

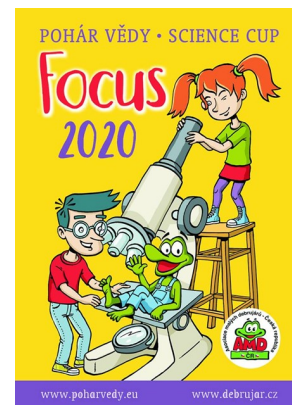
SCIENCE CUP – FOCUS 2020



POHÁR VĚDY SCIENCE CUP

Category 4 – High School

1st round – January – deadline 31. 1. 2020 23:59



Introduction

Dear competitors, welcome in the first round of the already ninth year of the Science Cup – FOCUS 2020. Before you start working, please spend some time on this information on tasks, solutions, and evaluation.

Every month's assignment includes creativity task (20 % of the total evaluation), theory task (30 %), and practical task (50 %). The solution procedure of individual tasks should be described with your own words and documented with your own photos or pictures.

For each assignment solution, there is always one month. The solution must be handed in no later than on the last day of the given month at 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 3 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 three 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, zero points. On the contrary, if your solution gets full marks, you can get 20 points for creativity, 30 points for theory, and 50 points for practice. In total, you can reach to 100 points in each of the four rounds of the corresponding part of the competition. Each evaluation consists also from the written feedback, so you know what was your strong part, and what you can improve for the next rounds. For the evaluation, the work of the team, not of the team leader, is crucial.

And last, but not least, please be aware of one innovation. For your presentation during the final, your team would have ONLY a table or a school desk of approx. 100 x 150 cm in size (exact size will be given in the acceptance letter for the finalists) and the proximate surroundings of 10 cm around the table. You would not be able to use any additional space (walls, notice boards, floor behind the 10-cm radius), so keep this in mind when preparing your products.

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

Yours FOCUS 2020 Team

1. Creativity (20 %)

"FOCUS" in optics, acoustics and mathematics, "FOCUS" as a verb, "FOCUS" in medicine...

Focus on the Science Cup and in the creative section, use the FOCUS as a verb, so focus on your team and its name. We wonder why did you choose the name and we also wonder what your logo would look like. The logo will guide you through the competition.

Design your competition team logo, draw it and take a picture, or design it in your chosen graphics editor. Also tell us how it was created and why.



Logo (from Greek logos = word, speech, law, concept...) is a simple and easy to remember graphic of an organization, company, or institution, in your case a team. The company (team) logo is then featured on various company (team) documents and materials, helping to identify and create brand awareness (image-building).

downloaded from: <https://www.gigsdy.com/jobs/graphics-design/create-logo-design/>

2. Theory and research (30 %)

"FOCUS" in optics, acoustics and mathematics, "FOCUS" as a verb, "FOCUS" in medicine...

- a) Find a practical use of beam concentration to one point using a concave mirror or a positive lens. How is the point called? Draw the situation correctly for either a positive lens or a concave mirror.
- b) Support your considerations with your own designed experiment. Describe, explain, and document your experiment with pictures or photos.
- c) What curvature radius should have a concave spherical mirror if we know that it concentrates the reflected rays to a point 18 cm away from the top of the mirror?
- d) How powerful a positive lens is if we know that the refracted beams concentrate to a point 18 cm behind the lens?

3. Practice and project (50 %)

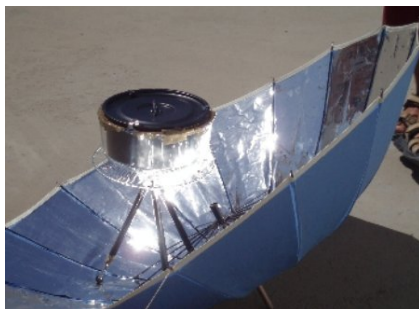
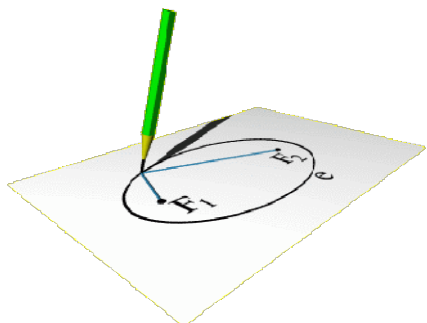
"FOCUS" in optics, acoustics and mathematics, "FOCUS" as a verb, "FOCUS" in medicine...

Focus on the Science Cup and in the practical section introduce "FOCUS" as a noun, either as a mathematical term or as a physical (optical / acoustic term).

Build a physical / mathematical model / product / toy or carry out an experiment in which the focus plays a role.

Describe the material needed and the creation of your product/model/toy/experiment, explain its principles or describe the experiment results, and add also your own photos or pictures.

Since we are the first round of the competition, and there are some beginners among us, here are some tips on experiments, models, products, or toys for your inspiration: constructing various ellipses using their foci and a string, water lenses, lenses made of drinking glasses, mysterious inscriptions or images, spreading sound from the focus, solar furnace and so on.



Picture: 1 <http://mdg.vsb.cz>, 2 <https://www.shtfpreparedness.com/diy-how-to-build-your-own-umbrella-solar-cooker>, 3 <https://www.dpchallenge.com>

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.

If you have any questions, you can ask a category consultant in your country:

Czech Republic and Slovakia: Jitka Soukupová – jitule.sk@seznam.cz and Naďa Ziková – zikova@icpf.cas.cz

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