Cloud Clues

PARTLY CLOUDY

Clouds play an important role in maintaining the Earth's temperature. One of the ways they regulate the amount of light (energy) coming from the sun is their opacity. The terms transparent, translucent, and opaque describe how much light gets through a cloud and help us understand why clouds make shadows.

You'll Need:

45 min.

- optional:
  SciGirls *Nature Nurture* journal

For each small group

- transparent items (cellophane, drinking glass or glass jar, bottle full of water)
- translucent items (wax paper, frosted contact paper, tracing paper, parchment paper, tissue paper)
- opaque items (construction paper, cardboard, aluminum foil, cotton balls)
- light source (small desk lamp, overhead light, natural light)
- white paper

Here's how:

1. Introduce visual opacity. One of the properties of a material is the ability of light to pass through it. This property is called visual opacity. Discuss the terms *transparent*, *translucent*, and *opaque*. Create a list of descriptors for each.

- **transparent** – light passes through, things on the other side can be seen clearly
- **translucent** – light passes through, things on the other side can't be seen clearly
- **opaque** – little to no light passes through

2. Investigate. Put girls into small groups[1] and give them a collection of materials to investigate. Introduce the **SciGirls Challenge**: Determine whether the items in the collection are transparent, translucent, or opaque.[3] Be prepared to share results with the whole group.

SciGirls

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POINTER: A good way to test the opacity of materials is to hold your hand behind them and see if you can observe details. You can also see if the materials cast a shadow when placed in front of a light source.

3. Share. Each small group can share a couple of items that it investigated. Were the items transparent, translucent, or opaque? How did they test each item?

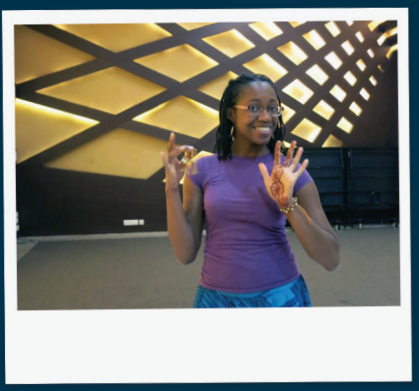
To get started, watch SciGirls collect data about clouds on the *SciGirls Participate DVD.* (Select **SkyGirls**: Collect Data.)

4. Go outside. Once groups have shared their results, go outside and observe clouds. Are the clouds in the sky transparent, translucent, or opaque? Are the clouds casting shadows on the ground?

POINTER: When observing clouds, observe the clouds directly above you. Remember that where a shadow falls depends on the location of the sun–the shadow may not be directly below the cloud. When observing clouds make sure not to look directly at the sun.

Watch Yolanda teach the SciGirls about citizen science and clouds on the *SciGirls Participate DVD.* (Select **SkyGirls**: Mentor Moment.) [7]

Mentor Moment



Dr. Yolanda Roberts is a physical scientist at NASA Langley Research Center who studies Earth-reflected sunlight to help understand how and why the Earth's climate is changing. As a young girl she was terrified of thunderstorms and would glue herself to the Weather Channel to make sure tornadoes weren't coming. Soon the meteorologists and cool maps ignited her interest in what was happening in the sky. Yolanda is a first generation American; both her parents immigrated to the United States from Trinidad. When she has time to relax she likes to play classical, folk, and bluegrass music on her violin. She loves weightlifting because it makes her feel powerful and she's almost reached her goal of dead-lifting half her bodyweight.

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1-7 See **SciGirls Seven** strategies on page 3.

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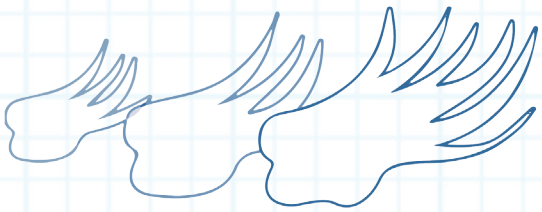
5. Discuss. Share what you observed outside. Were the clouds transparent, translucent, or opaque? Were there different types of clouds with different types of opacities? [6]

6. Extension. Make multiple observations over time and learn different cloud types. Use transparent, translucent, and opaque materials to create a 3D illustration of the clouds you observed.

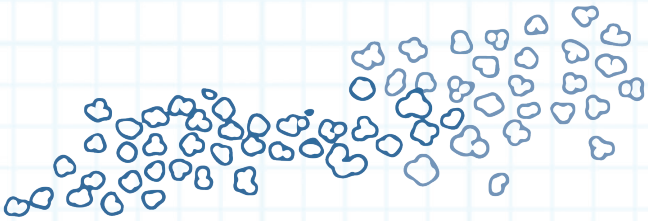
S'COOL

Students' Cloud Observations On-Line (S'COOL) is a hands-on project that supports NASA. S'COOL involves students in weather and climate research. Participants provide NASA with cloud observations to validate data from CERES satellite instruments. Ground observations are an important piece of the puzzle, providing a different perspective of clouds and their behavior. Who knew science was as easy as looking up!

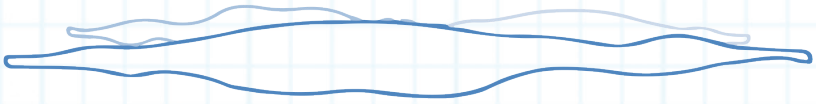
scool.larc.nasa.gov



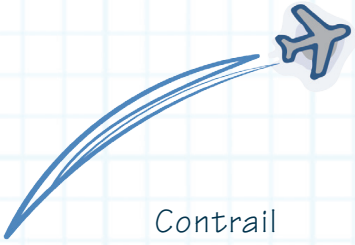
Cirrus



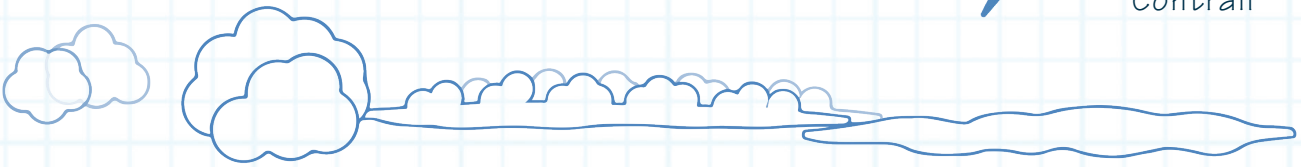
Cirrocumulus



Altostratus



Contrail



Cumulus Stratocumulus Stratus

Visit pbskids.org/scigirls for videos and games.

SciGirls