

2.8 Photosynthesis

Question Paper

Course	DP IB Biology
Section	2. Molecular Biology
Topic	2.8 Photosynthesis
Difficulty	Medium

Time allowed: 20
Score: /10
Percentage: /100

Question 1

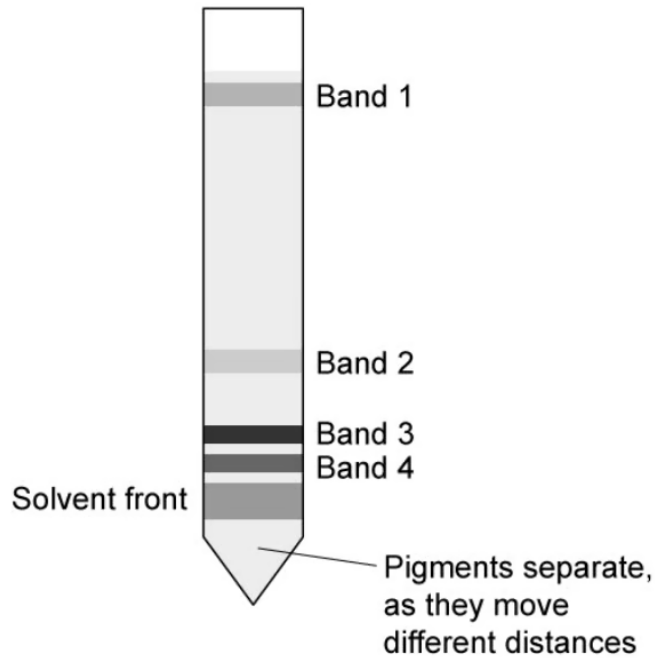
Which of the following statements about photosynthesis is incorrect?

- A** Energy captured from sunlight is used to fix carbon.
- B** Photosynthesis is an anabolic reaction.
- C** Photosynthesis only occurs in chloroplasts.
- D** Photosynthesis is an endothermic reaction.

[1 mark]

Question 2

Paper chromatography can be used to separate photosynthetic pigments obtained from chloroplasts. The chromatography strip shows distinct coloured pigment bands. Which pigments are represented by bands 3 and 4?



- A** Carotenes and Xanthophylls.
- B** Carotenes and Chlorophyll a.
- C** Carotenes.
- D** Chlorophyll a and Chlorophyll b.

[1 mark]

Question 3

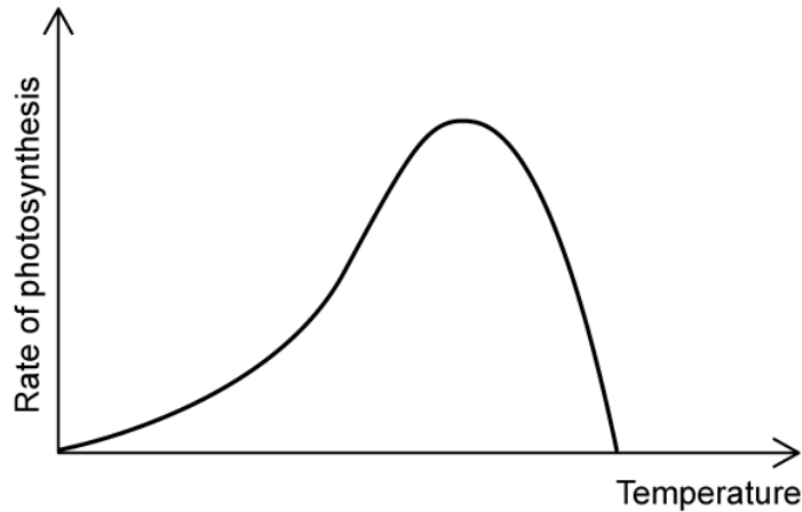
Which is the most correct statement about chlorophyll?

- A** Absorbs red and blue light.
- B** Reflects red and blue light, and absorbs green light.
- C** Absorbs the full spectrum of light equally.
- D** Only absorbs blue light.

[1 mark]

Question 4

The graph shows how the rate of photosynthesis is affected by temperature. Which statements correctly explain why the rate decreases at higher temperatures?



- I Photosynthesis is an enzyme-catalysed metabolic pathway.
- II Enzymes denature at high temperatures.
- III Less carbon dioxide is available in the atmosphere.
- IV Rate of respiration increases

- A I and II
- B II and III
- C I, II and III
- D All the above

[1 mark]

Question 5

A plant is grown in standard atmospheric air with a carbon dioxide concentration of approximately 400 ppm. The level of carbon dioxide is then reduced to below 100 ppm. Which of the following statements about the plant are correct?

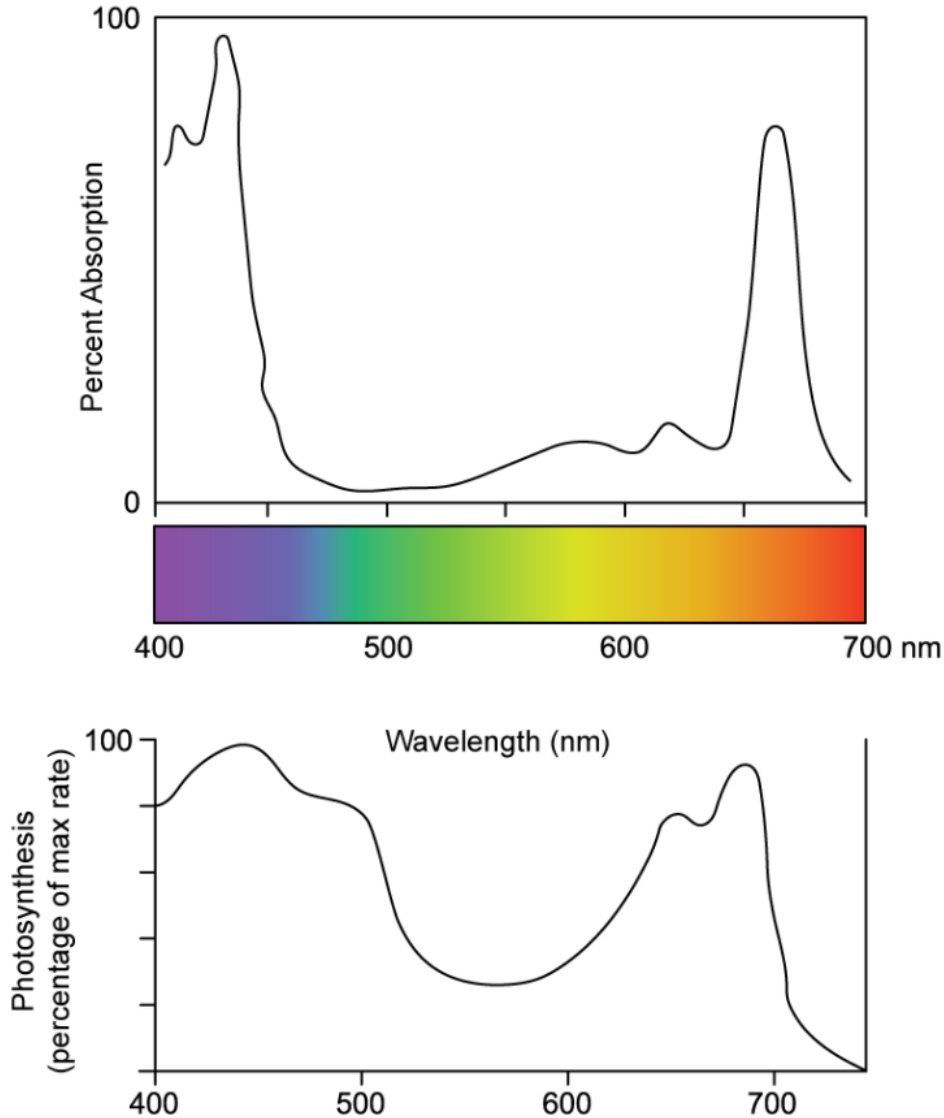
- I The rate of photosynthesis increases.
- II Respiration and growth continue until stored sugars are used up.
- III The rate of photosynthesis decreases.
- IV Metabolism is reduced to save energy.

- A** I only
- B** I and II
- C** II and III
- D** II, III and IV

[1 mark]

Question 6

The following graphs show the absorption spectrum for chlorophyll a and the action spectrum showing the relative rate of photosynthesis at different wavelengths of light.



Why do the graphs look different?

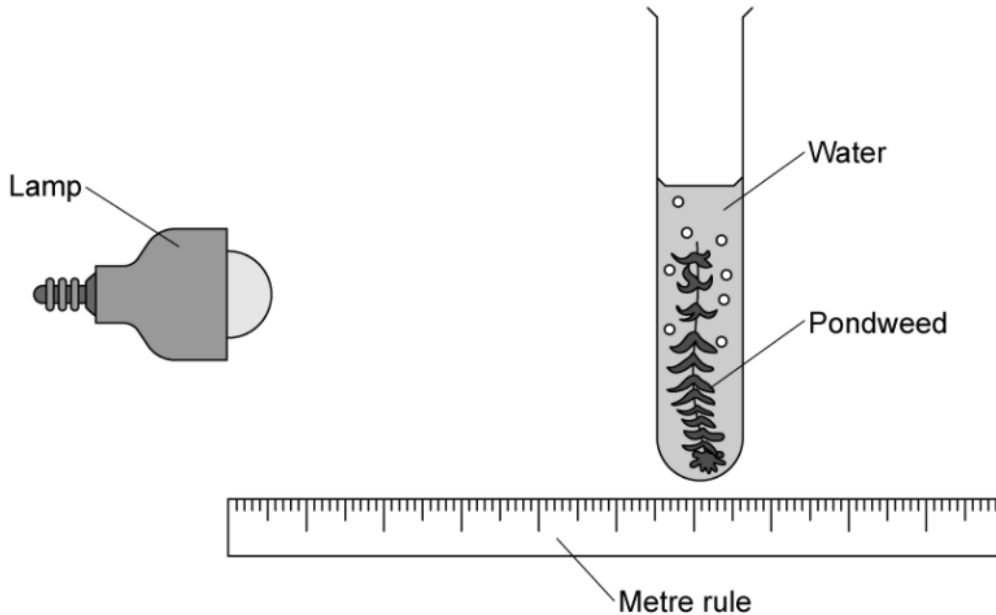
- A** Other pigments are involved in photosynthesis which can absorb light of different wavelengths.
- B** Only visible light is absorbed by photosynthetic pigments.
- C** Photosynthesis can only occur in blue and red wavelengths of light

- C Photosynthesis can only occur in blue and red wavelengths of light.
- D Chlorophyll a inhibits the absorption of green and yellow light.

[1 mark]

Question 7

A student designed the following experimental set-up to measure the effect of light intensity on the rate of photosynthesis. The experiment was repeated three times.



Distance from lamp (cm)	Number of bubbles per minute		
	Replicate 1	Replicate 2	Replicate 3
10	99	81	64
20	63	43	45
30	31	18	13
40	18	7	8
50	15	6	4

The results were inconsistent, how could the experimental set-up be improved?

- A** Measuring the change in biomass of the plant.
- B** Using cooled, boiled water to remove dissolved oxygen.

- C Replacing the water with sodium hydrogen carbonate solution.
- D Using a red light source.

[1 mark]

Question 8

The effect of different colours of light on the growth of *Arabidopsis thaliana* (thale cress) seedlings was studied. Three different colours of light were tested and measurements of seedling height, shoot length, and biomass were taken.

Colour of light	Wavelength of light (nm)	Height of seedlings (cm)	Shoot length (cm)	Total biomass (g)
Blue	450	3.5	2.8	2.4
Orange	600	2.3	2.0	2.8
Red	630	7.4	6.1	3.7

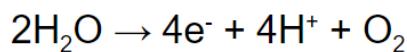
What conclusions can be drawn from the data?

- A White light gives the optimal conditions for photosynthesis.
- B There is a linear relationship between wavelength of light and plant growth.
- C Red light enhances plant growth.
- D There is no correlation between total biomass and plant height.

[1 mark]

Question 9

In photosynthesis, the following reaction occurs:



What happens to the oxygen generated through this reaction?

- A** It is converted into water.
- B** It is incorporated into glucose molecules.
- C** It is used in cellular respiration.
- D** It diffuses out of the plant cell.

[1 mark]

Question 10

Most of the world's iron ores are found in 'banded iron formations' which are a distinct type of sedimentary rock with horizontal layers of iron deposited. These are found in rocks that are approximately 1.8 to 2.5 billion years old. How can photosynthesis account for this?

- A** A rise in atmospheric oxygen caused a decrease in methane and carbon dioxide.
- B** Oxygen released by photosynthetic bacteria in the oceans caused the oxidation and precipitation of dissolved iron.
- C** Iron oxidising bacteria started to proliferate.
- D** Photosynthesis by plants and algae caused a rise in atmospheric oxygen which led to the oxidation of the oceans and consequently the precipitation of dissolved iron.

[1 mark]

