



Topic: Clouds (Composition)

MISSION: MAKE A RAIN GAUGE

MISSION IGNITION!

Teachers: Introduce the Primary Goal by piquing curiosity and stimulating thinking.

Students: Engage in open-ended dialogue related to the MISSION GOALS AND OBJECTIVES.

- Go outside and look at the clouds in the sky. Show students pictures of clouds. Through **open-ended dialogue**, discuss the Primary Goal: What do clouds look like to you? (shape, color) What do you think they are made of? How do you think they're made or formed? What do they do? What do we get from clouds? (precipitation: rain, hail, sleet, snow) Do all clouds make precipitation?

Let's make some sound effects!

1) Have children sit down. They should begin rubbing their hands together.

2) After 20–30 seconds, children should start snapping fingers. (It's okay if some stick with hand rubbing.)

3) After 20–30 seconds, children should start snapping clapping hands on thighs. (It's okay if some stick with hand rubbing or snapping fingers.)

4) After 20–30 seconds, children should start stamping their feet. (It's okay if some stick with snapping fingers or clapping hands with thighs.)

5) Slowly reverse this process.

- What did we sound like? Any type of weather?
- The end result of the discussion should be a need on the part of the students to explore or solve questions. Encourage children to come up with their own questions.
- Throughout the activity give children *plenty* of time to think and wonder before offering answers. And remember, every answer should be treated as a valuable contribution. Instead of judging an answer as "off topic" or "inaccurate," say "How interesting, *what* makes you say that?" to find out what they are thinking!

CREW BRIEFING:

Teachers: View, read about, and discuss this "mission" with your children.

Students: Explore, ask questions, gather information, research (books, video clips, pictures), and hypothesize.

- **Read** and discuss a book about clouds (see Recommended Reading).

- **Watch** *The Zula Patrol: Under the Weather!* full-dome show. Discuss the subject of clouds, what they're made of, and how they form:

Q: What do clouds do? (make rain, snow, hail, sleet, which are all types of precipitation)

Q: Do all clouds produce precipitation? (no)

Q: What are some clouds that produce precipitation? (stratus and cumulonimbus)

Q: What are the clouds making today? (rain) If it is not currently raining, ask what children think it might do later. Then read a brief weather forecast for the day.

Connect responses to children's MISSION IGNITION observation and discussion.

- Ask students if they would like to make a tool that will measure how much rain falls. Let children examine rulers. Ask how much rain they think will fall. Make a chart of their estimates.

MISSION BLASTOFF!

Teachers: Support and facilitate student experimentation; introduce MISSION VOCABULARY after children describe concepts in their own words.

Students: Experience the concepts, work with materials, experiment, test, collect data, measure, quantify, discover and observe.

Pre-cut the bottles about 4–5 inches from the top.

1) Give each child one pre-cut bottle. Ask them to place the top of the bottle upside-down inside the bottom of the bottle. Explain that the top of bottle is the funnel and the bottom is the collection container. *Note that if you live in a place where there is little wind, you may not need the funnel. If a lot of wind is expected, then you will want to use it.*



MISSION GOALS AND OBJECTIVES:

FUNDamental Goal: Children will make water gauges.

Primary Goal: Children will learn about Form and Function by inquiring about cloud composition, formation, shape, color, and precipitation.

Primary Objective: Children will use water gauges and measure rainfall.



NATIONAL SCIENCE EDUCATION STANDARDS MET BY THIS MISSION:

• Earth and sky • Property, position, and motion of objects



MISSION VOCABULARY: Clouds, Shape, Color, Dust Particle, Water Drops, Gauge, Measure, Precipitation



MISSION TIME: This mission can be divided into several shorter periods of discussion, reading, viewing, building tools, and measuring. Be flexible – children's inquiry of clouds and rain can extend and deepen over time!



MISSION EQUIPMENT AND PREPARATION CHECKLIST:

- Rainy day (or forecast for rain and a brief copy of the forecast)
- Raincoats
- Pre-arranged outside location where children can place their water gauges (should be level, away from building, where they will not be disturbed), or send the gauges home for children to measure rainfall with their families.
- Tall, clear plastic bottles with flat bottoms (e.g., a personal-sized water bottle). Post a request for families to collect these ahead of time. Have one per student or one for each small group.
- Sharp scissors
- Rulers
- Pens or permanent markers
- Light-colored plastic tape
- Small digging tools or stones
- Paper or Weather/Science Journal
- Book about clouds
- Cloud and water gauge photographs, which are available in the online photo library at zula.com

2) Hand out a 3-inch length of tape to each child. Invite students to write their name and/or a special symbol on their tape. Help children place their tape along the top edge of the water gauge.

3) Before going outside, ask children where would be a good place to put their water gauges. Ask students what they can do to make sure their gauges don't tip over (dig shallow holes with small tools or surround with stones). Let them choose digging tools or stones to bring outside with them.

4) Go outside. Place the water gauges in open areas away from trees or structures. (Or allow students to choose the locations and use results to inspire questions about why some water gauges have more rain in them than others!)

5) Secure gauges so they won't tip.

6) Later in the day, collect the gauges and measure rainfall with rulers.

7) Compare these results with the children's estimates.



MISSION SPIN-OFFS AND CONNECTIONS:

Teachers: *Enrich and extend content by supporting children's understanding of the Primary Goal, its connection to other concepts, and application to "real world" situations.*

Students: *Review results, analyze, record and infer, use deductive reasoning, elaborate on findings, and extend activities to the home.*

• Mission Spin-offs

1) Rain, Rain, Don't Go Away Mission: Allow children to come up with a long-term plan for measuring water. How long do they want to measure rainfall? How would they like to display their results? Make a beautiful class chart/mural and incorporate other fun facts about rain/precipitation that children can research, record, and illustrate.

2) Hats off to Sleet, Hail, and Snow: Your class can measure more than one type of precipitation! (You will not need funnel tops for snow, so store these for future use.) Ask why the funnels are not used for snow (funnels make it harder for snow to get in to measure.) Compare snow measurement when frozen – to snow measurement when melted. About 12 cm (4.5 inches) of snow equals 1 cm (.33 inches) of water.

3) Home Mission: Daily breakfast-time "weather watches" are a great time for families to read, listen to, or watch weather forecasts together and to track their accuracy.

• Mission Connections:

Support additional learning about clouds with the *Keep a Cloud Chart* and *Create a Cloud in a Jar* activities.

Note to Educators: This activity works well after your class has completed the Create a Cloud in a Jar activity. First, children will discover what clouds are and how they form. Then they will see how rain comes from (some of) them.

MISSION ACCOMPLISHED:

Teachers: *Empower students to express their conclusions and determine the next mission.*

Students: *Draw conclusions, assess learning, evaluate what they've discovered, and envision their next mission.*

1) After completing this mission, ask students to assess what they've discovered and how. What conclusions can they draw about clouds? (what they do, what different kinds there are, etc.) Use their comments to reinforce the Primary Goal. Ask what else the children would like to know about clouds. For additional *Zula Patrol* activities and information, log onto zula.com.

2) Mission Accomplished Badge: Celebrate a mission accomplished by downloading this free badge at zula.com. Distribute them for children to color and wear or glue into their science journals.

Congratulations on a mission well done – keep exploring!

Recommended Reading

Find additional titles at zula.com.

Cloud Dance by Thomas Locker

The Cloud Book by Tomie de Paola

The Kids' Book of Clouds & Sky by Frank Staub

Clouds (Now I Know Series) by Roy Wandelmaier



FICTION VS. FACT!

Fiction: It is a common misconception that clouds go to oceans to get water.

Fact: Clouds are actually made mostly of water and a tiny bit of dust! They are created when water drops that are in the air condense with a tiny bit of dust that's also in the air.

