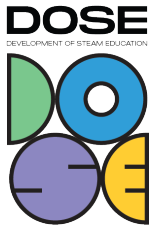**TEMPLATE for BEST PRACTICE EXAMPLES - SOLVED TASK**
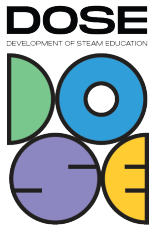
1. Name of the task:
    3D Printed Reflective Telescope

2. Why did you choose this task?
    To take photographs of the moon and large planets

3. Subjects covered from STEAM areas:
    astrophotography, microcontrollers, 3d design, 2d design

4. Target group (age range and size of the group):
    14-16

5. Duration of the activity:
    50 hours

6. Key words:
    telescope, 3d printed, Newtonian telescope, reflective telescope, Pikon, diy telescope, raspberry pi telescope

7. Key sentence describing context of the activity, followed by short description (200 words):

    We've chosen to recreate open-source project "PIKON" founded and developed by UK based physicist Mark Wrigley. The Idea of this project is to create a 3d printed telescope with inexpensive everyday materials to take photographs of the moon and large planets. It is Newtonian based construction which consist of a pipe with spherical mirror mounted on the bottom. The light enters the tube from the open hole in the top and bounces back from the mirror and directs it to the viewfinder which in our case is video camera along with raspberry Pi microcontroller. With a completed Pikon telescope we can take photographs of the night sky and learn principles of astrophotography.

    To achieve this goal we have learned:

    1. fundamentals of photography.
    2. basic linux bash commands.
    3. the basics of microcontrollers.
    4. implement physical buttons for RasberiPi (basic Python commands).
    5. working principles of a reflective telescope.
    6. how estimate the focal length of the telescope mirror (fundamentals of optics).
    7. modeling of our own 3 dimensional parts with tool like Tinkercad

During the project we've contacted Mark Wrigley discussed technical issues and possible developents for our future experiments

8. Description of the activity environment, including the list of materials and tools needed: classroom, home, raspberry pi with camera, 3d printer, section of air ventilation tube, balsa wood, laser cutter, Inkscape, Tinkercad

9. Step by step, detailed description of the activity, including teaching and learning strategies:
- Learn telescope building.
- Learn microcontrollers – raspberry pi with camera.
- Learn 3d printing.
- Learn basic workshop tools – we had to cut the air ventilation tube to length.

10. Learning objectives/competencies:
    design and build a physical object, python programming language, take photographs of distant objects

11. Evaluation/Assessment guidelines:
    a good photograph of the Moon

12. Lessons learned:
    design and build a physical object, python programming language, take photographs of distant objects

13. Additional information/Links:
    https://elektric-works.com/disruption/

14. Contact person: Deimantė Januškauskaitė deimante.januskauskaitė@putinugimnazija.lt