Modeling Air Masses and Fronts

Overarching question: How do air masses form fronts?

SAFETY!!

Goggles are required during this investigation.

Problems: To model air masses.
Observe the location of a front.
Infer the type of front that forms.

Background Information: **Fronts** form where air masses of different temperatures meet.

Materials:

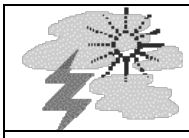
Plastic box with lid	Water	Paper
Match	Lamp	Ice
Ruler	Paper towels	

Procedure:

1. Cover the bottom of the box with 5cm of water. Keep the walls of the box dry.
2. Light the paper. Blow it out, directing the smoke into the box so that the box is filled with smoke.
3. Place the lid upside down on the box.
4. Put five ice cubes inside one end of the lid.
5. Turn on the lamp so that it shines above the other end of the box.
6. Observe what happens inside the box and on the bottom of the lid. Record your observations.
7. Move the lamp so that it shines over the middle of the box.
8. Observe what happens inside the box and on the bottom of the lid. Record your observations.

Name_____

Data:

	**Observations**
Ice on end of box	
Lamp on end of box	
Lamp in middle of box	

Conclusions:

1. Infer where clouds come from.

2. Describe where condensation and precipitation form.

3. Identify what section of your box represents a cold air mass.

4. Identify what section represents a warm air mass.

5. Infer where the weather front is in your box.

6. Describe where the front moved.

7. Identify which kind of front you made.

As this experiment utilizes matches and fire, educators should use best judgment on whether or not to allow the students to directly participate.

Levels of Inquiry

Confirmation – Provide the students with the overarching question and the procedure, as well as the materials. Place several instrument artifacts around the room so that students can check their progress.

Structured - Provide the students with the overarching question and the procedure, as well as the materials. Allow students to discover the finished product on their own.

Guided – Provide the students with the overarching question and materials. Students are to create and write their own procedures and determine which materials to utilize. Allow students to discover the finished product on their own.

Open - Students are given a scenario that describes a situation. From this scenario, students are to generate an overarching question. From that point, students are to create and write their own procedures and determine which materials to utilize. Allow students to discover the finished product on their own.

Possible scenario – During television weather forecasts, Tyrese listens to the meteorologist talk about air masses and fronts. How does this affect the weather outside?

Correlated Literature (with Lexiles) (Audio capable)

(All literature can be found on the Galileo website unless otherwise noted.)

Vasquez, T. (2011). Forecast Center. *Weatherwise*, *64*(3), 78. doi:10.1080/00431672.2011.572459

Technology Integration

Digital Camera – Documenting your student's work with a digital camera is a great idea. Not only do you have digital media, but students are usually excited about presenting their work to be captured by camera. With the media, there are endless possibilities, from PowerPoints to blogs to Glogs and beyond!!! (Always refer to your school's policies about posting student's pictures or work on the Internet.)

Presentation Platforms – Presentation platforms have evolved. PowerPoint is still effective, but here some examples of Internet based platforms. (Many of them allow the embedding of pictures, video, and audio, as well as text.)

http://www.prezi.com – zoomable slide presentation tool

http://edu.glogster.com/ - Internet based poster maker

http://museumbox.e2bn.org/index.php - description of an event or person in an interactive box

http://www.voki.com/ - create an avatar to speak for you

Common Core (Grades 6-8)

L6-8RST3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
L6-8RST7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
L6-8WHST2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

e. Establish and maintain a formal style and objective tone.

f. Provide a concluding statement or section that follows from and supports the information or explanation presented.

Georgia Performance Standards

S6CS2. Students will use standard safety practices for all classroom laboratory and field investigations.
a. Follow correct procedures for use of scientific apparatus.
b. Demonstrate appropriate techniques in all laboratory situations.
c. Follow correct protocol for identifying and reporting safety problems and violations.

S6CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.
c. Read analog and digital meters on instruments used to make direct measurements of length, volume, weight, elapsed time, rates, and temperature, and choose appropriate units for reporting various quantities.

S6CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.
a. Observe and explain how parts are related to other parts in systems such as weather systems, solar systems, and ocean systems including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts. (For example: El Nino's effect on weather)
b. Identify several different models (such as physical replicas, pictures, and analogies) that could be used to represent the same thing, and evaluate their usefulness, taking into account such things as the model's purpose and complexity.

S6E3. Students will recognize the significant role of water in earth processes.
b. Relate various atmospheric conditions to stages of the water cycle.

S6E4. Students will understand how the distribution of land and oceans affects climate and weather.

a. Demonstrate that land and water absorb and lose heat at different rates and explain the resulting effects on weather patterns.

b. Relate unequal heating of land and water surfaces to form large global wind systems and weather events such as tornados and thunderstorms.