ANSWER KEY

PREDICTION

I predict that the amount of evaporation from the *student answers will vary* treatment will be the **highest** (i.e., this treatment will lose the **most** water).

a. Control

b. Solar radiation (heat lamp)

c. Infrared ground radiation (heating pad)

d. Wind (fan)

e. Ground cover (moss)

f. None (they will be the same)

MATERIALS

- Small plastic container
- Permanent marker
- Ruler
- Soil
- Graduated cylinder
- Scale

PROCEDURES

1. Measure 2 cm from the bottom of the plastic container, and place a mark with the permanent marker.
2. Your group will be assigned a treatment and a group number. Write your treatment and group number on the tape on your container and on page 3 of this handout.
3. Fill the container with dry soil to the 2 cm mark. Do not pat down the soil. Take the mass of the container with the dry soil and record the mass on page 3 of this handout.
4. Measure 100 mL of water in a graduated cylinder and carefully sprinkle the water on top of the soil in the container. Make sure the water is sprinkled evenly across the top and not poured into one area of the container.
5. Take the mass of the container immediately after sprinkling the water and record it on page 3 of this handout.
6. You have been assigned to one of the following treatments. Follow the directions for your treatment.
   a. **Control**: do not add any other variables.
   b. **Solar radiation** (heat lamp): place the container under the heat lamp, approximately 3-6 inches away. Rotate the container 180° daily. The lamp simulates radiation from the sun.

c. **Infrared ground radiation** (heating pad): place the container on top of the heating pad. Rotate the container daily. The heating pad simulates ground surface radiation.
d. **Wind** (fan): set the container in front of the fan, and position the fan so that it blows level with the container. Put the fan on the lowest setting. Make sure that no other containers are in the line of the fan. Rotate the container daily. The fan simulates the wind.
e. **Ground cover** (moss): place moss on top of the soil in patches. Do not cover the soil completely. Make sure all containers have the same percentage of the surface covered. The moss simulates plants covering the soil surface.

7. Put the containers in an area that will not be disturbed and that will not allow other variables to affect them (e.g., keep them away from direct sunlight).
8. On a daily basis for the following three days, take the mass of the container and record it in the table on page 3 of this handout. If possible, take the mass at the same time each day.
9. Obtain data from other groups and record these data on the class mean data table on page 3 of this handout. Calculate the mean mass of water loss for each treatment.
10. Make a bar graph of the mean mass of water loss for each treatment on page 4 of this handout.

DATA & ANALYSIS

Group number: _____ Treatment: _____

Mass of container with dry soil: _____ Mass of container after sprinkling water: _____

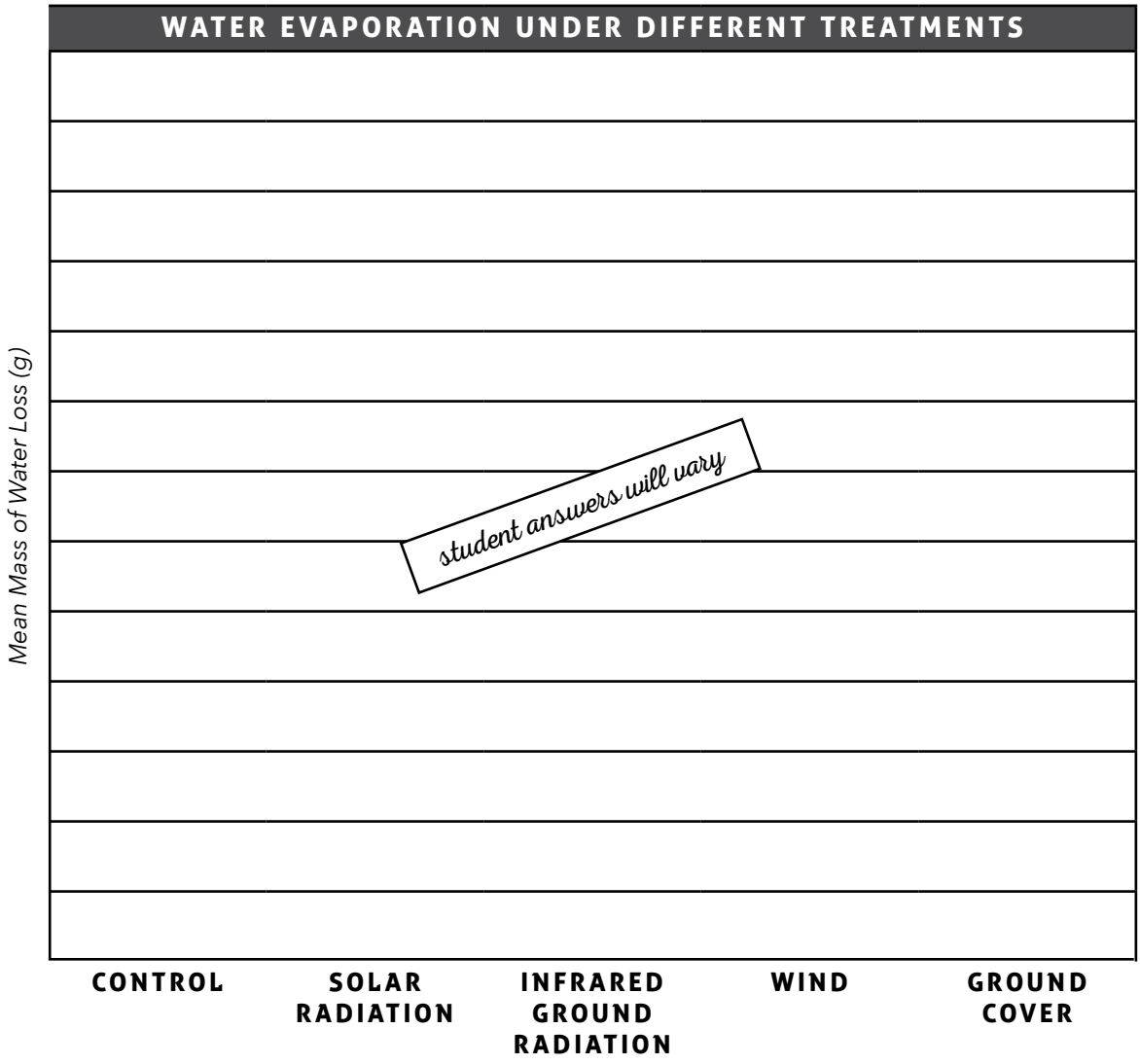
YOUR GROUP'S DATA TABLE		
	MASS (G)	DAILY WATER LOSS (previous day's mass minus current day's mass)
DAY ONE		
DAY TWO		
DAY THREE		
DAY FOUR		
TOTAL WATER LOSS (G)		

student answers will vary

CLASS MEAN DATA TABLE					
TOTAL MASS OF WATER LOSS (G)					
GROUP/ REPLICATE	CONTROL	SOLAR RADIATION	INFRARED GROUND RADIATION	WIND	GROUND COVER
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
MEAN					

student answers will vary

BAR GRAPH OF CLASS MEAN DATA



RESULTS

1. Looking at the class mean data table and bar graph, which treatment had the highest mean water loss? (Circle one.)

a. Control

b. Solar radiation

c. Infrared ground radiation

d. Wind

e. Ground cover

f. None (they were the same)

student answers will vary

CONCLUSIONS

1. Turn back to the first page and review your prediction. Was your prediction correct? Use the mean mass of water loss from the class mean data table and bar graph to answer.

   student answers will vary Yes / No

2. After examining the results, summarize your conclusions about this experiment.

   student answers will vary

3. Use what you found in this experiment regarding the effects of several factors on the rate of evaporation and your knowledge of the climate change, the water cycle, and evaporation to answer these questions.

   a. What effect(s) does climate change have on the rate of evaporation from Earth?

   Student answers will vary but may include:
   When heat was applied in this experiment, the rate of evaporation increased. The solar radiation and infrared ground radiation treatments lost more mass than the control. As Earth continues to get warmer, evaporation rates will increase and more water will evaporate into the atmosphere.

   b. How do you think the effect(s) of climate change on the rate of evaporation (from question a. above) is changing the water cycle?

   Student answers will vary but may include:
   - *Increased evaporation results in more water in the atmosphere, which leads to increased precipitation and flooding in some areas.*
   - *More water in the atmosphere results in increased frequency of extreme weather events, such as severe storms.*
   - *More water in the atmosphere enhances the greenhouse effect because water vapor is a greenhouse gas.*
   - *In this experiment, ground cover reduced the rate of evaporation. The ground cover treatment lost less mass than the control. However, in conjunction with increased global temperatures, we may experience an increase in evaporation, even in areas with ground cover. Increased evaporation from the soil will leave less water for plants, which may lead to a decline in plant ground cover. If plant ground cover decreases, even more water will evaporate into the atmosphere.*