Teacher Survey

Instructions: Please complete the following evaluation.

1. Did you make any adjustments to the learning module? If so, what did you change or omit?

2. From your observations, are the students more interested in atmospheric science?

3. What part of the lesson was most effective or interesting to them?

4. What concept did the students have most trouble understanding or applying?

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Student Survey

Please distribute this survey to the students before and after completing the module.

Instructions: Circle the answer that best describes your feelings about science.

1. I like science.
    a. I strongly disagree.
    b. I disagree.
    c. I am indifferent or unsure.
    d. I agree.
    e. I strongly agree.

2. How often do you talk to your *family* about what you do in science class?
    a. Never
    b. Rarely (less than once a week)
    c. Once a week
    d. A few times a week
    e. Every day

3. How often do you talk to your *friends* about what you do in science class?
    a. Never
    b. Rarely (less than once a week)
    c. Once a week
    d. A few times a week
    e. Every day

4. I think science will be useful when I am older.
    a. I strongly disagree.
    b. I disagree.
    c. I am indifferent or unsure.
    d. I agree.
    e. I strongly agree.

5. I would like to be a scientist when I am older.
    a. I strongly disagree.
    b. I disagree.
    c. I am indifferent or unsure.
    d. I agree.
    e. I strongly agree.

Effectiveness Assessment

Part 1: Pre and Post Assessment (Student Evaluation)

Instructions: Please distribute and score the **Student Evaluation** for each student before and after completing the module. Each question is worth 1 point.

Student Evaluation

Instructions: After completing the lesson on water, please have the students answer the following questions below.

1. Which of the following is not true about dewpoint temperature?
    a. Dewpoint temperature is the temperature at which the air must be cooled for condensation to begin.
    b. If the temperature and dewpoint temperature are close, the air is humid.
    c. The dewpoint temperature is directly related to the amount of water vapor in the air.
    d. The dewpoint temperature is directly related to saturation vapor pressure.

2. If the classroom were heated from 70^{o}F to 85^{o}F, which variable would increase?
    a. Vapor pressure
    b. Dewpoint temperature
    c. Saturation vapor pressure
    d. Moisture
    e. Relative humidity

3. Which phase of water is the most dense?
    a. Ice
    b. Liquid water
    c. Water vapor

4. Clouds are made up of
    a. Water vapor
    b. Liquid droplets
    c. Ice crystals
    d. Both a & b
    e. Both b & c

5. Which of the following is <u>not</u> true about vapor pressure?
    a. Vapor pressure is the force per unit area applied by all phases of water.
    b. Vapor pressure cannot be measured directly.
    c. Vapor pressure is needed to calculate relative humidity.
    d. Vapor pressure is the partial pressure of water vapor in the atmosphere.
    e. Vapor pressure is calculated using the dewpoint temperature.

6. Saturation
    a. occurs when relative humidity is 150%.
    b. occurs when the temperature equals the dewpoint temperature.
    c. causes evaporation.
    d. occurs when vapor pressure equals the total air pressure.

7. Increasing the temperature results in a lower relative humidity. T F

8. Water vapor is invisible to the naked eye. T F

9. When water changes phase, energy in the form of latent heat is required to aid in the phase change or is released once the change occurs. Briefly explain whether the air temperature would increase or decrease slightly when a liquid cloud forms. Why? Recall clouds form when water vapor condenses into small cloud droplets.

10. Calculate the relative humidity if the vapor pressure is 42 mb and the saturation vapor pressure is 85 mb. Would you consider this dry or humid?

    a. RH = 0.494 mb, Dry
    b. RH = 2.024 mb, Dry
    c. RH = 2.024%, Dry
    d. RH = 49.41%, Dry
    e. RH = 202.38%, Humid
    f. RH = 49.41%, Humid

Part 2: Math & Science Proficiency (In-Class Activity: Part 3)

Please score **In-Class Activity**: **Part 3** for each student using the rubric below. This problem is aligned with the following academic standard:

NGSS.MS-ESS2-5
MS-ESS2-5. Weather & Climate (DCI ESS2.C): The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns.

Scoring Rubric

Questions	Score (0 – 3)
Did the student use the relative humidity calculator correctly?	
Did the student include the correct units for relative humidity?	
Did the student demonstrate knowledge of relating temperature and relative humidity (Q2)?	
Did the student demonstrate knowledge of relating dewpoint temperature and relative humidity (Q2)?	

0 – Incomplete
1 – Completed with incorrect answer
2 – Complete with small errors
3 – Complete with correct answer

In-Class Activity: Part 3. Calculation

Instructions: Relative humidity (RH) is the ratio of the actual amount of water vapor in the air over the air's maximum holding capacity. Calculate the RH for the following days using the relative humidity calculator (be sure to enter temperatures in degrees Fahrenheit).

Relative Humidity Calculator

Day 1: Temperature = 78°F, Dewpoint Temperature = 55 °F → RH = _____

Day 2: Temperature = 78°F, Dewpoint Temperature = 60 °F → RH = _____

Day 3: Temperature = 85°F, Dewpoint Temperature = 60°F → RH = _____

Discussion Questions

1. Did the relative humidity increase or decrease between Days 1 – 2? What about between Days 2 – 3?

2. Based on the relationships of moisture in the atmosphere and your results above of how RH changes, relate how changes in temperature affect relative humidity. What about changes in dewpoint temperature? Explain why.

   Day 1-2:

   Day 2-3: