N5 Biology CB1 Cell Structure Learning Outcome Checklist

|  |  |  |
| --- | --- | --- |
| **Lesson** | MC900432651[1] | by the end of each lesson you should know (including meanings of **key words**) |
| **Microscope & making a slide** |  | * a microscope is used to magnify an object so it *appears* larger than it is
* more powerful lenses on a microscope let you see less of the whole object but in greater detail
* position and function of the following parts of a microscope:

**eyepiece lens, focus wheel, stage, objective lens, handle, clips, mirror / light source*** to calculate the **total power** of the microscope, **multiply** the **power of the eyepiece** lens by the **power of the objective lens**.
* a **stain** is used to show the cell components more clearly and a **coverslip** is used to keep the specimen flat when preparing a slide
 |
| **Size & Scale** |  | * metres, centimetres are too big for measuring length of microscopic organisms and cells so we need to use smaller **scientific units** i.e **millimetres(mm)**, **micrometres (μm)**, nanometers (nm).
* **1000 μm= 1mm**. To convert μm to mm – **divide** by 1000 to convert mm to μm- **multiply** by 1000
 |
| **Cell Ultrastructure and Functions** |  | * distinguish between the organelles in **plant**, **animal**, **fungal** and **bacterial** cells.
* the appearance and function of each of the following cell organelles
* **nucleus -**  contains the genetic information of the cell
* **cell wall -** supports the cell
* **mitochondria –** site of some chemical reactions or Respiration
* **chloroplasts –** site of photosynthesis
* **cell membrane –**controls what moves into / out of the cell
* **cytoplasm –** site of many of the cell’s chemical reactions
* **vacuole –**stores sugary solution called sap
* **ribosome –** site of protein synthesis
* **plasmids –** circular piece of DNA
* State that plant cell walls are made of **cellulose**, but fungal and bacterial cell walls are made of **different materials**.
 |

N5 CB2 Transport Across Cell Membranes **Learning Outcome Checklist**

|  |  |  |
| --- | --- | --- |
| Lessons | MC900432651[1] | by the end of each lesson you should know (including meanings of **key words**) |
| **Membrane Structure** |  | * **phospholipids** and **proteins** are the two main components of a membrane
* identify phospholipids and proteins in a diagram of membrane structure.
* the cell membrane is **selectively permeable,** allowing only some molecules to cross it**.**
 |
| **Passive Transport** |  | * **passive transport** requires **no energy** from the cell.
* **passive transport** is **the movement of molecules down a concentration gradient** **from an area of high concentration to an area of low concentration.**
* **osmosis** and **diffusion** are examples of passive transport.
* **diffusion** is the movement of molecules down a concentration gradient from higher to lower concentration.
* Examples of diffusion include – glucose diffusing from the blood to the cells for respiration, oxygen diffusing from the lungs to the blood to be take n to the cells
* **osmosis** is the movement of **water molecules from a higher water concentration to a lower water concentration across a** **selectively permeable membrane**.
* **animal cells** can **burst** if placed in a solution of higher water concentration or **shrink** if placed in a solution of lower water concentration
* **plant cells** can become **turgid** if placed in a solution of higher water concentration or **plasmolysed** if placed in a solution of lower water concentration
 |
| **Active Transport** |  | * **active transport** is the movement of molecules andions **from an area of low concentration to an area of high concentration, against a concentration gradient.**
* **energy** is required by **membrane proteins** for **active transport**.
 |

N5 Biology CB3 DNA and the Production of Proteins Learning Outcome Checklist

|  |  |  |
| --- | --- | --- |
| Lesson | MC900432651[1] | by the end of each lesson you should know (including meanings of **key words**) |
| **Structure of DNA** |  | * The genetic information in the nucleus is held on **chromosomes**
* Chromosomes are made of a chemical called Deoxyribonucleic Acid - **DNA**
* DNA is a **double-stranded helix** held together with **complementary base pairs**.
* DNA carries the instructions to make **proteins**.
* A **gene** is a section of DNA which codes for a **protein**.
* The code is made of four bases: adenine (**A**), thymine (**T**), guanine (**G**), cytosine (**C**)
* The **sequence** of the four bases (A,T,C,G) make up the **genetic code.**
* In **complementary base pairing - A** always pairs **T** and **G** always pairs with **C**.
* The **sequence of bases** determines the sequence of the **amino** **acids** which make up the **proteins**.
 |
| **mRNA** |  | * DNA is only found in the **nucleus** and proteins are made on a ribosome
* messenger Ribonucleic Acid **mRNA** transports a **complimentary copy** of the genetic code from the **nucleus** to the **ribosome** in the cytoplasm of a cell.
* the **code** is written in **triplets of bases**, three bases code for one amino acid.
 |

N5 Biology CB4 Proteins Learning Outcome Checklist

|  |  |  |
| --- | --- | --- |
| Lesson | MC900433882[1] | by the end of each lesson you should know (including meanings of **key words**) |
| **Protein Shape and Function** |  | * Proteins are made up of long chains of **amino acids**
* The **sequence** of amino acids is determined by the genetic code (the sequence of bases).
* The **shape** and **function** of proteins arise from the sequence of amino acids.
* Functions of proteins include: **structural** proteins (cell membrane CB2), **enzymes** (CB4), **hormones** (MO2**), antibodies** and cell **receptors** (MO2).
 |
| **Enzymes** |  | * Enzymes function as **biological catalysts** and are made by all **living cells.** They **speed up** chemical reactions and are left **unchanged** by the reaction.
* The shape of the **active site** of an enzyme is **complementary** to a **specific substrate** (so each enzyme will only work on one substrate).
* Enzymes reactions result in the production of specific **products**.
* Enzymes are involved with **degradation (breakdown)**  and **synthesis (build up)** reactions.
 |
| **Example Enzyme Reactions** |  |

|  |  |  |
| --- | --- | --- |
| **Substrate** | **Enzyme** | **Product(s)** |
| Glucose -1- Phosphate | Phosphorylase | Starch |
| Starch | Amylase | Maltose |
| Protein | Pepsin | Peptides |
| Fat | Lipase | Fatty Acids and Glycerol |
| Hydrogen peroxide (H2O2) | Catalase | Water (H2O) & Oxygen(O2) |

 |
| **Optimum Conditions** |  | * Enzyme controlled reactions work **slowly at low temperatures**. As the **temperature increases** the **rate of reaction increases**.
* **High** **temperatures** cause the enzyme to be **denatured**. This changes the **shape of the enzyme** and so its **active site no longer fits the substrate** and the **reaction stops.**
* Each enzyme works within a small **pH range.**
* **Optimum** conditions are those in which the enzyme is **most active**.
 |

|  |  |  |
| --- | --- | --- |
| **Genetic Engineering** |  | * **Genetic engineering** is the transfer of genetic information from a cell of one type of organism to a cell of another type of organism.
* **Bacterial cells** are often used in genetic engineering as they have small circular structures called **plasmids** that are made of DNA
* The stages of **genetic engineering** are:
* **identify** the section chromosome, **gene**, that contains the **DNA** to be transferred.
* **extract** the required gene using an using an enzyme
* extract the **plasmid** from the bacterial cell, cut it open using an **enzyme**.
* **insert** gene into the plasmid using an **enzyme**.
* **insert** the plasmid into the host bacterial cell. The bacterium is now a **genetically modified (GM) organism**.
* You should be able to identify these stages in a diagram
 |

N5 CB5 **Genetic Engineering** Learning Outcome Checklist

N5 Biology CB6 Respiration Learning Outcome Checklist

|  |  |  |
| --- | --- | --- |
| Lesson | MC900433882[1] | by the end of each lesson you should know about the following (including meanings of **key words**) |
| **Function of Respiration** |  | * Respiration is a **chemical reaction** performed by **all living cells**.
* It releases the **chemical** energy stored in **glucose** through a **series of reactions** controlled by **enzymes**.
* The useful product of the reaction is **ATP.**
* The energy provided by **ATP** can be used by cells for **muscle contraction**, **protein synthesis, cell division** and **transmission of electrical impulses along nerves.**
 |
| **Aerobic respiration** |  | In the first stage **glucose** is broken down into 2 molecules of **pyruvate,** this yields **2 molecules of ATP**Glucose 2 Pyruvate + 2ATP* this first stage happens in the **cytoplasm**
* If **oxygen** is present **aerobic respiration** occurs. The pyruvate is further broken down to the waste products **Carbon Dioxide** and **water** and yield **lots of ATP**
* the second stage happens in the **mitochondria**
* Thus, **Aerobic Respiration**:

**Glucose + O2 Pyruvate  Water + CO2 + lots of ATP** |
| **Fermentation** |  | * When no oxygen is available, **fermentation** takes place in the **cytoplasm**
* In **animals**, **pyruvate** is broken down into **lactate.**

Glucose Pyruvate Lactate + 2ATP* In **plants**, pyruvate is broken down into **carbon dioxide** and **ethano**l.

Glucose Pyruvate Ethanol + Carbon Dioxide + 2ATP |