Name: _____ Earth Science Date: _____

Lab: *Sally Feels a Sea Breeze…*

Objective: How does the rate of heating and cooling of land surfaces compare to that of water?

Vocabulary:

Specific Heat- _____

_____

_____

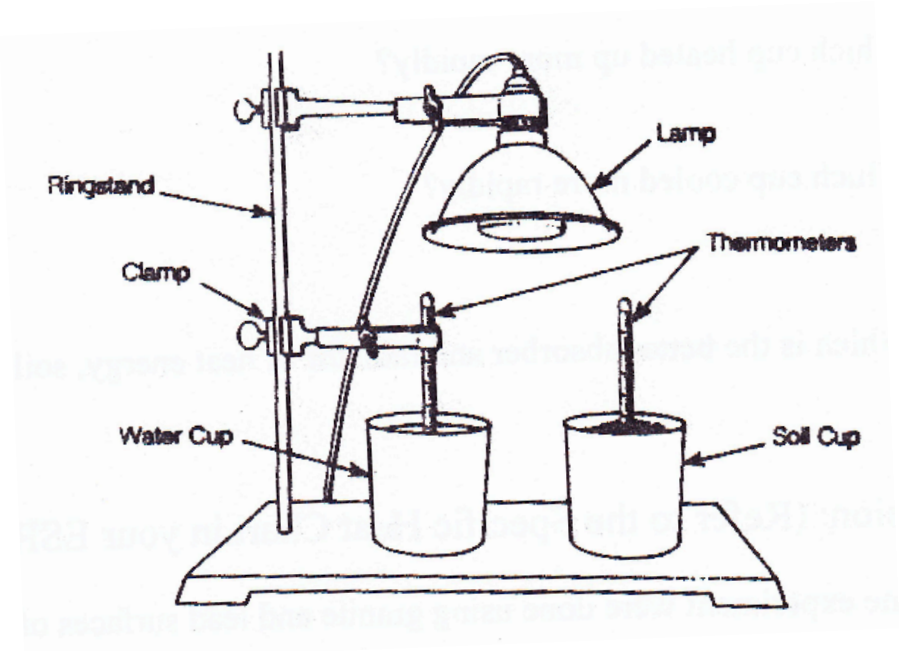
Sea Breeze- _____

_____

_____

Lab Procedure:

Imagine you set up a heat lamp directly above a cup of water and a cup of soil. Both cups are the same distance from the heat lamp. The temperature of both cups is taken at one minute intervals. For the first 10 minutes, the heat lamp is turned on. From 11-20 minutes, the heat lamp is turned off.



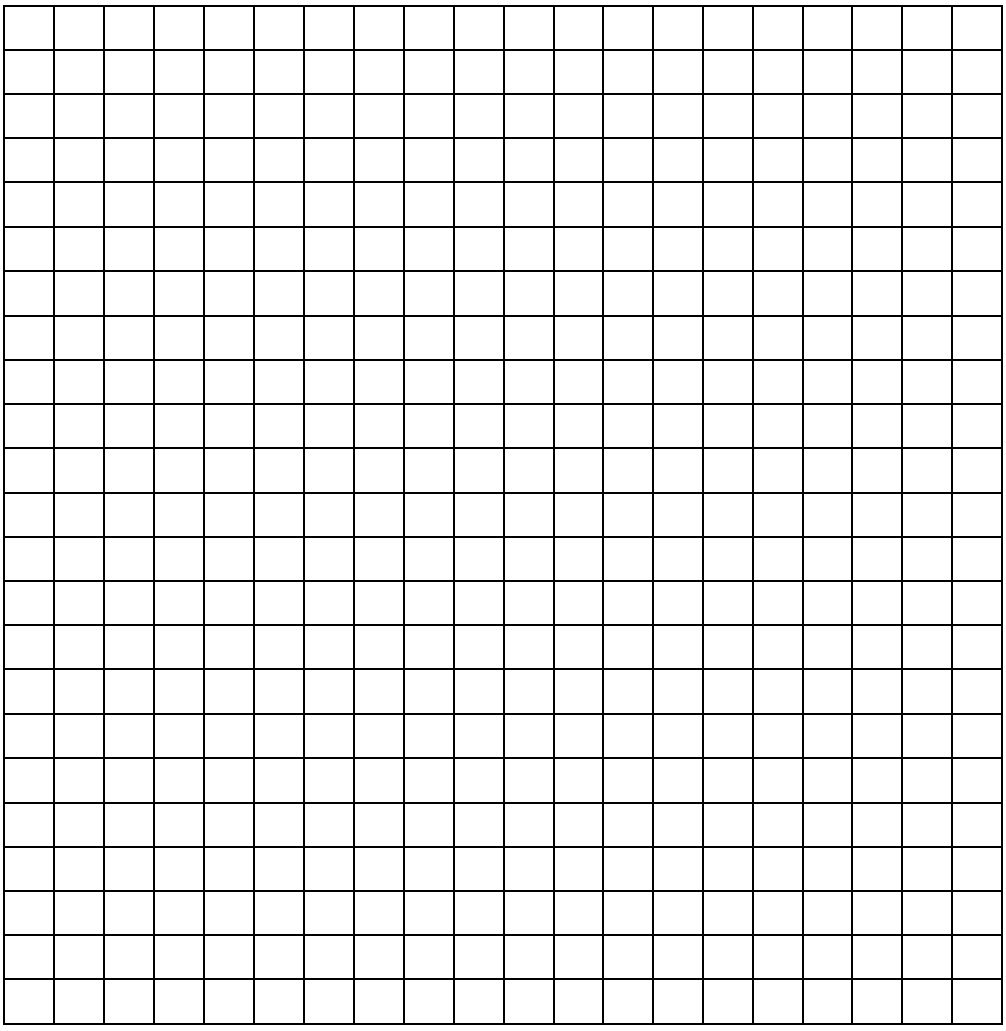
Graph: Plot a graph showing both sets of data on one set of axes. Be sure to label each line (with a different color, label, or key) on the graph.

Report Sheet

Time (mins)	0	1	2	3	4	5	6	7	8	9	10
Soil Temp (^oC)	21	24.5	26	28	30.5	32	35	36.5	37.5	38	39
Water Temp (^oC)	21	21.5	22	22.5	23	23.5	24	24.5	25	25.5	26

Time (mins)	11	12	13	14	15	16	17	18	19	20
Soil Temp (^oC)	37.5	35.5	34	32.5	31	29.5	28	27	25.5	24.5
Water Temp (^oC)	26	25.5	25.5	25	25	25	24.5	24.5	24	24

ABSORPTION AND RADIATION OF ENERGY BY SOIL AND WATER



Discussion Questions:

1. How did the infrared (heat) energy received by the cup of soil *compare* to the heat energy received by the cup of water?

2. Which cup heated up more rapidly? _____

3. Which cup cooled more rapidly? _____

4. Which is the better absorber and radiator of heat energy, soil or water? Explain.

5. Refer to the Specific Heat Chart in your ESRT (pg 1). If the same experiment were done using granite and lead surfaces of equal size…

a) Which surface would you expect to heat up faster? Why?

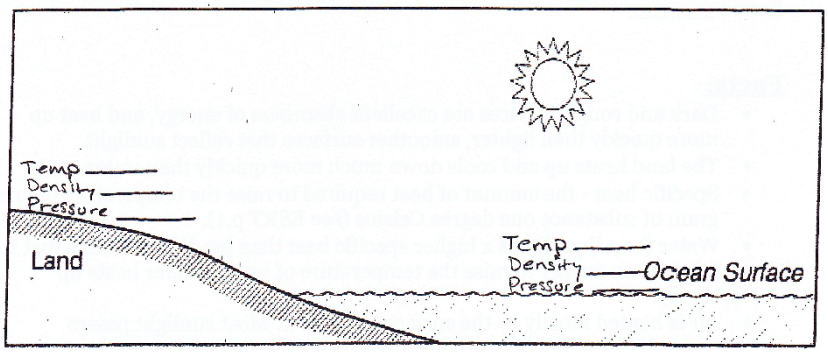
b) Which surface would you expect to cool faster? Why?

Conclusion: The sea breeze and land breeze effects incorporate all three types of heat transfer as a result of land and water having different specific heats.

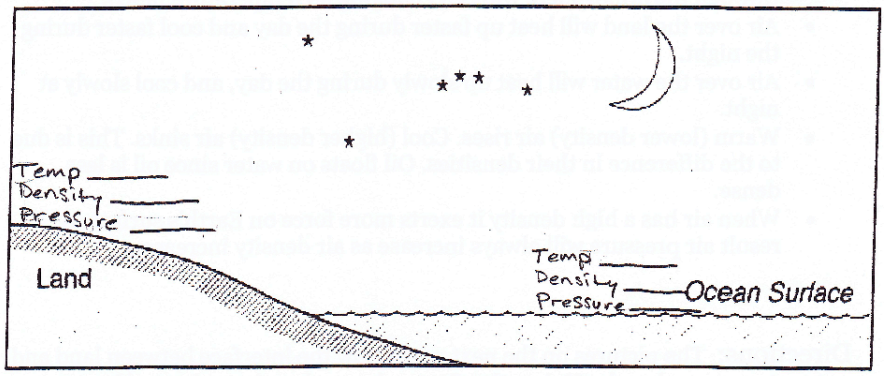
1. The pictures below show the interface between land and water at an ocean beach. Using your knowledge of heat transfer, show how air would most likely move during the day (first diagram), and at night (second diagram). When constructing your answer, follow the specific directions below.

a. Label regions of (relatively) warm or cold air. Keep in mind which heats/cools faster according to specific heat.
b. Label regions of (relatively) high or low density. Keep in mind that less dense air will rise above more dense air.
c. Regions with a high density have a high pressure. Regions with a low density have a low pressure. Label these pressure regions accordingly.
d. Draw arrows showing the direction of air movement. You should have a total of four arrows on each picture: one up, one down, one left, and one right.

Sea Breeze: Picture yourself sitting at Jones Beach at 1:00pm on a hot, summer day.



Land Breeze: Picture yourself on the beach boardwalk at 8:00pm on a cool, summer night.



Adapted from William L. Donn, *Meteorology with Marine Applications.*

2. Describe how radiation, conduction, and convection all play a role in the sea breeze effect.