Student Name: _____

TSSM
Creating VCE Success

BIOLOGY 2020

Unit 3
Key Topic Test 5 – Photosynthesis

Recommended writing time*: 45 minutes
Total number of marks available: 45 marks

QUESTION BOOK

* The recommended writing time is a guide to the time students should take to complete this test. Teachers may wish to alter this time and can do so at their own discretion.

Conditions and restrictions

- Students are permitted to bring into the room for this test: pens, pencils, highlighters, erasers, sharpeners and rulers.
- Students are NOT permitted to bring into the room for this test: blank sheets of paper and/or white out liquid/tape.
- No calculator is allowed in this test

Materials supplied

- Question and answer book of 9 pages.

Instructions

- Print your name in the space provided on the top of the front page.
- All written responses must be in English.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic communication devices into the room for this test.

SECTION A – Multiple-choice questions

Instructions for Section A

Select the response that is **correct** for the question. A correct answer scores 1; an incorrect answer scores 0. Marks are not deducted for incorrect answers. If more than 1 answer is completed for any question, no mark will be given.

Question 1

Photosynthesis is a process that began with cyanobacteria about 3 billion years ago. What is the purpose of photosynthesis?

A. generate oxygen for cellular respiration

B. create ATP for energy

C. make water, carbon dioxide and oxygen from glucose

D. convert light energy into chemical energy

Question 2

The site of photosynthesis in plants and algae is

A. chlorophyll

B. stroma

C. chloroplasts

D. thylakoid membrane

Question 3

A chloroplast is a membrane organelle that is found in plants and algae. In the chloroplast is membranous stacks which contain chlorophyll in the membrane. These stacks are called

A. granum

B. grana

C. Stroma

D. Lumen

Question 4

The chloroplast contains clearly defined areas where different stages of photosynthesis occurs. One of these areas the stroma contains many ribosomes. This is because

A. the chloroplast was once a protist

B. the light dependent stage requires ribosomes to absorb light and split water

C. the Krebs cycle is a biochemical pathway requiring enzymes

D. the stroma is the site for many enzyme-based reactions

Question 5

Chloroplasts contain many layers of thylakoid membranes which assist in photosynthesis. The reason for the multiple layers is that

A. the surface area to volume ratio of the stroma is increased

B. the layers increase the surface area for capturing light

C. the layer help to spread the light evenly between each granum

D. water can move easily between the membranes

Question 6

Endosymbiosis is a theory associated with cyanobacteria taking up bacteria and forming a mutually beneficial relationship. Evidence to support this theory is

A. the multiple layers of thylakoid membrane

B. larger ribosomes being found in chloroplasts than in bacteria

C. chloroplasts being the site of photosynthesis

D. binary fission occurring when the chloroplast divides

Question 7

All eukaryotes contain mitochondria but not all have chloroplasts. This information suggests that as

A. eukaryotes evolved separately to plants

B. mitochondria are more useful to cells than chloroplasts

C. chloroplasts joined eukaryotic cells after mitochondria

D. endosymbiosis theory has unexplainable flaws

Question 8

Inputs to the light dependent stage of photosynthesis may include

A. light only

B. carbon dioxide and oxygen

C. water and oxygen

D. water

Question 9

Photosynthesis has 2 stages. Coenzymes are cycled between these two stages to carry inputs to the next stage. These inputs include

A. ADP and NADPH

B. oxygen, hydrogen and electrons

C. protons, electrons and energy

D. ATP, NADPH and NADH

Question 10

Plants in different parts of the world have different adaptations to increase efficiency of photosynthesis. Some plants in arid environments keep stomata closed during the day and only open stomata to take in carbon dioxide at night. This would mean

A. carbon dioxide would build up and become toxic

B. light dependent reactions could only occur at night

C. the rate of light independent reactions would increase at night

D. glucose would be in low supply during the day in the plant

Question 11

In one stage of photosynthesis a biochemical pathway called the Calvin cycle occurs. In the Calvin cycle

A. RuBisCo is an enzyme used to split water

B. glucose is built using hydrogen and oxygen from the light dependent stage

C. carbon dioxide is an input and glucose is an output

D. chlorophyll is used as a source of ATP

Question 12

Photosynthesis is an enzyme-controlled pathway whose rate is affected by limiting factors. Limiting factors may include

A. oxygen levels

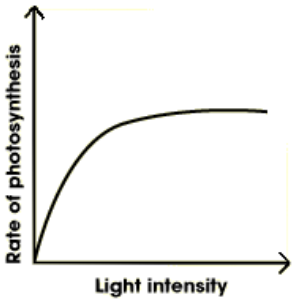
B. amount of enzymes

C. glucose levels

D. all the above

Question 13

The light intensity versus rate of photosynthesis is shown in the graph below. To increase the rate of photosynthesis above the levels shown



A. the temperature or carbon dioxide levels would have to increase

B. the light intensity would have to continue to increase

C. more oxygen needs to be produced to ensure there is enough ATP being produced

D. more coenzymes would be needed to carry the hydrogen ions

Question 14

Plants that are found on the floor of rain forest areas must be adapted to the conditions to ensure they are able to undergo photosynthesise. A limiting factor for plants on the rainforest floor is

A. amount of sunlight

B. water

C. temperature

D. concentration of carbon dioxide

Question 15

As global warming progresses plants around the world respond to the changing environment and in some cases show increased growth rates. This may be because

A. there is an increase in carbon dioxide and temperature

B. there is a decrease in water in the atmosphere

C. more light can reach the surface

D. plants have access to more oxygen for respiration

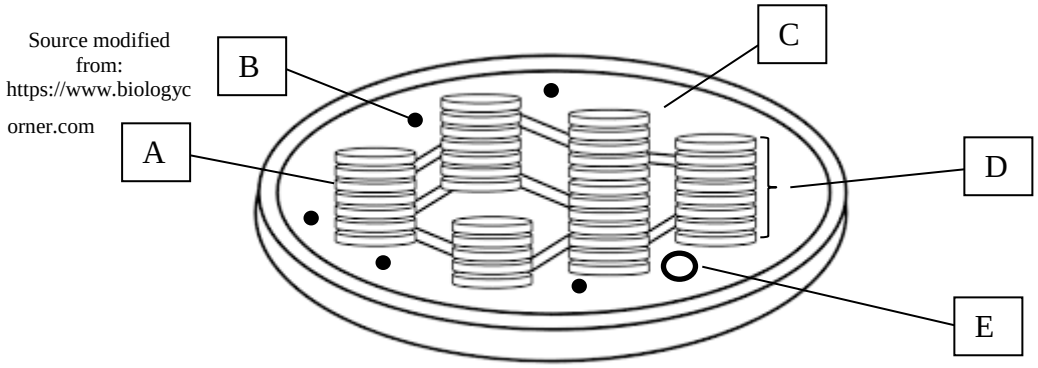
SECTION B - Short-answer questions

Instructions for Section B

Answer **all** questions in the space provided. Write using a blue or black pen.

Question 1

Chloroplasts are double membraned organelles that are the site for the 2 stages of photosynthesis to occur in plants and algae. Chloroplasts have distinct areas associated with the stages where biochemical reactions occur.



a. Use the diagram above to complete the table below

Structure	Name	Function associated with photosynthesis
A		
B		
C		
D		
E		

10 marks

b. Chloroplasts are thought to have evolved from cyanobacteria captured by a prokaryotic cell approximately 3 billion years ago. From the diagram suggest two labelled structures that support this theory and explain why.

_____

_____

_____

_____

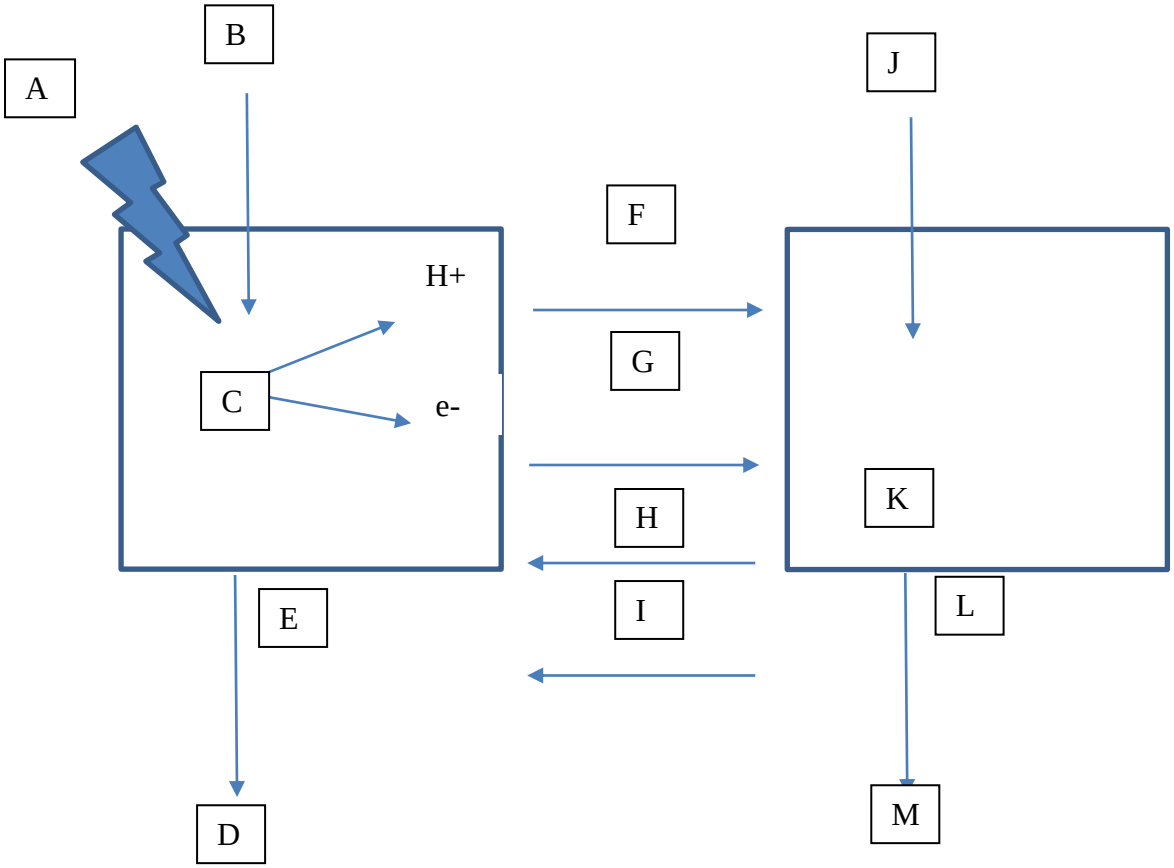
4 marks

Total 14 marks

Question 2

Photosynthesis occurs in 2 stages, both occurring in the chloroplast of plants. Each of the stages of photosynthesis occurs in separate parts of the chloroplast and have their own inputs and outputs

a. Complete the table below to show the inputs and outputs for each stage

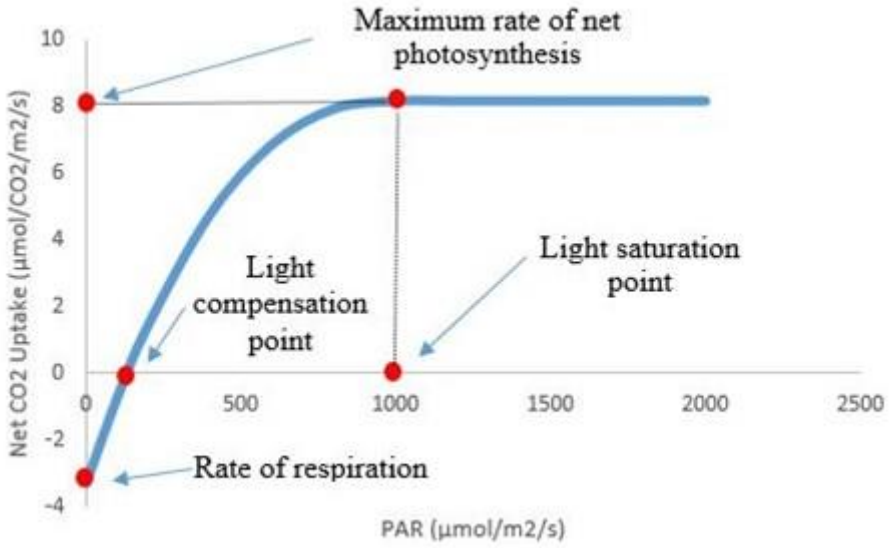


Label	Name
A	
B	
C (Process)	
D	
E (Structure)	
F	
G	
H	
I	
J	
K (Process)	
L (Structure)	
M	

13 marks

Question 3

Photosynthesis is affected by a variety of factors which have an impact on the inputs to the two stages of photosynthesis. The effect of these factors has been extensively studied by agricultural universities to maximise the production of crops and increase yields. Below is a graph showing the effect of light intensity.



Modified from: https://www.pthorticulture.com/en/training-center/influence-of-light-on-crop-growth/

a. The graph above has light saturation point labelled. What is the light saturation point and what may be causing the rate of photosynthesis to plateau?

_____

2 marks

b. What is the light compensation point?

_____

_____

_____

1 mark

Total 3 marks

END OF KEY TOPIC TEST