Name: _____

25.1 Measuring Heat

Question: How is temperature measured?

Safety Tip: If you are using glass thermometers, remember that they are very fragile and may break. Handle them very carefully.

1 Which beaker is warmest?

a. Describe how each finger feels. Which finger feels hot? Which finger feels cold?

_____

_____

b. Are your fingers a reliable measuring tool for temperature? Why or why not?

_____

_____

2 What is the actual temperature of the water in each beaker?

Follow the procedures and record your data in table below.

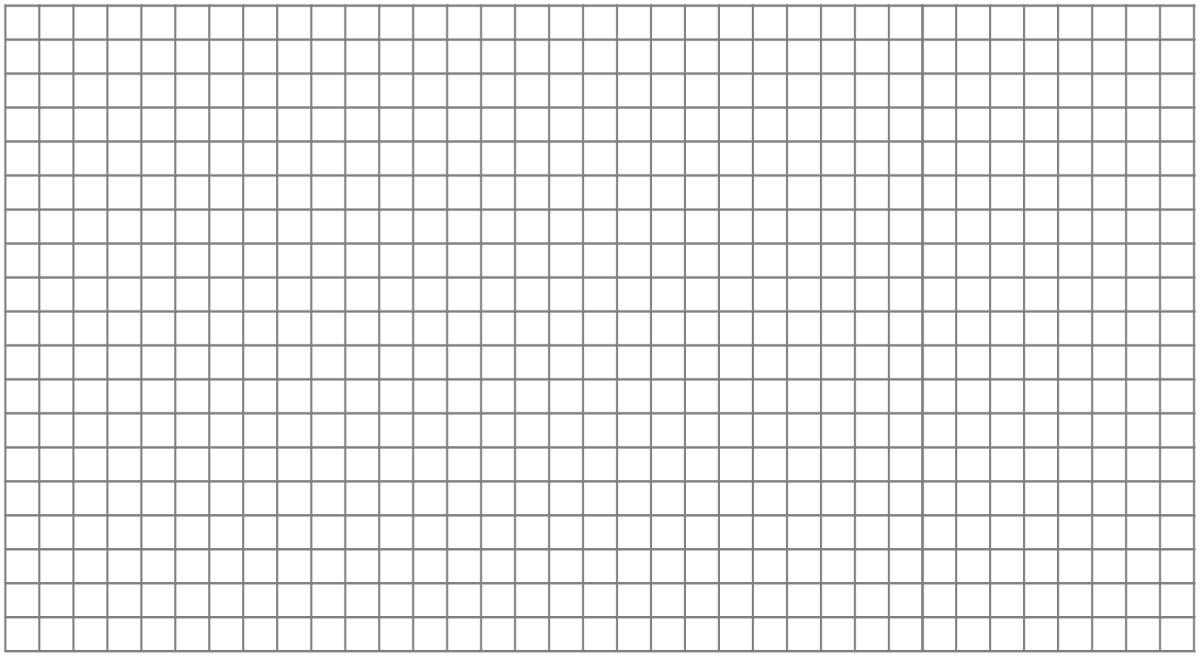
beaker	°F	°C
A		
B		
C		
D		

3 Analyzing your data

Graph your Fahrenheit vs. Celsius data from the table in part 2.

Title: _____

y label: _____



x label: _____

a. Based on your graph, what is the equation that allows you to convert from Celsius to Fahrenheit?

_____

_____

b. Solve the equation you just obtained, ($°F = m°C + b$), for °C. This will give you the formula to convert Fahrenheit to Celsius temperature.

_____

_____

_____

c. Is it possible to obtain negative values of °F? Of °C? Explain your answer.

_____

_____

_____

_____

_____

Name:

25.2 Flow of Heat

Question: How efficient is an immersion heater?

1 Setting up

Follow the procedures and record you data in Table 1.

Warning: DO NOT plug the immersion heater in until it is immersed in water.

Table 1: Initial data

Volume of water (mL)	Mass of water (g)	Heater power (watts)

Safety Tip: The immersion heater will get very hot. Do not touch the metal, only the handle. Also, while heating the water, you should wear goggles.

2 Heating the water and measuring temperature

After you plug in your immersion heater, you will take temperature readings every 30 seconds. Be sure to stir the water before each measurement. Record the time and temperature in Table 2. You will not notice a significant change in temperature for the first minute. Why do you think this is?

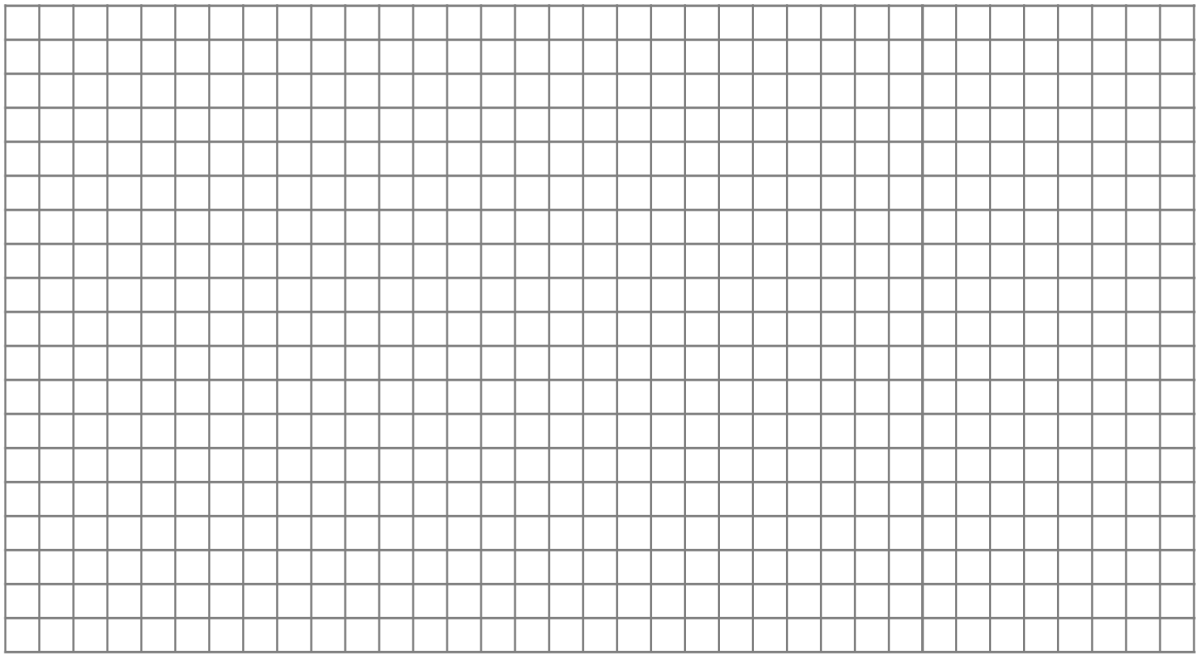
Unplug your immersion heater when you are finished collecting data.

Table 2: Water temperature

Time (s)	Temperature (°C)
0	
30	
60	
90	
120	
150	
180	
210	
240	
270	
300	

Title: _____

y label: _____



x label: _____

3 Graphing your data

a. Graph the data in Table 2 in the blank graph under the table (on the previous page). On which axis will you plot temperature? On which axis will you plot time? Explain your answer.

b. Calculate the slope of your graph. Use the correct units.

c. On which factors does the slope of your graph depend?

4 Calculating increase in thermal energy

Follow the procedure and record your data in Table 3.

Table 3: Increase in thermal energy of the water

Minute	Change in temperature (°C)	Mass of water (g)	Increase in thermal energy (calories)	Increase in thermal energy (joules)
1				
2				
3				
4				
5				

5 Analyzing the data

a. If you were to change the mass of the water, what effect do you think this would have on the increase in thermal energy? What effect would it have on the increase in temperature?

b. What effect would changing the mass have on the slope of your graph? Draw a dashed line on your graph to indicate what you think this effect would be.

c. Does the increase in energy stay constant over the duration of the experiment or does it change? If it changes, why do you think this is?

6 Calculating the efficiency of the water heater

Follow the procedure and record your data in Table 4.

Table 4: Efficiency

Minute	Work output (joules)	Power (watts) from Table 1	Work input (watts/second = joules)	Efficiency (%)
1				
2				
3				
4				
5				

a. How efficient would you say this method of heating water is?

b. Is there any way to recapture the heat that is not absorbed by the water? What happens to the heat that the water does not absorb?

Name:

25.3 Heat Transfer

Question: How much heat is transferred through convection?

1 Doing the experiment

Follow the procedure and record your data in Table 1.

Table 1: Initial data

Temp. of hot water:_____ °C	Volume water in large beaker:_____ mL
	Temp. of water in large beaker:_____ °C

2 Data and observations

Follow the procedures and record your data in Table 2.

Table 2: Convection data

Time	Temp.	Y/N	Time	Temp.	Y/N	Time	Temp.	Y/N

a. Record your observations 1 minute after the onset of convection. Sketch your observations also.

b. Record your observations 5 minutes after the onset of convection. Sketch your observations also.

3 How much heat was transferred by convection?

$\frac{a}{b}$ Calculate the amount of heat transferred using the equation $Q = mc\Delta T$.

$m_{\text{cold water}}$	c_{water}	T_{final}	T_{initial}	ΔT	$Q_{\text{heat transferred}}$
	$1 \frac{\text{calorie}}{\text{gram}^\circ\text{C}}$				

a. What is the heat transfer rate? Divide heat transferred by the number of minutes convection occurred.

b. Does natural convection seem like a good method for transferring heat? Explain.

c. How much heat was transferred in the first minute after convection stopped? What was this heat transfer rate?

d. If convection stopped, and there was no mixing, what caused this additional heat transfer?

e. How does this other method of heat transfer compare with convection? Explain.

4 Forced convection

a. Describe and record your observations.

b. How is forced convection similar to natural convection? How is it different?

Name: _____

26.1 The Atmosphere

Question: Can you measure atmospheric pressure?

1 Parts of an aneroid barometer

a. A compression chamber must be airtight yet flexible so that you can measure changes in volume of the gas it contains. With your group, brainstorm materials you could use for a compression chamber.

b. How will you measure your compression chamber's changes in volume?

2 Building the compression chamber

There are no questions to answer in part 2.

3 Constructing the pointer

a. Write out a step-by-step procedure for constructing your pointer.

b. As you construct the pointer, you may encounter unexpected issues that may require you to modify your procedure. When finished, revise the steps you listed in Part 3a to reflect your final procedure.

c. Test your mechanism by gently pushing on the tympanum with your finger. Could you see the pointer's movement? If not, devise a method to increase the distance moved by the pointer. Record any final changes made to your procedure.

4 Attaching a frame and scale

There are no questions to answer in part 4.

5 Calibrating your barometer

Follow the procedures and record your data in Table 1.

Table 1: Atmospheric pressure data, Week 1

	Temperature	Scale mark on barometer	Commercial barometer reading
Sample	24°C	3	1031 millibars
Sample	26°C	4	1031 millibars
Day 1			
Day 2			
Day 3			
Day 4			
Day 5			
Day 6			
Day 7			

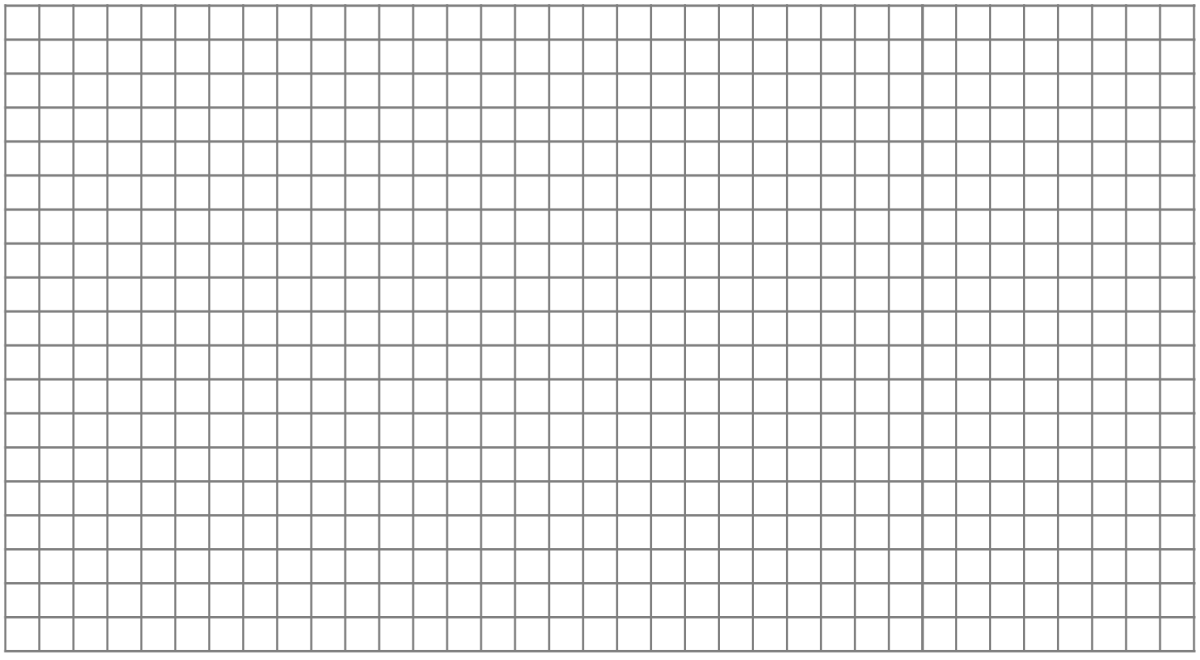
Rewrite the data in Table 1 in Table 2. In Table 2, be sure to group together all readings at one temperature. Then, follow the procedures to make a graph of your data. A blank graph is provided.

Table 2: Atmospheric pressure data, Week 1

	Temperature	Scale mark on barometer	Commercial barometer reading

Title: _____

y label: _____



x label: _____

6 Evaluating your design

a. Use your barometer, thermometer, and graph to measure barometric pressure for an additional week. Record your data, along with data from a commercial barometer, in Table 3 below.

Table 3: Atmospheric pressure data, Week 2

Day	Your barometer reading	Commercial barometer		Day	Your barometer reading	Commercial barometer
1				5		
2				6		
3				7		
4						

b. What is the maximum difference, in millibars, between your reading and the commercial barometer reading? Calculate the percent error of this reading.

c. Name two adjustments you could make to increase the accuracy of your barometer.

d. Look back on your barometer readings for the past week. Can you see a relationship between air pressure and the weather? Do sunny days tend to have high or low pressure? How about rainy days?

Name:

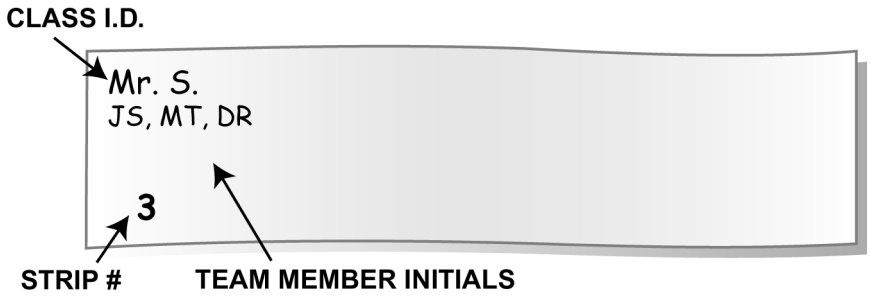
26.2 Layers of the Atmosphere

Question: How much ozone is in our living areas?

1 Making Schönbein paper

Christian Friedrich Schönbein (1799-1868), a chemist, discovered ozone in 1839. He developed this technique for detecting ozone and collected the first ozone data.

1. Lay out several layers of newspaper on your work area. Do all of your work on the newspaper.
2. You will need a coffee filter or a filter disk. Use a pair of scissors to cut your filter paper into strips 1 inch wide and about 4 inches long.
3. Use a pencil to mark one end of each strip with your class, your team, and a number to identify each strip. It might look like this:



4. Lay out a square piece of wax paper. Place your paper strips on it.
5. Lay out a few paper towels to clean up any spills.
6. Your teacher will provide a small cup of ozone detecting mixture.
7. Use your finger to coat both sides of each strip with the mixture. Do not coat the labeled end. *Be sure to wash your hands after working with the mixture.*
8. Place the strips on the wax paper to dry.
9. When the strips are dry, place each in a separate zip-closing plastic bag until needed. Use a permanent marker to label each bag with the strip's number.

2 Detecting ozone

Although you can place your Schönbein paper strips in any location for ozone testing, avoid direct sunlight, and choose a place where your strips will not be disturbed.

1. Before you take your strips out of the classroom, pour a small amount of distilled water into a zip-closing bag. Take this water bag with you.
2. Save one strip as a control. Label it CONTROL and carry it along with you, but leave it in its bag.
3. At each location, first open the distilled-water bag, and dip the strip into the water. Hang the wet strip with removable tape or poster putty.
4. After placing a strip, record the strip number, location, time, and date in Table 1. Save the bag.

Table 1:Ozone detection data

Strip #	Location	Time	Date	Shade: dark, medium, light, or white	Ozone concentration rank
I					
I					
I					
I					
I					

3 Comparing results

There are no questions to answer in part 3.

4 Organizing your data

Follow the procedures and record your data in Tables 2 and 3.

Table 2:Indoor ozone data

Rank	Shade	Location
1		
2		
3		
4		
5		
6		
7		

Table 3:Outdoor ozone data

Rank	Shade	Location
1		
2		
3		
4		
5		
6		
7		

5 Interpreting your results

a. Which of your group's indoor strips recorded the highest ozone concentration? Where was it located? Did any of your classmates find an indoor location with a higher ozone concentration? If so, where was the highest concentration found?

b. Which of your group's outdoor strips recorded the highest ozone concentration? Where was it located? Did any of your classmates find an outdoor location with a higher concentration? If so, where was the highest concentration found?

c. Using what you have learned in this activity, can you predict a location inside your home that may have a high concentration of ozone? Give a reason for your answer.

d. Can you predict an outdoor location in your community where you may expect to find a high concentration of ozone? Why?

e. Extension: Research the causes of ozone in the lower atmosphere. Suggest two ways that ozone concentrations in your home or community could be reduced.

Name:

26.3 Energy in the Atmosphere

Question: Which factors affect Earth's temperature?

Experiment 1: Greenhouse gases and Earth's temperature

1 Investigating the effect of greenhouse gases

Record your sensations and the temperatures for each jug in Table 1 below.

Table 1:Greenhouse gas simulation data

	Temperature	Sensations
Dry jug		
Water jug		
Ammonia jug		

2 Analyzing your results

a. Which jug felt warmest?

b. Did the thermometers measure a temperature difference between the three jugs?

c. Why do you think one jug may have felt warmer than the others?

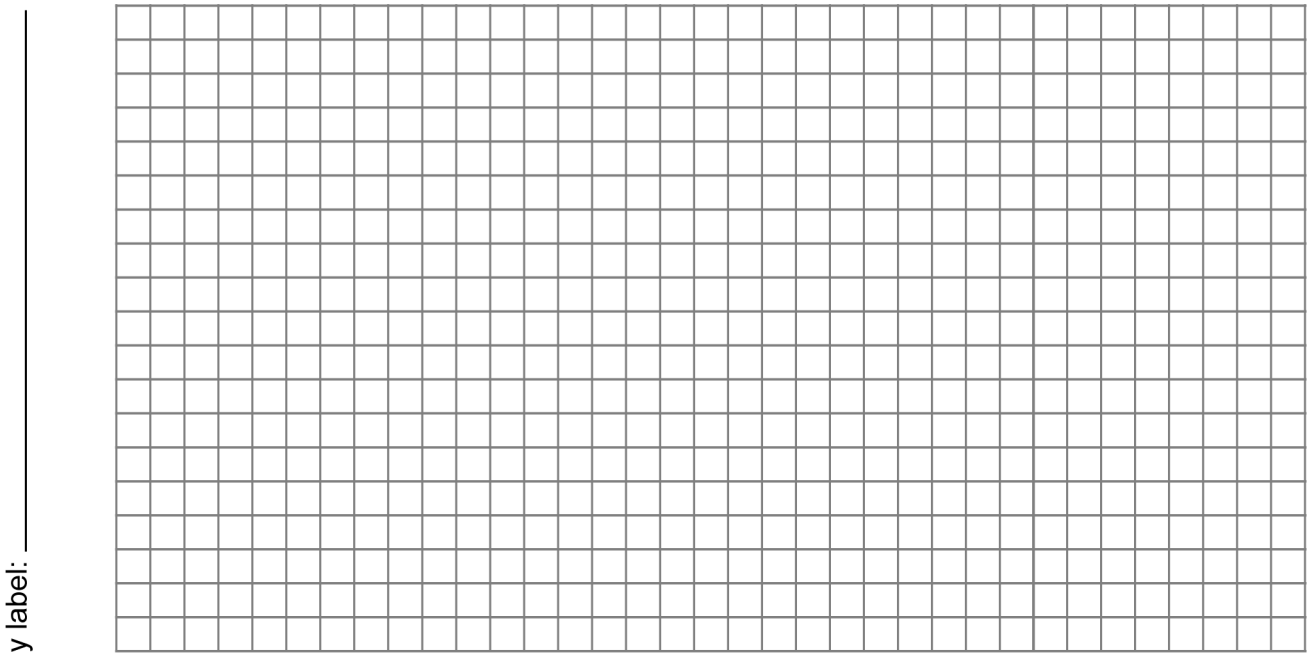
d. How are the vapors in the jugs like the greenhouse gases in the atmosphere?

Experiment 2: Ice and Earth's temperature

1 Investigating latent heat

Graph the data from Table 2 on the graph below. Give your graph a titles.

Title: _____



x label: _____

Table 2: Latent heat data

Elapsed time (min)	Water temp (°C)	Ice temp (°C)		Elapsed time (min)	Water temp (°C)	Ice temp (°C)
0 (start)						

2 Analyzing your data

a. What was the purpose of the ice-salt mixture in this experiment?

b. Compare the shape of the water line and the ice line on your graph.

c. Why does the line representing water temperature have a horizontal section? (Hint: Use what you know about latent heat to help you).

d. Describe the water temperature graph you would plot if you had put a piece of ice in a test tube and surrounded it with a warm-water bath.

e. Think about the contents of the test tube at the middle of the flat part of the graph you described above. What proportion of water and ice would you expect to find in the tube? Is this the same or different from what you observed at the same point in your experiment?

f. What would you expect to happen to the temperature of a test tube containing both ice and water if you placed it in a hot cup for a short time? How about if you placed it in a cold cup for a short time?

3 Applying your experience

a. Would thermal buffering occur if the test tube contained only ice or only water?

b. How is our planet like the test tube?

c. What would happen to ocean temperatures in the months and years following a complete melting of all of the ice that currently serves as a thermal buffer?

Experiment 3: Water and Earth's Temperature

1 Investigating water's specific heat

Record the temperatures of the water and air bottles in Table 3. Use this data to make a graph on the next page.

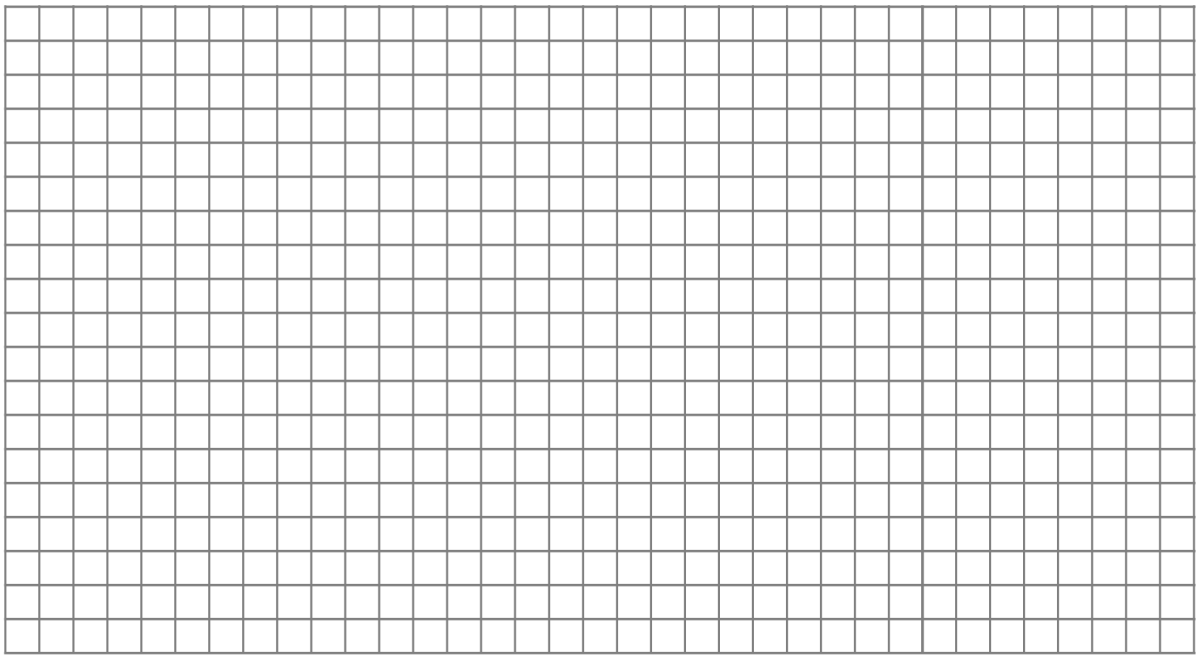
Table 2:Specific heat data

Sunny window				Cold place		
Elapsed time (min)	Water temp (°C)	Air temp (°C)		Elapsed time (min)	Water temp (°C)	Air temp (°C)
0 (start)				0 (start)		

Graph the water and air temperature readings as two separate lines on one graph. Label the *x*-axis *Time*, and the *y*-axis *Temperature*. Be sure to give your graph a title.

Title: _____

y label: _____



x label: _____

2 Analyzing your data

a. Which warms more quickly, water or air?

_____

_____

b. Which cools faster, water or air?

_____

_____

c. The difference between the highest and lowest temperatures is called the temperature range. Calculate the temperature range for the water in your experiment. Then calculate the air's temperature range.

_____

_____

_____

_____

_____

d. Each day, the surface of Earth is warmed by the energy from the sun. Seventy-five percent of Earth's surface is covered with water. If only 10 percent of the surface were covered with water, would Earth experience a greater temperature range each day, or a smaller range? Explain your answer.

3 Extension: How bodies of water affect climate

a. Choose two cities in the world. This will work best if you avoid high polar regions and cities on or near the equator. One city must be on an ocean or sea, the other must be at least 200 miles away from any big body of water. Look up the highest monthly average temperature for both cities. This usually happens in July north of the equator. You can find this information in an encyclopedia or atlas. Or, see www.worldclimate.com on the Internet.

b. Next, look up the lowest monthly average temperature for both cities. This usually happens in January north of the equator.

c. Find the temperature range for both of your cities by subtracting each city's low monthly average temperature from its high monthly average temperature.

d. Are you able to detect the effect of the specific heat of water in the temperature range of your coastal city compared with your inland city? Explain.

e. Use the Internet to find the average daylight and nighttime temperatures for the moon and Mars. Calculate the temperature range for both of these bodies as you have done above. Compare those day-night ranges with the day-night temperature ranges that we experience here on Earth. Use this data to explain in a paragraph how water's high specific heat helps make life on Earth possible.

Name: _____

27.1 Variations in the Heating and Cooling of Earth

Question: What causes the seasons?

1 Developing a hypothesis about the seasons

a. Why do seasons occur? What is your hypothesis?

_____

_____

_____

_____

_____

_____

b. At which point in Earth's orbit is it summer in the northern hemisphere? Draw a diagram to answer this question. Be sure to justify your answer.

2 Setting up your model of Earth's orbit around the sun

a. Although the axis of Earth is always pointing in the same way, what is happening to Earth itself as it revolves around the sun?

_____

_____

b. What does the side of the globe that faces the sun represent? What does the side of the globe that faces away from the sun represent?

_____

_____

c. Identify the following parts of your globe: equator, northern hemisphere, southern hemisphere, and latitude lines. At what latitude are you located right now?

d. In which position in the diagram is the northern hemisphere pointing towards the sun? In which position is the southern hemisphere pointing towards the sun?

3 How does the distance of Earth from the sun affect its intensity?

Follow the procedures and fill in the table below.

Position	Distance from the sun (km)	Scale distance from the sun (cm)	Light intensity (mA)
A	150,000,000	**150**	
B	147,000,000		
C	149,000,000		
D	153,000,000		

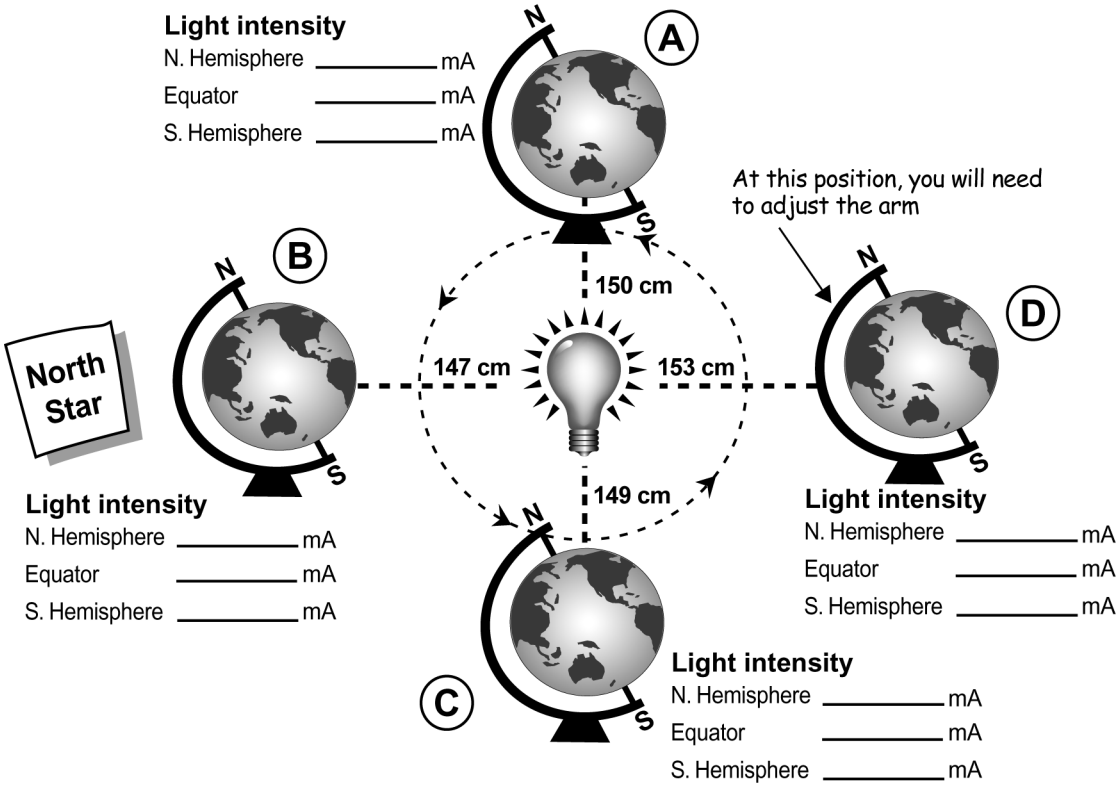
a. Are there big or small differences in distance as Earth revolves around the sun?

b. Based on your data, how does light intensity change as these distances change?

c. Based on your results from this experiment, do you think Earth's distance from the sun over a year causes the seasons? Why or why not?

4 How does Earth's tilt affect the sun's intensity?

Follow the procedures and fill in the blanks in the graphic below.



a. What role does axial tilt play in the intensity of light on Earth?

b. At which position (A, B, C, or D) and latitude (northern hemisphere, equator, and southern hemisphere) does Earth receive the most light? The least light?

5 Applying your knowledge

a. Of the two factors—distance from the light source and axial tilt—which plays the most significant role in causing the seasons? Was your hypothesis supported by your results?

b. Based on your results, which position (A-D) represents the first day of summer in the northern hemisphere? Which position represents the first day of winter in the northern hemisphere?

c. Which quarter of Earth's orbit represents summer in the northern hemisphere (from A to B, B to C, C to D, or D to A)? Explain your answer based on your results from the Investigation.

Name:

27.2 Global Wind and Ocean Currents

Question: How do temperature and salinity cause ocean layering?

1 Density and ocean currents

a. Which do you think is more dense, warm or cold ocean water? Why?

b. Explain why dissolved salt increases the density of ocean water.

2 Observing salinity-dependent layering

a. Try slightly tipping the clear plastic cup. Are the layers stable? Do they resist mixing?

b. Tear off a small piece of foam cup. Press some staples into the foam, and place it on the surface of the clear water. Remove the foam and add more staples to it, one at a time, until the foam bit sinks. Where did the foam bit end up? Why?

c. Explain why the clear water floats over the saline water.

3 Exploring temperature-dependent layering

a. Try tipping the cup slightly. Are the layers stable? Do they resist mixing?

b. Explain why the hot red water floats over the cool blue water.

4 Creating an underwater waterfall

a. Explain why the red water floats at first.

b. Explain why the red water eventually sinks.

5 Observing underwater springs

a. Where did the blue water go? Why?

b. In this model, the blue water was less salty than the surrounding water. Think of another difference you could use to create an underwater spring. Write your own procedure, test it, and explain what happened.

6 Applying your knowledge

a. From there, the North Equatorial Current flows westward toward the Caribbean Sea. Then it turns north and becomes the beginning of the Gulf Steam. During this trip along the equator, the intense sun warms the current and evaporates a lot of water. This makes the water both warm and highly saline. The high temperature is dominant.

Float or sink: _____

Experiment: _____

b. After turning northward, the Gulf Stream flows along the United States' Atlantic Coast. The water is highly saline, but it remains warm. The high temperature remains dominant.

Float or sink: _____

Experiment: _____

c. As the Gulf Stream leaves the US coast, evaporation is not as great in the cold northern regions, but the cooling effect is very significant. The low temperature is dominant.

Float or sink: _____

Experiment: _____

d. Now part of the Gulf Stream is no longer on the surface. The water is cold and too deep to be warmed by the sun. But fresh water from ice melt may mix with these cold waters off the coast of Europe. Lower salinity is dominant.

Float or sink: _____

Experiment: _____

7 Extension: Thermohaline currents and the ocean food chain

a. Two of the biggest fisheries in the world are off the Canary Islands and Peru. Can you explain why?

b. If global climate change eliminates all ice from the poles, how might this affect ocean currents and world fisheries?

Name:

27.3 Weather Patterns

Question: How can we measure water content in the atmosphere?

1 Doing the experiment

Follow the procedures and record your data in Table 1. Record your classmates data in the last three rows of the table.F

Table 1: Sling psychrometer data

Location description	Dry bulb temperature	Wet bulb temperature	Temperature difference

2 Analyzing your data

a. Which was generally higher, the wet bulb temperature or the dry bulb temperature?

b. Give a reason for the temperature difference between the thermometers.

c. In which location did you find the greatest temperature difference between the two thermometers? Which location had the smallest difference?

d. What environmental factors seem to be connected to large temperature differences between the two thermometers? What factors seem to be connected to small temperature differences?

e. How might the temperature difference at each location be related to the water content of the atmosphere at each location?

3 Finding relative humidity

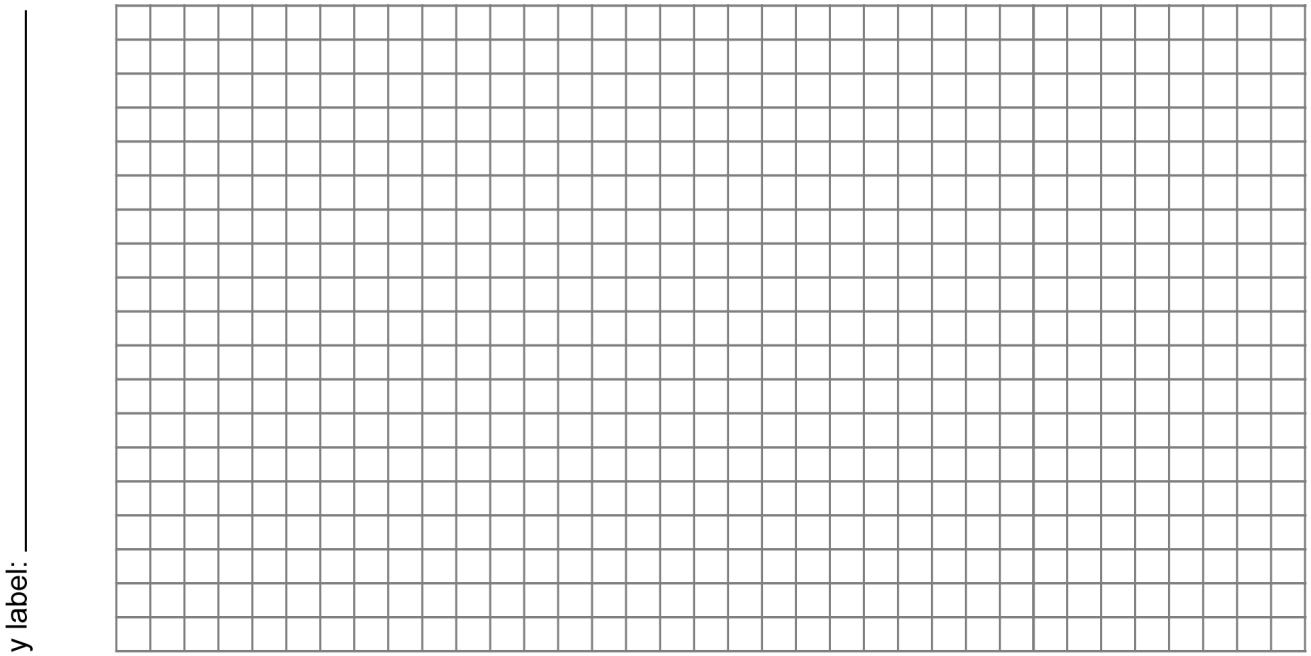
Follow the procedures and record your data in Table 2.

Table 2: Relative humidity at each location tested

Location	Relative humidity

4 Analyzing your results

Title: _____



x label: _____

a. Use the blank graph above to make a bar graph which shows the relative humidity of the locations tested, in order from lowest to highest. On each bar, print the dry bulb temperature at each location.

b. Does your graph show a relationship between dry bulb temperature (the temperature of the atmosphere) and the relative humidity? Using what you know about water content in the atmosphere, explain why or why not.

c. Challenge: It takes specialized equipment to directly measure water content in the atmosphere. This equipment tells how many grams of water are present in a cubic meter of air—a measurement called absolute humidity. If the relative humidity was 100% in two cities, but one had a dry bulb temperature of 16°C and the other was at 32°C, would their absolute humidity be the same? Why or why not?

Name: _____

27.4 Storms

Question: How does Doppler radar work?

1 How can we use radar to track precipitation?

a. Look at Radar Image Plate 1. Over which state is the most intense rain falling?

_____

b. Name two states in which mixed precipitation is falling.

_____

2 How can we use radar to detect a tornado?

a. Look at Radar Image Plate 2. Near which interstate highway intersection is a tornado possibly beginning to form?

_____

b. The National Weather Service issues tornado watch and tornado warning bulletins when certain atmospheric conditions are observed. Use the Internet to find out what each notice means. How does Doppler radar help meteorologists issue these bulletins?

_____

_____

_____

_____

_____

3 Recognizing insects, birds, or airborne debris on a radar image

a. Near which city is the airborne debris located?

_____

b. What safety precautions does the National Weather service recommend when conditions like these are observed?

_____

_____

_____

4 How can we use radar to track a hurricane?

a. The hurricane's eye is the low-pressure center around which the storm rotates. Inside the eye, winds are calm and skies are blue. Look at Hurricane Image 1. Where is the eye located?

_____

b. In the afternoon, Georges gathered strength because of the combination of the Caribbean Sea's warmer waters, the demise of some earlier wind shear, and the fact that as the storm moved over open sea between St. Croix and Puerto Rico, the wind circulating around the eye had no resistance from land objects. What evidence can you see in Hurricane Image 2 that the storm is gaining strength?

_____

c. The National Weather Service reported that Georges made landfall on Puerto Rico at 7 p.m. local time (23:00 GMT). Landfall is defined as the time when the center of the hurricane's eye reaches land. Use the scale printed on Hurricane Image 3 to determine the diameter of the eye when it made landfall.

_____

d. As the hurricane moved across Puerto Rico, intense rain and a possible tornado were spawned as the eye wall's heavy thunderstorms interacted with the mountainous terrain. Notice the strong bands of precipitation found in Hurricane Image 4. Why do you suppose it is harder to see the eye in this image?

_____

_____

_____

e. Just after midnight on the morning of Sept. 22, 1998 (04:01 GMT), the eye of Hurricane Georges began to move off the west coast of Puerto Rico. Using the time stamps on Hurricane Image 3 and Hurricane Image 5, calculate the time it took for Georges to make its way across Puerto Rico.

Hurricane Georges' travel time (round to the nearest hour): _____

Then, using a ruler and the scale provided on the radar images, calculate the distance from the center of the eye in the third image to the center of the eye in the fifth image.

Hurricane Georges' travel distance (round to the nearest km): _____

Divide the distance traveled by the time taken in order to calculate the speed of the hurricane as it moved across the island.

Hurricane Georges' speed (round to the nearest km/hour): _____

f. By 2:51 a.m. local time (06:51 GMT) the eye of Hurricane Georges was again over water. Use information from Hurricane Image 5 and Hurricane Image 6 to calculate the speed of the storm as it moved off of Puerto Rico. Does the storm appear to be intensifying or dissipating? Explain your answer.

Distance _____ ÷ time _____ = speed _____ km/hour

Name:

27.5 Weather and Climate

Question: How do zoos mimic an animal's natural habitat?

1 Choose an animal

a. Your group will be assigned a particular biome to study. Use a library or the Internet to research the biome's characteristics. You should be able to identify the temperature range, annual rainfall, special characteristics such as alternating rainy and dry seasons, and the prominent types of vegetation in the biome. Write your research notes in the blanks below.

b. Once you have a clear picture of the biome's physical characteristics, choose an animal unique to this biome that you believe could thrive in a carefully planned zoo habitat. Choose an animal that could be used to teach zoo visitors about its native environment. For example, a wildebeest's long legs are adapted to enable it to outrun the periodic fires on the savanna grasslands.

The animal we choose is:

2 Plan an environment

a. How many animals of this species will you have in the exhibit? Is this animal a solitary creature or does it live in a group?

b. Size of zoo habitat: Be sure to provide for both viewing areas and sheltered areas for the animal. Consider its exercise requirements as well as space for a dens, nests, etc.

c. Landscape: What type of ground surface and vegetation will make this animal most comfortable?

d. Security: How will you provide for both animal and visitor safety? Will you use fencing, a moat, a glass enclosure, or other means?

e. Feeding areas/water needs: How will you provide a clean and sanitary supply of food and water?

f. Heating and/or cooling of the exhibit: How will you meet the temperature and humidity needs of this animal?

g. Well-being of the animal: What additional features are necessary to ensure that the animal not only survives, but thrives in this environment?

h. Visitor education: What means will you use to teach visitors about this animal and the biome in which it originates?

3 Present your design

a. Decide as a group on a method of presenting your design visually. Your design must effectively show how your zoo exhibit would both provide for the welfare of the animal and teach visitors about the animal's home biome.

Room design description and diagrams:

b. Zoo exhibit designers must present their ideas to the zoo's board of directors before plans are finalized and construction begins. Prepare a 10-minute oral presentation that highlights the important features of your design and clearly shows how it meets the goals listed in step 3a.

c. Present your project to your classmates.

Space for notes: