

# SpaceOLÉ • Voyager Challenge Cards

## SpaceOLÉ Voyager Astronomer

### Challenge Question

Most planets rotate in elliptical heliocentric orbits, which have an aphelion and a perihelion. Explain what changes in distance occur between your planet/moon and the sun.

### National Science Education Standards

*D4: Origin and evolution of the universe*



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### Challenge Question

Some planets/moons were discovered early in history, while others were discovered as late as the year 2002. Investigate the circumstances involved in the discovery of your planet/moon.

### National Science Education Standards

*F6: Science and technology in local, national, and global challenges*



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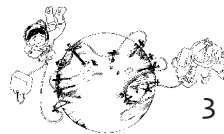
## SpaceOLÉ Voyager Astronomer

### Challenge Question

Some planets are closer to earth during different points of their elliptical orbit. Investigate the distance of the planet/moon and the earth during different times of the year. Explain when it would be best to attempt a trip to your planet/moon from earth.

### National Science Education Standards

*D4: Origin and evolution of the universe*  
*E1: Abilities of technological design*



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### Challenge Question

The length of a year on a particular planet (period of revolution) is determined by the number of earth days that pass while your planet/moon makes one full trip around the sun. Explain why the period of revolution of your planet/moon may vary from the period of revolution of Earth.

### National Science Education Standards

*D4: Origin and evolution of the universe*  
*E1: Abilities of technological design*



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### Challenge Question

According to Isaac Newton, gravity is a force that is directly proportional to a planet's mass. Determine the mass and gravity of your planet/moon and discuss how they relate to the mass and gravity of earth.

### National Science Education Standards

*D3: Origin and evolution of the earth system*

*D4: Origin and evolution of the universe*



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### Challenge Question

The other planets/moons near your planet/moon may affect it by exerting a gravitational pull that affects the planetary/lunar orbit. Determine the effect your planet's/moon's nearest neighbors may have on your planetary/lunar orbit.

### National Science Education Standards

*D4: Origin and evolution of the universe*



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## SpaceOLÉ Voyager Astronomer

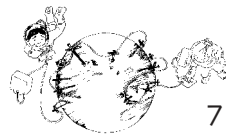
### Challenge Question

One rotation of the planet/moon on its axis is observed as one rising and setting of the sun from the planetary surface. How much time here on earth does it take for your planet/moon to rotate on its axis?

### National Science Education Standards

*D3: Origin and evolution of the earth system*

*D4: Origin and evolution of the universe*



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### Challenge Question

The Earth has one natural satellite: the Moon. Some planets do not have any natural satellites, while some have many. List the natural satellites that are orbiting your planet/moon and determine what natural resources they might provide your team.

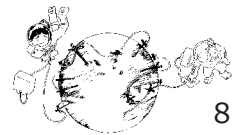
### National Science Education Standards

*D3: Origin and evolution of the earth system*

*D4: Origin and evolution of the universe*

*E1: Abilities of technological design*

*F6: Science and technology in local, national, and global challenges*



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### Challenge Question

Contrary to common misconceptions, the seasons on earth are caused by the tilt of the earth's axis, not by the distance of the earth from the sun. Discover if your planet/moon is tilted on its axis and discuss what this implies.

### National Science Education Standards

*D3: Origin and evolution of the earth system*

*D4: Origin and evolution of the universe*



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### Challenge Question

Solar energy is a renewable resource that could provide an endless source of power on your planet/moon. Considering the amount of solar energy that reaches your planet/moon, would solar energy be a good source of energy for your team? If not, suggest an alternate energy source.

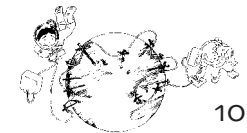
### National Science Education Standards

*D1: Energy in the earth system*

*D2: Geochemical cycles*

*E1: Abilities of technological design*

*F6: Science and technology in local, national, and global challenges*

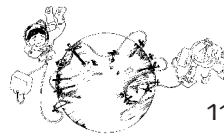


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## SpaceOLÉ Voyager Astronomer

### Challenge Question

### National Science Education Standards

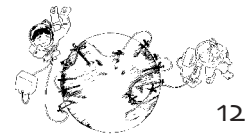


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### Challenge Question

### National Science Education Standards



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