Unit 3 · Photosynthesis

WORKSHEET

Full marks 32

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 32

1 Key words [4]

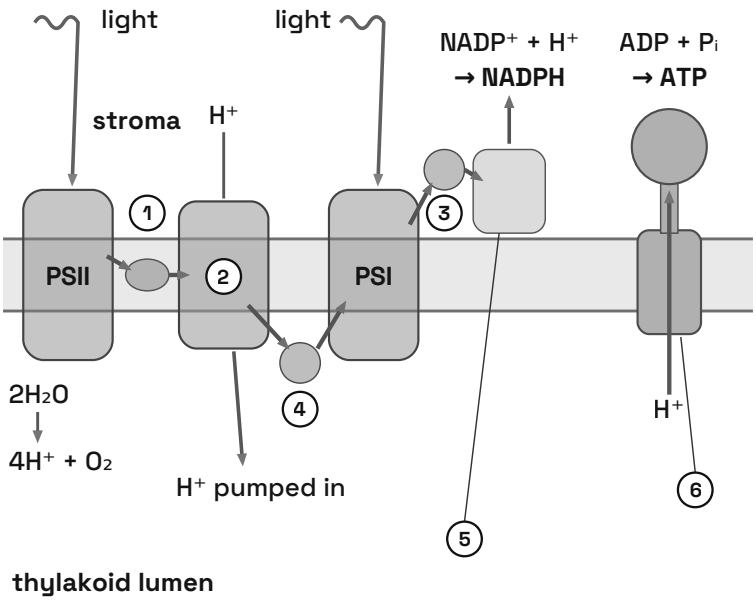
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

chemiosmosis	Kranz	magnesium	P700	PEP carboxylase	PGA	pheophytin
photolysis	phycobilins	phycocyanin				

At the center of every chlorophyll molecule is an atom of _____. The water-soluble pigments of red algae and cyanobacteria are the _____. The reaction center of photosystem I absorbs best at 700 nm and is called _____. The splitting of water by light, which gives out oxygen, is the _____ of water. Making ATP as protons flow back out of the thylakoid lumen through ATP synthase is explained by Mitchell's theory of _____. The first stable product of the Calvin cycle is the 3-carbon acid _____. The enzyme that fixes carbon dioxide in the mesophyll cells of maize is _____. The ring of large bundle sheath cells round each vein of a C_4 leaf is called _____ anatomy.

2 Label the diagram [3]

The diagram shows the light reaction in the thylakoid membrane. Write the names of the parts 1 to 6. Each carries 0.5 mark.



1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Which is the first stable compound of the C_3 cycle? [1]

a. citric acid
b. oxaloacetic acid
c. phosphoglycolic acid
d. phosphoglyceric acid

ii. In which part of a photosystem does the absorbed light energy finally arrive? [1]

a. the reaction center (photocenter)
b. the antenna molecules
c. the light-harvesting molecules
d. the accessory pigments

iii. Which is the correct order of electron carriers between PSII and PSI? [1]

a. primary acceptor, PC, cytochrome complex, PQ
b. primary acceptor, Fd, PQ, cytochrome complex
c. primary acceptor, PQ, cytochrome complex, PC
d. primary acceptor, Fd, cytochrome complex, PC

iv. A plant opens its stomata at night and keeps them closed by day. Its leaves taste sour in the morning. It is most likely [1]

a. a C_3 plant
b. a C_4 plant
c. a CAM plant
d. a plant that doesn't photosynthesize

v. A plant in strong light gives out no more oxygen when the light is made even brighter, but does when carbon dioxide is added. What was limiting the rate? [1]

a. light
b. carbon dioxide
c. chlorophyll
d. temperature

4 Short answers [9]

Write short answers to the following questions.

a. What is the photolysis of water? Write its equation. [2]

b. The Calvin cycle is often called the dark reaction. Why is that name misleading? [2]

c. In the Terai, maize fills the fields in summer and wheat in winter. Suggest why, from their ways of fixing carbon dioxide. [2]

d. What is photorespiration? Why is it called wasteful, and why do C_4 plants hardly show it? **[3]**

5 Numerical problem **[4]**

Show your working.

A plant makes 3 molecules of glucose by the Calvin cycle. How many molecules of carbon dioxide does it fix, how many turns of the cycle does this take, and how many ATP and NADPH does it use? How many ATP would a C_4 plant use for the same glucose?

Answer:

6 Long answer **[4]**

Write a long answer to the following question.

Write any four differences between cyclic and non-cyclic photophosphorylation.

7 Think **[3]**

A chloroplast is lit only with far-red light of 710 nm, which only photosystem I can use. Predict what it will make, and what changes when red light of 680 nm is added. Explain.

8 Activity: C_3, C_4 and CAM plants near you (not marked)

On a field visit, or round your school, list the plants you see and sort them by their way of photosynthesis. A leaf with its green tissue in neat rings round the veins (a thin cross-section under a hand lens) is likely C_4; thick, fleshy leaves or stems of dry places suggest CAM.

C_3 plants	C_4 plants	CAM plants

Which group had the most plants?