

WHICH STORES HEAT ENERGY BETTER RECORD SHEET

Exploration Questions

Which stores heat energy better, water or sand?

How does warm water affect the air temperature above it? What about warm sand?

Prediction

Which do you think will cool down more quickly: water or sand? Explain your answer.

Data

Use the tables below to keep track of your data. If you are in a water group, get the sand data from your sand partners. If you are in a sand group, get your water data from your water partners.

Table 1: Time (in minutes) to heat sand and water to 55°C	
Water	Sand

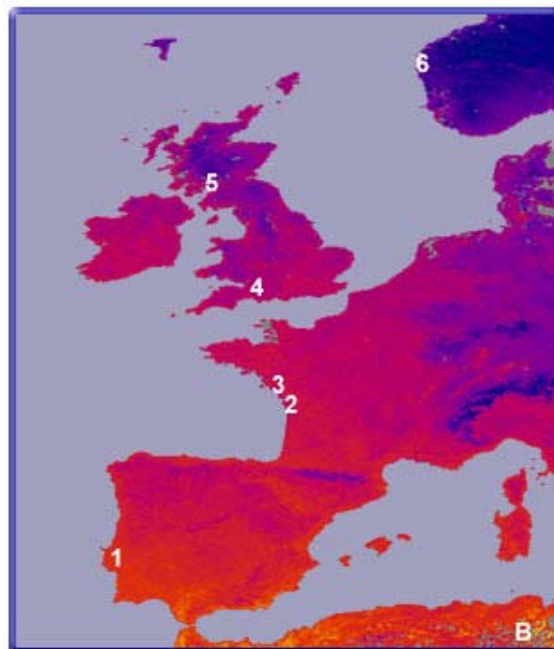
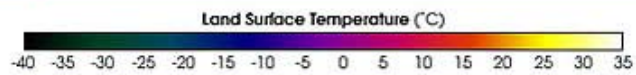
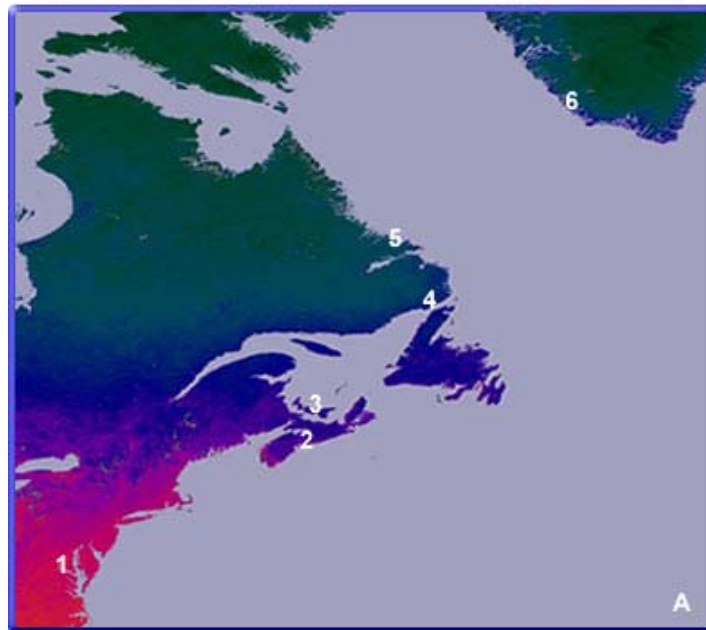
Table 2: Cooling of water vs. sand		
Time (in 1-minute intervals)	Temperature (in degrees Celsius)	
	Water	Sand
0	55	55
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Initial reading	
After one minute above water	
After one minute above sand	

Questions

1. *How long did it take the water to heat to 55°C? The sand?*
2. *Which cooled down more quickly, water or sand? How do you know?*
3. *Which do you think requires more energy to change temperature, water or sand? Why do you think so?*
4. *Specific heat capacity is the amount of energy required to change the temperature of 1 gram of a substance 1 degree Celsius. Different materials have different heat capacities. The more energy required to change the temperature, the higher the specific heat capacity. Do you think that it takes more energy to change the temperature of 1 gram of water or of 1 gram of sand? Why do you think so?*
5. *The law of conservation of energy tells us that energy cannot be lost or gained. The water and sand held a lot of heat energy when they were heated to 55°C. It can't have just "disappeared" when the water and sand were cooling, so where do you think that the heat energy went? What evidence do you have of this?*
6. *Which was warmer after you had cooled the water and sand for 10 minutes, the air above the water or the air above the sand? How do you explain this finding?*

Data



Questions

1. *When you compare cities at similar latitudes, are coastal cities to the east of the Gulf Stream warmer or cooler than coastal cities to the west? Use some of your data to support your answer.*

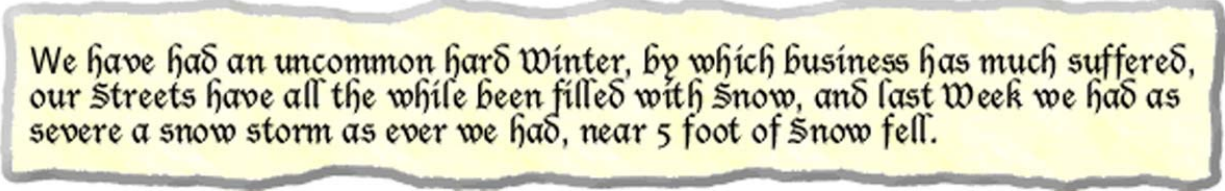
2. *How does the path of the Gulf Stream explain the temperatures that you see in the table?*

3. *Goose Bay, Canada and Connaught, Ireland are at about the same latitude. Which would you expect to have warmer average temperatures? Why do you think so?*

4. *In "Exploring and Discovering," you learned that water holds heat energy very well. You also learned that the heat from water is transferred to the air above it. How does this help explain your findings?*

CHECK FOR UNDERSTANDING RECORD SHEET

Jonathon Williams wrote in a letter to Ben Franklin in 1772:



We have had an uncommon hard Winter, by which business has much suffered, our Streets have all the while been filled with Snow, and last Week we had as severe a snow storm as ever we had, near 5 foot of Snow fell.

Where do you think Williams was living that winter, in the American colonies or in Europe? Support your answer with evidence from the investigation you just conducted.

