**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Assignment Sheet 7th Grade (January 30, 2017)**

**Objectives:**

* Use experimental results to explain thermal energy and changes of state in the water cycle
* Apply experimental results to explain why lake effect snow occurs

**\_\_\_\_\_\_\_\_\_Opening: (3 min)**  Watch the following video clip (1:58 min) from the Weather Channel explaining how lake effect snow occurs: <http://safeshare.tv/x/8yZ9Ry4x2Yk>.

**\_\_\_\_\_\_\_\_\_\_Elaborate (20 min)** Handout 1-13: Lake Effect Snow.  Use what they have learned about evaporation and condensation to explain how lake effect snow forms.  Have a class discussion with students about their answers to the questions on the Lake Effect Snow sheet.

**\_\_\_\_\_\_\_Evaluate: (17 min)**  Demonstrate their knowledge of how thermal energy and gravity cause water to cycle through Earth’s systems on  Handout 1-14: Changes of State in the Water Cycle.

**Objective:**

* **Explain that warm air can hold more water vapor than cold air.**

**\_\_\_\_\_\_\_\_\_--Elicit: (10 min)**  Create a foldable by holding a piece of paper hamburger-style and folding the bottom of the paper up to the halfway point. They need to label the bottom flap with hydrosphere and then divide the top into the 5 layers of the atmosphere: troposphere, stratosphere, mesosphere, thermosphere, and exosphere.

\_\_\_\_\_\_\_Watch the following video, quickly sketch and label the different parts of the hydrosphere and atmosphere: <http://safeshare.tv/x/ss57b462f93a303> (3:04 min). Fold down the hydrosphere flap and write a few sentences about what would happen to weather if there were no hydrosphere. Finally, students need to turn the foldable over and upright (where they sketched the hydrosphere) and write a few sentences about what would happen to weather if there were no atmosphere.

**\_\_\_\_\_\_\_Engage: (15 min)**  You will model warm and cold air masses which are large bodies of air with similar temperature and humidity. Following the modeling, You will be creating a cartoon showing what they learned. The rules are that the water molecules can touch each other but they cannot touch the air molecules or they are out. If water molecules touch each other they become liquid or solid water.

Ask 4 students to be “air molecules” and stand 4 feet apart in a square grid (If you have square floor tiles, you can use them as a guide). Then, have four students representing “water molecules” with laminated signs that show their state and visibility.

The “water molecules” should have their signs turned to the “Invisible Water Vapor.” The water molecule students should stand between the air molecules without touching anyone. Tell the students that they are modeling warm air.

Explain that when air molecules cool, they come closer together. Have the air molecules slowly move closer to each other. If the water molecules touch the air molecules, they are “out” and fall as precipitation. If they touch other water molecules, they become a cloud. Have all of the “water molecules” turn their signs to the cloud if they touch each other and to the precipitation if they touch an air molecule. Continue moving the air molecule students closer together (very cold air) until all of the water molecules are out.

\_\_\_\_\_\_\_Reflect on this demonstration.  We started out with warm, humid air. We ended up with cold, dry air. Have the students fill out Handout 1-17: Which Has More Moisture, Warm or Cold Air demonstrating the activity. Have students share their ideas with a partner or small group.

**\_\_\_\_\_\_\_\_\_Closing: (15 min)** Distribute copies of Handout 1-18: Summary of Activities and Discoveries. We have done several hands-on activities and made discoveries about weather. Use the rest of the class period to fill in the first 3 rows of this summary. Keep the handouts to use in several following sessions.