BIOLOGY ***Organising Plants***	***Students will know and remember…***	***So that they can…***
Identify the tissues in a leaf and relate their structure to their function in photosynthesis	Leaves are adapted to maximise photosynthesis	Label a diagram of a cross section through a leaf from observations using a microscope. How to create biological drawings.
Describe the role of stomata and guard cells in controlling water loss and gas exchange	Stomatal opening can be controlled by plant. More stomata on the shadier underside of the leaf to avoid water loss.	Make imprints of a leaf and observe under a microscope. Draw the arrangement of guard cells and stomata. How to calculate stomatal density.
Describe how xylem, phloem and roots are adapted to their functions	The roots, stem and leaves of a plant form a transport system. Phloem transports sugars (translocation).	Observation and drawing of tissues from slides.
Explain how water is transported through the plant (transpiration)	Xylem tissues are hollow and transport water and dissolved substances.	Observation of celery. Forming hypothesis on observing the behaviour of water drops on a penny.
Explain how water is transported through the plant (transpiration)	Water is lost through stomata by evaporation (transpiration).	Forming hypothesis on observing a plant in a clear plastic bag.
Explain how the rate of transport through a plant can be measured.	Transpiration is affected by different factors.	How to use a potometer Calculate rates. Evaluate data from a potometer.
Describe why plants have to control water loss	Plants need to balance out the need for carbon dioxide for photosynthesis with water loss from stomata.	Analyse data from cactus

BIOLOGY Communicable Disease	***Students will know and remember…***	***So that they can…***
What is health and how is it affected?	There are different types and causes of ill health. Many health problems interact with each other.	Analyse health data
Describe the four types of pathogen and how they multiply	Pathogens cause infectious disease in both animals and plants.	
Explain how pathogens spread	Pathogens can be spread by direct contact, by water, by air or by animals (vectors).	
Describe how the spread of disease can be prevented.	That spread can be reduced by simple hygiene, destroying vectors, isolation and vaccination.	History of antiseptics.
GCSE BIOLOGY ONLY Required Practical 2: Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition.	**GCSE BIOLOGY ONLY** Use agar plates to establish a safe method using aseptic techniques. Uncontaminated cultures of microorganisms are required for investigating the action of disinfectants and antibiotics. Bacteria can be grown in a nutrient broth solution or as colonies on an agar gel plate.	**GCSE BIOLOGY ONLY** How to use aseptic techniques. Evaluate risks Present and analyse the results. Calculate cross-sectional areas of colonies or clear areas around colonies using πr^2.
Describe the effects of antiseptics or antibiotics on bacterial growth	Bacteria multiply by simple cell division (binary fission) as often as once every 20 minutes if they have enough nutrients and a suitable temperature.	Calculate the number of bacteria in a population after a certain time in standard form
Describe the symptoms and control of viral and bacterial diseases in plants and animals.	Viral diseases include tobacco mosaic virus, measles and AIDS, which is caused by HIV. Viruses cannot be killed by antibiotics. Bacterial diseases include salmonella and gonorrhoea.	
Describe the symptoms and control of fungal and protist diseases in plants and animals.	Fungal diseases include rose black spot and athlete's foot. Protist diseases include malaria.	
Describe the body's first line of defence and how pathogens make us feel ill.	Bacteria produce toxins which cause cell damage. Viruses reproduce inside of cells.	
Explain how the immune system defends against disease.	White blood cells help to defend against pathogens.	Use models to represent how white blood cells work.
Explain how the immune system defends against disease.	Antibodies are specific for one type of antigen. There are different types of immunity.	Use models to represent how white blood cells work.
Describe the symptoms and detection of diseases in plants.	Plants can be infected by a range of pathogens as well as insect pests. Plants can be damaged by a range of ion deficiency conditions.	

GCSE BIOLOGY ONLY Describe the variety of mechanisms that plants have evolved to defend themselves.	**GCSE BIOLOGY ONLY** Plants have physical, chemical and mechanical adaptations to defend themselves against disease.	

BIOLOGY ***Treating & Preventing Disease***	***Students will know and remember…***	***So that they can…***
Explain how vaccines prevent disease.	A vaccine stimulates white blood cells to produce antibodies. The need for herd immunity.	Use models to explain how vaccination works. How Edward Jenner discovered vaccines.
Explain how vaccines prevent disease.	The secondary response to an infection is far greater and quicker than the primary response. Immunity can be passive or active.	Evaluate risks related to vaccination.
State which drugs come from plants and microorganisms.	Traditionally drugs were extracted from plants and microorganisms. Most new drugs are synthesised by chemists; the starting point may still be a chemical extracted from a plant.	Developments in pharmacology
Describe the impact of antibiotics.	Specific antibiotics are used to kill specific bacteria.	How Alexander Fleming discovered penicillin and the work of Florey and Chain. Analyse results of mast rings.
Describe the problems associated with antibiotic resistance.	The emergence of resistance is of great concern.	
Explain the difficulty in developing drugs that kill viruses without damaging body tissues.	Antibiotics cannot kill viral pathogens. Painkillers treat symptoms but do not kill pathogens.	How to interpret data about painkillers and other medicines. Understand how scientific methods and applications develop over time. Evaluate personal, social and economic implications of drugs.
Explain the main steps in the development and testing of a new drug.	New drugs are tested for toxicity, efficacy and dose.	Evaluate methods used in the development of drugs.
Explain what a double-blind trial is.	Placebos and double-blind trials remove bias from a trial.	How to set up a double-blind trial.
GCSE BIOLOGY ONLY Describe the uses of monoclonal antibodies (MABs) and explain how these work.	**GCSE BIOLOGY ONLY** MABs are produced from a single clone of cells. They are specific to one antigen, so target a specific chemical or cell in the body.	**GCSE BIOLOGY ONLY** How to use a model to describe how MABs are produced.
GCSE BIOLOGY ONLY Explain why MABs are not yet widely used in the body.	**GCSE BIOLOGY ONLY** There are many uses for MABs. MABs can have serious side effects.	**GCSE BIOLOGY ONLY** Evaluate the advantages and disadvantages of MABs. Appreciate the power and limitations of science by explaining technological applications of science and evaluate risks in relation to MABs.

BIOLOGY Photosynthesis	***Students will know and remember…***	***So that they can…***
State the symbol equation for photosynthesis. Explain how a leaf is adapted for photosynthesis.	Photosynthesis is an endothermic reaction. Photosynthesis equation. Photosynthesis is important to the survival of other organisms.	How to obtain evidence for use of light, use of chlorophyll and use of carbon dioxide Predict results. How theories have changed over time.
Explain the different stages in testing a leaf for starch	Plants convert sugars to starch for storage. Oxygen relights a glowing spill.	How to test a leaf for starch. How to show oxygen is released in photosynthesis
Describe the effect of limiting factors on photosynthesis.	The rate of photosynthesis may be limited by the shortage of carbon dioxide, light intensity, chlorophyll or low temperature.	Analyse data on limiting factor experiments.
RP5 Rate of Photosynthesis	The rate of photosynthesis may be limited by the shortage of carbon dioxide, light intensity, chlorophyll or low temperature.	Hypothesis, method, CIDERR Risk assessment Data analysis Evaluation
Describe how a plant uses glucose.	Glucose produced in photosynthesis may be: • used for respiration • converted into starch for storage • used to produce fats and oils for storage or cellulose to strengthen cell walls • used to produce amino acids for protein synthesis.	
Describe how humans can manipulate the environment in which plants grow	The rate of photosynthesis may be limited by the shortage of carbon dioxide, light intensity, chlorophyll or low temperature.	Analyse data to relate limiting factors to the cost effectiveness of adding heat, light or carbon dioxide to greenhouses.

BIOLOGY Respiration	***Students will know and remember…***	***So that they can…***
State the symbol equation for aerobic respiration.	Aerobic respiration is an exothermic reaction. Aerobic respiration equation.	How to obtain evidence for use of glucose and oxygen, and release of water, carbon dioxide and heat energy.
State the symbol equation for aerobic respiration. Explain why organisms need energy transfers.	Aerobic respiration happens in the mitochondria. Energy transfers required for chemical reactions, movement and keeping warm.	
Describe how the body responds to an increased demand for energy during exercise.	The heart rate, breathing rate and breath volume increase during exercise to supply the muscles with more oxygenated blood.	How to measure pulse rate before and after exercise. Calculating a mean rate.
State the word equation for anaerobic respiration in mammals.	Anaerobic respiration equation. Anaerobic respiration takes place in muscles, creating lactic acid, muscle fatigue and an oxygen debt. Less energy transfer.	
State the word equation for anaerobic respiration in yeast and its use in industry.	Anaerobic respiration equation. Release carbon dioxide and ethanol. Less energy transfer.	How to determine rate of respiration in yeast.
Identify different metabolic reactions that occur in organisms.	Metabolism is the sum of all the reactions in a cell or the body. Blood flowing through the muscles transports the lactic acid to the liver where it is converted back into glucose.	

BIOLOGY Adaptations, Interdependence & Competition	***Students will know and remember…***	***So that they can…***
Explain what is meant by a stable community.	One species depends on others for food, shelter, pollination, seed dispersal etc. This is called interdependence. Organisms need a supply of materials from their surroundings and other organisms to survive and reproduce.	How to observe organisms in their habitats and suggest inter-relationships.
Name biotic and abiotic factors in a habitat and explain how a change in one of these factors might affect a community	Biotic factors are living factors that can affect a community. Abiotic factors are non-living factors which can affect a community.	How to model changes in an environment.
Required Practical 7 Describe how to carry out random sampling of organisms using a quadrat.	Quantitative data on the distribution and abundance of organisms can be obtained by random sampling with quadrats	Evaluate data gathered by using a quadrat. Calculate area, mean, median, mode and range. Evaluate method to estimate cover and modify to estimate a plant population on the school field.
Required Practical 7 Describe when and how a transect should be used.	Quantitative data on the distribution and abundance of organisms can be obtained by sampling along a transect.	Evaluate data gathered by using a line transect. Calculate area, mean, median, mode and range.
Describe resources that animals compete for in a given habitat.	Animals compete for food, mates and territory.	
Describe resources that plants compete for in a given habitat.	Plants compete for light, space, water and mineral ions.	
Describe and explain how structural, behavioural and functional adaptations, in a range of organisms, help them to survive in their habitat. Define the term extremophile and give general examples.	Organisms have adaptations for survival, they may be structural, behavioural or functional. Extremophiles can survive in very extreme environments, such as high temperature or pressure, or in high salt concentration.	Develop explanations for adaptations.
Describe and explain how structural, behavioural and functional adaptations in animals help them to survive in their habitat.	Animals have adaptations for survival, they may be structural, behavioural or functional.	Develop explanations for adaptations.

Describe and explain how structural, behavioural and functional adaptations in plants help them to survive in their habitat.	Plants have adaptations for survival, they may be structural, behavioural or functional.	Develop explanations for adaptations.

BIOLOGY ***Organising and Ecosystem***	***Students will know and remember…***	***So that they can…***
Explain what a food chain shows. Explain that photosynthetic organisms are the producers of biomass for life on Earth.	Feeding relationships can be represented by food chains.	How to use a model to describe food chains.
Interpret and explain population curves, eg hare and lynx, red and grey squirrels, and bacterial growth.	In a stable community the numbers of predators and prey rise and fall in cycles.	How to interpret population curves and explain predator – prey relationships. Evidence from Hudson Bay Company records.
Explain the role of microorganisms in cycling materials through an ecosystem.	The decay cycle returns carbon to the atmosphere as carbon dioxide and mineral ions to the soil.	
Required Practical 10 Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.	Temperature, water and availability of oxygen affect the rate of decay of biological material.	CIDERR
Required Practical 10 Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.	Temperature, water and availability of oxygen affect the rate of decay of biological material.	Calculate rate changes in the decay of biological material Translate information between numerical and graphical form Plot and draw appropriate graphs selecting appropriate scales for the axes.
Explain the water cycle.	Materials are recycled to provide the building blocks for future organisms.	Evaluate models of the water cycle.
Explain the carbon cycle.	Materials are recycled to provide the building blocks for future organisms.	Evaluate models of the carbon cycle.