"Taking Our Middle School By Storm"

For further information contact

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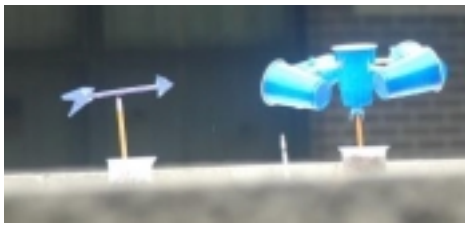
T2T
Teacher to Teacher Connection



2005-2006 IDEA CATALOG OF EXCELLENCE

PROGRAM OVERVIEW

"Taking Our Middle School By Storm" is part of a 7th grade science unit that incorporates multiple hands on activities while learning about weather and climate. This is part of a 4 week unit that introduces students to basic weather patterns, making weather predictions, and storm patterns.

There were several engaging lessons in which students became very involved and excited about this unit. First, students constructed a weather station that included a barometer to measure changes in barometric pressure, an anemometer to measure wind speed, a psychrometer to measure relative humidity, a thermometer to measure temperature, and a wind vane to measure wind direction. With this equipment, students then recorded daily measurements and began to make weather predictions.

During the second phase of this project, students used their weather data and Internet resources to prepare a forecast for the upcoming school day. This information was scripted and then recorded in the school's video production studio. The forecast was then aired on the school's television station the following morning during announcements.

Once the students understood basic weather patterns, students simulated a cold front using warm and cold water. Next, they learned about various weather conditions (thunderstorms, tornadoes, etc.) that can develop from cold fronts. The unit ended with the students creating a storm documentary in which they simulated a thunderstorm, lightning, and a tornado in a mini-village.

OVERALL VALUE

Throughout this unit, this project incorporated multiple learning styles, and thus fascinated a large number of students. Students had the opportunity to learn through visual, auditory, and kinesthetic means.

In addition, the daily tracking of weather data reinforced analytical and critical thinking skills. Preparation of weather scripts strengthened written communication skills, while preparation of the televised weather report strengthened oral communication skills. Students working together stimulated interpersonal and team-building strategies. Increased test scores, an enthusiastic approach toward learning, and increased interpersonal relationships are some of the rewards of this project.

LESSON PLAN TITLES

- Collecting Weather Data
- Making Weather Predictions
- Cold Front Simulation

MATERIALS

Materials for each lesson are listed with each lesson plan. Overall materials budget including pricing and vendors follows the lesson plans.

ABOUT THE DEVELOPER

Angela Chapman began teaching 7th grade science at Sleepy Hill Middle School in 2004. Angela has also taught at Polk Community College and Lansing Community College as an instructor of Anatomy and Physiology.

She has her Master of Science in Biology from the University of Kentucky and Bachelor of Science in Zoology from Michigan State University.

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LESSON PLAN No 1: Cold Front Stimulation

SUBJECTS COVERED

7TH Grade Science, Weather & Climate

GRADES

Seven

OBJECTIVES

1. Students will reinforce their understanding of density, and that more dense objects sink.
2. Students will learn that a cold air mass is more dense than a warm air mass.
3. Students will learn that a cold front occurs when a rapidly moving cold air mass meets a warm air mass, as a result the cold air mass moves under the warm air mass.
4. Students will learn the different weather conditions that can develop when a cold front occurs (tornadoes, thunderstorms, floods).

SUNSHINE STATE STANDARDS

- Knows the different weather events on Earth that change Earth's features
- Uses scientific processes to solve problems and reach conclusions
- Accurate record keeping, openness, and replication of experiments are essential

MATERIALS (PER GROUP)

- 1 beaker of warm water with red food coloring
- 1 beaker of (refrigerated) cold water with blue food coloring
- 1 beta fish tank with solid removable divider
- Colored pencils (black, blue and red minimum)

DIRECTIONS

1. For bellwork or warm-ups have the students define cold front, warm air mass, cold air mass, density.
2. Begin class with a lecture/ discussion reviewing density, how it is determined, and the units. Then discuss what a cold front is, as well as warm and cold air masses. Lead into how cold fronts can often lead to certain storms such as thunderstorms, etc.
3. Having students apply the scientific method using QOPEC.
   a. Question: Is cold water (air) more dense than warm water (air)?
   b. Observations: Will vary, but usually that they can "feel" cold air. (Reinforce that an observation is using one of the five senses).
   c. Prediction/Hypothesis: I let the students form their own hypothesis - the majority will predict that cold and warm will mix - to form "purple" water. They base this on their own understanding of water. However, some will predict that cold water (air) is more dense than warm water (air).
   d. Experiment: Step 4 below
   e. Conclusion: Those that predicted the two would mix to form purple water then reject their hypothesis, while those that predicted cold water is more dense than warm will accept their hypothesis.
4. Next, have the students work in groups of 3 or 4 and assign the following roles (based on Kagan): Lead Scientist, Materials Specialist, Data Collector, and Supervisor (4th person).
5. Materials Specialist is to get the listed supplies from the teacher.
6. Instruct the Lead Scientist to simultaneously pour the cold water in one compartment and the blue water in the adjacent compartment.
7. As soon as the water has been added, immediately remove the divider.
8. Tell the students to observe what is happening and to both write down their observations and draw a picture of what is happening. All of the students should do this, however, it is the responsibility of the Data Collector to be taking thorough notes as the Lead Scientist may be busy and not be able to take notes right away.

EVALUATION / ASSESSMENT

1. Have students answer the following questions:
   a. What happened when the divider was removed from the tank?
   b. Why did the blue (cold) water form a distinct layer beneath the red (warm) water?
   c. Write out the QOPEC steps above and answer each.
2. Have the student write an essay question describing how a cold front forms - based directly on their observations and the lecture material. Have them include their drawing they made during the simulation.

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LESSON PLAN No 2: Collecting Weather Data

SUBJECTS COVERED

Science, Weather & Climate

GRADES

Seven

OBJECTIVES

1. Students will understand how to make a psychrometer.
2. Students will understand how to record data from their psychrometer.
3. Students will understand how to determine relative humidity.

SUNSHINE STATE STANDARDS

- Knows the different weather events on Earth that change Earth's features
- Uses scientific processes to solve problems and reach conclusions
- Accurate record keeping, openness, and replication of experiments are essential

MATERIALS NEEDED

- 2 alcohol-filled air thermometers (they must read exactly the same temperature when placed side by side out of direct sunlight)
- clear tape - packing or duct
- cotton shoelace (the hollow type) or gauze
- thread
- beaker or plastic bottle
- water (distilled is best but tap will do)
- relative humidity chart (see below)

DIRECTIONS

1. Find a flat area (outdoors) that is out of the way of heavy traffic, but exposed to direct sunlight (a window ledge can work).
2. Cut the tips off of the shoestring and then cut about 5 cm of shoestring and slip it over the bulb of one of the thermometers. Alternatively, cut a piece of gauze approximately 5 cm of gauze and wrap it around the bulb of one of the thermometers. Tie it in place with the thread.
3. Cut a small piece of tape. Position the covered bulb of the thermometer inside of the beaker, so that the bottom of the gauze or shoelace is approximately 1/2 into the beaker. Be sure the top of the thermometer is aligned with the top of the bottle. Tape the thermometer to the bottle. Tape the other thermometer parallel to the first one and about 1/4 inch away. Put a strip of tape around the bottle and both thermometers to make sure they don't fall off.
4. Put room temperature water in the bottle until it covers the gauze but does not reach the bulb of the thermometer.
5. Wait 5 to 10 minutes and read both thermometers. There will be a difference in the two. Use the chart below to calculate the relative humidity. Find the dry temperature along the top of the chart that is closest to your actual dry temperature. Next, determine the difference between the dry and wet bulb temperatures by subtraction.
6. Keep a record of the daily humidity for a few weeks. Next to your entries, describe the way you feel on those days.
7. The dry-bulb temperature can also be used to record the air temperature. (1)

EVALUATION / ASSESSMENT

1. Assess the completed psychrometer.
2. Evaluate the completed data log which can include wet and dry temperature recordings, relative humidity determination, as well as a record of how humid it "feels". (A sample table follows). (2)

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(1)

	Dry Bulb Temperature in Degrees Fahrenheit							
Difference Between Dry Bulb and Wet Bulb Temperatures in Degrees Fahrenheit	**60**	**64**	**68**	**72**	**76**	**80**	**84**	**88**
1	90	91	91	92	92	92	93	93
2	80	82	83	83	84	85	86	86
3	71	73	74	76	77	78	79	80
4	61	65	66	68	69	71	72	73
5	53	57	59	61	62	65	66	67
6	44	49	51	54	56	58	60	61
7	36	41	44	47	49	52	54	56
8	27	34	37	40	43	47	49	51
9	20	27	31	34	37	41	43	45

(2)

DAY	TIME	WET TEMP	DRY TEMP	DIFFERENCE	"FEELING"

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LESSON PLAN No 3: Predicting Weather & Storms

SUBJECTS COVERED:

7TH Grade Science, Weather & Climate

GRADES:

Seven

OBJECTIVES

1. Students will understand the meaning of storm, tornado, lightning, thunderstorm.
2. Students will learn the weather symbols on maps: cold front, warm, front, stationary front, occluded front.
3. Student will learn the importance of low pressure system.

SUNSHINE STATE STANDARDS

- Knows the different weather events on Earth that change Earth's features
- Uses scientific processes to solve problems and reach conclusions
- Accurate record keeping, openness, and replication of experiments are essential

MATERIALS (PER GROUP)

1. Map of United States
2. 2 sets of laminated weather symbols
3. Double sided tape
4. Glue

DIRECTIONS

1. Use information collected from the weather station (mainly barometric pressure) and Internet (SEE LINKS BELOW).
2. Have students make flashcards of with one set of laminated symbols (fronts, sun, cloud, thunderstorm, etc.). Glue or tape the symbol (i.e.- thunderstorm) to one side and a description on the opposite (i.e.- thunderstorms are heavy rainstorms accompanied by thunder and lightning, they often develop within cumulonimbus clouds).
3. Have the students construct a weather map predicting the weather for the next day. Use appropriate symbols (fronts, sun, cloud, thunderstorm, etc.).
4. Using only their map, have the students write a weather script (which is read by the on air meteorologist). They can choose 2-3 other cities around the country to incorporate into their script.

EVALUATION / ASSESSMENT

1. The weather script is a good assessment.
2. Allow students to quiz each other with their flash cards. This works well as a group of four. One student is responsible for flashing the card to the other three. The student with a correct response gets to keep the card - if they want to keep track of points.

ADDL INFORMATION

LINKS:

www.weather.com

www.nws.noaa.gov

www.accuweather.com

http://www.edheads.org/activities/weather/

www.weatherwizkids.com

SAMPLE CLIP ART FOR WEATHER MAP:

~ Materials Budget ~

SUPPLIER	ITEM DESCRIPTION	COST	QUANTITY	TOTAL COST
www.sciencekit.com	Thermometer	$5.00	2	$10.00
Wal Mart	Beta fish tank	9.00	10	90.00
Wal Mart	Food Coloring	3.00	2	6.00
Wal Mart	Latex balloons (100)	9.00	1	9.00
Wal Mart	Straws	2.00	2 packs	4.00
Wal Mart	Plastic Cups	4.00	1 pack	4.00
Wal Mart	VCR tapes	5.00	1	5.00
Lynn's or Wal Mart	Aquarium	20.00	1	20.00
Home Depot	2x2 sheets of Plywood	5.97	5	29.70
Home Depot	1x2x8'	5.00	4	20.00

	Subtotal	$197.50
	Tax if applicable	
	Shipping if applicable	
	TOTAL BUDGET AMOUNT	$197.50

Teacher's Name Angela Chapman

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