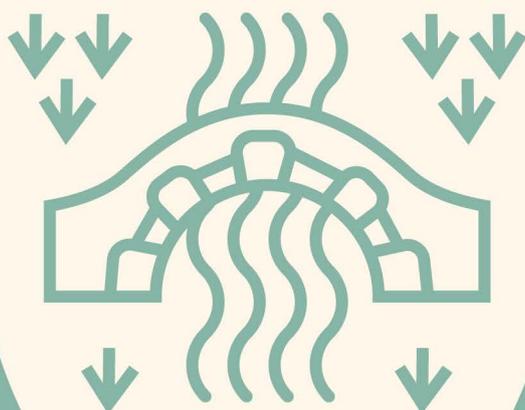


BLANCHELANDE  
COLLEGE

Sixth Form Bridging Courses



Biology



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## A-Level Bridging Work Biology For Summer 2020

*There are three tasks in this bridging course. You should do as much as you can. The first task is a must, and the second and third are extension tasks. Give them your best shot!*

### Biology Bridging Work 1

### Cells

**1. Make a model or** Draw and label plant, animal and prokaryotic cells in as much detail as possible. (15 marks)

PLANT CELL

**Use your GCSE notes, don't guess**

ANIMAL CELL

PROKAROTIC CELL

2. Describe the function of these cell organelles...

**Use your GCSE notes, don't guess**

Ribosomes

(5 marks)

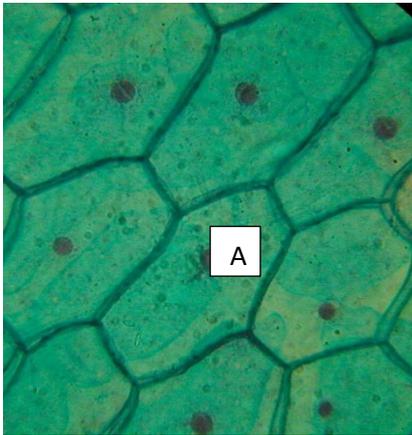
Mitochondria

Chloroplasts

Cell Wall

Cell Membrane

3.



**Remember the magnification equation**

$$\text{Magnification} = \frac{\text{Image Size}}{\text{Actual Size}}$$

You need to measure the image in mm and convert to  $\mu\text{m}$  by  $\times 1000$

So, 6.5 mm would become 6500  $\mu\text{m}$

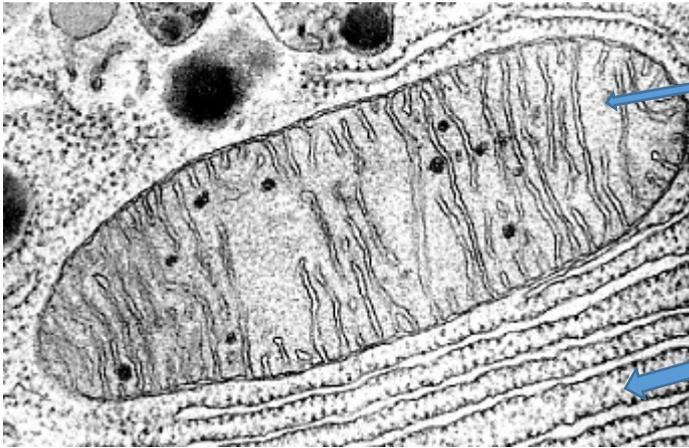
Measure the maximum length of cell A =  
(1 mark)

Convert this to  $\mu\text{m}$  =  
(1 mark)

If the actual length of the cell is 85  $\mu\text{m}$ , calculate the magnification =  
(1 mark)

Now use this magnification value to calculate the diameter of a cell nucleus in the photo  
= (2 marks)

4.



This is a photograph of a mitochondrion

These tiny dots are ribosomes

Magnification = x 9000

Use the magnification number (x 9000) to calculate the actual length of the mitochondrion in  $\mu\text{m}$  (2 marks)

Explain as well as possible why you can see so much more detail in this second photograph compared to the 1<sup>st</sup> photograph. Use your GCSE notes on microscopes. (3 marks)

## Biology Bridging Work 2

## Enzymes

A student did an experiment where she added lipase enzyme to a mixture containing fats.

Before adding the lipase enzyme, she incubated the fat mixture at the right temperature for 5 min

She added 1cm<sup>3</sup> of lipase to 10cm<sup>3</sup> of fat mixture and gave the tube a shake.

She incubated the reaction at different temperatures each time she repeated the experiment.

She measured how long it took for the reaction mixture to change from pH 7 to pH 6.

Calculate as  
1 ÷ time  
eg 1 ÷ 16.7 sec

Temperature / °C	Time for pH to fall to pH 6 / sec				Rate of reaction / sec <sup>-1</sup>
	Attempt 1	Attempt 2	Attempt 3	Average	
5	130	152	145		
21	78	70	86		
30	42	47	39		
39	20	28	28		
48	9	10	9		
60	no pH change	no pH change	no pH change		

- Calculate the average time taken and the rate of reaction, write them in the table.  
(4 marks)
- Plot a graph of **temperature vs rate of reaction** remember labels, units, scales and an appropriate line.  
(5 marks)





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- f. Explain why the rate of reaction increased between 5 and 48°C – details needed  
(3 marks)
- g. Explain why no pH change occurred at 60°C – details needed  
(3 marks)
- h. Think about lipase and fat. Why does the pH of the reaction mixture decrease from 7 to 6? (2 marks)



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## Biology Bridging Work 3

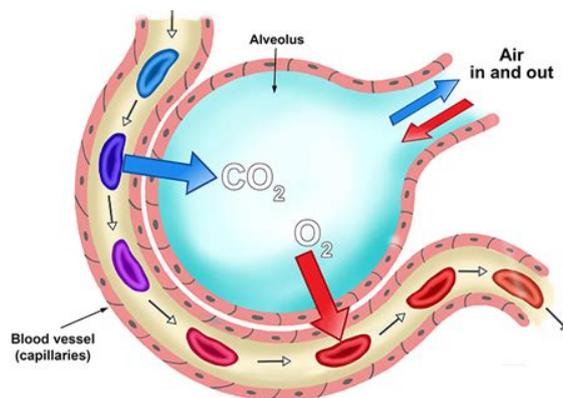
## Diffusion

1. Write a good definition of diffusion:

2. Which of these would increase the rate of diffusion

Increase in temperature	Surface area for diffusion becoming lower	Decrease in length of diffusion pathway	Doubling of Concentration Difference
Surface area for diffusion becoming higher	Halving of Concentration Difference	Decrease in temperature	Increase in length of diffusion pathway

The human gas exchange system is adapted to increase the rate of oxygen and  $\text{CO}_2$  diffusion into or out of the blood. This is achieved by having millions of tiny alveoli in the lungs, not 2 big balloons, to increase the surface area. A very short diffusion pathway is possible because the epithelial cells of the alveoli and endothelial cells of the blood capillaries are both very thin. Being inside the body helps warm the air up before it gets from your nose to your alveoli. The constant blood flow and regular breathing keeps the concentration gradient high. Blood flow carries oxygenated blood away from the alveoli; whilst exhaling and inhaling removes air with little oxygen and replaces it with air with lots of oxygen. Finally, blood flow through capillaries is slow, to ensure enough time for oxygen and  $\text{CO}_2$  diffusion.



Quite a few diseases can affect the efficiency with which the alveoli work as a surface for gas exchange. During an **asthma** attack, the airways narrow so that breathing in and out is very difficult, with low volumes of air moved out of or into the alveoli. Smoking not only causes lung cancer, but also **emphysema**. In this condition a patient's alveoli walls



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break down so that in effect they have fewer, larger alveoli. The alveoli also lose their elasticity and their 'stretch and recoil' ability so that the patient finds it difficult to remove 'old' air from their alveoli. Coal mining and other dust-filled occupations often led to **COPD** before appropriate face masks were introduced. A patient with COPD (chronic obstructive pulmonary disease) has scarred alveoli that have much thicker walls as well as alveoli that lose their elasticity and their 'stretch and recoil' ability just like in emphysema.

3. Look at the diagram. How many cell membranes would an oxygen molecule have to cross to move from the air in an alveolus into a red blood cell?

(1 mark)

4. Which process is oxygen essential for in all cells? Write a balanced symbol equation for this process. (3 marks)

5. Use the explanation of how alveoli maximise oxygen diffusion and the description of lung diseases to...

a. Explain why, during an asthma attack, a patient can't get enough oxygen to their cells (3 marks)

b. Explain why a sufferer of COPD would quickly become out of breath when they walk upstairs (3 marks)

c. Explain why sufferers from emphysema often need an oxygen cylinder to help them stay alive (3 marks)

## Biology Extension Work

Before you start A-Level Biology its really (really really) important that you have a good grounding in basic organic chemistry

### Biological Molecules

Biological molecules are often polymers and are based on a small number of chemical elements. In living organisms carbohydrates, proteins, lipids, inorganic ions and water all have important roles and functions related to their properties. DNA determines the structure of proteins, including enzymes. Enzymes catalyse the reactions that determine structures and functions from cellular to whole-organism level. Enzymes are proteins with a mechanism of action and other properties determined by their tertiary structure. ATP provides the immediate source of energy for biological processes.

*Read the information on these websites to help you:*

<http://www.s-cool.co.uk/a-level/biology/biological-molecules-and-enzymes>

<http://www.bbc.co.uk/education/guides/zb739j6/revision>

And take a look at these videos:

<https://www.youtube.com/watch?v=H8WJ2KENIK0>

<http://ed.ted.com/lessons/activation-energy-kickstarting-chemical-reactions-vance-kite>

### Task

Krabbe disease occurs when a person doesn't have a certain enzyme in their body. The disease affects the nervous system. Write a letter to a sufferer to explain what an enzyme is.

Your letter should:

- Describe the structure of an enzyme
- Explain what enzymes do inside the body
- Be written as a letter, but include fully labelled diagrams
- Full references should be included. Eg the URL of the website you have used or the name and author of any books you may have used.