

Past-paper walk-through

Photosynthesis ■ 6.1

eXercise

Questions in this set

- 0610/21 N25 Q8 ■ 1 mark
- 0610/23 N25 Q8 ■ 1 mark
- 0610/23 N25 Q10 ■ 1 mark
- 0610/43 N25 Q5 ■ 11 marks
- 0610/22 J25 Q9 ■ 1 mark
- 0610/23 J25 Q6 ■ 1 mark
- 0610/22 M25 Q10 ■ 1 mark

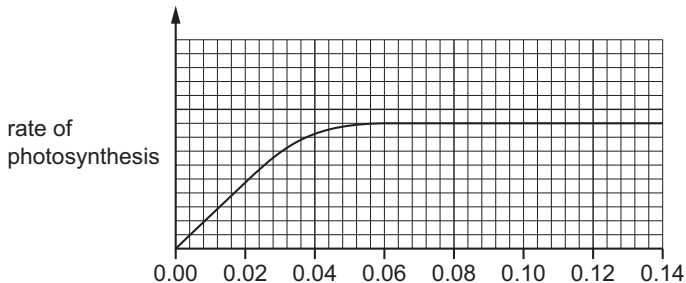
Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 8

0610/21 N25 ■ Q8 ■ 1 mark

- 8 The graph shows the rate of photosynthesis of a plant in full sunlight in different concentrations of carbon dioxide. All other factors were kept constant.



Question 8

percentage carbon dioxide concentration

What limits the rate of photosynthesis at 0.02% carbon dioxide concentration?

- A** carbon dioxide concentration
- B** humidity
- C** light intensity
- D** temperature

Solution 8

Answer: **A**

Why

- Where the graph is rising, carbon dioxide concentration is the limiting factor.
- Where it levels off, adding more carbon dioxide makes no difference.
- Something else – light intensity or temperature – has become the limiting factor there.

Question 8

0610/23 N25 ■ Q8 ■ 1 mark

8 Which substance contains magnesium ions?

A cellulose

B chlorophyll

C glucose

D glycerol

Solution 8

Answer: **B**

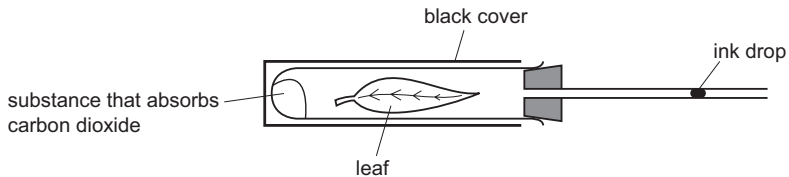
Why

- Chlorophyll has a magnesium ion at the centre of each molecule.
- That is why a shortage of magnesium causes yellow leaves.
- Cellulose, glucose and glycerol contain only carbon, hydrogen and oxygen.

Question 10

0610/23 N25 ■ Q10 ■ 1 mark

10 The diagram shows an experiment to investigate gas exchange in a leaf.



In which direction does the ink drop move and for what reason?

	direction	reason
A	towards the leaf	photosynthesis

Question 10

B	towards the leaf	respiration
C	away from the leaf	photosynthesis
D	away from the leaf	respiration

Solution 10

Answer: **B**

Why

- The chemical absorbs the carbon dioxide, so the leaf cannot photosynthesise.
- The black cover blocks light, so photosynthesis stops anyway.
- The leaf still respire, using oxygen, so the gas volume falls and the ink drop moves towards the leaf.

Question 5

0610/43 N25 ■ Q5 ■ 11 marks

5 (a) (i) State the balanced chemical equation for photosynthesis.

Question 5

- (ii) Chlorophyll is needed for photosynthesis.

State the name of the mineral ion needed to make chlorophyll.

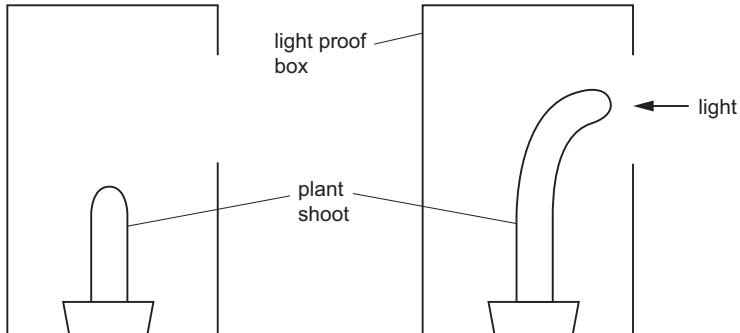
Question 5

(iii) State the name of the carbohydrate used for energy storage in a plant.

Question 5

- (b) A plant shoot was placed in a light-proof box. A hole was cut in one side of the box and a light was shone into the box.

Fig. 5.1 shows the plant shoot at the start of the investigation and after one week.



Question 5



Fig. 5.1

- (i) Identify the tropic response shown by the plant shoot in Fig. 5.1.

Question 5

- (ii) Explain the chemical control of the tropic response shown by the plant shoot in Fig. 5.1.

Question 5

- (iii) Explain how the type of tropic response shown in Fig. 5.1 is an advantage to a plant.

Question 5

[Total: 11]

Solution 5

(a)(i)

Mark scheme

- $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$;;
- 2 MP1 correct reactant and product
- molecules
- MP2 correct balancing of equation

Solution 5

(a)(ii)

Mark scheme

- magnesium (ion) ;
- 1
- 0610/43
- October/November 2025
- Guidance

Solution 5

(a)(iii)

Mark scheme

- starch ;
- 1

Solution 5

(b)(i)

Mark scheme

- (positive) phototropism ;
- 1

Solution 5

(b)(ii) Mark scheme

- any four from:
- 1
- auxin ;
- 2
- (auxin) is made in / released from, the (shoot) tip ;
- 3
- (auxin) moves by diffusion from (the shoot tip) ;
- 4

Solution 5

- (auxin) is concentrated on, shaded / left / AW, side of the, shoot / plant ;
- 5
- (auxin) stimulates cell elongation ;
- 6
- shaded / left / AW, side of shoot, elongates / bends / grows, more than,
- light / right, side ;
- 4

Solution 5

(b)(iii) Mark scheme

- 1
- better chance of light reaching the plant / AW ;
- any one from:
 - 2
 - light provides energy ;
 - 3
 - light is needed for photosynthesis ;
- 4

Solution 5

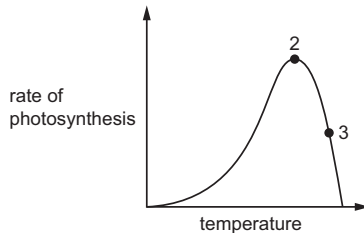
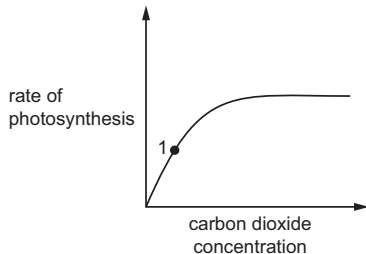
- able to, produce more glucose / respire ;
- 2
- Guidance

Question 9

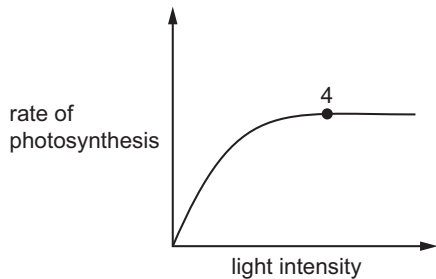
0610/22 J25 ■ Q9 ■ 1 mark

- 9 A student investigated how the rate of photosynthesis is affected by carbon dioxide concentration, temperature and light intensity.

The graphs show the results.



Question 9



What is a correct statement for these results?

- A** Carbon dioxide concentration is a limiting factor at 1.
- B** No enzymes are denatured at 3.

Question 9

- C** Light intensity is a limiting factor at 4.
- D** Temperature is a limiting factor at 2.

Solution 9

Answer: **A**

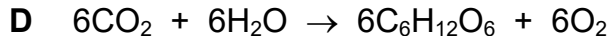
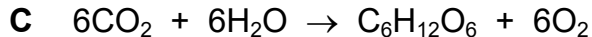
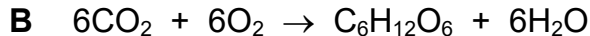
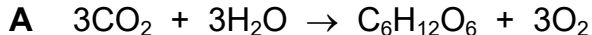
Why

- Each graph levels off when the factor plotted stops being the limiting one.
- Below the plateau, that factor is limiting the rate.
- So read where each curve flattens to see which factor becomes limiting and when.

Question 6

0610/23 J25 ■ Q6 ■ 1 mark

6 What is the balanced chemical equation for photosynthesis?



Solution 6

Answer: **C**

Why

- Photosynthesis takes in carbon dioxide and water and makes glucose and oxygen.
- Balance the carbons first: six CO_2 give one $\text{C}_6\text{H}_{12}\text{O}_6$.
- $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$.

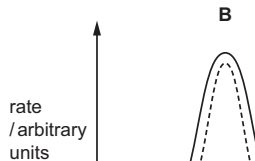
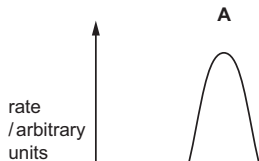
Question 10

0610/22 M25 ■ Q10 ■ 1 mark

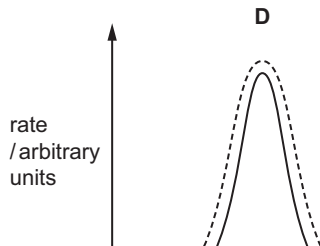
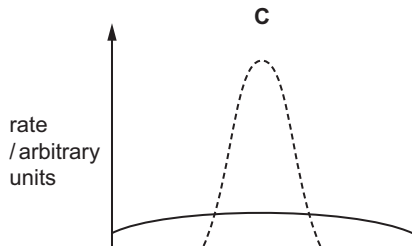
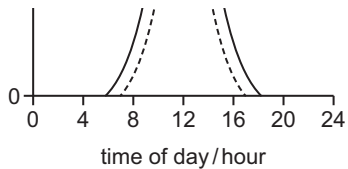
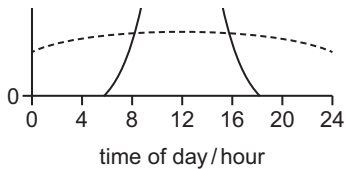
- 10** The graphs show how the rate of photosynthesis and the rate of respiration in a plant changed over a 24-hour period.

Which graph shows the correct rate of photosynthesis and rate of respiration?

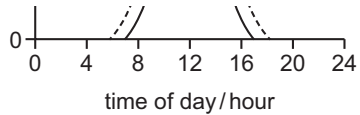
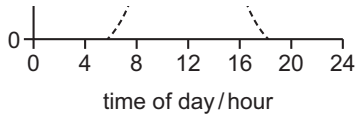
key
—— photosynthesis
----- respiration



Question 10



Question 10



Solution 10

Answer: **A**

Why

- Respiration happens all the time, day and night, so its rate never falls to zero.
- Photosynthesis needs light, so it is zero during the hours of darkness.
- So look for a respiration line that stays above zero throughout and a photosynthesis line that touches zero at night.