Lesson Plan #5


Name: Mr. Lance Cunningham  Grade Level: 9th

Content Objectives:
Students will recall knowledge of the Earth's atmosphere and the patterns and functions of weather that have recently been developed and employ them to interpret weather data in order to extrapolate weather forecasts.

State Standards:
3.5.7.C
- Explain weather forecasts by interpreting weather data and symbols
- Explain and illustrate the processes of cloud formation and precipitation
- Identify different air masses and global wind patterns and how they relate to the weather patterns in different regions of the U. S.

3.5.10.C
- Describe weather and climate patterns on global levels

Rationale:
This material is useful to the student so as to be able to understand the weather phenomena around them day to day and also to understand the means by which it is predicted. In understanding these variables and the concepts controlling them they develop the means to advance to other physical systems.

I chose to comport this lesson after this fashion in order to allow the students to review the material for the upcoming exam and demonstrate both to themselves, and to me, their understanding thereof. The form of the review was chosen so as to encourage accountability as the students control the timeline and direction of the review. The assignments with aid allows me to review with students singly if miscomprehension is not generalized, or if instead their is a general need the subject might be revisited prior to examination.

Materials:
Teacher:
- Notes from previous lectures, computer, Smartboard, chalkboard, writing utensils
- Fronts Worksheet (ch15_lesson3_fronts.pdf),
- Weather Patterns Worksheet (ch15_lesson5_weather_patterns.pdf),
- Weather Prediction Worksheet (ch15_lesson4_weather_prediction.pdf)

Student:
- Writing utensils, notebook, Fronts Worksheet (ch15_lesson3_fronts.pdf),
- Weather Patterns Worksheet (ch15_lesson5_weather_patterns.pdf),
- Weather Prediction Worksheet (ch15_lesson4_weather_prediction.pdf)
Procedures:

Transition Motivation:
Okay guys and gals, we've covered the atmosphere in the previous unit; we've gone over pressure systems, isolines, Coriolis force, cyclonic rotation and fronts in this. We're fast approaching another exam. There will be one next week on weather, I know you have a long weekend to study but does anyone have any questions they'd like to ask; or does anyone have anything they would like gone over again, beforehand?

Behavioral Objectives:
Students will reproduce the information of the past unit, with the help of their peers and the teacher, as review for the upcoming exam. Following this they will interpret atmospheric data and employ the reviewed knowledge to infer from the data a predictions of the trends of fronts, temperatures and other weather phenomena.

Organizer:
Agenda on side white-board:
- Review Weather
- Fronts worksheet
- Weather Prediction worksheet
- Weather Patterns worksheet

Sequence of Lesson:
I. Student led review of weather and the atmosphere
II. Behavior of weather systems
   A. Discuss front locations and motions
      1. Placement
         a. Between all high/low interfaces
         b. Spinning out of lows with warm leading
      2. Motions
         a. Counterclockwise (cyclonic, for winds)
         b. Cold moves faster than warm
   B. Discuss effects of system behavior on weather
      1. Cold is low and dense
      2. Warm is light relatively
      3. Cold lifts Warm at interfaces
   III. Fronts worksheet (with teacher aid)
   IV. Weather Prediction worksheet (with teacher aid)
   V. Weather Patterns worksheet (with teacher aid)

Assessment Strategies:
Assess understanding based upon number and complexity of review type questions as well as the difficulty and degree of assistance needed during worksheets.

Closure:
Transition to next Lesson:
Next Tuesday Mr. Wilson will be reviewing this weather material as a refresher after the break and maybe adding a few new tricks. Then we will be starting our study of the oceans; with a test on weather probably Friday.

Assessment:
1. Level and complexity of the questions asked during review
2. Answers and degree of difficulty with the three worksheets.

Homework Assignment:
Finish uncompleted worksheets for Tuesday.
LESSON 3: FRONTS

What happens along cold fronts and warm fronts?

The boundary between two air masses is called a front. As a result, moving fronts indicate a change in the weather. On a weather map fronts are drawn where there is large change in temperature and a shift in wind direction. A front can also be described as the boundary between adjacent Highs with different conditions.

On a weather map, fair weather is generally associated with Highs while stormy weather is associated with Lows and with the portions of fronts that extend from them. Highs and Lows are usually hundreds or thousands of miles across. Both Highs and Lows tend to travel from west to east across the United States, bringing changing weather as they move.

The image above shows an example of a weather map containing a warm and cold front. A cold front means a cold air mass is pushing into a warmer air mass, and is shown with blue sharp "teeth" pointing the direction of the moving cold air. A warm front means a warm air mass is pushing into a colder air mass, and is shown with red rounded "teeth" pointing the direction of the moving warm air.

Exercise 3:

- This activity will assist you in interpreting weather maps on which fronts are already identified.

Use the map above to complete the following activity.

Imagine that you are located at El Paso, Texas on the map.

1. As the cold front approaches, what changes in the sky condition do you expect?
2. What changes in wind direction will occur as the front passes?
3. At the time the front passes what change in temperature will occur?

Imagine that you are located at New York City, New York on the map.

4. What changes will occur in the sky condition prior to the arrival of the warm front?
5. As the warm front passes, what changes do you expect in wind direction?
6. After the front passes, what changes in weather do you predict?

The rainfall is usually different along cold fronts and warm fronts. Along cold fronts, the air is pushed up
rapidly and the front quickly passes. The rain is often more stormy and relatively brief. Along warm fronts, the air is pushed more slowly over the cold air mass. The rainfall is usually more gentle and extended in duration.

7. Over which city, New York or El Paso, are thundershowers more likely to occur? Why?

8. Draw a table similar to the one below and fill in the characteristics of Highs and Lows in the blanks.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>HIGH</th>
<th>LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Winds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sky Condition</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Activities (Lessons)

- LESSON 1: ISOBARS
- LESSON 2: ISOOTHERMS
- LESSON 3: FRONTS
- LESSON 4: WEATHER PREDICTION
- LESSON 5: WEATHER PATTERNS
- LESSON 6: WEATHER PROVERBS Part A and Part B

Image Credits:

Maps from The Weather Channel
Maps from Tiger Census Maps

Written by: Gene Rempel and Mike Hanson

Last Modified by NASA: September 19, 1998
LESSON 4: WEATHER PREDICTION

How well can I predict the weather for the next four days?

Chicago Forecast:
"Current weather is cloudy with drizzle as a warm front is passing; temperatures will rise and the skies will clear as the front moves past our area; winds will from the southwest; air pressure will remain relatively steady."

Notice that as the Low moves across the country, the associated fronts advance around the center of the Low. It works somewhat like a spinning top traveling across a floor. Also notice the relative speed of motion of the two fronts around the center of the Low. The cold front, advancing more quickly than the warm front, eventually "catches" the warm front. The approaching cold front "arm" pushes the warm, moist air upward like a bulldozer pushes dirt. Recall that precipitation occurs as the warm moist air ahead of a cold front rises. (The "squeeze play" involves a fast-moving bulldozer (cold front) rear-ending a slower moving truck (warm front) ahead of it, moving in the same direction. When the collision occurs, the contents of the truck (precipitation) are pushed out.)

Exercise 4:

- This activity will assist you in creating your own weather maps of the next few days and making your own forecast.

Select Image 4-A and print out the page of maps. You will use these maps to draw your own forecast maps and write your own weather report.

1. You are a weather forecaster. Given the first two days of a four day forecast sequence, predict and draw the sequence of forecast images for the next two days. Notice the distance the Low (L) and High (H) travel in a one day period, and use that to predict how it will travel over the last two days. Use the first two day sequence to estimate the speed at which the cold front approaches the warm front.

2. As a weather forecaster you must explain these maps to your viewing or reading audience. Write a weather report explaining your forecast sequence. Include forecasts for Denver, Memphis, and Chicago. Discuss changes in pressure, wind direction, wind speed, temperature, and sky condition.

Check your predictions and discussion.
Activities (Lessons)

- LESSON 1: ISOBARS
- LESSON 2: ISOTHERMS
- LESSON 3: FRONTS
- LESSON 4: WEATHER PREDICTION
- LESSON 5: WEATHER PATTERNS
- LESSON 6: WEATHER PROVERBS Part A and Part B

Written by: Gene Rempel and Mike Hanson

Last Modified by NASA: September 19, 1998
Lesson 5: Weather Patterns

LESSON 5: WEATHER PATTERNS

How will the weather change over the next week?

Air masses and accompanying fronts do not remain stationary for long. Although their movements are never exactly the same, they do exhibit some patterns that help meteorologists and others predict the weather. The boundary between two air masses is called a front. As a result, moving fronts indicate a change in the weather. On a weather map fronts are drawn where there is a large change in temperature and a shift in wind direction. A front can also be described as the boundary between adjacent Highs with different conditions.

Exercise 5:

- This activity will assist you in predicting the weather maps of the next few days.

Use the following map to do this activity.

Imagine that you are located at El Paso, Texas, on the map.
1. As the cold front approaches, what changes in the sky condition do you expect?
2. What changes in wind direction will occur as the front passes?
3. At the time the front passes what change in temperature will occur?

Imagine that you are located at New York City, New York, on the map.

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7. Over which city, New York or El Paso, are thundershowers more likely to occur? Why?

Activities (Lessons)

- LESSON 1: ISOBARS
- LESSON 2: ISOTHERMS
- LESSON 3: FRONTS
- LESSON 4: WEATHER PREDICTION
- LESSON 5: WEATHER PATTERNS
- LESSON 6: WEATHER PROVERBS Part A and Part B

Written by: Gene Rempel and Mike Hanson

Last Modified by NASA: September 19, 1998
My fifth lecture began with a review of the material that had been taught in this present unit, on the Earth’s atmosphere and weather. This, I feel to have been the most productive review activity that I have performed or seen performed so far. This resulted from the form that I chose to use for the review. I began by announcing that we had now completed the unit on weather and the Earth’s atmosphere; which are in fact two units wherein the present was weather and the Earth’s atmosphere had been the previous. I called them one intentionally as the present unit on weather is so integrally related to the previous that you cannot usefully discuss the weather without presuming knowledge of the atmosphere.

For this review, after my announcement of completion of the unit, I listed some topics that had been covered in the unit: air masses, fronts, and pressure systems. This was a very incomplete list, I had prepared a more complete list of topics on the SmartBoard but concealed using a screening program ‘black-drop’ prior to class. This more complete list I would use to prompt discussion subjects if my students could not think of topics on which to expound. After presenting my abbreviated list of topics I asked the students to chose any one topic that we had learned about during this unit. S.G. raised his hand chose a topic that I had not mentioned but was still a current development, ‘station models’. I asked him to tell me one fact about station models and then at his choosing, name a student to give me one more fact. He told me that the base structure of a station model was a circle that then had other information presented in and around it and denoted R.C. as his follower. R.C. then told me that station models had temperature at that station noted on it. This was not a complete enough fact, so I asked him which temperature we had learned a few including air temperature and dewpoint temperature. He told me that he had meant the air temperature and with a bit more prompting gave me its location on the station model and the caveat that this was always in Fahrenheit on these models and lacked its units with the number.

This review went on after this fashion for about twenty minutes of the forty-five minute class period. I ran into only one student that even with prompting could give me no new information; I did not push any student to a point that I felt would make them feel uncomfortable but neither did I let them simply get away
with ‘I don’t know’. In the event that one gave me an ‘I don’t know’ I gave them more prompting, or asked
them a question about the subject of discussion that very nearly gave them an answer. After the class review
activity I handed out my three worksheets on fronts, weather prediction and weather patterns. I gave little
direction on these handouts as they contained their instructions and those contained were fairly self-explanatory
to an informed community. I did however circulate amongst the class offering help and further explanation to
those that asked for it.

My mistake with this lesson was that I openly offered to my class that they may work with their
neighbor so long as they do so quietly and controlled-ly. I have since learned that this phrasing is not
understood by ninth graders, or at least not this particular class of them. I have had difficulties with this class
before, in this regard, but decided to give them yet another chance. They failed, and the offer will not be made
again. I had to break up one group of students that decided to rearrange the desks to create a small island at
which seven of them sat in a ‘neighboring community’. I told them that they had pushed it too far, and at this
point they must separate and return to their original seats and work with whom they could speak to in a whisper
from that position. If, at their assigned seat, that happened to be no one that they desired too work with, so
much their loss. My mentor, after my lesson lauded me for the review activities success, but with regard to the
assignments said that I was pretty much crazy. I’ve had that particular difficulty with them before, why invite it
again? A second potential issue, that I may have created, is that to those that did not finish all three activities in
class I assigned them to finish for homework. This may create an issue as this is an extended weekend due to
the holiday, from the normal two days to a full five. These students are not in the habit of receiving homework
on any given day, for them to remember over the course of a full week is unlikely at best. The true scale of the
issue created by this is negligible as the assignments that I give, during this semester are generally not graded at
all and if they are then it is only to the tune of a binary grade being completed or not. I shall see the completion
rate next week, but the revelations that it may allow I will hold until I am teaching next semester as then I will
have the opportunity to set the norm.