjwA\\_y4](https://www.youtube.com/watch?v=6aFVbjwA_y4)
- **Rube Goldberg: The TRASH Machine**  
<https://www.youtube.com/watch?v=xHrYypDKXTc>

## Step 2

Most chain reactions are built to solve a problem. Feel free to create your own problem to inspire your creation. Below are a few examples which can be used. Create a chain reaction machine:

- To feed your pet if you are away for one day.
- To turn on/off the TV.
- To turn on/off a light switch or lamp.
- To make a sandwich when you are busy working on your homework.
- To open/close the curtain in the morning to wake you up.
- To water your plants if you are abroad on holiday.
- To pour orange juice/ water for breakfast.
- To open/close your room door.
- To switch on/off the water tap.
- To dry/wash plates.

## Step 3

To build your chain reaction, you can use any material that you find around your home. All chain reactions usually involve the following:

- Things to use as building material
- Objects that move and roll
- Ramps and slides – these will help keep your chain reaction moving and will also influence the speed of a rolling object
- Objects of different weights
- Things that can connect everything together such as strings or rubber bands

**Examples of resources that you might find at home include but are not limited to:**

- |                           |                                        |
|---------------------------|----------------------------------------|
| • Cardboard               | • Old toys                             |
| • Shoe boxes              | • Building kits such as Lego           |
| • Cable ties              | • Tinfoil                              |
| • Cups                    | • Ping-pong balls                      |
| • Tape                    | • Domino blocks                        |
| • Scissors                | • Toys with wheels                     |
| • Glue stick              | • Clingfilm                            |
| • Rubber bands            | • Marbles                              |
| • Pieces of pipes         | • Weights such as nuts, bolts, washers |
| • Wooden pegs             |                                        |
| • Wooden pieces           |                                        |
| • Lolly sticks            |                                        |
| • Toilet paper roll tubes |                                        |
| • Plastic water bottles   |                                        |
| • Recycled materials      |                                        |
| • Wooden skewers          |                                        |
| • Books                   |                                        |

For example, for the chain reaction shown in the pictures that follow, wooden pieces, billiard sticks, books, a lemon, and an electric kettle were used to build a chain reaction across the kitchen that would enable the kettle to switch on automatically.







Figure 2: Example of a chain reaction - switching on an electric kettle automatically.

## Step 4

.....

You can make this project as challenging as you want. Here are a few ideas how:

- **Steps:** Decide on the number of steps that your machine needs to have. For example, a creation which has 3 steps might involve a marble rolling down a ramp, dropping on a seesaw, which in turn, catapults an object to a specific bowl; and a creation which has 6 steps might involve walking on soil; toss small pebbles into a bucket; weight of pebbles lowers the bucket causing series of rods; to pump bellows; and blowing soil out of show through exhaust pipe.
- **Time:** Challenge yourself and incorporate ways of how you can slow down moving objects between one step and another to make the chain reaction take longer.
- **Materials:** Be creative and think outside the box – how can different objects be used? How many uses does each object have? What materials would work best? What materials could be resistant to water, wind, or high sunlight intensity?

## Step 5

.....



Follow the design process to plan how to solve a problem of your choosing. Test, re-design, and re-build to fix any problem or challenge that you encounter along the way on a constant basis. Explore the science behind your creation. Your creation should be presented in the form of a video where you explain your masterpiece or a series of photographs together with a short description of your creation.

# Film it and send it to us!

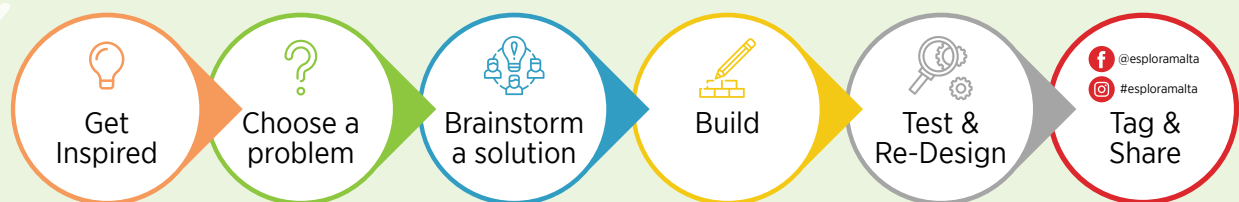
---

Send a short (max. 5 min.) video explaining your chain reaction and the problem it solves to [stemengagement.esplora@esplora.org.mt](mailto:stemengagement.esplora@esplora.org.mt) by 14<sup>th</sup> June 2021.

Please specify whether your chain reaction was built by one child or was a class/school effort.

## How will the projects be evaluated?

---



Submitted chain reaction projects will be evaluated as follows:

- Quality and relevance of the project: 10 points
- Originality and innovativeness of the project: 10 points
- Level of critical thinking, problem-solving skills and engineering applied in the design process: 10 points

**In the event of equal scoring, extra points will be awarded to projects that:**

- Use upcycled or recycled materials

## Prizes for winners classroom/school projects

---

### 1<sup>st</sup> Place (Year 1 – Year 3):

The winning school will receive a total of **€400** voucher from robocoach, for kits to be selected on [digital.com.mt](https://digital.com.mt)

### 1<sup>st</sup> Place (Year 4 – Year 6):

The winning school will receive a total of **€400** voucher from robocoach, for kits to be selected on [digital.com.mt](https://digital.com.mt)

# Individual projects years 1-3

---

## 1<sup>st</sup> Place (Year 1 – Year 3):

The winning individual will receive a total of **€100** voucher from EsploraShop.

## 2<sup>nd</sup> Place (Year 1 – Year 3):

The winning individual will receive a total of **€50** voucher from EsploraShop.

## 3<sup>rd</sup> Place (Year 1 – Year 3):

The winning individual will receive a family Esplora ticket including Planetarium and a **€10** voucher from EsploraShop.

# Individual projects years 4-6

---

## 1<sup>st</sup> Place (Year 4 – Year 6):

The winning individual will receive a total of **€100** voucher from EsploraShop.

## 2<sup>nd</sup> Place (Year 4 – Year 6):

The winning individual will receive a total of **€50** voucher from EsploraShop.

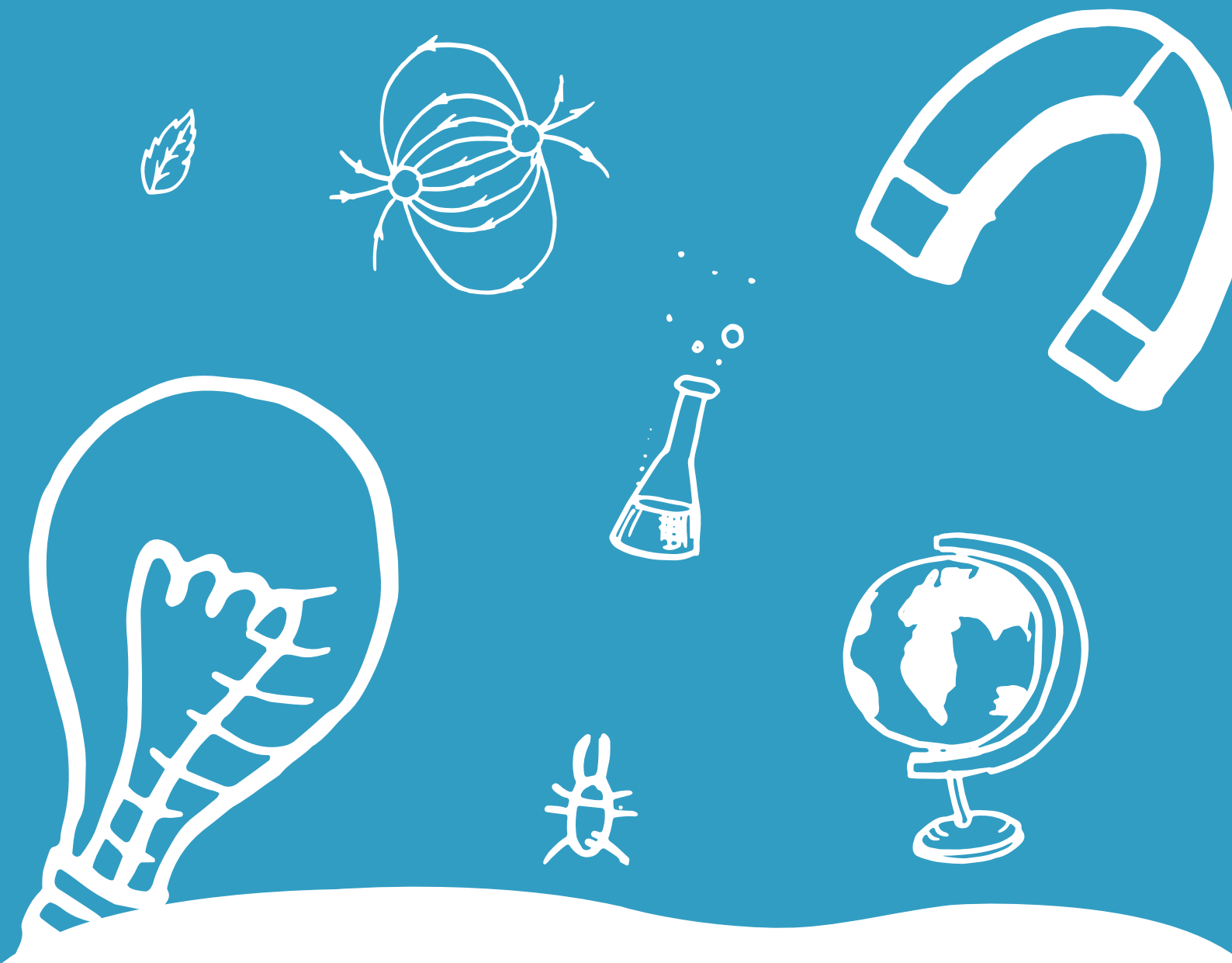
## 3<sup>rd</sup> Place (Year 4 – Year 6):

The winning individual will receive a family Esplora ticket including Planetarium and a **€10** voucher from EsploraShop.

Thank you for taking part in the Let's Build! STEM Challenge proposed by Esplora and robocoach!

# BEST OF LUCK!

**We look forward to seeing you at Esplora!**



Interactive Science Centre, Villa Bighi, Kalkara, Malta  
Tel: (356) 2360 2300 | Email: [info@esplora.org.mt](mailto:info@esplora.org.mt)

[www.esplora.com.mt](http://www.esplora.com.mt)



Esplora Interactive Science Centre was part-financed by ERDF  
Esplora was declared to be an Emblematic Project by the EU Commission