

# AP Biology

Name \_\_\_\_\_

Date START \_\_\_\_\_ FINISH \_\_\_\_\_

Period \_\_\_\_\_ Score \_\_\_\_\_

Lab Partner(s) \_\_\_\_\_

## Investigation 11: TRANSPIRATION Big Idea 4: Interactions

$$1 \text{ cm}^2 = 100 \text{ mm}^2$$

$$4 \text{ graph paper squares} = 1 \text{ cm}^2$$

High Power Field of View/Low Power Field of View = Low Power Magnification/High Power Magnification

$$\text{High Power Field of View}/2 = r$$

$$\text{Area of a circle} = \pi r^2$$

### BACKGROUND

1. What governs the process of water moving from roots to shoots?
2. What facilitates the process of water movement?
3. Name the four mechanisms (TACT) that forces water and nutrients up the xylem:
4. What balance must be maintained in order to maintain homeostasis?
5. List two of the questions posed on p.136 that you might be interested in investigating:

### THE INVESTIGATIONS:

**Getting Started: answer questions 1-4 below, as asked, except for #3 (use a prepared slide)**

1. A plant cell with lower water potential....
2. Salt on icy roads in the winter, dead grass in the spring...
3. View a prepared slide of both a monocot and a dicot/eudicot, draw both, identify structures (use your book).
4. Transplanting a tree....

**PROCEDURE**

Step 1: Discuss a-h with your team. Any of these could be potential questions on my exams as well as the AP exam.

Step 2: Follow the procedures in step 2:

g.

h. \_\_\_\_\_ Total stomata

k. See helpful equations at start of lab paper. \_\_\_\_\_ mm<sup>2</sup> (Show all of your calculations below.)

l. Table # \_\_\_\_\_ (Per. \_\_\_\_ ) \_\_\_\_\_ mm<sup>2</sup> (Show all of your calculations below.)

**Designing and Conducting Your Investigation:**

Read and discuss the introduction and Steps 1-3 and then go to: **Option 2: Whole Plant**

*With your lab team design and conduct your experiment, and type up your lab report. Be sure to:*

1. Identify your essential question.
2. State your hypothesis and explain your reasoning.
3. List your general procedures and indicate your control.
4. Record your quantitative data (mass measurements) in a data table and graph your results.

	Day 1 (initial)	Day 2 @ 24hrs		Day 3 @ 48 hrs		Day 4 @ 72 hrs	
		Mass	Change	Mass	Change	Mass	Change
Variable/Condition:							
Control: may be shared between two lab teams.							
Adjusted change (b-c)							

5. Calculations to include:

- a. Total surface area of the leaves: \_\_\_\_\_ cm<sup>2</sup> Variable \_\_\_\_\_ cm<sup>2</sup> Control.  
(tracing leaves on graph paper)
- b. Rate of transpiration/surface area for variable: \_\_\_\_\_ @ 24 hrs \_\_\_\_\_ @ 48 hrs \_\_\_\_\_ @ 72 hrs  
(ml of water loss/surface area in cm<sup>2</sup>)
- c. Rate of transpiration/surface area for control: \_\_\_\_\_ @ 24 hrs \_\_\_\_\_ @ 48 hrs \_\_\_\_\_ @ 72 hrs  
(ml of water loss/surface area in cm<sup>2</sup>)
- d. Give an explanation for the need to have an “adjusted change”.

6. Analyzing Results:

- a. Based on data collected from different lab groups, which environmental variable(s) resulted in the greatest rate of water loss through transpiration? Explain.
- b. Make a prediction about the number of stomata in a leaf and the rate of transpiration.

7. Evaluating Results:

- a. Was your initial hypothesis about the effect of your environmental variable on the rate of transpiration supported by the data you collected? Why or why not?
- b. If you had to revise the design of your experiment, what suggestions would you make? Why?