



## Bilton School Sixth Form

### Biology – Transition Work

To prepare effectively for Biology you should work through the below tasks and bring these with you for your first day at Bilton sixth form.

Please note you will sit a baseline assessment related to the materials below (TASKS1, 2, 3 & 4) when you commence sixth form.

#### Task 1— Biological molecules and cells

A) Draw and explain the structure of an amino acid, alpha and beta glucose molecule, and a triglyceride. Make comprehensive notes on the structure of proteins (including primary secondary and tertiary and about peptide bonds), carbohydrates (including the three elements they consist of and starch and cellulose as a polysaccharide) and the different lipid structures (including saturated fatty acid, unsaturated fatty acid and phospholipids)

B) Explain in detail what enzymes do in terms of their role as a biological catalyst, including a graph showing activation energy with and without the presence of an enzymes. Explain the structure of enzymes and their two possible functions. Draw a diagram of the enzyme substrate complex and explain what is happening at each stage. Explain what is meant by the phrase “enzymes are specific” and describe how temperature and pH affect enzyme activity.

C) Draw and label a diagram of a nucleus, mitochondria and cell wall and explain their structure and their function within the cell. Write the word equation for aerobic respiration, explain what is released by this process and its uses within the body. Draw and label the structure of the cell membrane and make comprehensive notes on diffusion, osmosis, facilitated diffusion and active transport.

D) Draw a diagram of a DNA molecule and a single nucleotide (including an explanation of the four bases and how they pair up). Explain how Proteins are made using DNA. Explain the differences between RNA and DNA, where they are found in the body and how DNA is used to make mRNA. Explain what a mutation is and make comprehensive notes on how a substitution mutation in the DNA will affect the protein produced (you can use a diagram to demonstrate this). Explain why mutations can be harmful.

E) Draw a diagram to show where DNA is found in the body (which includes chromosomes, a nucleus and a cell). Explain what a homologous pair is and why chromosomes are often shown as x shaped. Explain what mitosis and meiosis are with a labelled diagram and where they take place in the body. Explain which type of cell division takes place in asexual and sexual reproduction.

#### Task 2 — **Organisms**

A) Make three cubes (1cm x 1cm x 1cm, 2.5cm x 2.5cm x 2.5cm and 5cm x 5cm x 5cm) and calculate their surface area, volume, and surface area to volume ratio. Explain in your own words why the small cube has the biggest surface area to volume ratio. In terms of organisms, explain why surface area is important and why increasing volume becomes a problem. Lungs have a very large gas exchange surface. Draw and label the respiratory system and draw a separate diagram showing the alveoli and capillary network. Make comprehensive notes on the three adaptations that increase diffusion rate in the alveoli. Explain why we



breathe, the relationship between volume and air pressure and draw and label a diagram showing inhalation and exhalation.

B) Explain why large animals need a circulatory system but an animal such as a worm does not. Draw and label the heart and the entire circulatory system. Explain why the heart had a left and right side and valves. Draw and label the cardiac cycle and explain the role of a pacemaker. Draw, label and explain the key features and roles of each type of blood vessel (arteries, arterioles, capillaries and veins). Make comprehensive notes about haemoglobin, including an explanation of how carbon dioxide changes the properties of haemoglobin.

### Task 3—**Disease and variation**

A) Give three examples of things that can cause disease and examples of each. Write comprehensive notes about what a risk factor is and give examples of avoidable and unavoidable risk factors. Give six lifestyle risk factors and the diseases linked to them. Explain immunity by writing comprehensive notes on how the different white blood cells and how they fight pathogens (including pathogens, antibodies, and the role of T cells). Explain how a vaccination gives you immunity.

B) Give examples of how different species differ, how individuals from the same species can differ, yet why organisms of the same species are similar. Explain why variation within a species is important and explain step by step the process of natural selection.

C) Explain why we classify organisms, and what classification hierarchies are (please draw an example of this). Explain the different factors which older and more recent classification systems are based on and write a definition for the key term 'species'.

### Task 4—**Plants, Data collection and interpretation**

A) Explain the two ways that water can travel through roots (symplast and apoplast system) and make comprehensive notes on how water travels through the plant. Explain how organic compounds are transported through the plant.

B) Write a guide entitled "how to plan a good experiment". Make sure it includes how to make an experiment precise and valid, and key information on variables and repeats.

C) Create a poster which shows people how to interpret graphs. Include how to draw a scatter graph, calculating rate using a graph gradient, lines of best fit and a clear explanation of why correlation does not always mean it is the cause.

If you have any questions, email: Head of Subject - [bunce.s@bil.svmat.uk](mailto:bunce.s@bil.svmat.uk)