

Chemistry, Space, Innovation

(Book of Problems, Questions/Answers, 50 tasks)

All time values in Book of Problems are indicated as UTC (Coordinated Universal Time)

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**Foreword**

During last few years in various countries there were a great variety of attempts to increase young people’s motivation to choose space related education and industry as a career. Some Space countries such as EU (incl. ESA and National Space agencies), USA (incl. NASA) and India (incl. ISRO) basically solves it trying to implement STEM (Science, Technology, Engineering & Mathematics) in their educational processes.

Increasing of pupils interest in STEM disciplines is daunting challenge. In nowadays STEM careers are not particularly attractive to young people and a number who are deciding to choose STEM-related studies and careers is low. For example, in 2011 in Europe 40% of schoolboys and 14% of schoolgirls opted for a study in the fields of STEM. In 2014 according to the U.S. Department of Education only 16 % of school pupils were interested in a STEM career.

ESA seeks to remain an independent, world-class intergovernmental space organisation. During the Meeting of Ministers of ESA member countries held on December 02, 2014in Luxemburg it was underlined that future international space exploration Mission must be driven few overarching strategic objectives. One of them might be “An Inspirational dimension” wich attracts society, and in particular young generations to expand the limits of our knowledge, to the study of natural sciences and engineering, to the values of global cooperation in space, and to the preparation of sustainable human presence in the solar system beyond Earth. Since 2005 ESA is contributing to reverse negative trend through its European Space Education Resource Office (ESERO). In 2014 India‘s non-governmental organization „Educare“ working in the field of STEM started highly emerging concept amongst young generation – the Space Olympiad. India in 2017 will host the first International Space Olympiad for 5-12 grades. Similar activities has started in USA. United States Alliance for Technological Literacy (USATL) in 2012 and 2014 organized „STEM TECH Olympiads“ where pupils competed in robotics, programming and many other technological challenges. Hereinabove described STEM-situation in case of Lithuania is far more complicated. In World Economic Forum report „The Capital Report“ (2013) Lithuania was allocated at 87 position (out of 122) depending on wether the country is easy to find suitably qualified employess. In STEM are interested only 1/3 of Lithuanian pupils, the studies in STEM sciences are selecting only 1/6, but their learning achievements are lower than OECD average. Government of Lithuania on September 17, 2014 confirmed the “Investement stimulation and Industrial development for 2014 - 2020” programme and partly is stating in it „that STEM sciences are dificult to pupils, incomprehensible their application in life. It is necessary to amend the nature of subject teaching in schools, teacher qualifications and skills to teach these subjects in an attractive, understandable manner. As well in the learning process must be actively involved business, museums, vocational, higher education institutions and other representatives to familiarize pupils with the practical application of the aforementioned things. It is further claimed that „the educational institutions should be particularly flexible changing supply of programs, updating the content of training programs for specialists and the necessary infrastructure accordingly, working more closely with the business community“.

In 2016 the activities in STEM-oriented disciplines in Lithuania visibly increased. Only the conference organized by Education Development Center was attended by over 20 representatives from different schools. The event took part under the project „MARCH“ (Make Science Real in Schools) from European Commission‘s „International Lifelong Learning Program“.

Currently Lithuania is involved in ESA Space activities via PECS (Plan for European Cooperating States) and ready to obtain a full member status of ESA in 2020. Will exist the right human resources here for something to create?

 It is impossible not to notice, that changes taking place in the world, which must affect the pupils education system. Space theme directly affects all of our lives. Technologies and the habits of their use are changing, emerges new areas of space business. There are already 3D geography of Moon and Mars (*Google Moon, Google Mars*), even exist the computer 3D map of Universe (*Google Sky*). Sunny weather forecast or use of Lunar gravity during distant space missions become compulsory routines. Intensive preparation for flights to the Moon and Mars, even minint of asteroids. At the end of the year 2016 was launched the European satellite navigation system „Galileo“, which since very begining is identified as a new and significant stage of digital revolution. The European Council of Ministers approved a new program „Space 4.0“ (*inform, inspire, interact, innovate*) and allocated huge funding for Space research.

STEM expansion as itself is slow process at National and PanEuropean levels. It is not easy to create new educational programs, even harder to adopt and implement. Partly for this aim could serve basic space science and technology knowledge. Best life example of use of STEM-oriented discipline‘s knowledge mixed with fiction impurity could be the movie „Martian“ from the year 2015. By the way, the filmmakers, who were advised by NASA specialists, have earned 630 millions USD, what is sufficient to organize modern interplanetary mission.

In Europe yearly thousands a of pupils participates in Urban, Regional and National Science Olympiads. Each country yearly sends tens of pupils to the International Science Olympiads. Their abilities are quite higher than country‘s medium, part of them are even participating in more than one olympiad at national level.

In 2015 the Lithuanian Innovation centre was able to get the European Space Agency funding for project, which allows to prepare the exercise books (Books of Problems) and methodological material for pupils education. Ongoing ESA-funded project „SPACEOLYMP“ will develop 7 (seven) Books of Problems (mathematics, physics, chemistry, informatics, biologų, astronomy, geography), designed for more able pupils seeking for new knowledge. Created downloadable virtual books will increase pupils‘ motivation to choose a career in space science and industry. „SPACEOLYMP“ activities addresses very specific niche education market – innovative space-knowledge formation among participants of National and International Science Olympiads as well for their teachers. Proposed methodology will bring long-term benefits to rising Lithuanian space industry in its participation in space activities and will foster strong realations between national business, education and research institutions. Space theme horizontally covers almost all fields of science, even more, space = innovation.

The Lithuanian space history (it has not yet written) is unique, but a Lithuanian online dictionary wikipedia is „blind and deaf“. Hundreds of Lithuanian-Americans have participated in the development of the US Space science and industry, patente over 2000 inventions, have written several thousand scientific articles. In 2019 the World will celebrate 50 year anniversary of Human landing on the Moon. In the US „Apollo“ program have worked the scientists and engineers of Lithuanian origin. In 2014 in space around Earth Lithuania was carrying two smals satellites. In 2017 the first Lithuania‘s space business oriented company „Nanoavionics“ will launch the third satellite of Lithuanian origin. The young generation of scientists, engineers and managers are constructing special equipment for Lunar Mission, during which the plant should be grown from the seed. The most famous lithuanian‘s achievements will be included in the descriptive part of the problems or into the questions of Book of Problems.

In all the Books of Problems after each grade‘s tasks, the specially selected links will be embedded and will mark calendar days of the year (in English). The pupils and teachers will know that each calendar day of the year has its own space history, will understand how many countires together explore the space, how and for what purposes the spacecrafts are launched. For example, the 12th of November could be considered as unique Day in all space history. On this day in 2005 Japan landed the probe on the asteroid‘s surface, and in 2014 ESA landed the probe on the comet‘s surface. Pictures inserted in the texts of Problems will enhance the imagination of pupils and improve the level of understanding of the Problem. For mathematicians the space theme will revitalize the problems, and advantage would be very precise time use, astronomical nubers, koordinates and orbits, a variety of different forms of volume and surface area calculations, projections, sections and etc. For informatics the space theme will benefit a knowledge-based search, use of various databases an so on. Launch of spacecrafts or remote control of space robots demands additional programming skills. Especially popular has become programming for so-called „Cubesat“ satellites. Even smart phones already flew in space, which are considered the first personal satellite prototypes. Within the framework of project there are designed database of Lithuanian pupils who participated at Science Olympiads, as well as the database of achievements of 8 space leading countries. Separately in the project „SPACEOLYMP“ were developed and prepared templates of Books of Problems (Lithuanian and English versions), that are designed so that they could be filled by pupils with the help of teachers. In this way created Books of Problems could meet the current or targeted knowledge background depending on specific discipline, class or school level.

After reading at least all of the preambles of Problems (350 in total) created during project „SPACEOLYMP“ the pupils will be able to feel like amateur Space experts. For teachers it could facilitate their creative work, because the descriptive parts of Problems are interesting and informative. Challenges of solving Problems by pupils could lend credence to the reality, not the fictious „reality“.



**Grade 8**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Telescope | Moon |  | Radiation | JAXA | Period |  | Astronomy | STEM |
| Astronaut | Mars |  | Wave | CNSA | Angle |  | Geography |
| Robot | Planet |  | Magnetism | ISRO | Coordinate |  | Mathematics |
| Rocket | Sun |  | Temperature | CNES | Trajectory |  | Physics |
| Shuttle | Comet |  | Mass | DLR | Distance |  | Informatics |
| ISS | Asteroide |  | Gravity | CNES | Velocity |  | Biology |
| Cubesat | Meteorite |  | Atmosphere | DLR | Time |  | Astronomy |
| Satellite | Earth |  | Frequency | NASA | Period |  | Geography |
| Rover | Moon |  | Radiation | ESA | Angle |  | Mathematics |
| Probe | Mars |  | Wave | Roscosmos | Coordinate |  | Physics  |



C-8.1 – **Problem No. 1**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | radioactive_sign_u2622_icon_256x256 |  |  |  |  |
| Telescope | Moon |  | Radiation | JAXA | Period |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A81)**):**

**Write the text of question in bold font.**

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C-8.2 – **Problem No. 2**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| astronaut.jpg |  |  |  |  |  |  |  |
| Astronaut | Mars |  | Wave | CNSA | Angle |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A82)**):**

**Write the text of question in bold font.**

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C-8.3 –**Problem No. 3**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | https://cdn2.iconfinder.com/data/icons/windows-8-metro-style/128/math.png |
| Robot | Planet |  | Magnetism | ISRO | Coordinate |  | Mathematics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A83)**):**

**Write the text of question in bold font.**



C-8.4 – **Problem No. 4**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Rocket | Sun |  | Temperature | CNES | Trajectory |  | Physics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A84)**):**

**Write the text of question in bold font.**



C-8.5 – **Problem No. 5**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Shuttle.jpg |  |  |  |  |  |  |  |
| Shuttle | Comet |  | Mass | DLR | Distance |  | Informatics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A85)**):**

**Write the text of question in bold font.**



C-8.6 – **Problem No. 6**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ISS.jpg |  |  |  |  |  |  |  |
| ISS | Asteroide |  | Gravity | CNES | Velocity |  | Biology |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A86)**):**

**Write the text of question in bold font.**



C-8.7 – **Problem No. 7**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| cubesat |  |  |  |  |  |  |  |
| Cubesat | Meteorite |  | Atmosphere | DLR | Time |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A87)**):**

**Write the text of question in bold font.**



C-8.8 – **Problem No. 8**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Satellite.jpg |  |  |  |  |  |  |  |
| Satellite | Earth |  | Frequency | NASA | Period |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A88)**):**

**Write the text of question in bold font.**



C-8.9 – **Problem No. 9**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rover.jpg |  |  | radioactive_sign_u2622_icon_256x256 |  |  |  |  |
| Rover | Moon |  | Radiation | ESA | Angle |  | Mathematics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A89)**):**

**Write the text of question in bold font.**

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C-8.10 – **Problem No. 10**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Probe.jpg |  |  |  |  |  |  |  |
| Probe | Mars |  | Wave | Roscosmos | Coordinate |  | Physics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A810)**):**

**Write the text of question in bold font.**

**Space calendar** <http://www.spacecalendar.com> <http://spaceflightnow.com/launch-schedule/>

January 26 (YEAR)

<http://www.astronautix.com/j/january26.html>

Write very brief message about space-related event of this day in history, specify a year.

March 18 (1962)

<http://www.astronautix.com/m/march18.html>

<https://en.wikipedia.org/wiki/Alexey_Leonov>

First ever human outside the spacecraft in space.

March 20 (YEAR)

<http://www.astronautix.com/m/march20.html>

Write very brief message about space-related event of this day in history, specify a year.

May 9 (YEAR)

<http://www.astronautix.com/m/may09.html>

Write very brief message about space-related event of this day in history, specify a year.

May 11 (YEAR)

<http://www.astronautix.com/m/may11.html>

Write very brief message about space-related event of this day in history, specify a year.

June 30 (YEAR)

<http://www.astronautix.com/j/june30.html>

Write very brief message about space-related event of this day in history, specify a year.

July 2 (YEAR)

<http://www.astronautix.com/j/july02.html>

Write very brief message about space-related event of this day in history, specify a year.

August 23 (YEAR)

<http://www.astronautix.com/a/august23.html>

Write very brief message about space-related event of this day in history, specify a year.

October 14 (YEAR)

<http://www.astronautix.com/o/october14.html>

Write very brief message about space-related event of this day in history, specify a year.

December 5 (YEAR)

<http://www.astronautix.com/d/december05.html>

Write very brief message about space-related event of this day in history, specify a year.



**Grade 9**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Telescope | Planet |  | Magnetism | NASA | Trajectory |  | Informatics | STEM |
| Astronaut | Sun |  | Temperature | ESA | Orbit |  | Biology |
| Robot | Comet |  | Mass | Roscosmos | Velocity |  | Astronomy |
| Rocket | Asteroide |  | Gravity | JAXA | Time |  | Geography |
| Shuttle | Meteorite |  | Atmosphere | CNSA | Period |  | Mathematics |
| ISS | Earth |  | Frequency | ISRO | Angle |  | Physics |
| Cubesat | Moon |  | Radiation | CNES | Coordinate |  | Informatics |
| Satellite | Mars |  | Wave | DLR | Trajectory |  | Biology |
| Rover | Planet |  | Magnetism | DLR | Orbit |  | Astronomy |
| Probe | Sun |  | Temperature | NASA | Distance |  | Geography |



C-9.1 – **Problem No. 11**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Telescope | Planet |  | Magnetism | NASA | Trajectory |  | Informatics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A91)**):**

**Write the text of question in bold font.**



C-9.2 – **Problem No. 12**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| astronaut.jpg |  |  |  |  |  |  |  |
| Astronaut | Sun |  | Temperature | ESA | Orbit |  | Biology |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A92)**):**

**Write the text of question in bold font.**



C-9.3 – **Problem No. 13**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Robot | Comet |  | Mass | Roscosmos | Velocity |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A93)**):**

**Write the text of question in bold font.**



C-9.4 – **Problem No. 14**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Rocket | Asteroide |  | Gravity | JAXA | Time |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A94)**):**

**Write the text of question in bold font.**



C-9.5 – **Problem No. 15**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Shuttle.jpg |  |  |  |  |  |  |  |
| Shuttle | Meteorite |  | Atmosphere | CNSA | Period |  | Mathematics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A95)**):**

**Write the text of question in bold font.**



C-9.6 – **Problem No. 16**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ISS.jpg |  |  |  |  |  |  |  |
| ISS | Earth |  | Frequency | ISRO | Angle |  | Physics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A96)**):**

**Write the text of question in bold font.**



C-9.7 – **Problem No. 17**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| cubesat |  |  | radioactive_sign_u2622_icon_256x256 |  |  |  |  |
| Cubesat | Moon |  | Radiation | CNES | Coordinate |  | Informatics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A97)**):**

**Write the text of question in bold font.**



C-9.8 – **Problem No. 18**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Satellite.jpg |  |  |  |  |  |  |  |
| Satellite | Mars |  | Wave | DLR | Trajectory |  | Biology |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A98)**):**

**Write the text of question in bold font.**



C-9.9 – **Problem No. 19**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rover.jpg |  |  |  |  |  |  |  |
| Rover | Planet |  | Magnetism | DLR | Orbit |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A99)**):**

**Write the text of question in bold font.**



C-9.10 – **Problem No. 20**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Probe.jpg |  |  |  |  |  |  |  |
| Probe | Sun |  | Temperature | NASA | Distance |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A910)**):**

**Write the text of question in bold font.**

**Space calendar** <http://www.spacecalendar.com> <http://spaceflightnow.com/launch-schedule/>

January 24 (YEAR)

<http://www.astronautix.com/j/january24.html>

Write very brief message about space-related event of this day in history, specify a year.

March 16 (YEAR)

<http://www.astronautix.com/m/march16.html>

Write very brief message about space-related event of this day in history, specify a year.

May 7 (YEAR)

<http://www.astronautix.com/m/may07.html>

Write very brief message about space-related event of this day in history, specify a year.

June 28 (YEAR)

<http://www.astronautix.com/j/june28.html>

Write very brief message about space-related event of this day in history, specify a year.

August 19 (1960)

<http://www.astronautix.com/a/august19.html>

<https://en.wikipedia.org/wiki/Animals_in_space>

First ever animals launched into space (successfully returned).

August 21 (YEAR)

<http://www.astronautix.com/a/august21.html>

Write very brief message about space-related event of this day in history, specify a year.

October 10 (YEAR)

<http://www.astronautix.com/o/october10.html>

Write very brief message about space-related event of this day in history, specify a year.

October 12 (YEAR)

<http://www.astronautix.com/o/october12.html>

Write very brief message about space-related event of this day in history, specify a year.

December 1 (YEAR)

<http://www.astronautix.com/d/december01.html>

Write very brief message about space-related event of this day in history, specify a year.

December 3 (YEAR)

<http://www.astronautix.com/d/december03.html>

Write very brief message about space-related event of this day in history, specify a year.



**Grade 10**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Telescope | Comet |  | Gravity | ESA | Time |  | Mathematics | STEM |
| Astronaut | Planet |  | Atmosphere | Roscosmos | Period |  | Physics |
| Robot | Sun |  | Frequency | JAXA | Angle |  | Informatics |
| Rocket | Comet |  | Radiation | NASA | Coordinate |  | Biology |
| Shuttle | Asteroide |  | Wave | ESA | Trajectory |  | Astronomy |
| ISS | Meteorite |  | Magnetism | Roscosmos | Orbit |  | Geography |
| Cubesat | Earth |  | Temperature | JAXA | Distance |  | Mathematics |
| Satellite | Moon |  | Mass | CNSA | Velocity |  | Physics |
| Rover | Mars |  | Gravity | ISRO | Period |  | Informatics |
| Probe | Planet |  | Atmosphere | CNES | Angle |  | Biology |



C-10.1 – **Problem No. 21**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Telescope | Comet |  | Gravity | ESA | Time |  | Mathematics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A101)**):**

**Write the text of question in bold font.**

****

C-10.2 – **Problem No. 22**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| astronaut.jpg |  |  |  |  |  |  |  |
| Astronaut | Planet |  | Atmosphere | Roscosmos | Period |  | Physics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A102)**):**

**Write the text of question in bold font.**

****

C-10.3 – **Problem No. 23**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Robot | Sun |  | Frequency | JAXA | Angle |  | Informatics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A103)**):**

**Write the text of question in bold font.**

****

C-10.4 – **Problem No. 24**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | radioactive_sign_u2622_icon_256x256 |  |  |  |  |
| Rocket | Comet |  | Radiation | NASA | Coordinate |  | Biology |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A104)**):**

**Write the text of question in bold font.**

****

C-10.5 – **Problem No. 25**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Shuttle.jpg |  |  |  |  |  |  |  |
| Shuttle | Asteroide |  | Wave | ESA | Trajectory |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A105)**):**

**Write the text of question in bold font.**

****

C-10.6 – **Problem No. 26**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ISS.jpg |  |  |  |  |  |  |  |
| ISS | Meteorite |  | Magnetism | Roscosmos | Orbit |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A106)**):**

**Write the text of question in bold font.**

****

C-10.7 – **Problem No. 27**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| cubesat |  |  |  |  |  |  |  |
| Cubesat | Earth |  | Temperature | JAXA | Distance |  | Mathematics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A107)**):**

**Write the text of question in bold font.**



C-10.8 – **Problem No. 28**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Satellite.jpg |  |  |  |  |  |  |  |
| Satellite | Moon |  | Mass | CNSA | Velocity |  | Physics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A108)**):**

**Write the text of question in bold font.**

****

C-10.9 – **Problem No. 29**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rover.jpg |  |  |  |  |  |  |  |
| Rover | Mars |  | Gravity | ISRO | Period |  | Informatics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A109)**):**

**Write the text of question in bold font.**



C-10.10 – **Problem No. 30**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Probe.jpg |  |  |  |  |  |  |  |
| Probe | Planet |  | Atmosphere | CNES | Angle |  | Biology |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A110)**):**

**Write the text of question in bold font.**

**Space calendar** <http://www.spacecalendar.com> <http://spaceflightnow.com/launch-schedule/>

January 20 (YEAR)

<http://www.astronautix.com/j/january20.html>

Write very brief message about space-related event of this day in history, specify a year.

January 22 (YEAR)

<http://www.astronautix.com/j/january22.html>

Write very brief message about space-related event of this day in history, specify a year.

March 12 (YEAR)

<http://www.astronautix.com/m/march12.html>

Write very brief message about space-related event of this day in history, specify a year.

March 14 (YEAR)

<http://www.astronautix.com/m/march14.html>

Write very brief message about space-related event of this day in history, specify a year.

May 3 (YEAR)

<http://www.astronautix.com/m/may03.html>

Write very brief message about space-related event of this day in history, specify a year.

May 5 (YEAR)

<http://www.astronautix.com/m/may05.html>

Write very brief message about space-related event of this day in history, specify a year.

June 26 (YEAR)

<http://www.astronautix.com/j/june26.html>

Write very brief message about space-related event of this day in history, specify a year.

August 17 (YEAR)

<http://www.astronautix.com/a/august17.html>

Write very brief message about space-related event of this day in history, specify a year.

October 8 (YEAR)

<http://www.astronautix.com/0/october08.html>

Write very brief message about space-related event of this day in history, specify a year.

November 29 (YEAR)

<http://www.astronautix.com/n/november29.html>

Write very brief message about space-related event of this day in history, specify a year.



**Grade 11**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Telescope | Sun |  | Frequency | DLR | Coordinate |  | Astronomy | STEM |
| Astronaut | Comet |  | Radiation | NASA | Trajectory |  | Geography |
| Robot | Planet |  | Wave | ESA | Orbit |  | Mathematics |
| Rocket | Sun |  | Magnetism | Roscosmos | Distance |  | Physics |
| Shuttle | Comet |  | Temperature | JAXA | Velocity |  | Informatics |
| ISS | Asteroide |  | Mass | CNSA | Time |  | Biology |
| Cubesat | Meteorite |  | Gravity | NASA | Coordinate |  | Astronomy |
| Satellite | Earth |  | Atmosphere | ESA | Trajectory |  | Geography |
| Rover | Moon |  | Frequency | Roscosmos | Orbit |  | Mathematics |
| Probe | Mars |  | Radiation | JAXA | Distance |  | Physics |



C-11.1 – **Problem No. 31**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Telescope | Sun |  | Frequency | DLR | Coordinate |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A111)**):**

**Write the text of question in bold font.**



C-11.2 – **Problem No. 32**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| astronaut.jpg |  |  | radioactive_sign_u2622_icon_256x256 |  |  |  |  |
| Astronaut | Comet |  | Radiation | NASA | Trajectory |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A112)**):**

**Write the text of question in bold font.**



C-11.3 – **Problem No. 33**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Robot | Planet |  | Wave | ESA | Orbit |  | Mathematics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A113)**):**

**Write the text of question in bold font.**



C-11.4 – **Problem No. 34**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Rocket | Sun |  | Magnetism | Roscosmos | Distance |  | Physics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A114)**):**

**Write the text of question in bold font.**



C-11.5 – **Problem No. 35**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Shuttle.jpg |  |  |  |  |  |  |  |
| Shuttle | Comet |  | Temperature | JAXA | Velocity |  | Informatics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A115)**):**

**Write the text of question in bold font.**



C-11.6 – **Problem No. 36**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ISS.jpg |  |  |  |  |  |  |  |
| ISS | Asteroide |  | Mass | CNSA | Time |  | Biology |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A116)**):**

**Write the text of question in bold font.**



C-11.7 – **Problem No. 37**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| cubesat |  |  |  |  |  |  |  |
| Cubesat | Meteorite |  | Gravity | NASA | Coordinate |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A117)**):**

**Write the text of question in bold font.**

****

C-11.8 – **Problem No. 38**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Satellite.jpg |  |  |  |  |  |  |  |
| Satellite | Earth |  | Atmosphere | ESA | Trajectory |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A118)**):**

**Write the text of question in bold font.**



C-11.9 – **Problem No. 39**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rover.jpg |  |  |  |  |  |  |  |
| Rover | Moon |  | Frequency | Roscosmos | Orbit |  | Mathematics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A119)**):**

**Write the text of question in bold font.**



C-11.10 – **Problem No. 40**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Probe.jpg |  |  | radioactive_sign_u2622_icon_256x256 |  |  |  |  |
| Probe | Mars |  | Radiation | JAXA | Distance |  | Physics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A1110)**):**

**Write the text of question in bold font.**

**Space calendar** <http://www.spacecalendar.com> <http://spaceflightnow.com/launch-schedule/>

January 18 (YEAR)

<http://www.astronautix.com/j/january18.html>

Write very brief message about space-related event of this day in history, specify a year.

March 10 (YEAR)

<http://www.astronautix.com/m/march10.html>

Write very brief message about space-related event of this day in history, specify a year.

April 16 (YEAR)

<http://www.astronautix.com/a/april16.html>

Write very brief message about space-related event of this day in history, specify a year.

May 1 (YEAR)

<http://www.astronautix.com/m/may01.html>

Write very brief message about space-related event of this day in history, specify a year.

June 22 (YEAR)

<http://www.astronautix.com/j/june22.html>

Write very brief message about space-related event of this day in history, specify a year.

June 24 (YEAR)

<http://www.astronautix.com/j/june24.html>

Write very brief message about space-related event of this day in history, specify a year.

August 13 (YEAR)

<http://www.astronautix.com/a/august13.html>

Write very brief message about space-related event of this day in history, specify a year.

August 15 (YEAR)

<http://www.astronautix.com/a/august15.html>

Write very brief message about space-related event of this day in history, specify a year.

October 4 (1957)

<http://www.astronautix.com/o/october04.html>

<https://en.wikipedia.org/wiki/Sputnik_1>

First ever artificial Earth satellite.

October 6 (YEAR)

<http://www.astronautix.com/o/october06.html>

Write very brief message about space-related event of this day in history, specify a year.

November 27 (YEAR)

<http://www.astronautix.com/n/november27.html>

Write very brief message about space-related event of this day in history, specify a year.



**Grade 12**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Telescope | Planet |  | Wave | CNSA | Velocity |  | Informatics | STEM |
| Astronaut | Sun |  | Magnetism | ISRO | Time |  | Biology |
| Robot | Comet |  | Temperature | CNES | Period |  | Astronomy |
| Rocket | Planet |  | Mass | DLR | Angle |  | Geography |
| Shuttle | Sun |  | Gravity | ESA | Trajectory |  | Mathematics |
| ISS | Comet |  | Atmosphere | Roscosmos | Orbit |  | Physics |
| Cubesat | Asteroide |  | Frequency | JAXA | Distance |  | Informatics |
| Satellite | Meteorite |  | Radiation | CNSA | Velocity |  | Biology |
| Rover | Earth |  | Wave | ISRO | Time |  | Astronomy |
| Probe | Moon |  | Magnetism | NASA | Period |  | Geography |



C-12.1 – **Problem No. 41**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Telescope | Planet |  | Wave | CNSA | Velocity |  | Informatics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A121)**):**

**Write the text of question in bold font.**



C-12.2 – **Problem No. 42**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| astronaut.jpg |  |  |  |  |  |  |  |
| Astronaut | Sun |  | Magnetism | ISRO | Time |  | Biology |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A122)**):**

**Write the text of question in bold font.**



C-12.3 – **Problem No. 43**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Robot | Comet |  | Temperature | CNES | Period |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A123)**):**

**Write the text of question in bold font.**



C-12.4 – **Problem No. 44**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| Rocket | Planet |  | Mass | DLR | Angle |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A124)**):**

**Write the text of question in bold font.**



C-12.5 – **Problem No. 45**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Shuttle.jpg |  |  |  |  |  |  |  |
| Shuttle | Sun |  | Gravity | ESA | Trajectory |  | Mathematics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A125)**):**

**Write the text of question in bold font.**



C-12.6 – **Problem No. 46**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ISS.jpg |  |  |  |  |  |  |  |
| ISS | Comet |  | Atmosphere | Roscosmos | Orbit |  | Physics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A126)**):**

**Write the text of question in bold font.**



C-12.7 – **Problem No. 47**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| cubesat |  |  |  |  |  |  |  |
| Cubesat | Asteroide |  | Frequency | JAXA | Distance |  | Informatics |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A127)**):**

**Write the text of question in bold font.**



C-12.8 – **Problem No. 48**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Satellite.jpg |  |  | radioactive_sign_u2622_icon_256x256 |  |  |  |  |
| Satellite | Meteorite |  | Radiation | CNSA | Velocity |  | Biology |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A128)**):**

**Write the text of question in bold font.**



C-12.9 – **Problem No. 49**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rover.jpg |  |  |  |  |  |  |  |
| Rover | Earth |  | Wave | ISRO | Time |  | Astronomy |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the right side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A129)**):**

**Write the text of question in bold font.**



C-12.10 – **Problem No. 50**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Rover.jpg |  |  |  |  |  |  |  |
| Probe | Moon |  | Magnetism | NASA | Period |  | Geography |

Write short ***real space story*** dealing with topics presented in the above coloured cells.

Insert ***open source picture*** in the left side of the text.

For more information visit this webpage. *(Fill in corresponding hyperlink).*

**Question (**[**A**](#A1210)**):**

**Write the text of question in bold font.**

**Space calendar** <http://www.spacecalendar.com> <http://spaceflightnow.com/launch-schedule/>

January 14 (YEAR)

<http://www.astronautix.com/j/january14.html>

Write very brief message about space-related event of this day in history, specify a year.

January 16 (YEAR)

<http://www.astronautix.com/j/january16.html>

Write very brief message about space-related event of this day in history, specify a year.

March 6 (YEAR)

<http://www.astronautix.com/m/march06.html>

Write very brief message about space-related event of this day in history, specify a year.

March 8 (YEAR)

<http://www.astronautix.com/m/march08.html>

Write very brief message about space-related event of this day in history, specify a year.

April 18 (YEAR)

<http://www.astronautix.com/a/april18.html>

Write very brief message about space-related event of this day in history, specify a year.

April 29 (YEAR)

<http://www.astronautix.com/a/april29.html>

Write very brief message about space-related event of this day in history, specify a year.

June 20 (YEAR)

<http://www.astronautix.com/j/june20.html>

Write very brief message about space-related event of this day in history, specify a year.

August 11 (YEAR)

<http://www.astronautix.com/a/august11.html>

Write very brief message about space-related event of this day in history, specify a year.

October 2 (YEAR)

<http://www.astronautix.com/o/october02.html>

Write very brief message about space-related event of this day in history, specify a year.

November 23 (YEAR)

<http://www.astronautix.com/n/november23.html>

Write very brief message about space-related event of this day in history, specify a year.

November 25 (YEAR)

<http://www.astronautix.com/n/november25.html>

Write very brief message about space-related event of this day in history, specify a year.

**ANSWERS**



**Grade 8**

**C-8.1 (**[**Q**](#Q0801)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.2 (**[**Q**](#Q0802)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.3 (**[**Q**](#Q0803)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.4 (**[**Q**](#Q0804)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.5 (**[**Q**](#Q0805)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.6 (**[**Q**](#Q0806)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.7 (**[**Q**](#Q0807)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.8 (**[**Q**](#Q0808)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.9 (**[**Q**](#Q0809)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-8.10 (**[**Q**](#Q0810)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.



**Grade 9**

**C-9.1 (**[**Q**](#Q0901)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.2 (**[**Q**](#Q0902)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.3 (**[**Q**](#Q0903)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.4 (**[**Q**](#Q0904)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.5 (**[**Q**](#Q0905)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.6 (**[**Q**](#Q0906)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.7 (**[**Q**](#Q0907)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.8 (**[**Q**](#Q0908)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.9 (**[**Q**](#Q0909)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-9.10 (**[**Q**](#Q0910)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

****

**Grade 10**

**C-10.1 (**[**Q**](#Q1001)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.2 (**[**Q**](#Q1002)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.3 (**[**Q**](#Q1003)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.4 (**[**Q**](#Q1004)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.5 (**[**Q**](#Q1005)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.6 (**[**Q**](#Q1006)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.7 (**[**Q**](#Q1007)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.8 (**[**Q**](#Q1008)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.9 (**[**Q**](#Q1009)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-10.10 (**[**Q**](#Q1010)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

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**Grade 11**

**C-11.1 (**[**Q**](#Q1101)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.2 (**[**Q**](#Q1102)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.3 (**[**Q**](#Q1103)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.4 (**[**Q**](#Q1104)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.5 (**[**Q**](#Q1105)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.6 (**[**Q**](#Q1106)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.7 (**[**Q**](#Q1107)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.8 (**[**Q**](#Q1108)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.9 (**[**Q**](#Q1109)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-11.10 (**[**Q**](#Q1110)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

****

**Grade 12**

**C-12.1 (**[**Q**](#Q1201)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.2 (**[**Q**](#Q1202)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.3 (**[**Q**](#Q1203)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.4 (**[**Q**](#Q1204)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.5 (**[**Q**](#Q1205)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.6 (**[**Q**](#Q1206)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.7 (**[**Q**](#Q1207)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.8 (**[**Q**](#Q1208)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.9 (**[**Q**](#Q1209)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**C-12.10 (**[**Q**](#Q1210)**)** [Return to Content](#Content)

Problem solution comment.

**Answer:** write in the answer.

**INFORMATION SOURCE** [Return to Content](#Content)

ESA - <http://www.esa.int/ESA/Our_Missions>

NASA - <https://www.nasa.gov/missions>

DLR - <http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10012/#/Missionen/Start/Feature>

JAXA - <http://global.jaxa.jp/projects/>

CNSA - <http://www.cnsa.gov.cn/n6443408/index.html>

CNES - <https://cnes.fr/en/fiches_mission_alpha>

ISRO - <http://www.isro.gov.in/missions-0>

Roscosmos - <http://en.roscosmos.ru/>

<http://science.gsfc.nasa.gov/solarsystem/astrochemistry/> -

<http://www.astrobio.net/topic/deep-space/cosmic-evolution/the-chemistry-of-space/>

<http://pubs.acs.org/doi/abs/10.1021/ed064p228>

<http://www.nasa.gov/audience/foreducators/stem-on-station/lessons>

<http://www.nasa.gov/audience/foreducators/k-4/features/materials_archive_1.html>

<http://mynasadata.larc.nasa.gov/educators/>

Information on Launch vehicles, Satellites, Space Shuttle and Astronautics:

<http://space.skyrocket.de/index.html>

**VOCABULARY** [Return to Content](#Content)

|  |
| --- |
| Telescope |

 Earth or Space based instrument for observation of remote objects.

|  |
| --- |
| Astronaut |

Person trained for human spaceflight (as well cosmonaut or taikonaut).

|  |
| --- |
| Robot |

Mechanical aparatus capable to perform programmed physical tasks in space.

|  |
| --- |
| Rocket |

Flying space device powered by the reactive force.

|  |
| --- |
| Shuttle |

Reusable spaceplane for Earth orbiting or human/cargo delivery to ISS.

|  |
| --- |
| ISS |

Earth‘s largest artificial satellite - International Space Station.

|  |
| --- |
| Cubesat |

Earth‘s artificial cube shaped satellite, dimensions 10×10×10 cm, mass – 1 kg.

|  |
| --- |
| Satellite |

Artificial object launched by human efforts and orbiting any space body.

|  |
| --- |
| Rover |

Vehicle designed to explore surface of any space body.

|  |
| --- |
| Probe |

Automatic spacecraft exploring bodies of Solar system.

|  |
| --- |
| Earth |

Third planet from the Sun and fifth largest planet of Solar system.

|  |
| --- |
| Moon |

Earth‘s natural satellite.

|  |
| --- |
| Mars |

Fourth planet from the Sun and seventh largest planet of Solar system.

|  |
| --- |
| Planet |

Space body revolving around a star (including the Sun).

|  |
| --- |
| Sun |

Earth‘s closest star.

|  |
| --- |
| Comet |

Small icy space body (cometoid), when passing close to the Sun displaying coma or tail.

|  |
| --- |
| Asteroide |

Minor planet (planetoid) orbiting the Sun in elliptical orbit.

|  |
| --- |
| Meteorite |

Debris from space object (meteoroid) survived the passage through atmosphere.

|  |
| --- |
| Temperature |

Object‘s (space body) warmth.

|  |
| --- |
| Mass |

Quantity of matter.

|  |
| --- |
| Gravity |

Interaction between material bodies depending on their mass.

|  |
| --- |
| Atmosphere |

Gas layer surrounding space body of sufficient mass.

|  |
| --- |
| Frequency |

Event recurrence per unit of time.

|  |
| --- |
| Radiation |

 Spontaneous decay of atomic nuclei.

|  |
| --- |
| Wave |

Energy transfer in space and time.

|  |
| --- |
| Magnetism |

Magnetic interaction occuring between the moving electric charges.

|  |
| --- |
| NASA |

National Aeronautics and Space Administration – governmental agency of USA.

|  |
| --- |
| ESA |

European Space Agency – intergovernmental space exploration organisation.

|  |
| --- |
| Roscosmos |

Roscosmos State Corporation for Space Activities – governmental body of Russia.

|  |
| --- |
| JAXA |

Japan‘s National Aero-space Agency - national agency of Japan.

|  |
| --- |
| CNSA |

China National Space Administration - national agency of China.

|  |
| --- |
| ISRO |

Indian Space research Organisation – governmental agency of India.

|  |
| --- |
| CNES |

National Center of Space Research - governmental agency of France.

|  |
| --- |
| DLR |

German Aerospace Center – national center of Germany.

|  |
| --- |
| Time |

Duration of object (space body) existence.

|  |
| --- |
| Period |

Time elapsed for one rotation of object (space body) around its axis or other space body.

|  |
| --- |
| Angle |

Figure (area) formed by two rays sharing the common endpoint.

|  |
| --- |
| Coordinate |

Object‘s (space body) position in plane or space.

|  |
| --- |
| Trajectory |

Path that moving object (space body) follows through space.

|  |
| --- |
| Orbit |

Curved path of moving object (space body) around other object (space body).

|  |
| --- |
| Distance |

Lenght (interstice) between objects (space body) in plane or space.

|  |
| --- |
| Velocity |

Completed distance of object (space body) per unit of time.

|  |
| --- |
| Mathematics |

Science of structures, variations and spatial patterns.

|  |
| --- |
| Physics |

Science of all forms of matter.

|  |
| --- |
| Chemistry |

Science of chemical elements and nature of materials.

|  |
| --- |
| Informatics |

Science of information processing and storage, the use of computers.

|  |
| --- |
| Biology |

Science of life and living organisms.

|  |
| --- |
| Astronomy |

Science of celestial objects and processes outside the atmosphere of Earth.

|  |
| --- |
| Geography |

Science of the lands, the features, the inhabitants and the phenomena of Earth.

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Contract was carried out “Funded by the Government of Lithuania through an ESA Contract under the PECS (Plan for European Cooperating States)”

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