SCOPE

On the skies

Fun phrases help students remember facts about the solar system.

My educated mother

Astronomy is one of the many sciences that lends itself well to the use of mnemonics (memory aids) because there are so many celestial bodies to know and learn about. For example, if you are covering a unit on the solar system, you'll want students to learn the order in which the planets extend outward from the Sun. One way to achieve this is by having students make up their own mnemonics. Strive to get students interacting with one another as they think up their mnemonics.

To start things off, provide the class with some seed mnemonics; also inquire about any mnemonics students already know. Some students might know the following mnemonic for remembering the order of the planets: **M**y **V**ery **E**ducated **M**other **J**ust **S**erved **U**s **N**ine **P**izzas (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto). Next have students think up their own mnemonics for the planetary order. Some sample brainstorming results include the following:

- **M**other **V**ery **T**houghtfully **M**ade a **J**elly **S**andwich **U**nder **N**o **P**rotest (In this case, the student chose to refer to the Earth as Terra.)
- **M**y **V**ery **E**ducated **M**other **J**ust **S**howed **U**s **N**ine **P**lanets
- **M**ein **V**ater **E**klaert **M**ir **J**eden **S**onntag **U**nsere **N**iedlichen **P**laneten (German for "My father explains to me every Sunday our nine planets.")

After students have the knack of thinking up mnemonics, encourage the class to provide their own lists for committing to memory, write mnemonics for them, and learn about the items in the list. For example, students might be interested in learning about the Galilean moons of Jupiter: Io, Europa, Ganymede, and Callisto. Sample mnemonics for remembering their order and names are "I Expect George Cries" and "I Eat Green Cheese." Or, students may choose to study the Uranian Satellites: Miranda, Ariel, Umbriel, Titania, and Oberon. Sample mnemonics include my favorite, "Mispronunciations Afflict Uranus Too Often."

The changing Moon

The Earth has a natural satellite, or moon, known in mythology as Luna. The two celestial bodies orbit the Sun as a pair. The Moon's different appearances, phases, result from its changing position with respect to the Earth and Sun, causing the Sun to illuminate different portions of the Moon's surface and to reflect different patterns of light back to Earth.

The Moon completes one cycle of phases in approximately 28 days. Toward the beginning of the cycle, shortly after new moon, the Moon appears as only a thin sliver over the western horizon after sunset. However, within two weeks, that sliver has grown to a full circle, which we call a full moon. During the two weeks following a full moon, the Moon's appearance again gradually slims to sliver-size; it then continues to get thinner until it disappears for a day or two.

Like Earth, the Moon also rotates around its axis as it moves along its orbital path; however, the Earth rotates once in 24 hours, whereas the Moon only rotates once every 28 Earth days. The Moon's phase cycle corresponds approximately to its rotation rate. This synchronization between the Moon's period of rotation and the duration of its phase cycle explains why the same side of the Moon always faces the Earth. Consequently, this has led to some misconceptions about how the Moon moves through space.

Moon misconceptions

A typical textbook describes the Moon as revolving about the Earth, providing us with an inaccurate picture of the paths of the two celestial bodies. Looking at the binary Earth-Moon system from the Sun's vantage, the Moon's orbit is quite obvious. To help students visualize how the Earth and Moon move as a system, we'll personify and have the Sun, known in mythology as Sol, tell a story of how the system looks from the Sun's position in space.

> I am Sol, the star for my family of satellites that make up the solar system. At least nine major satellites, or planets, orbit me. Some of these planets have their own satellite systems rotating about them, which are called moons. Mercury and Venus do not have satellites rotating around them because my gravitational field is so strong that I would swallow them. However, the third planet, Terra, or Earth, has just one satellite. It is quite large as moons go, nearly one fourth as large as the Earth, whereas most of the other planets dwarf their moons.
>
> I particularly enjoy watching the Earth–Moon system because it is so close to me. I can observe how the two celestial objects move in relation to one another as they orbit me. To me, their motion looks quite smooth and unchanging with very few changes in the curved path they follow. From my perspective, the Moon does not orbit the Earth. Rather, they both orbit me.

Bob Riddle *is the planetarium director for the Kansas City School District at Southwest Magnet Math and Science High School.*