Environmental Science Institute
THE UNIVERSITY OF TEXAS AT AUSTIN

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# Rain and Flood

**Lesson Plan for Grades 2-3**
**Length of Lesson: 1 hr**

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**Date created: 11/21/2014**

**Subject area/course: Science**

**Materials:**

Clear jar or mason jar or a clear glass that is heat resistant
Stove or microwave to heat water
Plate
Ice cubes (optional)

Cups of the same size (3 per group)
Soil
Clay
Sand
Filter and Funnel
Graduated cylinder or other measuring device

**TEKS/SEs:**

Grade 2
(8) Earth and space. The student knows that there are recognizable patterns in the natural world and among objects in the sky. The student is expected to:

- (C) explore the processes in the water cycle, including evaporation, condensation, and precipitation, as connected to weather conditions

Grade 3
(3) Scientific investigation and reasoning. The student knows that information, critical thinking, scientific problem solving, and the contributions of scientists are used in making decisions. The student is expected to:

- (C) represent the natural world using models such as volcanoes or Sun, Earth, and Moon system and identify their limitations, including size, properties, and materials

**Lesson objective(s):**

- Students will be able to describe the water cycle and relate it to a demonstration
- Students will investigate how soil types affect flooding problems

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**Differentiation strategies to meet diverse learner needs:**

Learners learning in a second language

- Think pair share: this strategy is when students are asked to pair up to think about the answer to a question or brainstorm activity. Then, they are asked to share their thoughts with the class.
- Extend wait time: teachers should wait at least three seconds after posing a question in order to let students process their thoughts.
- Review and practice concepts—have students teach each other their topic and note similar and different things that they did.
- Implement more formative assessment. Formative assessment is a strategy teachers use to change their lesson plans on the fly. For example, if a teacher poses a question that students are already supposed to know for a lesson but the teacher finds out that students don't actually know the answer—the teacher will then modify the lesson plan to include a mini lesson on that question or concept.
- Give students an opportunity to practice speaking (before presentation)
    - have them record themselves and send it to teacher for corrections

Students with reading and writing difficulties

- Give students plenty of space to write
- If students have visual impairments, provide recordings or text that is enlarged

Students with attention and behavioral challenges

- Use open ended questions that allow students to express their thoughts
- Structure long term assignments into smaller and manageable segments. Have students work on one task at a time.
- Build in mental breaks that allow students to regroup, stretch, and get out of their seats
- Have students keep an organizer or a binder where they can keep all their work materials in the order that they received them

**ENGAGEMENT**

Students will be asked what they already know about rain and what happens if it rains too much.

**EXPLORATION**

Students will observe and record what's happening as they watch a demo of a mason jar filled with hot water with a plate containing ice cubes on the top of the jar. They will describe how this process mimics rain and then be given key words and definitions to attach to the process. They will also get a handout of the water cycle and be asked to describe each process.

Students can answer worksheet questions using this site: http://education-portal.com/academy/lesson/the-water-cycle-precipitation-condensation-and-evaporation.html.

Water cycle worksheet is also attached.

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**EXPLANATION**

Students will be randomly picked to show their answers to worksheet questions on the doc cam and explain their answers to the class. Teacher will correct answers as needed.

**ELABORATION**

Teacher will then ask students what happens if it rains heavily and randomly pick a few students to answer. Teacher will then explain to the class that they will explore what types of soil is best to use in the occurrence of flood.

Students will explore how different types of soil contribute to or don't contribute to flooding after rain. They will place soil in a funnel with a filter at the bottom and then drain the same amount of water through it for each type of soil and then repeat again while using the soil that was already soaked in water. They will use their worksheet to record the amount of water that was collected (on dry and saturated soil) and conclude which type of soil (clay, sand, or agricultural soil) is best to use in case there is excessive rain and flooding.

On their worksheet they will answer the question 1 based on their experimental results, and they will use the website below to answer question two:

- http://www.ehow.com/info_8140777_soils-absorb-water.html

**EVALUATION**

Students will be evaluated on how they fill out the rain and flood worksheets. They will also be evaluated on their presentations of answers to class.

**SOURCES AND RESOURCES**

- Dr. Kevin Kloesel's Hot Science – Cool Talks Lecture # 92

Resources for teachers:

- Rain experiment with jar, hot water, and plate: http://www.weatherwizkids.com/experiments-make-rain.htm
- Youtube video of the rain demo: https://www.youtube.com/watch?v=bjh2Scqq_44
- Flood experiment: http://www.discoveryeducation.com/teachers/free-lesson-plans/flood.cfm
- Tips for teachers with English language learners: http://www.nbexcellence.org/cms_files/resources/FiveStrategiesToUseWithEnglishLanguageLearners.pdf

Resource for students to answer questions on the Rain demo worksheet:

- http://education-portal.com/academy/lesson/the-water-cycle-precipitation-condensation-and-evaporation.html

Resource for students to answer questions on the flood worksheet:

- http://www.ehow.com/info_8140777_soils-absorb-water.html

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## EXPLORATION ACTIVITY or ACTIVITIES

### Purpose

The purpose of this exploration is to conceptualize the process of the water cycle.

### Materials

Clear jar or mason jar that is heat resistant
Stove or microwave to heat water
Cold plate
Ice cubes (optional)

**Safety Information** Heated jar with water could pose a safety hazard to students, teachers should to handle glass jar that is heated at a safe distance away from students. Students should not handle glass jars.

### Procedure

1. Students will observe rain demo.
2. Students will take notes about what they observed.
3. Students will complete the rain demo worksheet as well as the water cycle worksheet.

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# Rain and Flood

**TEACHER PAGE(S)**

**Assignment:** You will be investigating which soil would be best to use if you were to build a new house in a city with severe flooding problems. Which soil type can hold the most rain without causing flooding?

**Flood Experiment:**

1. Gather materials: three transparent cups of the same size, filter, and three types of soil (all the same amount)
2. Into the funnel lined with filter paper, add one type of soil
3. Add half a cup of water and pour it into the funnel, with a cup at the bottom to collect water.
4. Measure the amount of water that was collected and then dump it out
5. Next, use the same amount of water from step 3 and pour it through the now saturated soil and record the amount of water collected
6. Repeat steps 3 – 5 for the second and third type of soil, remembering to use the same amount of water (half a cup) used in step 3.

**Data Collection Chart**

| | **Clay** | **Loam Soil** | **Sand** |
|---|---|---|---|
| **Water volume collected for dry soil** | Various volumes collected (most water collected of all three types) | Various volumes collected (least amount of water collected of all three types) | Various volumes collected (less water collected than clay, but more than loam) |
| **Water volume collected for saturated soil** | Various volumes collected (most water collected of all three types) | Various volumes collected (least amount of water collected of all three types) | Various volumes collected (less water collected than clay, but more than loam) |

**Questions:**

1. Which soil type is the best to use for a plot of land on which you are planning to build a house? Use the data you collected to support your answer. (Hint: which soil type is best used if it were to flood heavily?)

   I would use the loam soil type because it resulted in the least amount of water collected (make sure students list volume of water collected). This indicates that the loam soil type absorbs water well. This soil type will result in less flooding because the water is contained in the soil instead of causing flooding problems.

2. Which soil type is most likely to cause flooding problems and why? What properties of soil make it so that it causes (or does not cause) flooding problems?

   Clay is most likely to cause flooding problems because it resulted in the most amount of water collected. It is more likely to cause flooding because it is more compact than all the other soil types, which makes it unable to absorb as much water.

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# Rain and Flood

**STUDENT PAGE(S)**

**Assignment:** You will be investigating which soil would be best to use if you were to build a new house in a city with severe flooding problems. Which soil type can hold the most rain without causing flooding?

**Flood Experiment:**

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**Data Collection Chart**

| | **Clay** | **Loam Soil** | **Sand** |
|---|---|---|---|
| **Water volume collected for dry soil** | | | |
| **Water volume collected for saturated soil** | | | |

**Questions:**

**3.** Which soil type is the best to use for a plot of land on which you are planning to build a house? Use the data you collected to support your answer. (Hint: which soil type is best used if it were to flood heavily?)

**4.** Which soil type is most likely to cause flooding problems and why? What properties of soil make it so that it causes (or does not cause) flooding problems?

Name: _____

# Rain Worksheet

**Rain Demo**

Describe and draw a diagram of the rain demo that you just observed at your table. What is happening to the water?

A plate full of ice has been placed on top of the jar with hot water inside. As time passes, droplets start to form on the plate and then fall back into the jar. The water from the jar evaporates and turns into a gas. The water vapor meets the cold temperature of the plate to condense and form droplets that fall back into the jar.

Teacher's note: students do not need to use the complex words condensation and evaporation; they can describe the process in their own words

What do the terms below mean? And which event from the rain demo corresponds to these terms?

Evaporation:

Evaporation is the process by which water changes from a liquid to a gas or vapor. The term corresponds to the event where water from the jar turned into gas to meet the cold plate.

Precipitation:

Water falls from the atmosphere in the form of rain, snow, or hail. This term corresponds with the event in the rain demo when water droplets fall back into the jar.

Condensation:

Condensation is the process by which water vapor is changed back to liquid water. This term corresponds to the event in the rain demo when the water vapor meets with the cold plate to form droplets of water.

How is the demo about rain different from actual process of rain in the real world?

The demo about rain is different from the actual process of rain because water isn't held in a jar. In the real world, there is more distance between the water and the "plate" which represents the clouds. And obviously there are no plates in the sky, instead there are clouds. The jar and the water inside represent the land and bodies of water.

Name: _____

# Rain Worksheet

**Rain Demo**

Describe and draw a diagram of the rain demo that you just observed at your table. What is happening to the water?

What do the terms below mean? And which event from the rain demo corresponds to these terms?

Evaporation:

Precipitation:

Condensation:

How is the demo about rain different from actual process of rain in the real world?

When the droplets are too heavy, they fall back to Earth. This is called precipitation.

The water vapor begins to condense. The tiny droplets start to form clouds.

The sun heats the water on Earth.

The water starts to evaporate into a gas called water vapor that rises.

When the droplets are too heavy, they fall back to Earth. This is called precipitation.

The water vapor begins to condense. The tiny droplets start to form clouds.

The sun heats the water on Earth.

The water starts to evaporate into a gas called water vapor that rises.

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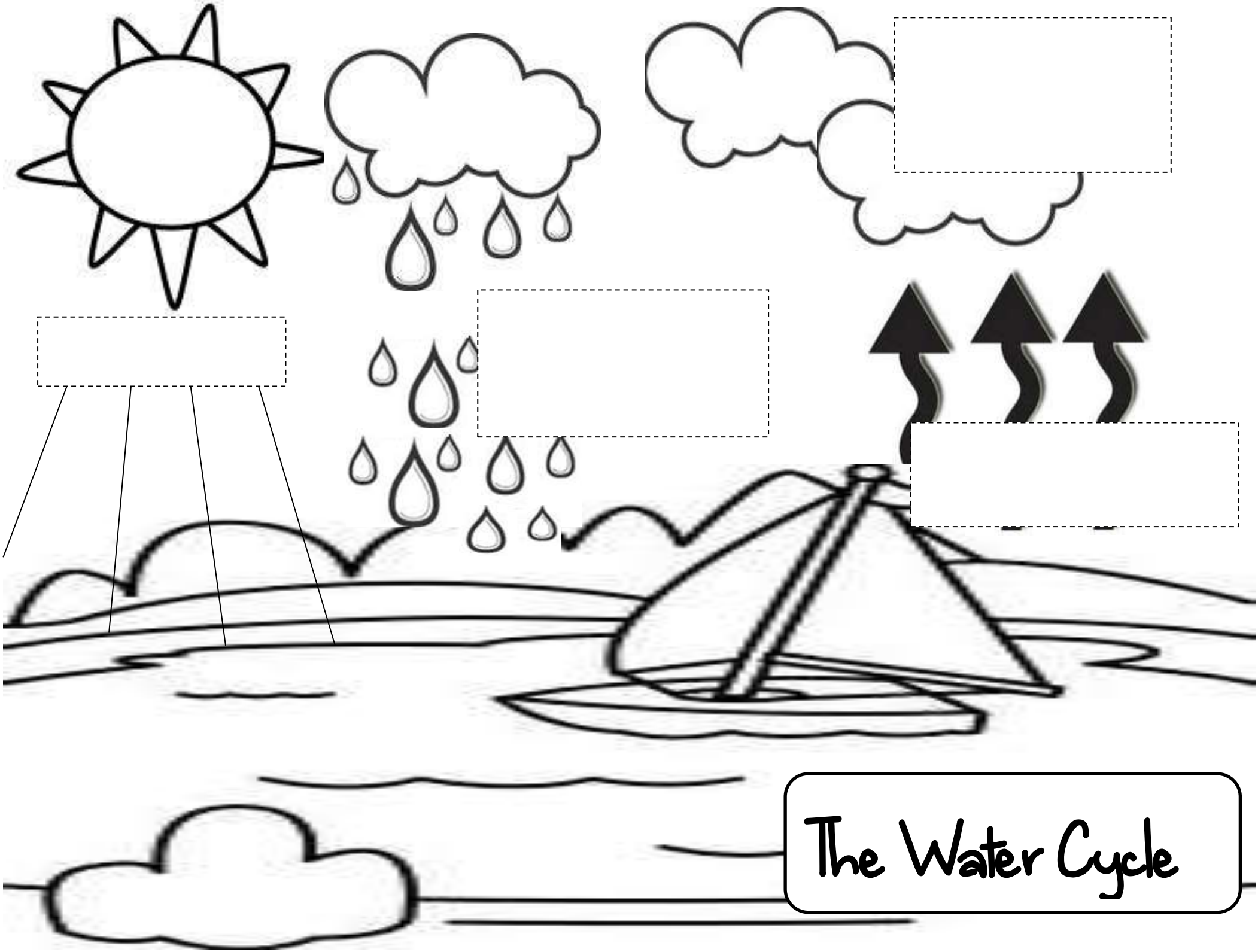
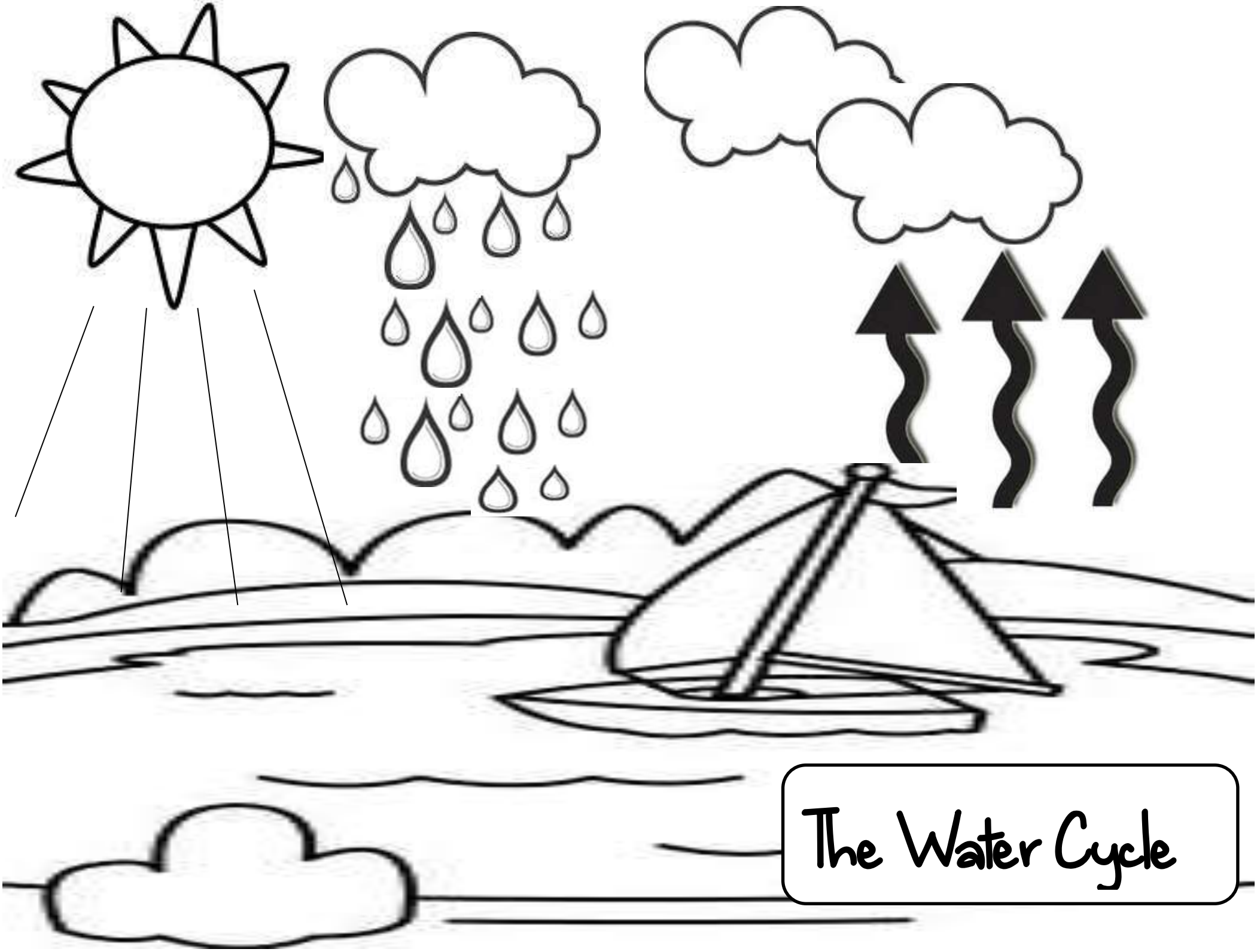

The Water Cycle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