

## COSI ON WHEELS Astounding Astronomy Program Description



**Astounding Astronomy** is designed to introduce students to our solar system and other objects in outer space. The program consists of a 45 minute interactive assembly followed by exciting hands-on activities that engage the students and encourage the development of Science Process Skills.

During the assembly, the following concepts will be explored:

- The sizes and distances between the planets in our solar system
- The electromagnetic spectrum
- The extreme cold of the outer planets and deep space
- How the Earth is the only planet we know of that contains life

The hands-on activities are presented in 30-45 minute sessions with each session accommodating 62 or fewer students. Students will have the opportunity to work as a team to maneuver a remotely operated vehicle, watch the effects of air pressure on a marshmallow, identify constellations, and have a better understanding why we experience seasons on the Earth. In the hands-on sessions students informally interact with the activities, spending as little or as much time as they like at each station. While many students will try all of the activities, some may choose to have a more in-depth experience with only a few.

To prepare you and your students for **Astounding Astronomy**, we suggest familiarizing yourselves with the Hands-On Activities descriptions and vocabulary list provided. Also, for extension activities go to <http://www.cosi.org/educators/outreach/cow> and click on 'Extension Activities' under **Astounding Astronomy**.

**NOTE:** *Students should be reminded to never eat or drink any of their experiments, even when experimenting with food items.*

## ASTOUNDING ASTRONOMY HANDS-ON ACTIVITIES

<b>Alien Eyes:</b>	Students will work in teams to experiment with colored filters and learn how astronomers use them to understand the composition of astronomical objects.
<b>Mighty Minerals &amp; Cool Crystals:</b>	Students will use microscopes and magnifying glasses to observe the differences between different minerals and crystals that form within the planet.
<b>Planetary Rotation:</b>	Students become “planets” themselves as centripetal force and a turntable demonstrate why the planets rotate, and why that rotation would be nearly impossible to stop.
<b>Remotely Operated Vehicles:</b>	Working in teams, students will experience how scientists navigate distant planets using remotely operated vehicles that require precise programming and communication.
<b>Spec-tacular:</b>	Using spectroscopy, students will examine how different gases burn in different arrangements of the electromagnetic spectrum, helping scientists understand the composition of far-away stars without leaving Earth.
<b>Stellar Stories:</b>	Piecing together the constellations first envisioned by ancient people, students will learn how constellations are still important to scientists today for mapping the sky.
<b>Under Pressure:</b>	Students will observe the physiological effects on an object in a vacuum, and discover how that relates to the atmospheric pressure found on planets.
<b>Weighting on the World:</b>	Using weights and scales, students explore the concepts of “weight” and “mass” and how your weight on Earth might be very different if you traveled to another celestial body.

## ASTOUNDING ASTRONOMY VOCABULARY

**AIR PRESSURE:** The force exerted on an object by the atmosphere.

**ATMOSPHERE:** A layer of gas held around a planet by its gravity.

**COMET:** A small, frozen object made of ice, dust, ammonia and organic matter that orbits the Sun.

**CHEMICAL CHANGE:** A change by which one or more new substances are formed. This change occurs on the molecular level.

**DENSITY:** The ratio of mass to volume. An object with a large mass or a small volume has a higher density.

**ELECTROMAGNETIC SPECTRUM:** The range of all the possible waves of energy that travel through space at the speed of light. The Earth receives this type of energy from the Sun.

**GRAVITY:** The force of attraction between any objects with mass, such as the pull between the Earth and the Moon.

**HYPOTHESIS:** An educated guess made as a starting point for further investigation.

**MICROGRAVITY:** A very weak gravitational force where the apparent weight of an object is small compared to its actual weight due to gravity.

**PHYSICAL CHANGE:** A change that rearranges or alters how a substance appears.

**PRESSURIZE:** To compress a gas or liquid into a smaller volume.

**STAR:** A hot, massive and luminous ball of gas that makes energy by nuclear fusion.

**SEASONS:** Specific climatic conditions (winter, spring, summer, fall) caused by the Earth's tilt towards the Sun.

**SPECTROSCOPE:** An instrument used for splitting light into its various wavelengths (colors) to produce a spectrum.

**SOLAR SYSTEM:** The Sun together with the eight planets and all other celestial bodies that orbit the Sun.

## SCIENCE PROCESS SKILLS

On the day of the program students will have the opportunity to participate in a variety of hands-on activities. The activities are intended to create a fun and stimulating environment which encourages the development of Science Process Skills. These skills include:

**OBSERVING:** Using the senses and/or appropriate tools to gather information. Observing may also include the skills of: **Measuring, Comparing and Classifying.**

**INFERRING:** Making preliminary conclusions by assessing what is already known. Inferences are what you reason to be true, but have not observed or tested.

**QUESTIONING:** Raising questions about objects, events, or phenomena. This includes recognizing and asking *investigable* questions, often beginning with phrases like 'What causes,' 'How does,' or 'What makes.'

**HYPOTHESIZING:** Offering a possible explanation or testable statement. A hypothesis can be a good reference point for further investigation.

**PREDICTING:** Using ideas or evidence to foretell the outcome of a specific future event. Often involves an action and a reaction or an if/then statement.

**PLANNING:** Designing one's own investigation using procedures to obtain reliable data. *Planning is not always formal.*

**INVESTIGATING:** Carrying out a planned experiment based on your hypothesis. Investigation uses many of the previously stated Process Skills.

**INTERPRETING:** Drawing conclusions by assessing the data. Finding patterns or other meaning in the data.

**COMMUNICATING:** Expressing observations, ideas, conclusions, or models by talking, writing, drawing, etc.

**RELATING & APPLYING:** Relating makes parallels to similar concepts, and applying uses the knowledge gained to help solve a challenge.