

# SCIENCE

## INTERACTIVE ASSESSMENT QUESTIONS BASED ON STANDARD PRACTICAL EXERCISES FOR REVISION AND EXAMINATION PRACTICE

### Biology Part 2

#### LEARNING VERSION

IN THIS LEARNING VERSION ANSWERS ARE IMMEDIATELY AND VISIBLY MARKED, CORRECT ANSWERS ARE INDICATED ON REQUEST, AND END OF SECTION TOTALS AND PERCENTAGES SHOWN ON SCREEN.

SOME OF THE MORE DIFFICULT QUESTIONS HAVE DROP DOWN HELP BOXES WHICH REVEAL INFORMATION WHEN THE CURSOR IS PASSED OVER THE QUESTION MARK. WHEN PRINTED OUT ONLY THE QUESTIONS SHOW, THEREFORE THIS CAN BE USED AS A PAPER VERSION FOR TESTS IF REQUIRED.

The questions are of the Multiple Choice style, where the phrase “Which ONE of the following ...” is implied, but is not always stated.

So that students are reminded of the type of question that requires short written answers, which unfortunately cannot be automatically marked, each topic has one short passage with missing words, which must be identified in their correct sequence.

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**NB** The practical work presented should be familiar to students, either as demonstrations or as procedures they might have carried out themselves in the lab.

The material is NOT presented as a practical guide, and while the methods followed safety guidelines, specific safety issues are NOT dealt with. Visit [www.cleapps.org.uk](http://www.cleapps.org.uk)

## CONTENTS

The following practical topics have been selected according to exam question frequency to form the basis of revision and examination practice.

### Part 1

Diffusion and Osmosis

Heart, Lungs & Smoking

### Part 2

Enzyme Reactions

Respiration

Fermentation

### Part 3

Leaf Structure and Function

Photosynthesis

Tropisms

## ● Enzyme Reactions

Enzymes catalyse (speed up) all the chemical reactions necessary for life.

**Practical** - The enzyme amylase catalyses the breakdown of starch into a sugar (maltose). The presence of starch is shown by testing with iodine solution. As the amount of starch decreases, the colour of the reaction with iodine solution goes from blue black to a lighter blue colour, until there is no change from the original iodine colour. PHOTO 1 shows a tile with 'spots' of iodine solution at the start of an experiment investigating the effects of amylase on a starch solution. PHOTO 2 shows the same tile at the end of the experiment.

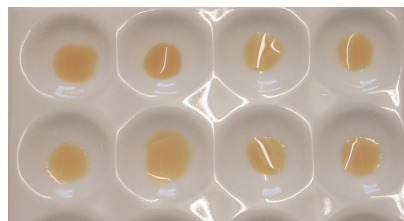


PHOTO 1  
Tile with 'spots' of iodine solution at start of experiment.

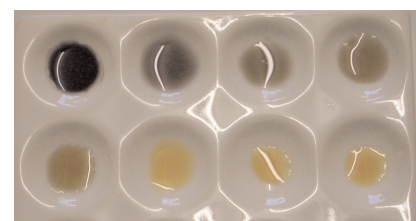


PHOTO 2  
Tile with iodine solution after samples from an amylase - starch mixture have been added. The first 'spot' (top left) was taken immediately the amylase was added to the starch, and then samples were taken at 30 sec intervals

1. In the experiment described above, and using the results shown in Photo 2, how long did it take for the starch to be broken down by amylase into sugar?

- A - more than 5 minutes
- B - less than a minute
- C - more than 4 minutes
- D - more than 2 minutes

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2. If in the experiment none of the spots of iodine solution changed colour, which one of the following would be the best explanation?

- A - The enzyme amylase was not working.
- B - All of the starch had been broken down immediately.
- C - No sugars had been produced.
- D - There was too much starch present for the enzyme to break down.

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## Enzyme Reactions

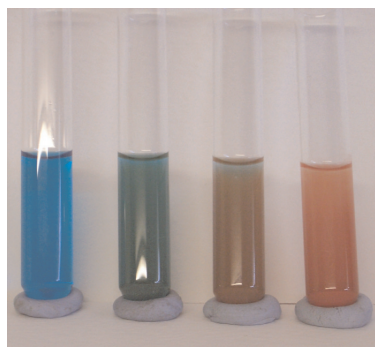
### HELP BOX

PASS CURSOR OVER  
QUESTION MARK  
FOR HELP WITH  
QUESTION  
NUMBER 4



A precipitate is a suspension of tiny particles of an insoluble substance produced in a reaction (in this case the Benedict's Test).

**Practical** - The production of sugar from the breakdown of starch can be tested for with the Benedict's Test. Benedict's solution is clear blue, and when boiled with samples from a starch/amylase mixture gives a **precipitate with a range of colours from green to red** depending on the amount of sugar present.



1 2 3 4

3. In the photograph above of the Benedict's Test, which tube contains the greatest amount of sugar?

- A - Tube 3
- B - Tube 1
- C - Tube 4
- D - Tube 2

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**Practical** - If the tubes shown above were allowed to stand for some time, gradually the colour would appear to fade at the top and get darker at the bottom of the tubes. Depending on your screen, you may be able to see that the process has already started.

4. Which one of the following is the best explanation of the above observation?

- A - There are more sugars at the bottom than at the top of the solution in the tubes.
- B - The colour is oxidised by the air at the surface of the solution.
- C - The enzyme is continuing its action on the starch.
- D - The colour is caused by a precipitate which gradually sinks to the bottom if the tubes are left to stand.

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## ● Enzyme Reactions

**HELP BOX**

PASS CURSOR OVER  
QUESTION MARK  
FOR HELP WITH  
QUESTION  
NUMBER **5**



Enzymes work best at a certain pH (acidity/alkalinity). The saliva is typically slightly alkaline, but the stomach contents are strongly acidic.

**5.** Which of the following could best explain why protease enzymes digest proteins in the stomach, but amylase in your saliva does not carry on working on starch in the stomach for very long?

- A** - The enzyme amylase is killed when the food is chewed.
- B** - The enzyme amylase is neutralised by the acid in the stomach.
- C** - All the starch is digested in the mouth.
- D** - The amylase is broken down by the acid in the stomach but the protease is not.

**6.** The following passage has four missing words.

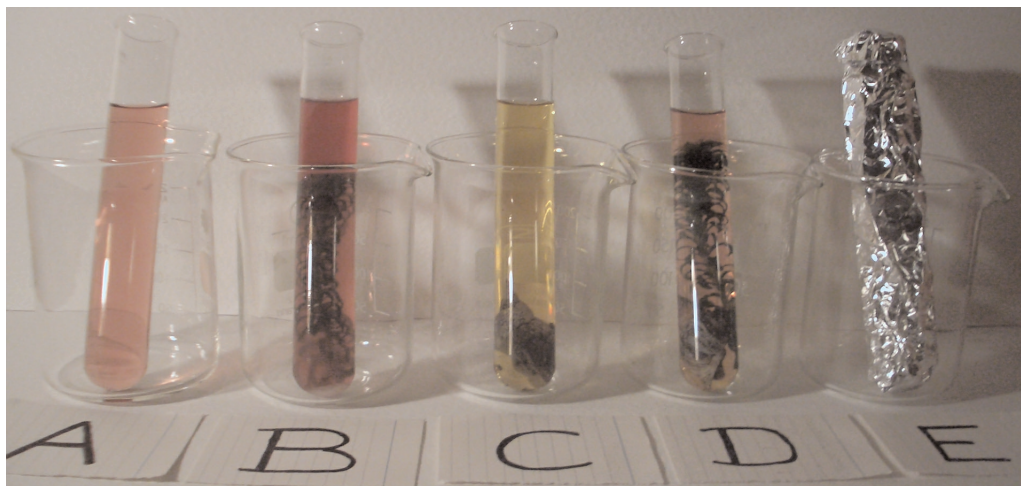
*Amylase speeds up the breakdown of \_\_\_\_ to sugars, lipase speeds up the breakdown of fats to fatty acids and \_\_\_\_, and proteases speed up the breakdown of \_\_\_\_ to \_\_\_\_\_. In the body, each type of enzyme works fastest at a particular pH, for example amylase works best at a pH around neutral.*

Which of the following has the correct missing words in the sequence as they should appear in the passage.

- A** - fats - glycerol - starch - amino acids
- B** - starch - glycerol - proteins - amino acids
- C** - starch - amino acids - proteins - glycerol
- D** - starch - glycerol - amino acids - proteins

## Respiration

**Practical** - Five tubes were set up containing hydrogen carbonate indicator solution, which is red when neutral (in equilibrium with the  $\text{CO}_2$  in the air), yellow when acidic (lower pH), and cherry red and then purple when alkaline (higher pH). Four tubes were set up containing various combinations of well washed pondweed and/or water snails, along with a tube of indicator solution only, as shown in the photograph below.



Tube contents

- A - indicator solution
- B - indicator solution plus pondweed
- C - indicator solution plus pond snail
- D - indicator solution plus pondweed and pond snail
- E - indicator solution & pondweed in tube covered in silver foil

At the start of the experiment the indicator solution in all the tubes was a red colour.

The photograph shows the tubes at the end of the experiment, during which they were all tightly sealed with rubber bungs. As screen colours can vary the results are also given below:

A - Red B - Deeper red/purple C - Yellow D - Red E - Yellow

**7.** Which of the following is the correct identification and explanation of the tube that is the control for this experiment?

- A** - Tube C because the pond snail is found in two other tubes.
- B** - Tube B because the pondweed is found in three other tubes.
- C** - Tube A because it demonstrates that the indicator solution does not change colour on its own.
- D** - Tube E because it eliminates light from the experiment.

### HELP BOX

PASS CURSOR OVER  
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FOR HELP WITH  
QUESTION  
NUMBER 7

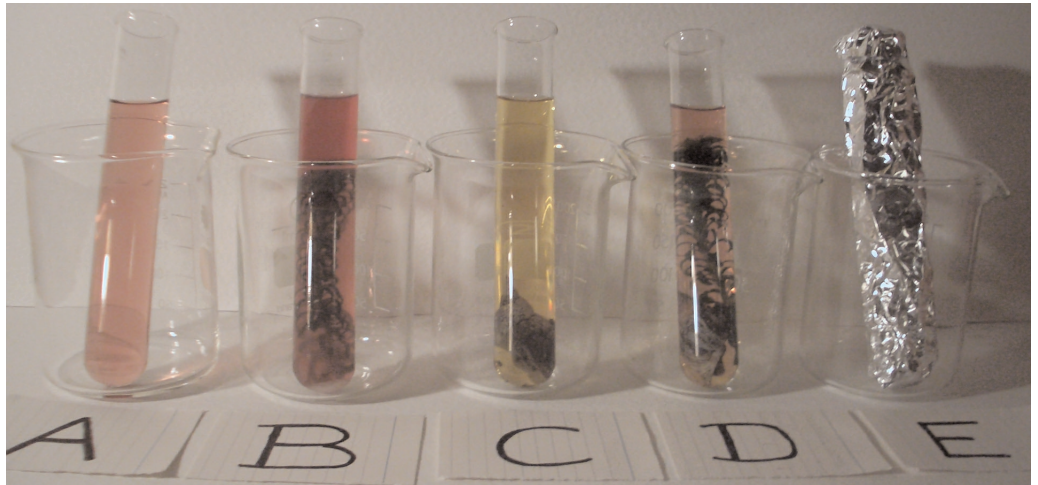


If carbon dioxide is added to the indicator solution it becomes more acid (lower pH), and if carbon dioxide is removed from the indicator solution it becomes more alkaline (higher pH).





## Respiration



8. What does tube E demonstrate?

- A** - Light is necessary for photosynthesis.
- B** - Plants increase the acidity (decrease the pH) of the surrounding indicator solution in the absence of light.
- C** - Plants decrease the acidity (raise the pH) of the surrounding indicator solution in the absence of light.
- D** - Light is not necessary for the indicator solution to change colour.

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9. Which of the following is the correct identification and explanation of why one of the tubes has the lowest oxygen concentration?

- A** - Tube E because no photosynthesis is taking place there.
- B** - Tube D because both plant and animal are respiring together.
- C** - Tube B because photosynthesis is using up oxygen faster than respiration.
- D** - Tube C because animal respiration is faster than plant respiration and no photosynthesis is taking place.

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10. Which of the following correctly explains why there was no change in colour in tube D?

- A** - The presence of the snail prevents the indicator solution from working.
- B** - The presence of the pondweed prevents the indicator solution from working.
- C** - The snail's exchange of gases is balanced by those of the pondweed.
- D** - The indicator solution has poisoned the snail.

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## ● Respiration

**HELP BOX**

PASS CURSOR OVER  
QUESTION MARK  
FOR HELP WITH  
QUESTION  
NUMBER **11**  
& **12**



Animals and plants respire all the time. In the light green plants carry out photosynthesis during which carbon dioxide is taken in and oxygen is given out. In the light photosynthesis produces more oxygen than respiration uses.

**11.** In which of the tubes containing pondweed is plant respiration occurring?

- A** - None of them  
**B** - D  
**C** - E  
**D** - All of them

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**12.** The following passage has four missing words.

*Animals only carry out respiration so always take in oxygen and give out carbon dioxide. Plants carry out \_\_\_\_ at all times, but also carry out \_\_\_\_ in the light. Above a certain light intensity photosynthesis proceeds at a faster rate than plant respiration. Therefore in the dark, plants usually take in \_\_\_\_ and give out \_\_\_\_, but in the light this is reversed.*

Which of the following has the correct missing words in the sequence they should appear in the passage.

- A** - respiration - photosynthesis - oxygen - carbon dioxide  
**B** - photosynthesis - respiration - oxygen - carbon dioxide  
**C** - respiration - photosynthesis - carbon dioxide - oxygen  
**D** - photosynthesis - respiration - carbon dioxide - oxygen

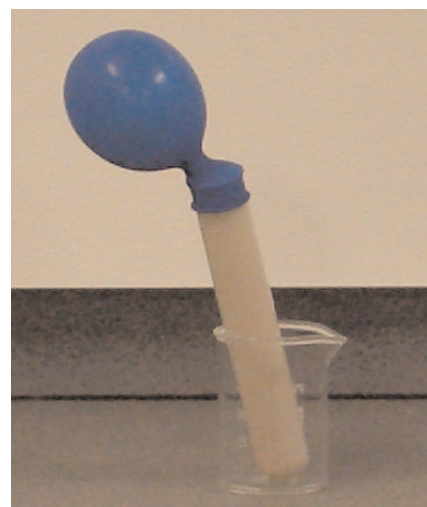
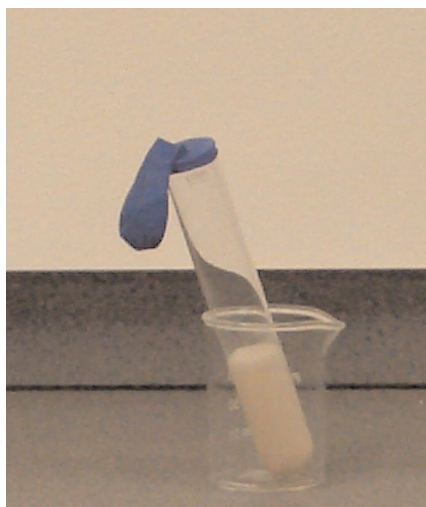
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### ● Fermentation

Yeast cells produce enzymes which break down sugar into alcohol and carbon dioxide, in a process known as fermentation. This process is made use of in the brewing and baking industries.

**Practical** - The apparatus was set up as shown. The boiling tube had a mixture of yeast and sugar solution added, after which a pre-stretched balloon was attached tightly to the top. The tube was then placed in a beaker-waterbath at 40 °C. After about 15 minutes the balloon became inflated as shown below.



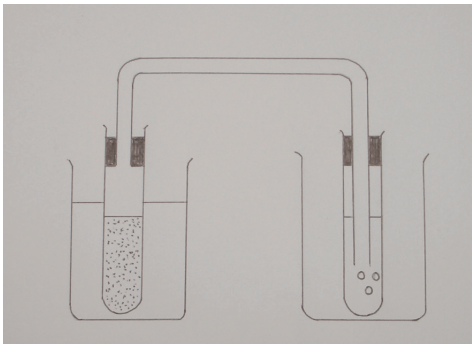
**13.** Which of the following is the best explanation of the balloon becoming inflated in this experiment?

- A** - Air in the tube is expanding because the water surrounding it is at 40 °C.
- B** - A gas is being produced by the yeast in the sugar solution.
- C** - Alcohol vapour is being produced.
- D** - The mixture has foamed up and filled the balloon.



● Fermentation

**Practical** - The production of a gas as a result of yeast reacting with a sugar solution can be MEASURED by counting the bubbles of gas as they are pushed out into the water in tube X shown below.



Yeast / sugar mixture at 40° C      Tube X

Using the apparatus shown, the number of bubbles produced in 30 seconds was counted. The counting was repeated three times and recorded in the table shown below.

30 sec Period	No. of bubbles
First period	12
Second period	16
Third period	17

HELP BOX

PASS CURSOR OVER QUESTION MARK FOR HELP WITH QUESTION NUMBER 14

To obtain the average or mean of a set of figures, add them all up and divide by the number of results, in this case 3.

14. Which of the following figures represents the average of the number of bubbles produced in a 30 second period?

- A - 15
- B - 14
- C - 13
- D - 16

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15. Which of the following changes in conditions of the experiment would NOT result in an increase in the rate of bubbling?

- A - An increase in the amount of sugar.
- B - An increase in temperature.
- C - An increase in the amount of light.
- D - An increase in the amount of yeast.

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## ● Fermentation

**HELP BOX**

PASS CURSOR OVER  
QUESTION MARK  
FOR HELP WITH  
QUESTION  
NUMBER **16**



Enzymes are permanently damaged (denatured) at 100 °C (see Enzymes sub-section).

**16.** After heating a sample of the yeast/sugar solution mixture to 100 °C, it was cooled to 40 °C and more sugar solution added. Which of the following is the best description of what you would expect to occur.

- A** - The rate of reaction would be the same as it was before at 40 °C.
- B** - No reaction would occur.
- C** - The rate of reaction would be much slower than it was before at 40 °C.
- D** - The rate of reaction would be much faster than it was before at 40 °C.

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**17.** After cooling a sample of the yeast/sugar solution mixture to 0 °C, it was re-warmed to 40 °C and more sugar solution added. Which of the following is the best description of what you would expect to occur.

- A** - The rate of reaction would return towards what it was previously at 40 °C. as the mixture was rewarmed.
- B** - No reaction would occur.
- C** - The rate of reaction would be much slower than it was before at 40 °C.
- D** - The rate of reaction would be much faster than it was before at 40 °C.

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## Fermentation

**Practical** - The previous experiment was set up again with the test tube through which the gas is bubbling now filled with LIME WATER.

Observe the result and answer the following questions.



Gas bubbling through water in tube on right



Gas bubbling through lime water in tube on right

Another tube of lime water was stood near by, open to the air, and did NOT go cloudy over the same period.

**18.** Which of the following best explains the results?

- A** - The gas produced by yeast contains impurities that 'cloud' the lime water.
- B** - Air causes lime water to go 'milky' at the same rate as yeast respiration.
- C** - Lime water goes 'milky' in contact with glass.
- D** - The gas produced by yeast is carbon dioxide which turns limewater 'milky'.



## ● Fermentation

**HELP BOX**

PASS CURSOR OVER  
QUESTION MARK  
FOR HELP WITH  
QUESTION  
NUMBER **19**



Aerobic means in the presence of oxygen, and anaerobic means in the absence of oxygen.

**19.** The following passage has four missing words.

*Yeast is a single celled organism that occurs naturally, decomposing dead organic matter, e.g. fruit. It is capable of breaking down and absorbing sugars from its surroundings and using them to release \_\_\_\_\_. This process is respiration. In the presence of \_\_\_\_\_, yeast can carry out aerobic respiration to produce carbon dioxide and \_\_\_\_\_. In the absence of oxygen, yeast respire anaerobically and produces carbon dioxide and \_\_\_\_\_, this process can also be called fermentation.*

Which of the following has the correct missing words in the sequence as they should appear in the passage.

- A** - water - oxygen - alcohol - energy
- B** - oxygen - energy - water - alcohol
- C** - energy - water - alcohol - oxygen
- D** - energy - oxygen - water - alcohol



- Enzymes
- Respiration
- Fermentation

**SECTION TOTAL****SECTION PERCENTAGE**