

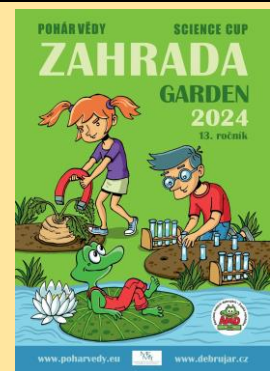
SCIENCE CUP – GARDEN 2024



POHÁR VĚDY SCIENCE CUP

Category 2 – Primary School

1st round – January – deadline 15. 2. 2024 23:59



Úvodní informace

Dear competitors,

Welcome to the first round of the 13th Science Cup - GARDEN 2024. Before you start with your work, please take a few minutes to learn about the tasks, their solutions and evaluation.

The assignments for the corresponding rounds for each month (January, February, and March) include tasks in three areas - Creative part (assessed 20%), Experimental part (assessed 40%), and Practical part (assessed 40%). Describe the solution procedure of each task using your own words, and document them with your pictures or photos.

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

The solution must be uploaded to the system on the competition website by the deadline in the form of a single PDF file of maximum 10 MB in size. All contents of the file (text, sketches, photos) must not exceed 3 A4 pages and must be easy to read (simple font, minimum font size 11).

We know you would be able to fill far more than three pages. However, we must also ensure that the evaluators are able to go through all the solutions and give them a fair evaluation. Therefore, we will - albeit reluctantly - penalize solutions that do not meet all these requirements with a loss of 20 points.

On the other hand, for a complete solution you can get 20 points from the evaluators for the Creative part, 40 points for the Experimental part and 40 points for the Practical part. In total, therefore, you can earn up to 100 points for each of the three rounds of the basic correspondence part of the competition between January and March. Each evaluation includes verbal feedback on what you did well or what you can improve for next time. The team members' own work, not the leader's, is essential for the evaluation.

And now you can get to work, we wish you not only success, but also a lot of fun.

Your Science Cup 2024 team

1. Kreativní část (20 %)

The theme of this year's Science Cup is The Garden. The pride of various gardens and parks are mazes and labyrinths.

A maze is a large, complex structure designed to make it difficult to find your way out of it. Sometimes a maze is distinguished as having branching paths with multiple possible routes to choose from, while a labyrinth contains only a single path to its center. Labyrinths can be realized physically, for example from hedges in a castle garden, or symbolically.

Zdroj: <https://cs.wikipedia.org/wiki/Labyrint>



Design and create a maze or labyrinth from natural materials. The maze/labyrinth must be large enough for you to walk through. Take photos of your drawn plans and give a brief description. What materials do you plan to use? Where will you build the maze/labyrinth? Take a picture of the maze you have created. What of your plans did you manage to implement? What was a problem and why? Measure how big your maze/labyrinth is and how long is the shortest path that goes through it. Figure out a way to measure this as accurately as possible.

2. Experimental part (40 %)

Water is important for plant growth. But how does it get from the roots to the tops of the plants? It's because of capillarity. You'll be familiar with the experiment of paper flowers that bloom when placed on water. Cut a flower out of paper and carefully fold the petals over the centre. Caution: only press the fold with the pads of your fingers! If we squeeze or fold it too much, the cellulose fibres in the paper will break, the water will have no way to esmove through and the flower will not open. Place the folded flower on the water, petals up.



Photo: J. Houfková

1. Test how the speed of opening a flower depends on the type of paper it is made of. Try at least four different types of paper (hard, soft, cardboard, cloth, filter, baking ...). Make sure that all the flowers are the same shape and size. What else can affect the speed of flower opening?
2. Test how water rises through strings made of different materials. Suggest how to compare the rise of water as accurately as possible according to the type of string and try at least four types of strings made of different materials (lycra, jute, sisal, paper tissue, cotton, wool, ...). Make sure that your testing takes place in the same conditions. Describe your testing procedure and results.
3. Make a multi-layered blooming flower (insert the flowers one inside the other and glue their centres together) and test how it blooms.

- Cover the undersides of the petals of the lowest flower with wax (just paint with wax pencil) so that the flower does not absorb water through them. Test that you have waxed the petals thoroughly and that the flower does not bloom.
- Now add a root to the multilayered waxed flower - pull a string from the material through which water rises best, through the centre of the flower, make a knot at the top or twist it and glue it to the centre of the flower from above. Test to see if the flower will now bloom.

3. Practical part (40 %)

Gardens and fields sleep in winter. But many of their crops can be stored and enjoyed throughout the winter. Carrots, for example. And they will play a major role in your next experimenting.

- Think of everything you can measure on and with the carrot. Write us your ideas. Test and describe at least five of your ideas and take pictures and tell us how you did.
- Devise an experiment, physical or chemical, in which you use carrots. Describe what tools you needed for the experiment, the procedure for carrying it out and try to explain the experiment.



<https://pxhere.com/cs/photo/975812>

Long-term observation

Task that you will HAND IN in the FEBRUARY round

What influences seed sprouting

Because seed sprouting can sometimes be difficult and you may not be able to complete this task in one month, we are assigning it now, but you will have to report the results to us in the next round of the competition in February.

Ethylene, one of the airborne plant hormones, affects the ripening of plant fruits, but also the growth of seedlings. And it is its effect that you will observe in this long-term assignment. You will use an apple as a source of ethylene for your experiments, from which ethylene is released into the air as it ripens. You may have heard of the apple being used, for example, when we want a fruit or vegetable to ripen faster. We will explore how the apple affects the sprouting of seeds.

Materials: 2 mason jars, a smaller apple (to fit the whole apple into the jar), 2 yoghurt cups (must be small enough to fit into the jar), cling film, duct tape, scissors, paper or newspaper, water, some soil (approx. 1 yoghurt cup), watercress seeds (or other fast sprouting plants)

- Prepare both glasses and the apple. Make a ball from crumpled paper or newspaper similar in size to the apple, moisten it with water and wrap it loosely in foil. Place the apple in the bottom of one of the jars and the ball in the other.
- Think about why it is appropriate to put a ball of moistened paper and foil in a jar without an apple when doing this experiment and write down your ideas.

3. Cut/cut both cups about 2 cm above the bottom to make a bowl. Fill the cups with soil, which you moisten and sow 10-20 watercress seeds (or another plant that germinates quickly) in each cup.
4. Place one of the cups in each jar (place them on top of the apple/sphere) and cover the necks of the jars with foil and tape them with duct tape. The jars must be tightly sealed.
5. Place the jars in a window (so that the germinating plants have enough light). Leave them in place for at least 14 days. You can watch the seeds germinate continuously. Do not open the jars during the experiment.
6. Make a note of how you expect your experiment to turn out. Do you expect the plants in each jar to be different? If so, how?
7. After 14 days, if the plants have already sprouted (if not, you can wait a few more days or try again with different seeds), take the cups out of the jars and examine the plants carefully. How big are they? How are the plants in the apple jar and the paper ball jar different? Carefully document the differences - both photographically, verbally and numerically. Do your findings differ from your expectations? If so, in what ways?
8. Try looking up in encyclopaedias or on the internet what effect ethylene has on germinating plants and compare your observations with the information you have found. Describe what you think has happened in each of the jars over the past 14 days.



Photo: L. H. Houfková

Credits: Thanks to L. H. Houfková and the Golden Leaf competition for the photo and inspiration. If you are interested in similar challenges, check out <https://zlatylist.cz/>.

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.

Remember, however, that in order for us to be able to evaluate all your solutions, 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 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, see poharvedy.eu for contacts.