

Bridging the Biology Gap between GCSE and A Level

You have learnt many things in GCSE. In Post 16 Biology we need to look at the topics in finer detail. Look at the headings in this table and see if you can research/remember the answers to the questions.

In the first term we will be covering CELLS and BIOLOGICAL MOLECULES.

Prior to starting your Post 16 studies in Biology you should have reviewed the topics and at the very least looked at the sections on microscopes, basic layout of cells, carbohydrates and proteins as these will be the first topics you tackle.

You should also have looked at the practical skills section as these skills are essential for success in the A level courses.

Each section has some statements related to GCSE knowledge and then some questions that test your recall of topics and also your ability to apply that knowledge.

Some of these questions may be a little bit challenging and are there to give you an idea of the style of some of the A level questions you may come across.

You will notice that many of them are about application and making links between topics and not just pure recall of facts. These are key skills that you will need to develop.

Each section is in a table so you can simply type your answers into the table (it should expand to take your answers). Alternatively you can simply print out the pages and write your answers on lined paper.

If you find some of this work challenging initially do not worry; however, you will need to think logically about some of the questions and persevere.

There are resources that you can purchase to help you with “bridging the gap” such as the CGP “Head Start to AS Biology) (ISBN 9781847621177)

CELLS

| PRIOR KNOWLEDGE | QUESTIONS TO MOVE YOU INTO AS. |
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| Microscopes <i>How to set up a microscope.</i> <i>Microscope drawings.</i> | <ol style="list-style-type: none">1. What are the objective lenses on a school light microscope?2. How do you work out the magnification you are using to look at a specimen using a microscope?3. What structures should you be able to recognise using a light microscope?4. Name a type of microscope that has higher magnifications than our school ones. |
| Basic layout of cells <i>How to draw a plant and animal cell</i> <i>Be able to label 3 structures on an animal cell and 6 in a plant cell.</i> <i>Describe the function of the structures.</i> <i>Identify specialised cells.</i> <i>Define tissues and organs</i> | <ol style="list-style-type: none">1. Draw a cheek cell and label.2. Draw a palisade cell and label.3. The pancreas makes insulin which is a protein. What structures should a pancreatic cell have to enable this function?4. Name 2 specialised animal cells and 2 plant cells.5. Outline how they are adapted for their function.6. What is the function of the xylem and phloem tissue in plants?7. What is unique about xylem? |

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| <p>Communication between cells. <i>Describe how the immune system works.</i> <i>Describe how a synapse works.</i></p> | <ol style="list-style-type: none"> 1. How does a synapse allow 2 cells to communicate with each other? 2. What structures must a cell have to enable this type of communication? 3. Explain why immunity is specific to one type of microbe. |
| <p>Movement across membranes <i>Define diffusion, osmosis and active transport.</i> <i>Give examples of these movements in the body and the plant.</i> <i>Understand the difference between these three processes.</i></p> | <ol style="list-style-type: none"> 1. What are the differences between diffusion and osmosis? 2. What are the differences between diffusion and active transport? 3. Name two locations in the body that use active transport. 4. Using the alveoli as your example, explain why diffusion of oxygen will always occur in the correct direction i.e. from the air into the bloodstream. 5. Suggest why root hair cells contain lots of mitochondria to absorb mineral ions from the soil. 6. What gas must be available to the roots in the soil if they are going to be able to absorb mineral ions effectively? |
| <p>Cell division <i>Define mitosis</i> <i>Recognise pictures of cells undergoing mitosis.</i> <i>Define stem cells</i> <i>Explain differentiation in terms of stem cells.</i></p> | <ol style="list-style-type: none"> 1. What is the purpose of mitosis in the body? 2. If a cell starts with 12 chromosomes how many will the daughter cells have at the end of mitosis? 3. What is a stem cell – what is the difference between totipotent and multipotent? 4. Do adults have stem cells and if so, where? 5. What is cell division called in bacteria? 6. Apart from the chromosomes, what else must be replicated before the cell cleaves? |

BIOLOGICAL MOLECULES

| PRIOR KNOWLEDGE | QUESTIONS TO MOVE YOU INTO AS. |
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| <p>Carbohydrates. <i>Examples of simple and complex carbohydrates.</i> <i>Function of carbohydrates.</i> <i>Sugar control in the body.</i> <i>How carbohydrates are stored in the body.</i> <i>Examples of how they are broken down and examples of enzymes.</i></p> | <ol style="list-style-type: none"> 1. Name a simple carbohydrate. 2. What is glycogen? 3. Which organism are able to produce starch? 4. What are the three elements found in all carbohydrates? 5. Name three locations of carbohydrase enzymes. 6. What is glucose used for in the body? 7. What is the chemical test for glucose? Remember to state the initial and final colour change. |
| <p>proteins <i>the function of proteins</i> <i>Examples of proteins.</i> <i>That the body cannot store proteins and convert excess into urea.</i> <i>That the size of them stops them from entering the urine.</i> <i>How they are broken down.</i> <i>Examples of protease enzymes.</i></p> | <ol style="list-style-type: none"> 1. Name 3 food sources that are rich in protein. 2. What is the test for proteins when testing food? Remember to state the initial and final colour change. 3. Name one type of protease enzyme. 4. What is the monomer unit of a protein? 5. Ordinarily enzymes would be denatured by extremes of pH. Why is this not the case for some protease enzymes? 6. What elements do plants need to manufacture proteins? Where does they come from? |
| <p>lipids <i>Examples of lipids .</i> <i>Function of lipids.</i> <i>How lipids are stored in the body and the effects of obesity.</i> <i>Explanation of how they are broken down by enzymes and how bile is related to lipid digestion.</i></p> | <ol style="list-style-type: none"> 1. Which fat has double bonds in their hydrocarbon tail? 2. What is the function of lipids? 3. Where is fat broken down primarily in the digestive system? 4. What are the monomers of a lipid? 5. What is the chemical test for lipid? |

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| <i>The relationship between cholesterol and lipids.</i> | |
| water <i>That water is part of the blood plasma</i> <i>That water is an abiotic factor in ecological terms.</i> <i>That many species have adapted to live and breathe in water.</i> | <ol style="list-style-type: none"> 1. What is the formula of water? Draw the chemical structure of water. 2. What properties of water do you know - from GCSE Chemistry and GCSE Physics? 3. What would happen to your body cells if too much water was in your plasma? |
| DNA <i>The structure of DNA</i> <i>How is replicated.</i> <i>How is passed on genetically.</i> | <ol style="list-style-type: none"> 1. What are the four bases of DNA? Which join with which? 2. What is the “backbone” of DNA made of? 3. Suggest why the key features of DNA, including the double helix and complementary base pairing, allow DNA to replicate. 4. What is a chromosome? |
| Enzymes <i>How enzymes work</i> <i>The effects of temperature, pH, substrate concentration and enzyme concentration on rate of reaction.</i> | <ol style="list-style-type: none"> 1. How does an enzyme catalyse a reaction with its substrate(s)? 2. How does this model explain that enzymes are specific? 3. Where are enzymes located in the body? 4. Why does the rate of reaction increase with temperature rise? 5. If you increase the enzyme concentration the rate will always increase. However if you continually increase the substrate concentration, the rate will plateau. Why? |

PRACTICAL SKILLS

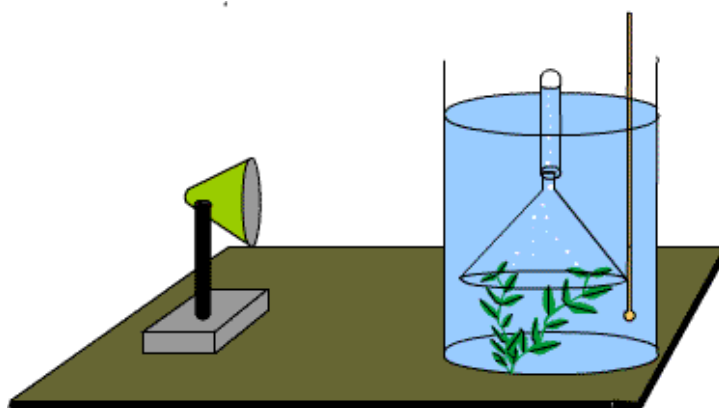
You should also be able to do the following basic data analysis and evaluation tasks.

- Find a mean, median and mode from given data.
- Calculate % change.
- Construct tables of results with suitable headings and units.
- Draw line graphs plotting the independent and dependent variable the right way round.
- Draw lines of best fit on those graphs.
- Describe trends and patterns from given data and make comparative statements using data including the units.
- Apply scientific knowledge to explain graphs.
- Evaluate the validity of any results as well as their reliability, accuracy and precision.

➤ *Have a go at the questions on experimental technique below*

Investigating photosynthesis

A student set up an experiment to investigate the effect of light intensity on the rate of photosynthesis in a pond plant called *Elodea* as shown in the diagram below.



The table of results below has 3 errors in how the data has been recorded.
What are they?

| Rate of oxygen production | Light intensity (lux) |
|---|-----------------------|
| 0 (cm ³ min ⁻¹) | 0 |
| 2.2 (cm ³ min ⁻¹) | 20 |
| 4.3 (cm ³ min ⁻¹) | 40 |
| 6.5 (cm ³ min ⁻¹) | 60 |
| 8 (cm ³ min ⁻¹) | 80 |
| 10.1 (cm ³ min ⁻¹) | 90 |
| 11.2 (cm ³ min ⁻¹) | 100 |
| 12 (cm ³ min ⁻¹) | 120 |
| 12 (cm ³ min ⁻¹) | 140 |
| 12 (cm ³ min ⁻¹) | 160 |

- Use the information from the table to plot a graph.
- Describe the results for this experiment.
 - In this experiment the student collected 1 set of results for each light intensity.
 - The light intensity was varied by moving a powerful 200W light bulb (that got very hot) closer to the plant (the light was turned off to begin with for the 0 lux value).
 - The rate of oxygen production was measured by collecting 5 bubbles and working out the volume of those bubbles and then working out a mean volume per bubble.

She then counted the number of bubbles in 1 minute (as soon as the light was turned on) and multiplied this by the average volume of 1 bubble to get the volumes recorded in the table above.
- The method used by the student contains a number of flaws that will affect the accuracy, validity and reliability of the data collected.
The flaws are listed below
Tick the appropriate box to show how the flaws have affected the data.

| Flaw | The flaw has affected the _____ of the data) | | |
|--|--|-------------|----------|
| | Accuracy | Reliability | Validity |
| Only collected 1 set of results. | | | |
| Used a very powerful (hot) light bulb). | | | |
| Counted bubbles as soon as light turned on. | | | |
| Counted 5 bubbles to measure the volume and work out a mean volume per bubble. | | | |

- The student concluded that: "the higher the light intensity the greater the rate of photosynthesis."
To what extent do the data support her conclusion?
Give reasons.
- To what extent do the limitations highlighted affect the validity of any conclusions that the student makes?