Taken from Differentiated Science Teaching by Keith Postlethwaite

Photosynthesis in pond weed

Question: Name the variables which affect the rate of photosynthesis in plants.

Like other green plants, pond weed can make sugar from carbon dioxide and water. When this happens, oxygen is also made. This oxygen comes out of the plant and can be seen as bubbles in the water around the pond weed. To do this job, the pond weed needs energy. It gets this from the light which shines on it. Bright light provides more energy than dim light. Red light is more easily used by the pond weed than most other colours.

This process of making sugar and oxygen is called photosynthesis.

Pond weed uses the carbon dioxide which is dissolved in the water it is in. The amount of dissolved carbon dioxide can be varied by adding sodium hydrogen carbonate (carbon dioxide solution) to the water. Many other plants take carbon dioxide from the air. The water for photosynthesis is water that is already inside the plant. It is not the water in the beaker holding the plant.

Part 1.
Now go through the passage and do the following:

1. Underline, in red, two things which are made if photosynthesis happens.
2. Underline in blue, two things the sugar is made from. The pond weed needs these if photosynthesis is to work.
3. Also in blue, underline one other thing the pond weed needs.
4. Draw a ring round the words which tell you where the pond weed gets its carbon dioxide from.
5. Draw a ring round the words which tell you where the energy comes from.
6. Draw a ring round the words which tell you where the pond weed gets the water it needs for photosynthesis from.

Part 2.

Using your information

1. Look back at your work. The things underlines in blue are the things that the pond weed needs. *Write them down in Table 1,* in the column headed, 'Things needed'
2. Now look at the things you have drawn rings round. These will tell you where the pond weed will get things from. *Write these in to Table 1 in the second column.*

Table 1

Things Needed	Come from
1.	
2.	
3.	

All of these things could be changed in some way – all of them are variables. However, it will be difficult for us to change the amount of water inside the plant. *Therefore, write down the two most relevant variables* for our experiment.

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These are two of the things which might have an effect on how fast oxygen gas is produced by pond weed.

Some extra information
Photosynthesis takes place inside a plant. It is just a chemical reaction like you see happening in test tubes. Temperature also affects the speed at which gas is produced by pond weed.

4. You could change the temperature of the plant. How could you do this?

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Also you would expect the size of the plant to affect how quickly oxygen gas is produced by pond weed.

5. You could easily change the size of plant. How could you tell how much you had?

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This suggests that temperature and size of plant are two more relevant variables.

Part 3.
Summary.

You have now identified four variables which you would expect to have some effect on how quickly oxygen gas is produced by pond weed. To get them all together, write them here.

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These four variables are the answers to the question which asked you to name the variables which affected the rate of photosynthesis in plants.

6. Now look back through the work you have just finished. With a friend, or in a group, decide *how you found out* that the four variables that you have written down in the list above were the relevant variables. Write down your ideas then talk to your teacher about what you think.