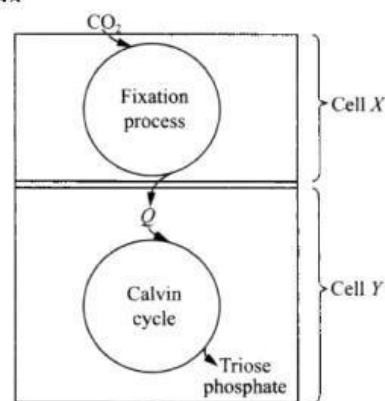


- 1 A process which occurs in plant is shown in the diagram below.
- I Q is malate. II X is a mesophyll cell.
 III Y is a bundle sheath cell. IV It occurs in CAM plants.
- A I and III B I and IV
 C II and III D II and IV



STPM 2014

- 2 Which statement is true of C4 plants? Their...
- A leaves have one type of chloroplast.
 B process of CO_2 fixation occurs twice.
 C PEP carboxylase is more active in the dark.
 D rate of photorespiration increases in the presence of O_2 .

- 3 Which are true about cyclic photophosphorylation? It...

- I produces ATP
 II produces NADPH
 III involves photolysis of water
 IV involves only photosystem I
- A I and III B I and IV C II and III D II and IV

STPM 2015

- 4 Which statement is true about photosynthesis in C4 plant?
- A Calvin cycle occurs in mesophyll cells to produce sugar.
 B Malate is converted to pyruvate in mesophyll cells and CO_2 enters the bundle sheath cells.
 C Pyruvate from bundle-sheath cells enters mesophyll cells and is converted to phosphoenol pyruvate.
 D Phosphoenol pyruvate carboxylase fixes the CO_2 and converts it to oxaloacetate in the bundle-sheath cells.

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- 5 Processes A-G in the table represent different photosynthetic processes in C3, C4 and CAM plants.

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	process
A	cyclic photophosphorylation
B	non-cyclic photophosphorylation
C	photolysis of water
D	regeneration of ribulose biphosphate
E	C3 plant, light-independent stage
F	C4 plant, light-independent stage
G	CAM plant, light-independent stage

Match each of the following to the correct process number.

- (i) Carbon fixation occurs to produce organic acid which is stored overnight in vacuoles. []
- (ii) The ATP that is produced involves photosystem 1, but not photosystem 2. []
- (iii) Carbon fixation occurs in the mesophyll cells and the products are transported to bundle sheath cells for decarboxylation. []
- (iv) The coenzyme NADP is reduced. []

- 6 (a) Describe the fixation of CO_2 in C4 plants.
 [8 marks]

- (b) Describe the distinctive anatomical features of vascular bundles in maize leaves.
 [7 marks]

- (b) Explain how CO_2 is fixed in a CAM plant.
[7 marks]

7 (a) ATP and NADPH are two main molecules which are required for the production of carbohydrate in plants.

Describe how these molecules are generated during photosynthesis.

[9 marks]

- (b) Explain the effect of high concentration of O_2 on the photosynthesis of C_3 plants.
[6 marks]

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8 (a) Explain the detail of CO_2 fixation in C_4 plants.
[8 marks]

(b) Describe the roles of C_3 , C_4 and CAM plants on the increasing CO_2 emission and global warming. [7 marks]

9 (a) Name two products of the light dependent reactions of photosynthesis which are used in the light independent reactions. [2 marks]

(b) Suggest how the rate of photosynthesis can be determined. [2 marks]

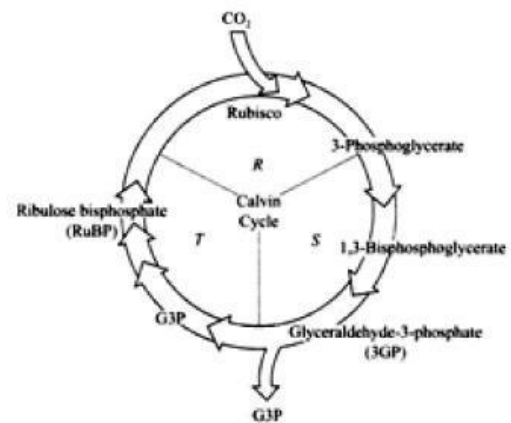
(c) The table below shows the results of a study on the effect of duration of light flashes and the dark period between them on the amount of photosynthesis.

Duration of light flash /ms	Duration of dark period between flashes/ms	Amount of photosynthesis per flash of light/ arbitrary units
3	3	1
3	17	2
3	400	2

(i) Explain the difference in the amount of photosynthesis for duration of dark period between flashes of 3ms and 17ms. [2 marks]

(ii) The amount of photosynthesis did not increase when dark period was increased from 17 to 400ms. Suggest why [1 mark]

10 The Calvin cycle is divided into three phases labelled R, S and T as shown in the diagram beside. The cycle involves many enzymes.



(a) Name phase R, S and T.

(b) State the enzymes involved in phase R. [1

(c) Describe what happens in phase S. [3 m]

(d) What happens to G3P in phase T [1 m]