

# Mathematics, Space, Innovation

(Grade 12, Questions/Answers)

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

Grade 12

M-12.1 .....[12.01](#)

M-12.2 .....[12.02](#)

M-12.3 .....[12.03](#)

M-12.4 .....[12.04](#)

M-12.5 .....[12.05](#)

M-12.6 .....[12.06](#)

M-12.7 .....[12.07](#)

M-12.8 .....[12.08](#)

M-12.9 .....[12.09](#)

M-12.10 .....[12.10](#)

Answers ..... [A](#)

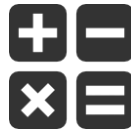
Information source ..... [Info](#)

Vocabulary ..... [V](#)



# Grade 12

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



M-12.1 – Problem No. 41



Telescope

Meteorite

Temperature

ESA

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):

Write the text of question in bold font.



M-12.2 – Problem No. 42



Astronaut

Earth

Mass

Roscosmos

Distance

Geography

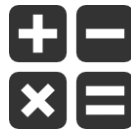
Write short **real space story** dealing with topics presented in the above coloured cells.

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

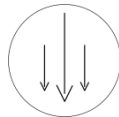
For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



M-12.3 – Problem No. 43



Robot	Moon	Gravity	JAXA	Velocity	Physics
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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.

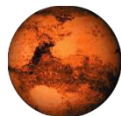
For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



M-12.4 – Problem No. 44



Rocket	Mars	Atmosphere	CNSA	Time	Chemistry
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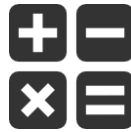
Write short **real space story** dealing with topics presented in the above coloured cells.

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

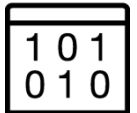
For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



M-12.5 – Problem No. 45



Shuttle

Earth

Frequency

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):

Write the text of question in bold font.



M-12.6 – Problem No. 46



ISS

Moon

Radiation

NASA

Angle

Biology

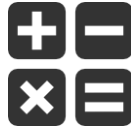
Write short **real space story** dealing with topics presented in the above coloured cells.

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

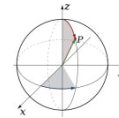
For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



M-12.7 – Problem No. 47



Cubesat	Mars	Wave	ESA	Coordinate	Astronomy
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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-12.8 – Problem No. 48



Satellite	Planet	Magnetism	Roscosmos	Trajectory	Geography
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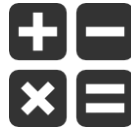
Write short **real space story** dealing with topics presented in the above coloured cells.

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

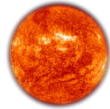
For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



M-12.9 – Problem No. 49



Rover	Sun	Temperature	JAXA	Distance	Physics
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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-12.10 – Problem No. 50



Probe	Comet	Mass	CNSA	Velocity	Chemistry
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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

## Space Calendar

<http://www.spacecalendar.com>

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

January 5 (YEAR)

<http://www.astronautix.com/j/january05.html>

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

February 13 (YEAR)

<http://www.astronautix.com/f/february13.html>

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

April 5 (YEAR)

<http://www.astronautix.com/a/april05.html>

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

May 27 (YEAR)

<http://www.astronautix.com/m/may27.html>

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

July 18 (YEAR)

<http://www.astronautix.com/j/july18.html>

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

September 8 (YEAR)

<http://www.astronautix.com/s/september08.html>

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

September 10 (YEAR)

<http://www.astronautix.com/s/september10.html>

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

September 23 (YEAR)

<http://www.astronautix.com/s/september23.html>

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

September 30 (YEAR)

<http://www.astronautix.com/s/september30.html>

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

November 1 (YEAR)

<http://www.astronautix.com/n/november01.html>

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

December 21 (YEAR)

<http://www.astronautix.com/d/december21.html>

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

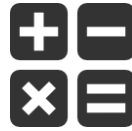
December 23 (YEAR)

<http://www.astronautix.com/d/december23.html>

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



## ANSWERS



## Grade 12

### M-12.1 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### M-12.2 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### M-12.3 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### M-12.4 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### M-12.5 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### M-12.6 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### M-12.7 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

SPACEOLYMP

ESA Contract No. 4000115691/15/NL/NDe

**M-12.8 (Q)**

[Return to Content](#)

**Problem solution comment.**

**Answer:** write in the answer.

**M-12.9 (Q)**

[Return to Content](#)

**Problem solution comment.**

**Answer:** write in the answer.

**M-12.10 (Q)**

[Return to Content](#)

**Problem solution comment.**

**Answer:** write in the answer.

## INFORMATION SOURCE

[Return to Content](#)

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

[Return to 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 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

ESA Contract No. 4000115691/15/NL/NDe

### 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.

[Return to Content](#)

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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