MODULE: Photosynthesis and Respiration

Intervention Session

This session has been designed to help you to practice answering PISA questions, both paper and computer based assessments about Respiration and Photosynthesis. It also helps you to practice reading and interpreting text; analysing and interpreting data; evaluating scientific inquiries; and explaining the key concepts and applying your understanding.

1. (15 minutes)

Carry out the Mars Mission computer based assessment question on the computer. Read the information, instructions and questions carefully before selecting or typing in your answers.

Remember that you can navigate backwards and forwards to check and change your answers.

When you have finished, print your answers by clicking on the print icon.

2. (15 minutes)

Plants produce food by photosynthesis.

a. Complete and balance the chemical equation for photosynthesis

$$CO_2$$
 + $C_6 H_{12}O_6$

Some students investigated the effect of temperature on the rate of photosynthesis in pondweed. They set up the apparatus in the water bath and altered the temperature using ice and hot water.

They counted the number of bubbles given off in a minute as different temperatures.



b. Why did the students use a water bath?



The graph shows the students' results.

c. Explain the shape of the graph between 22°C and 27°C.

d. A greenhouse owner wants to grow vegetables as quickly and cheaply as possible in winter. At what temperature should he keep his greenhouse in order to grow the vegetables as quickly and cheaply as possible?

Explain your answer:

3. (10 minutes)

A student investigated how much gas was given off under different conditions in the production of gasahol. The diagram shows the apparatus she used.

Test tubes A and B contained the same volume of yeast mixed with glucose solution.

Test tube C contained yeast in water, but no glucose

Test tube D contained glucose, but no yeast.

Test tube A was placed in room temperature at 20°C. The other test tubes were placed in a warm water bath at 35°C. A balloon was put over the opening of each tube.



The table describes the appearance of the balloons after 15 minutes.

Tube	Appearance of balloon after 15 minutes
А	slightly inflated
В	very inflated
С	no change
D	

- a. Explain why the balloons on tubes A and B inflated.
- b. Explain why tube B being in a higher temperature than tube A caused the balloon on tube B to inflate more than the balloon on tube A.
- c. Why did the balloon on tube C not show any change?
- d. Describe the appearance you would expect the balloon on tube D to have at the end of the experiment.

4. (10 minutes)

When we make bread, we mix flour, water, salt and yeast. After the ingredients have been mixed, the mixture is left for some time in a warm place for a reaction called fermentation to take place. This involves the yeast transforming the starch in the flour into carbon dioxide and water. It also causes the bread dough to rise.

- a. Why?
 - A. Because alcohol is produced and turns into a gas.
 - B. Because the yeast is reproducing.
 - C. Because a gas, carbon dioxide, is produced.
 - D. Because fermentation turns water into a vapour.
- b. After this process, called proving, has happened, if we weighed the dough we would observe that its weight had decreased.

Look at the experiments below. The dough weighed the same at the start of all four investigations.



Which two experiments would you compare if it was the yeast that was causing the loss of weight?

- A. You should compare experiments 1 and 2.
- B. You should compare experiments 1 and 3.
- C. You should compare experiments 2 and 4.
- D. You should compare experiments 3 and 4.
- c. In the dough, yeast helps to transform starch and sugars in the flour. A chemical reaction occurs during which carbon dioxide and alcohol form.

Where do the carbon atoms that are present in carbon dioxide and alcohol come from? Circle 'yes' or 'no' for each of the following explanations:

Is this a correct explanation of where the carbon atoms come from?	
Some carbon atoms come from the sugars	Yes/No
Some carbon atoms come from the salt	Yes/No
Some carbon atoms come from the water	

- 5. (10 minutes)
- a. The diagram below shows plants growing in a greenhouse. It is noon on a hot, sunny day.



In the sentences below, cross out TWO words which are wrong in each box.

The plant leaves will be taking in:

Carbon dioxide Nitrogen Oxygen

The plant leaves will be making:

Sugar

Magnesium

Nitrate

The energy needed for this process comes from:

Electricity

Fossil fuels

Light

b. The diagram shows a computer being used as a data logger in a photosynthesis experiment.

The experiment is to find how the oxygen output of the water plant varies over a 24-hour period.



Give TWO advantages of using a data logger in this experiment.

c. A student investigates the rate of photosynthesis in plants. She has two test groups of plants of the same species in different conditions.

For each group she measures the rate of photosynthesis at different concentrations of carbon dioxide.

The graphs show her results.



Suggest how the conditions for group B have differed from group A, and explain why this has produced the results shown in the graphs.