

CHAPTER 1

# Lesson 1: Where's The Water Board Game

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## Purpose

Students will learn concepts related to the water cycle by playing a board game

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## Objective

Students will use their knowledge of the water cycle to make their way around the board and try to play their opponents.

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## Arkansas Framework Correlation

### Language Arts

#### 4<sup>th</sup> Grade

OV.1.4.1 Use subject-related information and vocabulary

OV.1.4.7 Give precise directions and instructions for more complex activities and tasks

OV.1.4.8 Participate in formal and informal discussions about a variety of topics including state and/or national events

OV.1.4.12 Ask and answer relevant questions and make contributions in small or large group discussions

OV.2.4.3 Listen to understand, organize, and remember directions for doing tasks and assignments. Use context clues to determine the precise meaning of new words

R.11.4.8 Add content words to sight vocabulary

#### 5<sup>th</sup> Grade

OV.1.5.2 Use standard English in classroom discussion

OV.1.5.6 Contribute appropriately to class discussion

R.11.5.3 Add content words to sight vocabulary

R.11.5.9 Use word origins including common roots and word parts from Greek and Latin to analyze the meaning and determine pronunciation and derivations of complex words

#### 6<sup>th</sup> Grade

OV.1.6.2 Use standard English in classroom discussion

OV.1.6.6 Contribute appropriately to class discussion

R.11.6.3 Add content words to sight vocabulary

## Mathematics

#### 4<sup>th</sup> Grade

NO.3.4.4 Solve simple problems using operations involving addition, subtraction, and multiplication using a variety of methods and tools (e.g., objects, mental computation, paper and pencil and with and without appropriate *technology*)

NO.3.4.5 Use *estimation strategies* to solve problems and judge the reasonableness of the answer

M.12.4.2 Distinguish the temperature in contextual problems using the Fahrenheit scale on a thermometer

M.13.4.6 Read temperatures on Fahrenheit and Celsius scales

## 5<sup>th</sup> Grade

M.13.5.2 Determine which unit of measure or measurement tool matches the context for a problem situation

## 6<sup>th</sup> Grade

M.13.6.2 Determine which unit of measure or measurement tool matches the context for a problem situation

## Science

### 4<sup>th</sup> Grade

NS.1.4.1 Communicate observations orally, in writing, and in graphic organizers:

- T-charts
- pictographs
- Venn diagrams
- bar graphs
- frequency tables
- line graphs

NS.1.4.2 Refine questions that guide scientific inquiry

PS.5.4.3 Compare and contrast gases to solids and liquids

ESS.8.4.1 Locate natural divisions of Arkansas: Ozark Plateau, Ouachita Mountains, Crowley's Ridge, Mississippi Alluvial Plain (Delta), Coastal Plain, Arkansas River Valley

ESS.8.4.2 Analyze the impact of using natural resources

ESS.8.4.3 Differentiate between renewable and non-renewable resources

ESS.8.4.4 Evaluate the impact of water pollution

ESS.8.4.5 Evaluate the impact of Arkansas' natural resources on the economy, including but not limited to farming, timber, tourism, hunting, fishing

ESS.8.4.6 Evaluate human use of Arkansas' *natural resources* on the *environment*

ESS.8.4.7 Describe the processes of the *water cycle*: precipitation, evaporation, condensation

ESS.9.4.1 Analyze changes to Earth's surface

### 5<sup>th</sup> Grade

LS.4.5.16 Evaluate positive and negative human effects on ecosystems.

PS.5.5.4 State characteristics of physical changes.

PS.5.5.5 Identify characteristics and common examples of physical changes.

PS.5.5.6 Explain how heat influences the states of matter of a substance:

- solid
- liquid
- gas

PS.5.5.7 Demonstrate the effect of changes in the physical properties of matter.

PS.5.5.8 Model the motion and position of molecules in solids, liquids and gasses in terms of kinetic energy.

ESS.8.5.11 Investigate the formation of soil.

### 6<sup>th</sup> Grade

LS.2.6.5 Model and explain the function of plant organs:

- leaves
- roots
- stems

LS.2.6.7 Describe the relationship between organ function and the following needs of cells:

- water
- waste removal

LS.4.6.2 Conduct simulations demonstrating competition for resources within an ecosystem.

## Social Studies

### 4<sup>th</sup> Grade

G.1.4.11 Explore weather changes in various *regions*

G.3.4.4 Explain how people are influenced by, adapt to, and alter the environment (e.g., agriculture, housing, occupation, industry, transportation, communication, acid rain, global warming, ozone depletion)

G.3.4.6 Research ways in which the school and community can improve the physical environment by practicing conservation

### 5<sup>th</sup> Grade

G.1.5.10 Compare and contrast major landforms characterized as physical features of Earth (e.g., *plateaus*, rivers, deltas, seas, oceans, *peninsulas*)

G.3.5.5 Identify renewable and nonrenewable resources (e.g., fossil fuels, fertile soils, timber)

G.3.5.6 Identify ways people have modified the physical environment

G.3.5.7 Discuss ways in which Arkansans adapted to and modified the environment

### 6<sup>th</sup> Grade

G.3.6.1 Describe the location of major cities in Arkansas and the United States and the availability of resources and transportation in those areas

G.3.6.5 Describe the physical processes that produce renewable and nonrenewable resources

- Where's the Water Board Game(s) includes: board, game pieces, move & quiz cards water droplets

Note: 1 game = 4 to 8 students

**Resources** for materials not included:  
**UA Center for Math & Science Education**  
<http://www.uark.edu/~k12info/>  
 479.575.3875  
**Northwest Arkansas Education Co-Op**  
<http://starfish.k12.ar.us/web/>  
 479.267.7450  
**Beaver Water District**  
[www.bwdh2o.org](http://www.bwdh2o.org)  
 479.717.3807  
 Know of other resources? Please let us know!  
[awilson@bwdh2o.org](mailto:awilson@bwdh2o.org) or 479.756.3651

## Procedure

### Part 1 - Large Group Discussion

- Tape the KWL wall words where the entire class can see them.
- Ask questions to find out what the students know about watersheds and from where our drinking water comes. Write down whatever the students say on the strips and tape them to the wall under "What We Know" (leave the strips on the wall for future reference during the watershed study).
- When students have told "what they know," then have them wonder about what they would like to know. Use more blank strips to record their questions and tape these under "What We Want to Know."
- As the lesson (or unit) study continues, refer back to these strips to see if the students have changed their answers or have more questions. Allow them to take a strip from the wall and change "what they know" to "what we learned" if their first answers were wrong.

## Materials

- KWL wall chart words

5. At the end of the lesson(s) or unit, go back over any of the strips that haven't been moved and address each "What We Know" and "What We Want to Know."
6. New "What We Learned" strips may be added each time a student states something that the teacher can write for the "What We Learned" column.
7. Be sure to leave the KWL wall chart on the wall through the entire lesson(s) or unit. Use it, specifically, during the Water Cycle Game introduction and wrap-up.
3. Discuss the connections between the Beaver Lake Watershed, the water cycle, and where drinking water comes from in Northwest Arkansas as a whole. Ask questions of the class such as, "What is a watershed?" and show them a map of the Beaver Lake Watershed. Pose the question, "Where in the watershed can one find the water cycle taking place?" Students may respond by mentioning the streams and the lakes. Guide them into thinking about the soil, the caves and springs of the Northwest Arkansas region.

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## Part 2 – Playing the Game

1. The game can be implemented as part of a large group activity where there are multiple games being played at once, or as a small individually played game where students are in a station while other activities are taking place in the classroom.
2. The game can be played with 4 or 8 players (individuals or teams).
3. See Directions for the game in Lesson 1 Worksheets.
4. Game duration is at the discretion of the teacher where game play continues for a set amount of time or until the "Do" and "Don't" drops run out.

## Part 3 – Journal

1. Journaling is an option for long term projects.

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## Discussion

1. At the conclusion of game play, use the KWL Wall Charts to guide discussion and emphasize important points from the science frameworks.
2. Tie in with the true/false questions that were debated during game play.

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## Assessment

Students can work through a series of stations around the room that ask specific questions related to the Water Cycle game and the water cycle that you have created.

4. Copy or cut out questions (ideally 10) from the "What We Want to Know" KWL Strip and place them in a variety of locations around the room – on student desktops, on the countertops, or on the walls. To make them stand out, put colored paper behind them.
5. Ask students to number their paper 1 to 10 and to skip lines between numbers in order to give enough room for their responses. Point out the questions that have been placed around the room. Students move about the room to answer the questions. Have them write down the question and the answer. They have 1-2 minutes per question to respond. They can answer the questions in any order and can be completed in pairs or individually, depending on the type of assessment desired.
6. The KWL charts can be left up to be used as reference or this can be completed without references after the game is played to determine comprehension and retention of the concepts covered in the game.

7. Students return to their seats. With a partner, they turn to face each other. Have students take turns asking each other the questions. If the students have differing answers, have them highlight or circle the response so that they can tell about it during a large group discussion.
8. Students regroup as a class. Have students raise their hands if they had differences with any of their partners' responses. Have students share the responses upon which they disagreed and discuss as a class. Guide the discussion as discovery rather than toward "right" or "wrong" answers.
9. Refer to the KWL charts to guide discussion and close.

**Option:** The questions may also be answered at their seats OR given individually as a quiz.

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## Additional Resources

**EPA Water Cycle activities "Environmental Kids Club"**

[www.epa.gov/kids/water.htm](http://www.epa.gov/kids/water.htm)

**Water Cycle Kidzone**

<http://www.kidzone.ws/water/>

**USGS Water Cycle information**

<http://ga.water.usgs.gov/edu/watercyclesummary.html>

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## Lesson 1 Student Worksheets

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## KWL Chart

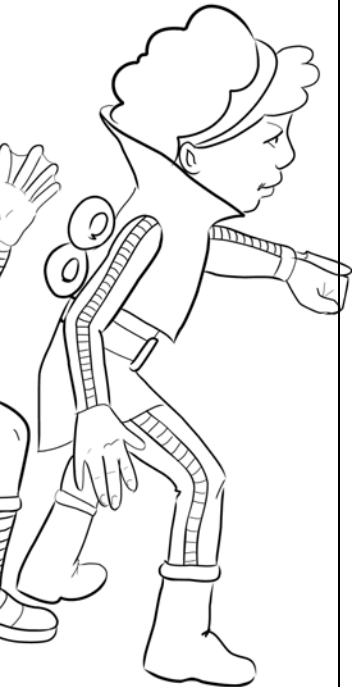
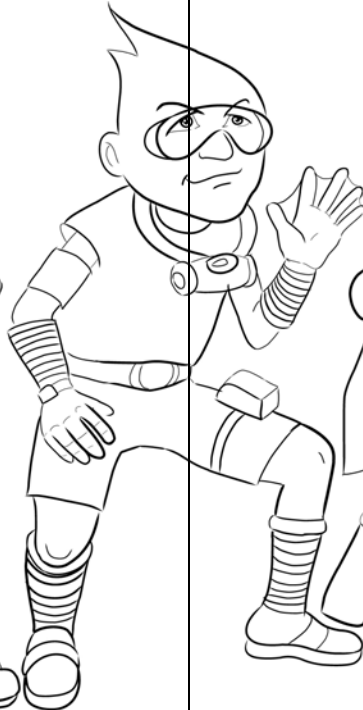
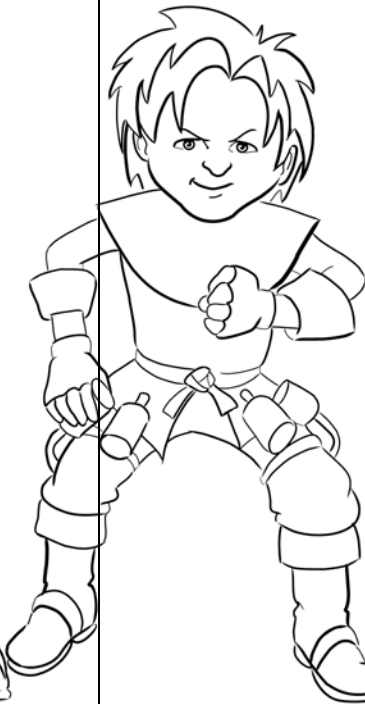
- Before students begin this unit, brainstorm what they know about the *water cycle* and write their thoughts in Column 1.
- Next, have students think of questions they have about the unit or what they would like to find out about the *water cycle* and list these in column 2.
- During the unit study, Column 1 may change as new information is found and Column 2 can be added to, as students think of more questions they'd like to answer.
- At the end of the unit and/or after completing all research, fill in Column 3.
- The following chart is a suggested KWL format and may be enlarged for large group “brainstorms” or printed as is. For individual student or small group work.

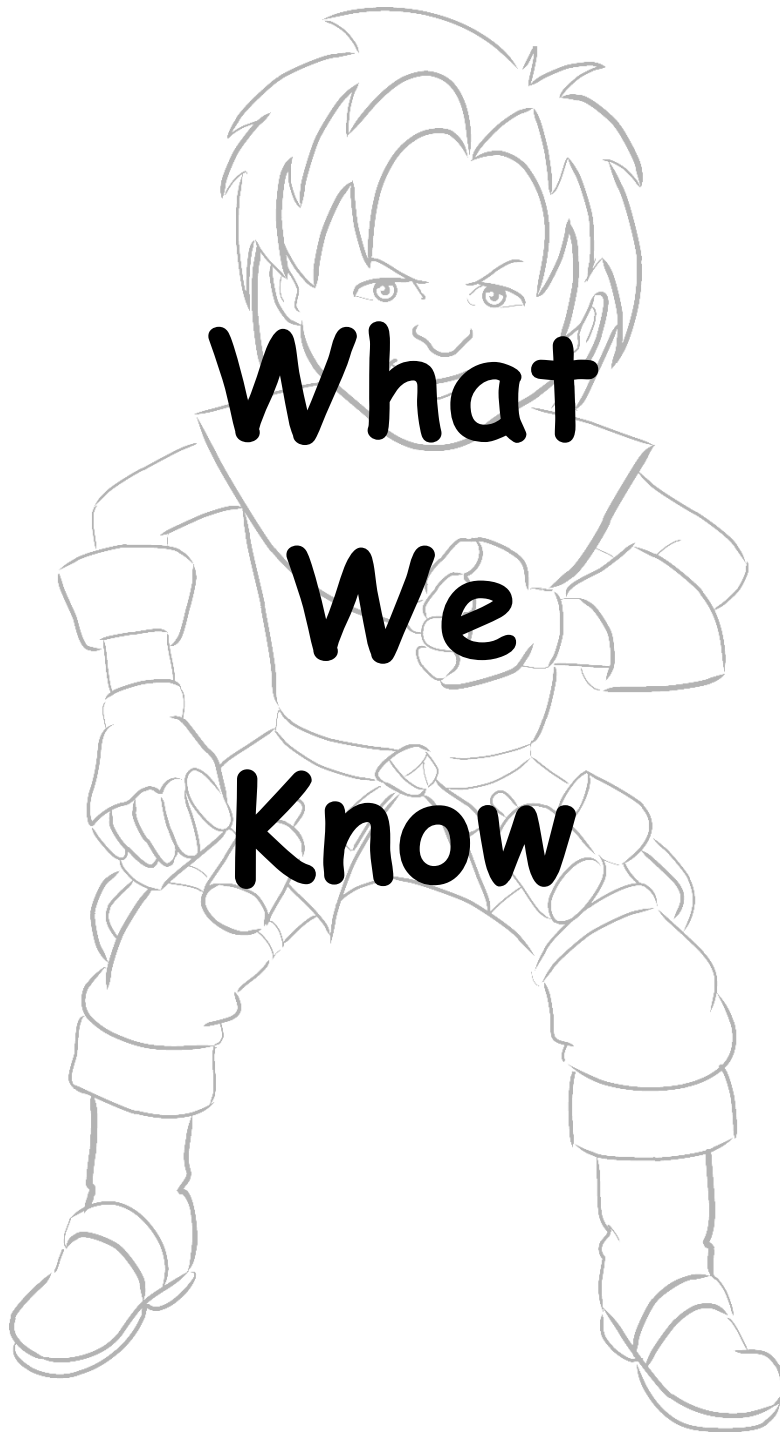
Topic \_\_\_\_\_

What I Know

What I Want to Know

What I Learned









Name \_\_\_\_\_ Date: \_\_\_\_\_

What do you know about \_\_\_\_\_ ?

Handwriting practice lines consisting of solid top and bottom lines with a dashed midline, repeated 10 times for writing.

Name \_\_\_\_\_ Date \_\_\_\_\_

**What I know about the *water cycle*.**

*Draw below*

Name \_\_\_\_\_ Date \_\_\_\_\_

What do you want to know about \_\_\_\_\_?

Handwriting practice lines consisting of solid top and bottom lines with a dashed midline. There are 10 sets of these lines provided for writing.

Name \_\_\_\_\_

Date \_\_\_\_\_

What did you learn about \_\_\_\_\_?

Handwriting practice lines consisting of solid top and bottom lines with a dashed middle line. There are 10 sets of these lines provided for writing.



## WHERE'S the WATER?

### The H2O Role Playing Game

#### HOW TO PLAY

**PLAYERS:** 4 individual players OR 8 players in teams of two.

**OBJECT:** Collect more “Do Drops” than your opponents, and avoid “Don’t Drops.”

#### PIECES:

- 1 Game Board
- 4 Game Pieces – Snow, Ice, Splash & Cloud
- 70 Move Cards – 10 each for Clouds, River, Lake, Animals, Plants, Soil and Groundwater
- 40 Quiz Cards
- 30 Do Drops
- 30 Don’t Drops

**SETUP:** Stack the Move Cards face down on the Game Board on their corresponding spaces – Clouds cards on the Clouds space, River cards on the River space, and so on.

Shuffle the Quiz Cards and place them face down in the lower left corner of the Game Board.

Arrange the Do Drops and Don’t Drops in two piles next to the Game Board.

Players choose their Markers and place them near the Clouds space.

The game monitor notes the time, announces the duration of play (usually 30 minutes), and tells the players to begin.

**MOVING:** The player closest to the *Clouds* space goes first. The player picks a *Clouds* move card, reads the instruction aloud, then follows its direction. For example, if the card says, “Water vapor condenses and falls as precipitation. Go to LAKE,” the player immediately moves his or her marker to the lake. On the other hand, if the card says, “Water vapor remains in CLOUD,” the player leaves his or her marker where it is and the turn ends. Play proceeds clockwise.

**COLLECTING DO DROPS:** Each time a player moves to a new space, he or she tries to earn a Do Drop by answering a Quiz Card correctly. When a player moves his or her marker, the opponent to the player’s left picks up the top Quiz Card and reads the question aloud, then returns the card face down to the bottom of the stack. If the player answers correctly, he or she may collect a Do Drop from the stack next to the Game Board OR collect a Do Drop from any opponent OR give his or her Don’t Drop to any opponent. Do Drops and Don’t Drops are stored in the indicated spaces around the border of the Game Board.

**COLLECTING DON’T DROPS:** If the player answers the Quiz Card incorrectly, he or she must collect a Don’t Drop from the stack next to the Game Board.

**LOSE A TURN CARDS:** One Move Card in each group is a LOSE A TURN Card. When a player draws this card, he or she skips play for one round.

**ENDING THE GAME:** Play ends when: 1) The time limit is reached or 2) players run out of Do and Don’t Drops. Players add together their Do Drops, subtract the number of Don’t Drops, and declare their total points. The player with the most totaled points is the winner.

## Assessment Sheet (Optional)

**Where do you think the water cycle begins?**

**What is another name for rain, snow, sleet, hail, drizzle, and sprinkle?**

**What is likely to happen when a molecule of water (H<sub>2</sub>O) is on the surface of a body of water?**

**Is there water under the surface of the ground? If so, what is it called? Describe the process of how it arrived under the ground.**

**Can humans impact the water cycle? How? Describe at least two examples of your responses.**

**True or False? Water flows downhill.**

**What is left behind when water evaporates?**

**Clouds are a result of a process called \_\_\_\_\_?**

**Where does transpiration take place?**

**How does temperature affect the rate of evaporation?**