Photosynthesis

Total mark – 14

Q1.

All living organisms respire.

(a) What is the chemical equation for aerobic respiration?

Tick (✓) **one** box.

$6\ O_2 + 6\ CO_2 \rightarrow 6\ H_2O + C_6H_{12}O_6$ ☐

$6\ H_2O + C_6H_{12}O_6 \rightarrow 6\ H_2O + 6\ CO_2$ ☐

$6\ H_2O + 6\ CO_2 \rightarrow 6\ O_2 + C_6H_{12}O_6$ ☐

$6\ O_2 + C_6H_{12}O_6 \rightarrow 6\ H_2O + 6\ CO_2$ ☐

(1)

(b) Name the sub-cellular structures where aerobic respiration takes place.

_____

(1)

(c) Energy is released in respiration.

Give **two** uses of the energy released in respiration.

1 _____

_____

2 _____

_____

(2)

(d) Describe **two** differences between aerobic and anaerobic respiration in humans.

Do **not** refer to oxygen in your answer.

1 _____

_____

2 _____

_____

(2)

(e) What are the **two** products of anaerobic respiration in plant cells?

Tick (✓) **two** boxes.

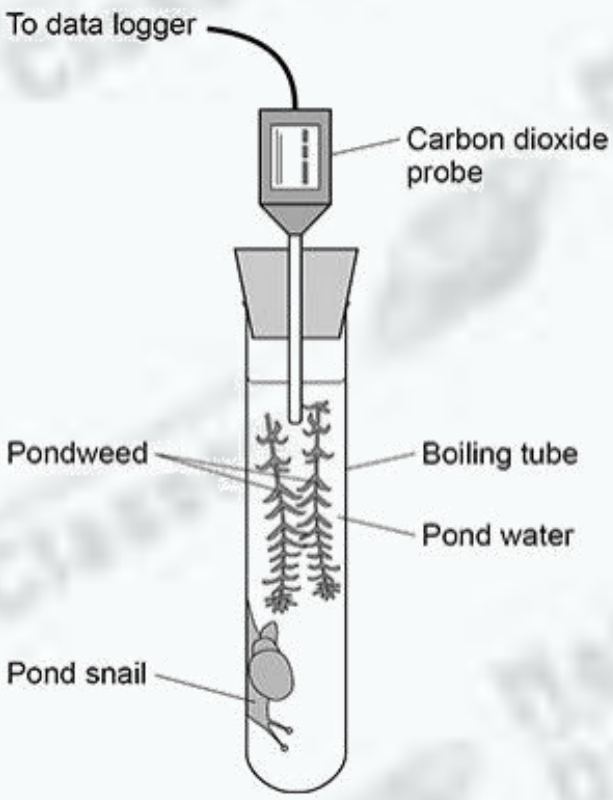
- Carbon dioxide ☐
- Ethanol ☐
- Glucose ☐
- Lactic acid ☐
- Water ☐

(2)

A scientist investigated respiration and photosynthesis using some pondweed and a pond snail.

Figure 1 shows the apparatus used.

Figure 1



The apparatus was left in a well-lit room for 5 days.

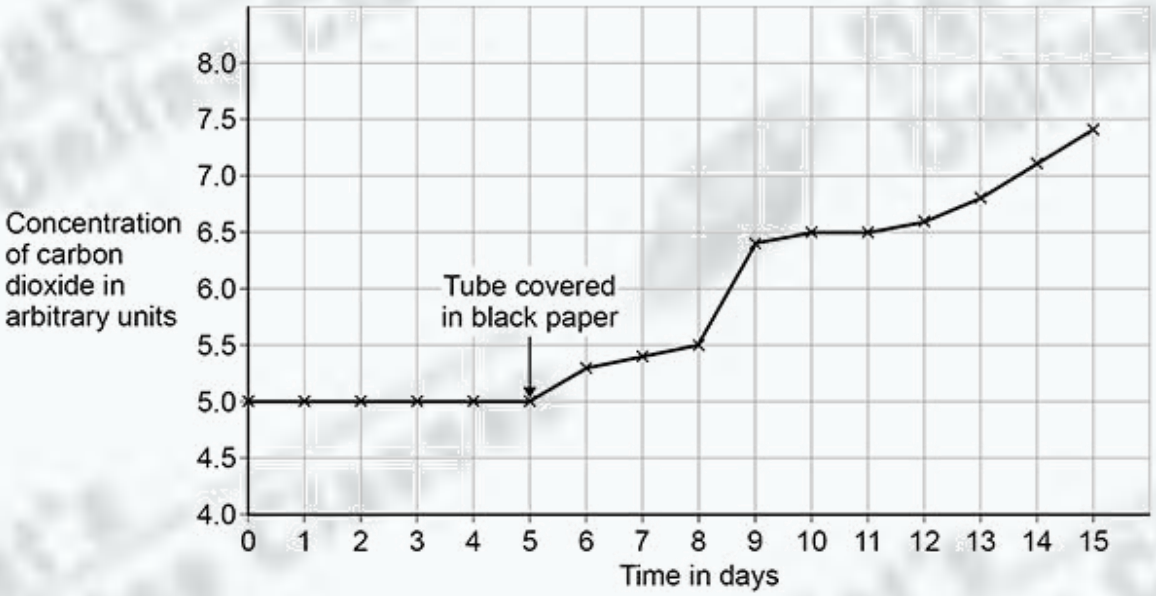
The data logger recorded the concentration of carbon dioxide continuously.

After 5 days, the scientist completely covered the boiling tube with black paper.

The data logger continued to record the concentration of carbon dioxide.

Figure 2 shows the concentration of carbon dioxide inside the boiling tube over 15 days.

Figure 2



(f) Explain why the concentration of carbon dioxide in the tube stayed the same between day 0 and day 5.

(2)

(g) Suggest why the concentration of carbon dioxide increased between day 5 and day 10.

_____

_____

(1)

(h) On day 10, the pond snail died.

Explain why the death of the pond snail caused the concentration of carbon dioxide to increase after day 10.

(3)

Mark Scheme

Q1.

(a) $6O_2 + C_6H_{12}O_6 \rightarrow 6H_2O + 6CO_2$

1

(b) mitochondria / mitochondrion

1

(c) any **two** from:

- movement / muscle contraction
- keeping warm
- active transport
- building larger molecules

ignore reference to metabolism unqualified

allow examples of movement

allow examples of building larger molecules e.g. making (named) proteins / cellulose

allow cell division

ignore growth

2

(d) any **two** from:

- anaerobic produces lactic acid **and** aerobic does not

  *allow anaerobic creates an oxygen debt **and** aerobic does not*
- aerobic produces carbon dioxide **and** anaerobic does not
- aerobic produces water **and** anaerobic does not
- aerobic occurs (mainly) in the mitochondria **and** anaerobic does not

  *allow anaerobic **only** occurs in the cytoplasm*
- anaerobic releases less energy than aerobic

  allow anaerobic releases less ATP (than anaerobic)

  *do **not** accept anaerobic produces / makes / creates less energy*

2

(e) carbon dioxide

1

ethanol

1

(f) pondweed takes in CO_2 for photosynthesis

1

snail **and** pondweed are respiring producing CO_2

if no other mark awarded allow rate of respiration = rate of photosynthesis for ***1*** *mark*

1

(g) (no light so) no photosynthesis
or
plant is not taking in CO_2

and

snail **and** plant are respiring and so are releasing CO_2

1

(h) snail is being decayed / decomposed / broken down
ignore being fed on

1

(by) decomposers / bacteria (in pond water / snail)
allow fungi / microbes / microorganisms

1

(therefore) respiration (of decomposers / bacteria) releases CO_2
do ***not*** *accept anaerobic respiration*

1