

# Mathematics, Space, Innovation

(Grade 8, Questions/Answers)

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

Grade 8

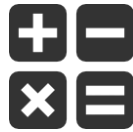
M-8.1 ..... [8.1](#)  
M-8.2 ..... [8.2](#)  
M-8.3 ..... [8.3](#)  
M-8.4 ..... [8.4](#)  
M-8.5 ..... [8.5](#)  
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Vocabulary ..... [V](#)



# Grade 8

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



M-8.1 – Problem No. 1



Telescope

Earth

Temperature

NASA

Time

Physics

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):

Write the text of question in bold font.



M-8.2 – Problem No. 2



Astronaut

Moon

Mass

ESA

Period

Chemistry

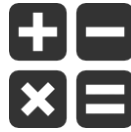
Write short **real space story** dealing with topics presented in the above coloured cells.

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

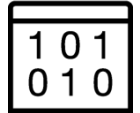
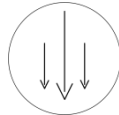
For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



M-8.3 – Problem No. 3



|       |      |         |           |       |             |
|-------|------|---------|-----------|-------|-------------|
| Robot | Mars | Gravity | Roscosmos | 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):

Write the text of question in bold font.



M-8.4 – Problem No. 4



|        |        |            |      |            |         |
|--------|--------|------------|------|------------|---------|
| Rocket | Planet | Atmosphere | JAXA | Coordinate | Biology |
|--------|--------|------------|------|------------|---------|

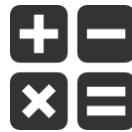
Write short **real space story** dealing with topics presented in the above coloured cells.

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

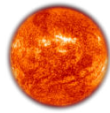
For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



M-8.5 – Problem No. 5



Shuttle

Sun

Frequency

CNSA

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):

Write the text of question in bold font.



M-8.6 – Problem No. 6



ISS

Comet

Radiation

ISRO

Orbit

Geography

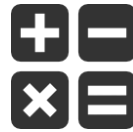
Write short **real space story** dealing with topics presented in the above coloured cells.

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

For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



M-8.7 – Problem No. 7



|         |           |      |      |          |         |
|---------|-----------|------|------|----------|---------|
| Cubesat | Asteroide | Wave | CNES | Distance | Physics |
|---------|-----------|------|------|----------|---------|

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):

Write the text of question in bold font.



M-8.8 – Problem No. 8



|           |           |           |     |          |           |
|-----------|-----------|-----------|-----|----------|-----------|
| Satellite | Meteorite | Magnetism | DLR | Velocity | Chemistry |
|-----------|-----------|-----------|-----|----------|-----------|

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.

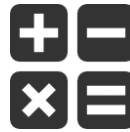
For more information visit this [webpage](#). (*Fill in corresponding hyperlink*).

Question (A):

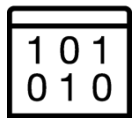
Write the text of question in bold font.

SPACEOLYMP

ESA Contract No. 4000115691/15/NL/NDe



M-8.9 – Problem No. 9



|       |       |             |     |        |             |
|-------|-------|-------------|-----|--------|-------------|
| Rover | Earth | Temperature | ESA | 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):

Write the text of question in bold font.



M-8.10 – Problem No. 10



|       |      |      |           |       |         |
|-------|------|------|-----------|-------|---------|
| Probe | Moon | Mass | Roscosmos | 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):

Write the text of question in bold font.

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## Space Calendar

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

January 2 (YEAR)

<http://www.astronautix.com/j/january02.html>

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

January 4 (1959)

<http://www.astronautix.com/j/january04.html>

[https://en.wikipedia.org/wiki/Luna\\_1](https://en.wikipedia.org/wiki/Luna_1)

First ever flyby of the Moon.

February 23 (YEAR)

<http://www.astronautix.com/f/february23.html>

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

February 25 (YEAR)

<http://www.astronautix.com/f/february25.html>

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

April 15 (YEAR)

<http://www.astronautix.com/a/april15.html>

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

April 17 (YEAR)

<http://www.astronautix.com/a/april17.html>

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

June 8 (YEAR)

<http://www.astronautix.com/j/june08.html>

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

July 30 (1946)

<http://www.astronautix.com/j/july30.html>

[https://en.wikipedia.org/wiki/Plants\\_in\\_space](https://en.wikipedia.org/wiki/Plants_in_space)

First ever seeds (maize) launched into space (successfully returned).

September 20 (YEAR)

<http://www.astronautix.com/s/september20.html>

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

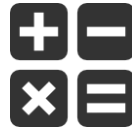
November 11 (YEAR)

<http://www.astronautix.com/n/november11.html>

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



## ANSWERS



## Grade 8

### M-8.1 (Q)

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Problem solution comment.

Answer: write in the answer.

### M-8.2 (Q)

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Problem solution comment.

Answer: write in the answer.

### M-8.3 (Q)

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Problem solution comment.

Answer: write in the answer.

### M-8.4 (Q)

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Problem solution comment.

Answer: write in the answer.

### M-8.5 (Q)

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Problem solution comment.

Answer: write in the answer.

### M-8.6 (Q)

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Problem solution comment.

Answer: write in the answer.

### M-8.7 (Q)

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Problem solution comment.

Answer: write in the answer.

SPACEOLYMP

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**M-8.8 (Q)**

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**Problem solution comment.**

**Answer:** write in the answer.

**M-8.9 (Q)**

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**Problem solution comment.**

**Answer:** write in the answer.

**M-8.10 (Q)**

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**Problem solution comment.**

**Answer:** write in the answer.

## INFORMATION SOURCE

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ESA - [http://www.esa.int/ESA/Our\\_Missions](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](https://cnes.fr/en/fiches_mission_alpha)

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

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

<http://spacemath.gsfc.nasa.gov/>

<http://www.nasa.gov/hrp/communications/estm-project>

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

[http://www.nasa.gov/audience/foreducators/k-4/features/materials\\_archive\\_1.html](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

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### Telescope

Earth or Space based instrument for observation of remote objects.

### Astronaut

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

### Robot

Mechanical apparatus 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 occurring 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**

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

## SPACEOLYMP

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### 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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