

Restrict your responses **only** to the space available. Answer directly and completely - don't beat around the bush. Point values for each question are given in parentheses. Of course, any notes you are allowed in answering the exam. All page references refer to Wanda's notebook. Write your name at the bottom of each page.

1(8) Which species is associated with the incorrect mitochondrial respiration rate based on the data presented on page 106?

Provide a brief supporting explanation for your answer.

2 (8) Are these photosynthetic rates of leaves that were grown in **full sun** or **deep shade** environments? Provide an answer and a justification for your answer.

3 (8) Based on the two photosynthesis – light response curves presented on page 106, can you conclude whether these two species exhibit C₃ versus C₄ photosynthesis? Answer and provide a rationale for your answer.

4 (12) For the photosynthesis and leaf conductance data presented on page 108, will the intercellular carbon dioxide concentration be (a) greater than 400 ppm, (b) equal to 400 ppm, or (c) lower than 400 ppm. Please select a choice and justify your answer.

5 (10) For the data presented on page 109, name the molecular sensor that govern the intermodal distance during leaf development and expansion.

Name _____

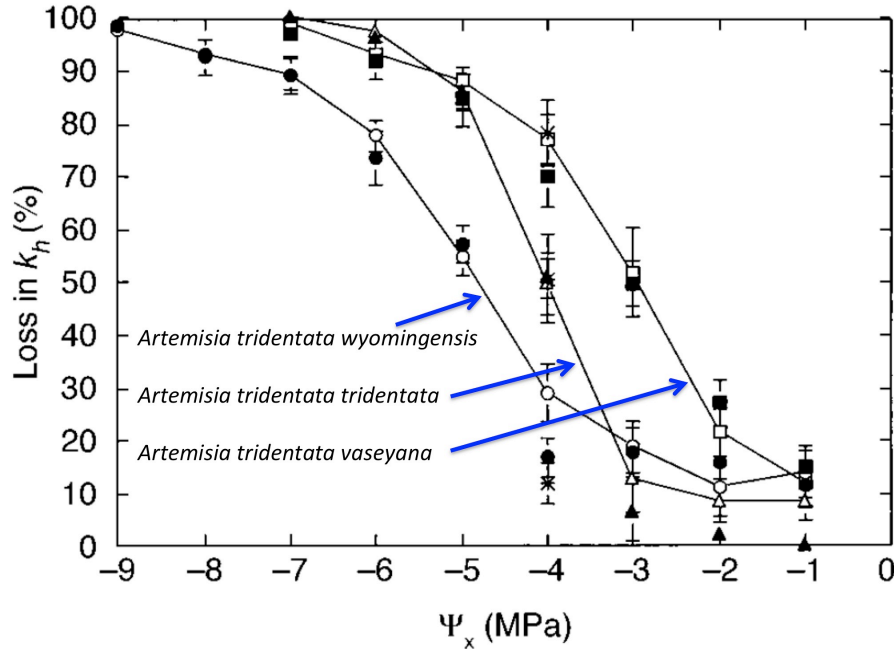
6 (12) For the data presented on page 247, please provide the correct interpretation for why sun leaves have deeper lobes and are smaller than leaves developed in the shade from the same tree.

7 (18) The observational data from page 343 are presented below:

Life history	annual	perennial
Age to reproduction	5 months	18 months
Root-to-shoot ratio	low	high
Carbohydrate storage in roots	high	low
Leaf-life expectancy	3 months	3 months
Leaf water potential @ 50% cavitation	-2.5 MPa	-1.5 MPa
Interannual variations in precipitation	low	high
Maximum LAI	1.5	2.3
Maximum leaf conductance	0.5 mmol m ⁻² s ⁻¹	0.3 mmol m ⁻² s ⁻¹

As noted on page 343 of the notebook, not all of the data above are correctly lined in the correct columns. Please circle each of those data that you feel are not correctly associated with the annual versus perennial life form. Then please provide an explanation for why you feel the data were not correctly lined under the correct heading.

On page 432, I now need your advice. There are three subspecies of *Artemisia tridentata*:
Artemisia tridentata tridentata
Artemisia tridentata vaseyana
Artemisia tridentata wyomingensis



8 Based on the graphic above answer the following questions:

8a (8) Which subspecies would you suggest that we plant on the dry slopes above the highways where soils are shallow and plants are subjected frequent droughts. Provide a justification for your answer.

8a (8) Which subspecies would you suggest that we plant on the relative moist valley bottoms near the highways where soils are deep and plants are rarely subjected to droughts. Provide a justification for your answer.

8a (8) John Sperry showed that the xylem of cottonwood trees cavitared at water potentials where little cavitation would have occurred in any sagebrush subspecies. In the graphic above, please draw the relationship between xylem water potential and cavitation for cottonwood trees.