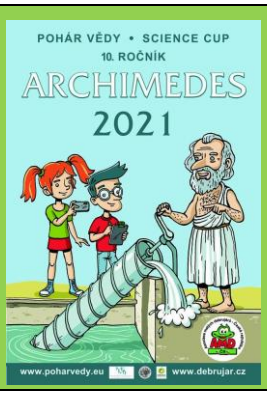
SCIENCE CUP – ARCHIMEDES 2021



Category 1 – Kindergarten and Pre-School

1st round – January – deadline 15. 2. 2021 23:59

Introduction

Dear competitors, welcome in the first round of the 10th year of the Science Cup – ARCHIMEDES 2021. Before you start working, please spend some time on this information on tasks, solutions, and evaluation.

Every month's assignment includes creativity task (40 % of the total evaluation), and practical task (60 %). The solution procedure of individual tasks should be described with your own words and documented with your own photos or pictures.

For assignment solution, you are given 45 days in the first and second round, and 30 days in the third round. The solution must be handed in latest on given deadline day before 23:59, when the assignment is closed.

The solution must be uploaded to the Science Cup web interface in the given period as one file in PDF format, not exceeding 10 MB in size. All the content of the solution (texts, drawings, schemes, photos) cannot exceed 4 pages of A4 paper format, and should be easily readable (simple font, minimal font size 11 pt.).

We can imagine you can write and fill with pictures far more than only four pages. The judges, however, need to have the possibility to read and fairly evaluate all the solutions. Thus, all the solutions that would not meet the given criteria would get, unfortunately, -20 points as penalization. On the contrary, if your solution gets full marks, you can get 40 points for creativity and 60 points for practice. In total, you can reach to 100 points in each of the three rounds of the corresponding part of the competition. Each evaluation consists also from the written feedback, so you know what your strong part was, and what you can improve for the next rounds. For the evaluation, the work of the team, not of the team leader, is crucial.

Now you can start working, good luck with the tasks and enjoy the exploring!

Yours ARCHIMEDES 2021 Team – JíťaS, Katka, JíťaH, Naďa, Andrea, Igor, and David

1. Creativity and idea (40 %)

Archimédes, Photo: https://cs.wikipedia.org

The Greek scholar Archimedes, who gave name to this year's Science Cup, studied a number of different physical phenomena and constructed many different ingenious devices. He also dealt with balance and how to balance things so that they do not fall.

How to balance a pencil on a finger, and what about a wooden spoon?

Take a pen or a marker, and place it horizontally on your finger so that it would not fall. The best place to support the pen can be found by placing the pen on the fingers, each of them supporting the pen on one end. Then move one of the fingers towards the center of the pen – the pen would start leaning. Move the other finger also towards the center of the pen so the pen is horizontal again. Gradually move both the fingers and make sure you keep the pen in a horizontal position. Once your fingers touch each other, you have found the desired place – if you support the pen in this place, you can hold the pen horizontal and it would not fall.

Find the place for the support for a simple pencil or a marker, and also for a pen. Borrow a wooden spoon find the place for the support also for the spoon. Is the place suitable for the support always in the middle of the body? Try to find out what the place for the support depends on. Can you find the place for the support also for a broom? You can try to find the place for support for some additional interesting objects, for example of something that is not long and straight. Make pictures of the supported objects, and also the points where you supported them.

Leaning block tower

Prepare some toy cubes, paper boxes and a modeling clay.

- Prepare the cubes and build a tower in such a manner that you move each of the new cube lightly to the side – the new cube laps over the lower one by one fourth of the cube. Move the cubes to the same side each time. What was the highest tower (from how many cubes on top of each other) you could build?
- Can you build a higher tower (from more cubes on top of each other) by shifting the cubes by various distances (move the cubes again to the same side all the time, and the new cube must lap over the previous one)? How much to the side did you manage to get? Make a picture.
- Instead of cubes, take some paper boxes, for example from tea or matches, and make a similar tower. Can you add the modelling clay into the boxes to be able to build a higher tower, from a higher number of boxes? Try it. Make a picture how you placed the clay into the boxes, how tall was your tower and send us also a picture or a photo of your tower.

2. Practice and project (60 %)

Archimedes investigated floating.

Research again in the kitchen and **explore how various fruits and vegetables** (such as apple, pear, peeled and unpeeled orange, kiwi, grapes, raisin, carrot, tomato …) **float** or do not float **in various liquids** (such as pure water, bubble mineral water, strongly salted water, oil…). Try at least five different things and at least three different fluids.

Always try to guess first what will be the behavior of the object – where would it float, and draw or otherwise record your guess. Then try it and draw the result. Compare if you hit the guesswork.

Answer the following questions and ask your team leader to write us your answers. You can also draw them.

- What did you miss and what did you guess correctly?
- Was there something floating in some liquid in the middle – it did not sink to the bottom or float to the surface?
- What surprised you the most?
- What did you like the most?
- Can you think of anything else to try, whether it floats or not?

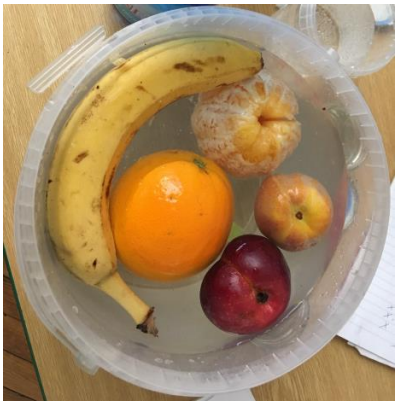


Foto: J. Houfková

Teach an egg to swim

Try to estimate if a raw egg floats in the water and then try it.
Carefully immerse the raw egg into a wider glass with clean lukewarm water.
Carefully add table salt to the water spoon by spoon.
Stir the salt carefully after each addition and then observe what the egg is doing.
How many teaspoons of salt did you add before the egg floated?

Document your experiments with photographs and pictures, or ask your adults to write down important things. We suggest you make research diaries, in which you will write and draw everything. You will not send us the diaries.

But don't forget that in order to be able to judge all your solutions at all, what you send us must not exceed four 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 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: Jitka Houfková – jitka.houfkova@gmail.com and Kateřina Vágnerová – Katerina.Vagnerova@seznam.cz
Turkey: Basriye Öngel – basriye.korkmaz@gmail.com