



COSI ON WHEELS CURRENT CONDITIONS Program Description

Current Conditions is designed to introduce students to the science of weather. 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 science concepts and more will be explored:

- Atmospheric Pressure and Wind
- Cloud Types and the Water Cycle
- Weather Forecasting
- Extreme Weather and Safety

The hands-on activities are presented in several 30-45 minute sessions with each session accommodating 62 or fewer students. Hands-on activity session times are scheduled by the person at your school who coordinates the COSI on Wheels event. Students will have the opportunity to test their forecasting skills, examine the tools and instruments used by meteorologists, and explore the power of wind and air pressure. 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 **Current Conditions**, 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 **Current Conditions**.

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

CURRENT CONDITIONS HANDS-ON ACTIVITIES

- A Bellowing Wind:** Students use a variety of air producing instruments to explore how air pressure variations cause air to move as wind.
- Canister Cloud:** Using simple materials, students will watch a real cloud form inside of a canister to examine how and why clouds form.
- Cloudspotting:** Students will examine the different types of clouds and what each means when it comes to predicting the day's weather.
- Dicey Situations:** It's all up to chance! Students will roll dice to see if they can build a storm by rolling the right storm-building "ingredients" in order.
- Measuring the Wind:** Students will investigate wind-measuring anemometer tools, and then use adjustable fan blades to build and test their own.
- Prediction Puzzler:** Using maps and weather symbols, students will be tasked with constructing a major weather event with all the right elements.
- Tornado Tubes:** By adjusting the directional flow and intensity of wind, students will create their own mini-tornadoes and discover why the country's infamous "Tornado Alley" is a hotspot for storms.
- Weather in a Vacuum:** Students experience the phenomenon of air pressure by recreating the famous Mag de Berg hemisphere experiment to see just how air pressure affects our daily lives.
- Weather Instruments:** As meteorologists-in-training, students can use the real tools of the meteorological trade to take atmospheric readings and record how the weather changes throughout the day.

CURRENT CONDITIONS VOCABULARY

AIR: The mixture of gases that make up the Earth's atmosphere.

ALTOCUMULUS: Medium-level clouds that appear as small, white, puffy clouds that resemble collections of cotton balls across the sky.

ALTOSTRATUS: Medium-level clouds that appear as a sheet across the sky. Clouds are often thin, allowing the sun to be seen. Rainfall from this cloud type will not reach the ground.

ANEMOMETER: An instrument that measures the speed of wind.

ATMOSPHERE: Thin layer of mixed gases that encircles the Earth.

ATMOSPHERIC PRESSURE: The amount of pressure exerted by the atmosphere at a given point. Atmospheric pressure is expressed in either millibars or inches of mercury.

BAROMETER: An instrument used to measure atmospheric pressure.

CELSIUS: Temperature scale where water at sea level has a boiling point of 100° and a freezing point of 0°

CIRROCUMULUS: High-level clouds that form in a rippled pattern that resemble the scales of a fish. These clouds are usually seen in cold and fair weather.

CIRROSTRATUS: High-level clouds that appear as a thin-layer, often causing a halo-effect around the sun.

CIRRUS: Thin, wispy clouds that appear high in the atmosphere.

CLIMATE: The long-term atmospheric conditions of an area. The prevailing weather conditions for an area during the year, averaged over a series of years.

CLOUD: A visible collection of water droplets and/or ice crystals in the air.

COLD FRONT: The leading edge of an air mass that is displacing the warmer air in its path.

CONDENSATION: The process by which water vapor turns from a gas state to a liquid state.

CUMULONIMBUS: A vertically developed cumulus cloud that is anvil shaped. This is also called a thunderstorm cloud.

CUMULUS: Low-level clouds that appear as big, white, puffy clouds.

EVAPORATION: The process by which liquid water is transformed into a gaseous state.

FAHRENHEIT TEMPERATURE SCALE: A temperature scale where water at sea level freezes at 32 degrees and boils at +212 degrees.

FRONT: The boundary between two air masses of different temperatures and humidities.

HAIL: Balls of ice that form in the updrafts of convective clouds like cumulonimbus. Once the hail reaches a certain weight it becomes too heavy and falls from the cloud.

HIGH PRESSURE SYSTEM: An area of relatively high atmospheric pressure and divergent, downward winds that rotate opposite the direction of the Earth's rotation.

ICE: The solid form of water. It can be found in the atmosphere in many forms, including ice crystals, hail, snow, and ice pellets.

LIGHTNING: A quick and visible release of electricity that occurs in response to electrical potential built up between clouds and ground or between two clouds.

LOW PRESSURE SYSTEM: An area of relatively low atmospheric pressure and convergent, upward winds that rotate in the same direction of the Earth's rotation.

METEOROLOGY: The science and study of the atmosphere and its phenomena.

NIMBOSTRATUS: Medium-level clouds that bring precipitation, often in heavy amounts.

PRECIPITATION: Any form of water, liquid or solid, that falls from the clouds and reaches the ground.

RAIN: Liquid precipitation that falls from clouds in droplets bigger than .5 mm.

SEVERE WEATHER: Any destructive weather event, but usually applies to tornadoes, blizzards, hurricanes, and thunderstorms.

SNOW: Frozen precipitation that includes ice crystals in complex hexagonal form.

STORM: An individual low pressure system that includes winds, clouds, and precipitation.

STRATOCUMULUS: Low-level clouds that can form in layers of clouds. These clouds can also form in rows with sky seen between clouds.

STRATUS: Lowest-level clouds that form in thick, gray layers of clouds. Stratus clouds often wrap around and cover the tops of tall trees and buildings, hills, and mountains.

TEMPERATURE: The measure of the degree of heat of an object.

THUNDER: The sound created by the rapid expansion and contraction of air caused by the superheating, and then quick cooling, of air around lightning.

THUNDERSTORM: Storm produced by a cumulonimbus cloud that includes heavy precipitation, lightning, thunder, and in severe cases hail and tornadoes.

TORNADO: Violently rotating column of air extending between the ground and a convective cloud.

WARM FRONT: The leading edge of an advancing warm air mass that is replacing the relatively colder air in front of it.

WATER CYCLE: The cycle that describes the transport of water in all its stages from the seas, land, and atmosphere. Stages include evaporation, condensation, precipitation, and collections.

WEATHER: The state of the atmosphere at a certain time in a given area.

WIND: The movement of air from an area of relatively high pressure to a lower pressure area.

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. The 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 haven't 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.