Water Cycle Mat
Guide to Presentation

Water Cycle Mat

(suitable for children 6 - 12 years of age)

Waseca Biome's updated Water Cycle Mat includes:

- Guide to Presentation
- Water Cycle Mat
- 36 Water Cycle Mat Fact File cards with wooden box
- 16 veneer Water Cycle Mat arrows
- 10 veneer clouds
- Clouds Control Chart
- Grammar Labels with wooden box
- Storage Tray

Guide to Presentation
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About the Water Cycle Mat

Waseca Biome's ***updated*** Water Cycle Mat provides a comprehensive overview of the Water Cycle. For those that teach from our Curriculum's "Elements that Support Life" sections, this package reviews concepts from the Energy, Air, and Water lessons to contextualize the importance of the Water Cycle. The materials foster a Systems Thinking approach of understanding where the Water Cycle takes place, how it functions, and what effects it has on the planet and our lives.

There are 36 Water Cycle Mat Fact File cards included broken into 4 sections:

- The Atmosphere
- Water Cycle
- Weather & Climate
- Clouds

These Fact File Cards serve as primers for learning about each of the topics. The lessons that follow will outline options for presentation and offer extension ideas for research and further lessons as applicable.

Please note: These materials are very adaptive. The presentations below are suggestions and may be adapted to focus on particular parts for extended research or further lessons. They may be broken up into multiple sections for group and individual work as you see fit.

First Presentation: "The Atmosphere" Fact File Cards

You will need: "The Atmosphere" Fact File Cards
Purpose: To learn about the layers of the Atmosphere and focus attention to the importance of the Troposphere to life on Earth and the Water Cycle.

There are 6 Water Cycle Mat Fact File Cards that provide an overview of what the Atmosphere is and the 5 layers it includes: The Atmosphere, Troposphere, Stratosphere, Mesosphere, Thermosphere, and Exosphere.

Work through these cards with the students as a group if it is their first introduction to the Layers of the Atmosphere. If students are already familiar with the Layers of the Atmosphere, they can review the cards individually. The Troposphere is the layer closest to the surface of Earth where the Water Cycle and all weather occur. This layer will be the emphasis for the lessons to follow.

Extensions:
- "Layers of the Atmosphere" lesson from the Waseca Biomes Curriculum
- Impressionistic Charts: The Atmosphere

Second Presentation: "Water Cycle" Fact File Cards

You will need: "Water Cycle" Mat Fact File Cards
Purpose: To understand what water is and what it does in the Water Cycle. To understand a natural cycle as continuous and renewing.

Work through the "Water Cycle" Fact File Cards:

1. The first card, Water Cycle, presents a simple illustration of the parts of the Water Cycle and general text overview of the stages of the Water Cycle (Evaporation, Condensation, Precipitation, and Collection).
2. The second card, What is water?, discusses water as a substance. Understanding the unique properties of water is essential to understanding the Water Cycle. Emphasize the importance of the three natural states of water: solid, liquid, gas.
3. The third and fourth cards (Water on Earth and Fresh Water's Importance) provide an overview of how much water there is on Earth, that it is constantly moving through the Water Cycle, and how little of it is fresh water. *(The "How Much Fresh Water" lesson from the Waseca Biomes Curriculum can be a good extension at this point in the presentation.)*
4. The last 4 cards from this section of the Water Cycle Mat Fact File Cards focus on the mechanics of the four stages in the Water Cycle: Evaporation, Condensation, Precipitation, and Collection.

Extensions:

- "How Much Fresh Water" lesson from the Waseca Biomes Curriculum
- "Water Flows Downhill" lesson from the Waseca Biomes Curriculum
- "Evaporation and Condensation" lesson from the Waseca Biomes Curriculum

Third Presentation: Water Cycle

You will need: Water Cycle Mat, Water Cycle Mat Veneer Arrows
Purpose: To explore the Water Cycle, how it works, and what effects it has on our planet. To understand a natural cycle as continuous and renewing.

1. Lay out the Water Cycle Mat. Look at the large drawing and ask the children to identify parts. Make sure to highlight the Sun, the ocean, the land, the mountains, the desert, the lake, the rivers, the groundwater, and the town.
2. Talk about how the sky they are looking at is the layer of the atmosphere closest to the surface of the Earth. It is called the Troposphere. Clouds and weather happen in the Troposphere. The Water Cycle happens in the Troposphere.
3. Review what you have learned about the four stages of the Water Cycle:
    - Discuss how the heat from the Sun evaporates water turning it into vapor. Take time to point out that water gets evaporated from many places: the ocean, the lakes, the rivers, and the land. The ocean collects the most water and most vapor forms from evaporation there.

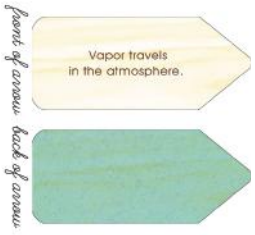
- What happens to the vapor? It travels in the air as a gas! Warm air can hold a lot of vapor.
- As the air goes higher in the Troposphere, it cools. It condenses back into liquid water as clouds.
- When clouds get heavy with the liquid water, it falls back to Earth where it joins streams and rivers and lakes.

4. Work through one of the illustrated sections of the Water Cycle Mat with the arrows.* For example, you can use the following arrows to work through an example of the cycle that includes rainfall. Place the following arrows on the mat discussing each as you place it:

- Most of Earth's water is collected in oceans.

- The Sun's heat evaporates water from the ocean's surface creating vapor.

- Vapor travels in the atmosphere.



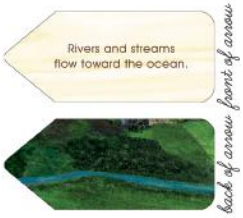
** There are keys for the mat and a chart of all the included arrows at the end of this guide for your reference while you gain familiarity with it.*

- As vapor cools, it condenses into clouds.

- Clouds get heavy with water and it falls to the Earth's surface as rain and hail.

- Runoff joins streams and rivers.

- Rivers and streams flow toward the ocean.



5. You can use the other arrows to highlight different instances of each stage of the Water Cycle. For example, you can now add the "Rainwater soaks into the soil and filters down to the groundwater." and "Groundwater flows back to the ocean." to the mat to show that the rainfall you just discussed can be absorbed by the soil and filter to the groundwater to flow back toward the ocean.

6. Place all of the arrows on the mat discussing what stage of the Water Cycle each represents and emphasizing that the Water Cycle is dynamic. Water is constantly moving between stages in the cycle and places on or above the Earth's surface.
7. The child will be able to work with the mat and arrows individually using the control on the back side to check their placement on the mat or find other applicable instances within the illustration.

Extensions:
- Impressionistic Charts: The Hydrosphere
- "Local Rivers" lesson from the Waseca Biomes Curriculum

Fourth Presentation: Grammar Cards

You will need: Water Cycle Mat, Grammar Labels
Purpose: To practice grammar skills and sentence building while learning about the Water Cycle.

Note: The following steps are to be introduced in separate lessons and may be practiced independently between lessons. You may wish to limit the number of words introduced at one time and fill the box with the parts of speech as they are introduced.

1. Have the children identify parts illustrated on the mat. Can they find the Sun, the ocean, the river, rain, plants, groundwater, etc? Label the parts with the appropriate black grammar label. Note that these words are nouns.
2. After matching the noun cards, take out the article cards (light blue) and "introduce" each noun with an appropriate article. Notice that any plural nouns require the article "the." Make a distinction between the use of "a" and "an."
3. Take out the adjective cards (dark blue) and read them. Ask the children if that word describes any of the nouns. Have them place the adjectives with the matching article and noun to make a phrase. Experiment with placement to see if it makes sense.
4. Choose 10 to 15 noun cards and find appropriate adjectives for them. Invite children to match the nouns with an adjective.
5. Take out the verb cards (red). Have the children perform the actions. Find a noun to match the verb. Add an article and, possibly, an adjective to make a sentence.
6. Choose 10 to 15 noun cards and find appropriate verbs for them. Invite children to match the noun with a verb.
7. Introduce the preposition cards (they are green). Write a phrase with the cards: "Water vapor rises above the surface of the lake." Where is the water going? "Clouds of water vapor move over the land." Leave the preposition cards out to add to the sentences the children may make.
8. Make a sentence like "Water vapor in the clouds falls as rain." Ask the children how does the rain fall? Give them the orange adverb labels and have them pick an adverb that applies. Match other adverbs to verbs and make sentences from there. "What flows downhill? What evaporates slowly?" Add the adverbs to the box for making sentences. Put out blank orange labels and see what the children come up with.

9. Take out the verb "evaporates." Ask, "What evaporates?" Have the children find different nouns that answer the question: *The rain evaporates. The dew evaporates.* Then, bring out the conjunction "and." Ask how you can use the conjunction and to make one sentence. Note that you have to exchange the verb "evaporates" for "evaporate" to make the verb and subjects match. Show the children how you can replace the "and" labels with commas leaving the last "and" in place. Leave the pink conjunction labels out with the work to see how the children's sentences are enhanced.
10. At any of the above levels, the children may work independently to compose a sentence about the Water Cycle Mat using the Grammar Labels. Have extra colored strips to use to make words that are not included. Use the Fact File Cards as reference for more information.

Fifth Presentation: "Weather & Climate" Fact File Cards

You will need: "Weather & Climate" Fact File Cards
Purpose: To explore how the Water Cycle plays a key role in creating and influencing weather and climate.

Work through the "Weather & Climate" Fact File Cards:
1. The first card of this section, Weather, introduces the concept of weather. It is important to emphasize that it describes events (rain, snow, wind) in a particular place over the short term - minutes to months. Weather describes short-term atmospheric events!
2. The next four cards focus on four important factors that create weather: Heat, Moisture, Wind, and Air Pressure. Each of these cards provide an opportunity for further lessons or research including the "Warm Air Rises" lesson or "What Makes Wind" lessons from the Waseca Biome Curriculum.
3. Children can also use the mat to visually demonstrate where these factors are at work. For example, ambient air pressure would be higher on the coast and lower at the top of the mountains.
4. The 6th card introduces Climate. It is important to differentiate Climate from Weather. Weather is short-term and localized. Climate describes long-term patterns and can describe conditions in a particular area or in global terms.
5. The next five cards from this section (Climate Zones, Rain Shadow Effect, Biomes, Greenhouse Gases, and Climate Change) touch upon some of the basics of the factors that influence or are influenced by Climate. Climate is a sophisticated concept and these cards are meant to serve as introductions to this broad topic and tie in things they have learned elsewhere through biomes studies, etc.

Extensions:
- "Warm Air Rises" lesson from the Waseca Biomes Curriculum
- "What Makes Wind" lesson from the Waseca Biomes Curriculum
- "What Happened to the Ozone Layer?" lesson from the Waseca Biomes Curriculum
- Have the child keep a weather journal to see if there are any patterns she can discern for where she lives.

- Have the children research the climate zone they live in and one unlike theirs. What are some of the factors that contribute to these differences? What are some things they have in common?

Sixth Presentation: Clouds

You will need: "Clouds" Fact File Cards, Clouds Control Chart, Veneer Clouds
Purpose: To learn about the 10 most common clouds.

1. Work through the "Clouds" Fact File Cards to get familiar with the 10 most common clouds. Note that their names describe a lot about them. They usually (though not always) will have a name that includes their height in the sky (three levels: High, Medium, Low). Clouds with "alto" in their name are Middle Level clouds. They will also have their shape described in their name. "Cumulus" means "pile" and these are fluffy clouds.
2. Have the children sort the veneer clouds to their appropriate levels on the Control Chart.
3. Now that they are familiar with the clouds, their names, and their levels in the sky, have them place them on the Water Cycle Mat at the approximate altitude where they might form.

Extensions:
- Research what types of clouds might form other clouds as they ascend, descend, decay, or accumulate. The child can move the veneer clouds through these processes on the mat after they have researched them.

CLOUDS CONTROL CHART

HIGH

cirrus

cirrostratus

cirrocumulus

MIDDLE

altocumulus

altostratus

LOW

nimbostratus

stratus

stratocumulus

cumulus

cumulonimbus

WATER CYCLE MAT ARROWS