

# Chemistry, Space, Innovation

(Grade 12, Questions/Answers)

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

Grade 12

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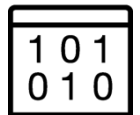


# Grade 12

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
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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.

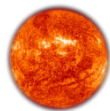
For more information visit this [webpage](#). (Fill in corresponding hyperlink).

Question (A):

Write the text of question in bold font.



C-12.2 – Problem No. 42



Astronaut	Sun	Magnetism	ISRO	Time	Biology
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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.

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C-12.3 – Problem No. 43



Robot	Comet	Temperature	CNES	Period	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.



C-12.4 – Problem No. 44



Rocket	Planet	Mass	DLR	Angle	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.

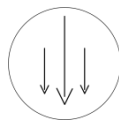
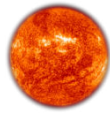
For more information visit this [webpage](#). (*Fill in corresponding hyperlink*).

Question (A):

Write the text of question in bold font.



C-12.5 – Problem No. 45



Shuttle	Sun	Gravity	ESA	Trajectory	Mathematics
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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.



C-12.6 – Problem No. 46



ISS	Comet	Atmosphere	Roscosmos	Orbit	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 left side of the text.

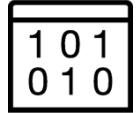
For more information visit this [webpage](#). *(Fill in corresponding hyperlink).*

Question (A):

Write the text of question in bold font.



C-12.7 – Problem No. 47



Cubesat	Asteroide	Frequency	JAXA	Distance	Informatics
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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.



C-12.8 – Problem No. 48



Satellite	Meteorite	Radiation	CNSA	Velocity	Biology
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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.



C-12.9 – Problem No. 49



Rover	Earth	Wave	ISRO	Time	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.



C-12.10 – Problem No. 50



Probe	Moon	Magnetism	NASA	Period	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.

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## 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 12

### C-12.1 (Q)

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Problem solution comment.

Answer: write in the answer.

### C-12.2 (Q)

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Problem solution comment.

Answer: write in the answer.

### C-12.3 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### C-12.4 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### C-12.5 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### C-12.6 (Q)

[Return to Content](#)

Problem solution comment.

Answer: write in the answer.

### C-12.7 (Q)

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Problem solution comment.

Answer: write in the answer.

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**C-12.8 (Q)**

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**Problem solution comment.**

**Answer:** write in the answer.

**C-12.9 (Q)**

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**Problem solution comment.**

**Answer:** write in the answer.

**C-12.10 (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://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://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.

**Asteroid**

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.

**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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