

1 Phagocytosis is a non-specific response of the body to infection.

(a) Explain the meaning of each of the following terms.

(i) Phagocytosis

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(ii) Non-specific response

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(iii) Infection

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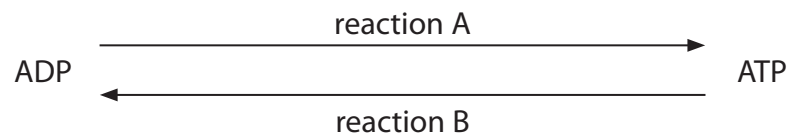
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(b) Phagocytosis requires a source of energy in the form of ATP.

The diagram below shows the relationship between ATP and ADP.



Place a cross  in the box next to the name of reaction A and reaction B.

(2)

Reaction	Name of reaction				
	autolysis	decarboxylation	hydrolysis	phosphorylation	polymerisation
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B	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

(c) ATP is synthesised in mitochondria.

(i) In the space below, draw and label a diagram to show the structure of a mitochondrion.

(4)

(ii) Name **one** other organelle that synthesises ATP.

(1)

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(Total for Question 1 = 13 marks)

- 2 The photograph below shows apples on a tree. The mass of apples produced by an apple tree depends on the type of fertiliser used. Fertilisers provide inorganic ions required by plants.



Magnification  $\times 0.5$

- (a) Plants use inorganic ions. Place a cross (☒) in the box that identifies the correct response.

- (i) Plants require the following inorganic ion to make the amino acids required for growth

(1)

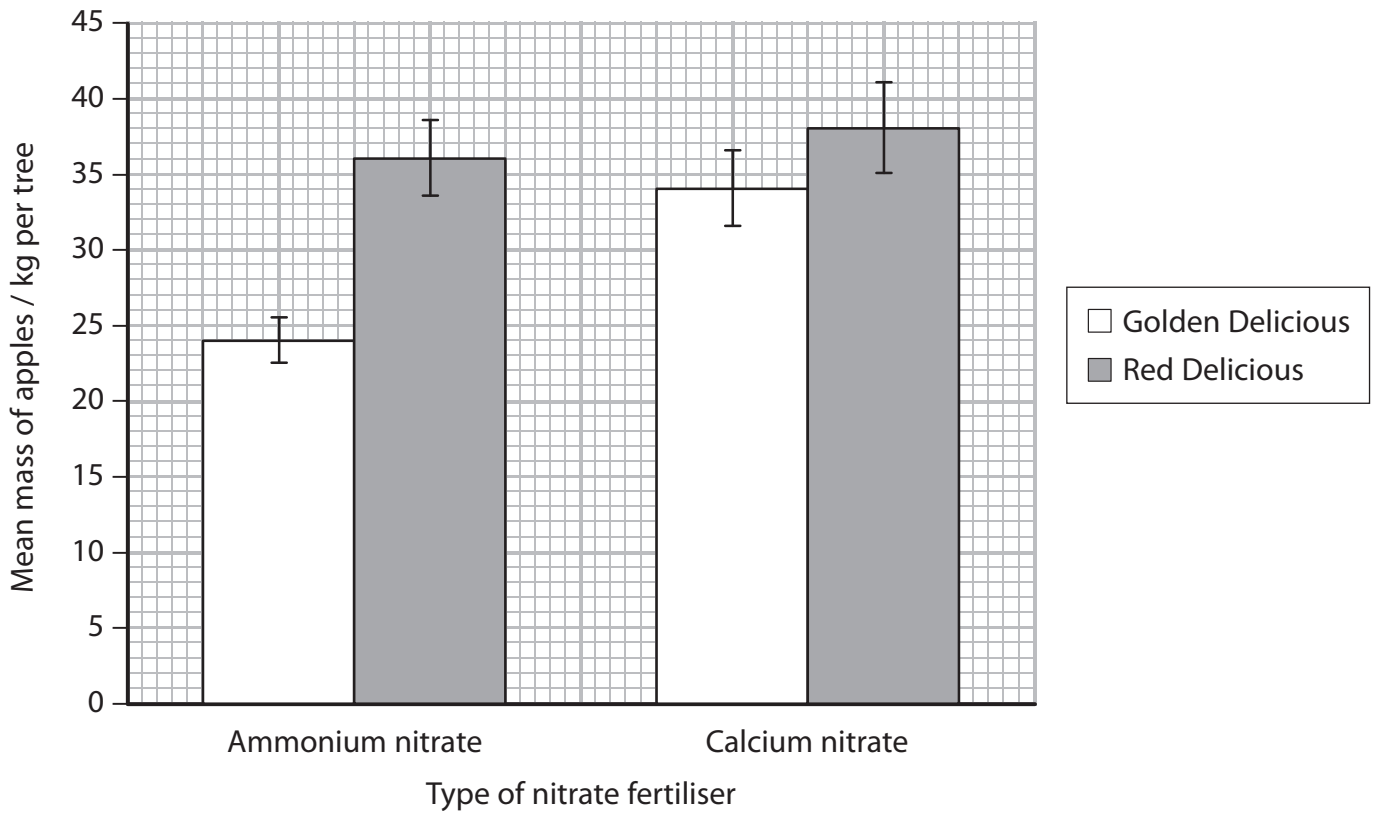
- A calcium
- B nitrate
- C phosphate
- D sulfate

- (ii) Plants require magnesium ions as a component of

(1)

- A cellulose
- B chlorophyll
- C phytochrome
- D protein

(b) The graph below shows the effect of different nitrate fertilisers on the mean mass of apples produced by Golden Delicious and Red Delicious apple trees.



(i) Using the information in the graph, describe the effects of the fertilisers on the mean mass of Golden Delicious apples produced.

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(ii) A farmer has decided to plant apple trees.

Suggest how the farmer could use the information given in the graph.

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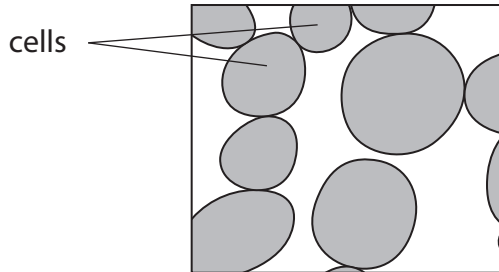
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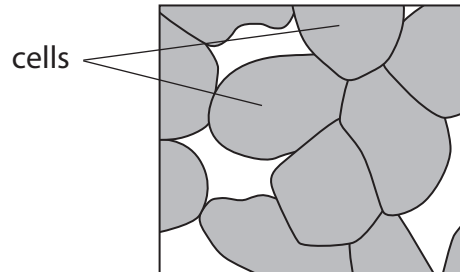
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(c) Apples with a high proportion of calcium stay firmer and can be stored for longer.

Scientists examined cells from Golden Delicious apples stored for seven months. They compared the cell structure of apples from trees given ammonium nitrate with those given calcium nitrate.



Cells from apples grown on trees given ammonium nitrate



Cells from apples grown on trees given calcium nitrate

Golden Delicious apples from trees given calcium nitrate were firmer than those from trees given ammonium nitrate.

Using information from the diagrams and your knowledge of the structure of plant cell walls, suggest an explanation for this difference.

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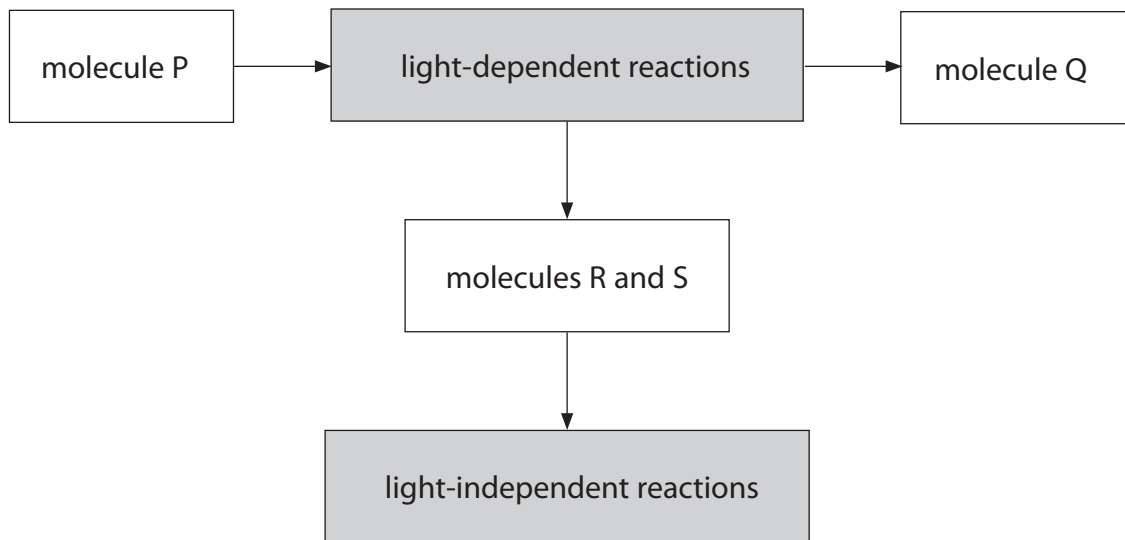
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**(Total for Question 2 = 10 marks)**

3 (a) The diagram below shows some of the steps in the process of photosynthesis.



(i) Name molecules **P** and **Q** in the diagram.

(1)

molecule P .....

molecule Q .....

(ii) Place a cross  in the box next to the names of molecules **R** and **S** in the diagram.

(1)

- A** ADP and oxidised NADP
- B** ADP and reduced NADP
- C** ATP and oxidised NADP
- D** ATP and reduced NADP

(iii) Describe the role of RUBISCO in the production of GALP in the light-independent reaction.

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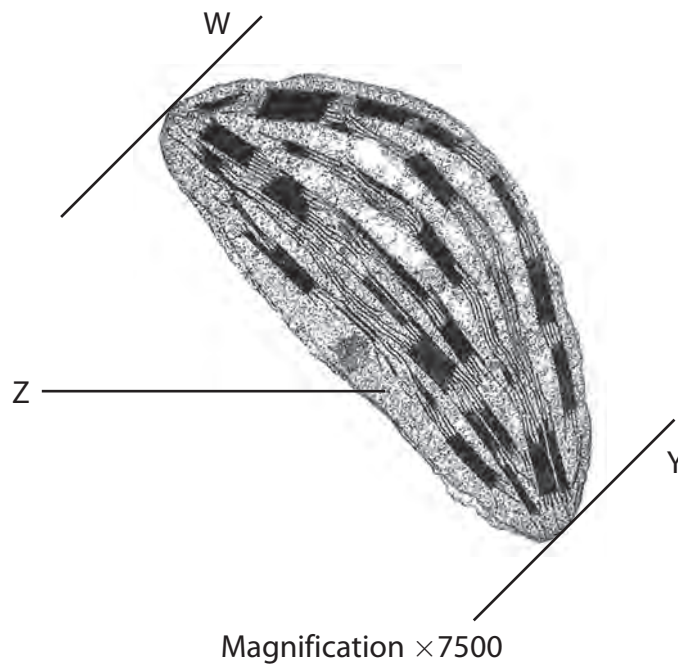
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(b) The electronmicrograph below shows a chloroplast.



(i) Place a cross  in the box next to the name of the part labelled **Z**.

(1)

- A** cytoplasm
- B** matrix
- C** stroma
- D** thylakoid



(ii) The equation below can be used to calculate the magnification of this chloroplast.

$$\text{magnification} = \text{image length} \div \text{actual length}$$

Use this equation to calculate the actual length of this chloroplast, between the lines labelled **W** and **Y**.

Show your working.

(3)

length of chloroplast = .....

(iii) Describe how the membranes inside the chloroplast are involved in photosynthesis.

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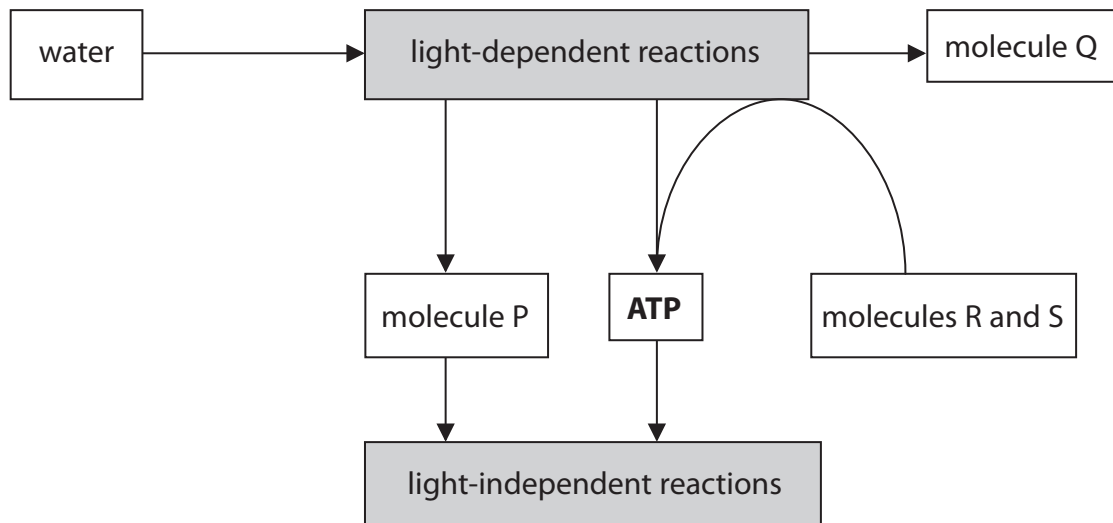
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**(Total for Question 3 = 13 marks)**

4 (a) The diagram below shows some of the steps in the process of photosynthesis.



(i) Place a cross ☒ in the box next to the name of molecule **P** in the diagram.

(1)

- A** carbon dioxide
- B** oxidised NADP
- C** reduced NADP
- D** RUBISCO

(ii) Name the molecules **R** and **S** in the diagram.

(1)

molecule **R** .....

molecule **S** .....

(iii) Describe how molecule **Q** is produced.

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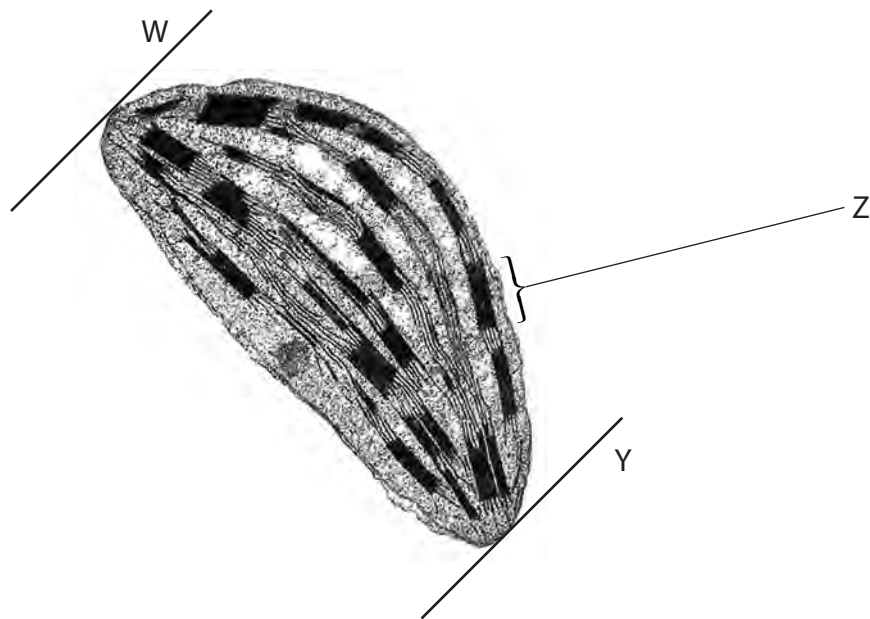
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(b) The electronmicrograph below shows an image of a chloroplast.



(i) Place a cross ☒ in the box next to the name of the part labelled **Z**.

(1)

- A** granum
- B** ribosome
- C** starch grain
- D** stroma

(ii) The equation below can be used to calculate the magnification of this chloroplast.

$$\text{image length} = \text{actual length} \times \text{magnification}$$

The actual length of this chloroplast is 0.007 mm.

Measure the image length between lines **W** and **Y**. Use this equation to calculate the magnification of the image.

(3)

magnification = .....

(iii) Describe the structure of chloroplasts in relation to their roles in photosynthesis.

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**(Total for Question 4 = 13 marks)**