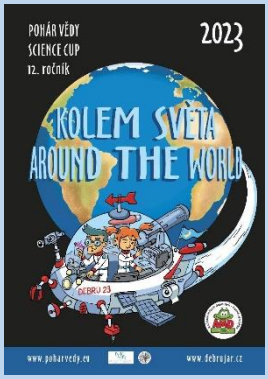
SCIENCE CUP – AROUND THE WORLD 2023



Category 2 – Primary School

2nd round – February – deadline 28th February 23:59

Introduction

Dear competitors, thank you for all the great solutions of the 1st round of the Science Cup - Around the World 2023, the trip to Asia was very successful - we really liked the original fans, the elaborate origami, and the imaginative pictures on your own paper; we were also really excited about the original experiments, observations, and measurements with tea, spices and new materials. We did not expect such a storm of ideas. Now the challenges of the second round await you as we head to the Americas and before you start, get down to business, let's remind the most important information.

Solutions must be submitted no later than 23:59 on the last day of the round.

The solution must be uploaded to your category's Google Classroom by the required deadline as a single PDF file of no more than 10 MB in size. All contents of the file (text, sketches, photographs) must not exceed 3 A4 pages and be easily readable (simple font, minimum font size 11). In case you do not meet the deadline, format or scope of the work, your solution will be penalized with a loss of 20 points.

And finally, ONLY a table or bench of approximately 1 x 1.5 m in size and the surrounding area of 10 cm will be available to the team for their presentation of each round of the competition in the finals. No other space will possible to be used.

We look forward to your solutions for the second round.

Your Science Cup 2023 team - Jít'a H., Katka, Jít'a S., Naďa, and David

1. Creative part (20 %)

In this round of around the world tour, we will take a look at the continent called America. We will visit North and South America and nearby islands.
Find these countries on the map again and find out interesting scientific or technology facts about them. This time, use the information you have found to make a poster full of interesting facts about North and South America. Your poster can not only have pictures and text, but also information stickers, opening windows or anything else you can think of. Of course, take a picture of your poster. If you are promoted to the finals, bring the poster with you.

Photo: Pinterest

2. Experimental part (40 %)

Do you know the story of Christopher Columbus, the discoverer of the American continent? If not, get to know him. You can use, for example, the animated series "Once Upon a Time... The Discoverers" or a nice picture book. Today we know that Columbus was not the first European to sail to America, but he was certainly the first to establish regular trade between America and Europe. Christopher Columbus sailed to the shores of America by ship. Let's explore what most affects a ship's ability to sail and to overcome the rigors of the sea.

Make a functional floating boat that can carry at least a 250 g of load (e.g. a cube of butter). Describe/draw the boat and do the following three tasks with it:
1) Test how resistant your boat is to waves or strong winds. You can also make different boats and compare their buoyancy and resistance. Be sure to let us know everything you find out.
2) Measure what is the largest weight your boat can carry (before it starts taking on water).
3) Equip your boat with a sail and simulate the wind by your blowing into the sail. Try different sail shapes and sizes and tell us which sail can best use the wind energy to move the boat.

Make sure to document all your observations with pictures or photographs and describe your findings to us.

Photo: living.iprima.cz; www.maxikovakuchynka.cz

3. Practical part (40 %)

On the American continent, different units are used to measure lengths. Typical representatives are the units called inch, foot and yard.
Investigate what these words mean in translation and determine the size of such units by measuring them on your own body.

In the unit of your inch, measure the dimensions of the book.
In the unit of your foot, measure the dimensions of a room.
In the unit of your yard, measure the length of a hallway.

Then measure the book, the room, and the hallway with a ruler or tape measure in using common units.

New York City is world famous for its skyscrapers. In 1931, the Empire State Building was built here, which with its 102 floors became the tallest building in the world for 40 years. However, building a skyscraper is not easy. It is not enough to just reinforce the building with a steel structure, also a number of other technical difficulties have to be solved. For example, the building has to be resistant to strong wind, even to hurricanes, it has to withstand earthquakes, and it has to stand on very solid ground so that it does not collapse over time.

For the following task you need 30 rolls of toilet paper. For example, ask your classmates if they could bring you some. If necessary, you can use 30 building blocks instead of the rolls. However beware! In this task, you are only allowed to use the rolls, scissors, a tablecloth/poster/plastic sheet/blanket as a mat and a hair dryer to simulate wind. Glue, tape, or any other material is not allowed!

First, build a tower as tall and stable as possible out of 10 toilet paper rolls. The rolls may be cut and bent, put into each other, but they cannot be reinforced or glued with anything else.
You can check the earthquake stability by placing the tower on a tablecloth or sheet/blanket, which you then try to shake lightly. To check for hurricane stability, try blowing a hair dryer on the tower.

Then build the tallest and most stable tower out of all 30 rolls. Again, check its properties. Take pictures of the tower and describe what you learned from building the small tower and how you used it to build the tall tower.

Can you think of any other technical difficulty we might encounter in building/operating a skyscraper?

Document your experiments with photographs and pictures, and write everything down carefully. We suggest you make research diaries, in which you will write and draw everything. You will not send us the diaries, but if you are promoted to the finals, you will take them with you together with the products from the individual rounds.
But do not forget that in order to be able to judge all your solutions at all, what you send us must not exceed three pages!
We are looking forward to your solutions and see you in the next round!

Describe the solution procedure of each task, the results of your team work, and any additional information, and document them with your own photos.

The solution can be handed in only before the deadline. Only the solutions fulfilling all the requisites given in the propositions will be judged without any point loss.

If you have any questions, you can ask a category consultant in your country:
Czech Republic and Slovakia: Jitka Houfková – jitka.houfkova@gmail.com and Kateřina Vágnerová – Katerina.Vagnerova@seznam.cz
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