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35	B3 Infection and Response
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60	B5 Homeostasis and Response	
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77	B6 Inheritance, Variation and Evolution
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Name of Lesson
Cell Organisation in animals
Cell Structure
Microscopy
Specialised animal cells
Chromosomes
Mitosis
Importance of stem cells
Cell organisation in plants
Specialised plant cells

Diffusion in living things
Osmosis in living things
Active Transport in living things
Role of exchange surfaces
Importance of the respiratory system
The importance of exchanging materials in the human body and other living things
The role of the heart in the circulatory system
The role of blood vessels in the circulatory system

The role of blood in the circulatory system
The importance of aerobic respiration in living things
Non communicable diseases
The causes of cardiovascular disease
Risk factors
Body's responses to exercise
The importance of metabolism in the body
The importance of the digestive system
Enzymes

Investigating rate of reaction of enzymes
Food tests
Structure of a prokaryote
Binary fission
Culturing microorganisms safely in the lab
Types of pathogens
Viral diseases
Protist diseases

Bacterial diseases
Immune system
Vaccines
Drugs
Drug testing
Monoclonal antibodies
Cancer
Structure of the leaf

Importance of photosynthesis
Limiting factors of photosynthesis
Investigating the effect of light on the rate of photosynthesis
Transport tissues
Guard cells
Artificial greenhouse
Plant diseases
Treating plant diseases
Nervous system

Reflex actions
Investigating the effect of a factor on reaction time
The Brain
The Eye
Correcting vision defects
Homeostasis
Controlling body temperature
Endocrine system

Blood glucose level
Kidneys
Kidney failure
Hormones in the menstrual cycle
Methods used to control fertility
IVF

Thyroxine and adrenaline

Plant hormones

Uses of plant hormones
Sexual and asexual reproduction
Structure of DNA
Protein synthesis
Mutations
Mitosis
Meiosis
Sex inheritance

Genetic inheritance
Inherited diseases
Mendel's work
Variation
Darwin's theory of evolution
Antibiotic-resistant bacteria
Selective breeding

Genetic engineering
Cloning
Fossils
Speciation
Classification
Organisation in an ecosystem
Biotic and abiotic factors
Adaptation

Food chain
Trophic level
Pyramid of biomass
Biomass transfer
Sampling
Environmental change

Cycling of materials
Decay
Biodiversity and Waste
Global warming
Deforestation
Maintaining ecosystems and biodiversity
Food security
Biotechnology

3 main Outcomes
Label the organs in the human body. Define the terms cell, tissue, organ and system. Describe simply the functions of these organs in the human body. Explain the importance of the hierarchy of organisation.
Describe the structure in animal cell. Explain the function of organelles found in an animal cell. Draw and label an animal cell
Compare a light and electron microscope. Use a light microscope to observe specimens. Calculate the magnification using the appropriate formula.
Describe the structure of specialised cells in animals. Relate the structure of these specialised cells with their functions. Explain the importance of cell differentiation.

State the number of chromosomes in a human cell.
Describe the structure and function of chromosomes.
Describe the function of genes.

Describe the process of mitosis. Recognise the different steps of mitosis in a given context. Calculate how long each stage of the cell cycle, given the required information.
State the two types of stem cells in the human body. Describe the function of stem cells in research. Explain the importance of therapeutic cloning.
Draw and label a plant cell. Describe the functions of the organelles in a plant cell. Compare an animal and a plant cell.
Describe the structure of specialised cells in plants. Relate the structure of these specialised cells with their functions. Explain the importance of cell differentiation, with reference to meristems.

Describe the process of diffusion, with regard to glucose and oxygen. Explain how certain factors affect the rate of diffusion. Explain the importance of diffusion in living cells. Explain the importance of a concentration gradient in the rate of diffusion.
Describe the process of osmosis in living things. Draw and interpret graphs showing the effect of concentration of sugar solution on mass of plant tissue. Design an experiment to investigate the effect of different concentrations of sugar solutions on plant cells.
Describe the structure of the root hair cell. Explain the importance of active transport in root hair cells. Explain the importance of active transport in the small intestines.
State the substances that move in and out of cells by diffusion. Calculate the surface area to volume ratios. Compare a single-celled organism with a multicellular organism with regards to its surface area to volume ratio. Explain the importance of exchange surfaces in multicellular organisms.
Label and describe the function of the respiratory system. Explain how the lungs are adapted for its function. Calculate the breathing rate.
State important exchange surfaces in the human body. Describe gas exchange in the lungs. Relate the structure of the lungs to its function.
State the three components of the circulatory system. Describe the structure of the heart. Explain the importance of a double circulatory system.
State the three types of blood vessels. Describe the structure of each blood vessel. Explain how the structure of these blood vessels allows them to perform their functions. Compare the three types of blood vessels.

Describe the structure and function of red blood cells, platelets and white blood cells Describe the components of plasma. Explain how the red blood cell is adapted for its function.
State what respiration is and where respiration happens. Describe aerobic respiration by refering to the word and chemical equation for aerobic respiration.
Define communicable and non-communicable diseases. Describe how epidemiological data is collected and how other factors affect health. Interpret data related to the incidence of disease.
Describe the causes of coronary heart disease. List some methods used to prevent or treat coronary heart disease. Describe how these methods (stents, pacemaker, statins, artificial heart, replacement valves and artificial blood) work.
Name some risk factors that cause disease. Define a risk factor. Evaluate how lifestyle factors can affect how common a disease is at a local, national and global level.
Recall how muscles get their energy. Describe muscle fatigue by relating to lactic acid. Explain what happens to heart rate, breathing rate and breathe volume during exercise.
State what metabolism is. Describe some endothermic and exothermic reactions in the body. Explain the importance of metabolism in the body.
Label the digestive system. Define digestion. Explain the level of organisation with regard to the functions of muscular, glandular and epithelial tissues in the stomach.
Define an enzyme. Describe the structure of an enzyme. Describe the role of these 3 groups of enzymes in digestion Explain how an enzyme works using the lock and key model. Explain the role of bile in the digestive system.

State the variables in your experiment. Describe how you will carry out your experiment safely. Explain each step in the practical.
Describe how to carry out qualitative tests to test for the presence of sugars, starch, proteins and lipids. Plan independently an experiment to test for these different types of food. Evaluate the use of qualitative testing as compared to quantitative testing.
State what prokaryotes and eukaryotes are. Describe the structure and function of bacterial cell. Compare and contrast prokaryotes and eukaryotes.
Describe the various factors that affect the rate at which bacteria multiply. Describe the process of binary fission. Calculate the number of bacteria in a population using mean division time.
Describe the process of growing an uncontaminated culture of bacteria. Explain the techniques involved. Calculate the area of inhibition zones using $\pi r2$.
Define what a pathogens is. Describe ways in which pathogens are spread. Describe the structure of bacteria, virus and fungi. Explain how bacteria, virus, protists and fungi cause disease.
State two viral diseases in human. Describe the symptoms of HIV and measles. Explain how HIV and measles are spread.
State one protest disease and describe the symptoms. Describe how malaria is spread. Explain how malaria is transmitted with reference to vector.

State two bacterial diseases.
Describe the symptoms of Salmonella food poisoning and Gonorrhoea.
Describe ways of reducing or preventing the spread of diseases.

Describe the body's defence system.
Explain how the immune system defends the body against pathogens.
Explain what "a person is naturally immune to a pathogen" means with reference to antigens.

Define a vaccine.
Name a vaccine.
Explain why a vaccine contains a dead or inactive pathogen.
Explain how a vaccine works with regard to the immune system.

Describe the role of antibiotics.
Describe the origin of traditional drugs with reference to the work of Fleming.
Plan an experiment to investigate the effect of antibiotics/antiseptics on bacterial growth.

Describe the steps of drug testing.
Describe the role of the placebo.
Explain the importance of drug testing with regard to thalidomide.

State what monoclonal antibodies (mABs) are.
Describe the process of making monoclonal antibodies.
Explain how mABs are used for diagnosis in pregnancy tests.

Explain how cancer is caused.
Describe the two types of tumours.
Explain how some lifestyle factors are linked to cancer.
Apply your knowledge of lymphocytes and phagocytes in the use of mABs to treat cancer.

Describe the structure of the leaf.
Explain how the leaf is adapted for its function.
Label a palisade cell.

Describe photosynthesis. Recall the word and the symbol equation for photosynthesis Describe the uses of glucose produced by photosynthesis. Explain the importance of diffusion in photosynthesis.
Name the three limiting factors. Describe what a limiting factor is. Explain how each limiting factor affects the rate of photosynthesis
State the dependent, independent and control variables Describe how to carry out the investigation. Plot and draw the appropriate graph.
Describe the structure of phloem and xylem tubes. Define transpiration and translocation. Describe the transpiration stream in plants, with reference to osmosis.
State how a stoma is formed. Describe the structure of guard cells. Explain the importance of guard cells
State the conditions needed in a greenhouse. Describe how each condition results in profit. Interpret data on artificial environments.
Describe the symptoms of the rose black spot. Describe the symptoms of the tobacco mosaic virus. Explain how the rose black spot affect plant growth. Explain how the tobacco mosaic virus (TMV) affects plant growth.
Describe in detail how deficiency diseases affect growth. Explain the physical, chemical and mechanical defences in plants against pests and pathogens. Describe ways of detecting plant diseases.
Define stimulus, receptors, neurones and effectors. Describe the path of a nervous impulse. Compare the structure and function of the different types of neurones.

State the importance of a reflex action. Describe a reflex arc. Explain the pathway of impulses in a synapse.
Describe a method and any safety measures. Explain how you will carry out a fair test. State the variables in the experiment.
State simply the structure of the brain. Describe the functions of different parts of the brain. Explain how the brain controls behaviour.
Label parts of the eye. Describe the function of these different parts of the eye. Explain the importance of the circular and radial muscles in the iris reflex. Explain how the eye accommodates for near and distant objects.
Describe the two vision defects. Explain how vision defects are corrected. Use and interpret diagrams to show the treatment for long and short sightedness with glasses.
Define homeostasis. Describe the control systems that regulate the internal environment. Describe the negative feedback mechanism.
State the role of the nervous system in the control of the body temperature. Describe the responses to a rise and a fall in body temperature. Explain how the body's responses raise or lower its temperature in a given context.
Label the endocrine glands. Define a hormone. Explain the functions of endocrine glands. Explain why the pituitary gland is called the "master gland".

Describe the role of insulin and glucagon in controlling the blood glucose level. Explain what happens to excess glucose in the body. Compare Type 1 and Type 2 diabetes.
State the role of the kidneys. State the importance of maintaining the level of water constant in the body. Describe how the water content in the body is controlled. Explain the structure and function of the nephron.
Describe two treatments available for kidney failure. Compare a dialysis machine and a nephron, referring to structure of the nephron. Explain the problems of kidney transplant with regard to the immune system.
State the hormones involved in puberty and menstrual cycle. Describe the menstrual cycle. Explain how the hormones control the menstrual cycle.
State some methods of contraception. State the importance of methods of contraception. Describe some hormonal and non-hormonal methods of contraception. Explain how these methods of contraception work.
State the hormones involved in increasing fertility. Describe how these hormones are used to treat fertility. Describe the steps involved in in vitro fertilisation.
Describe the role of thryoxine. Describe the role of adrenaline. Explain the effects of adrenaline in the body. Explain how thyroxine is controlled by negative feedback.
Describe how the plant hormones control growth in shoots and roots. Compare the importance of auxin in shoot and root growth. Plan an experiment to investigate plant growth responses to light and gravity.

Name the hormone that stimulates seed germination. Describe how auxins and gibberellins are used in agriculture and horticulture. Explain the importance of ethene by linking it cell division.
Differentiate between asexual and sexual reproduction. Explain the importance of gametes in sexual reproduction, in terms of chromosomes. Explain why offspring from the same parents look similar but are not usually identical.
Describe the structure of DNA as a double helix. Describe the importance of scientists like Watson, Crick and Franklin. Explain the structure of DNA, in terms of nucleotides and bases.
Identify where proteins are made and state some uses of proteins. Describe protein synthesis. Explain how proteins are synthesised in terms of mRNA.
State what a mutation is and where it happens. Describe the effect of a mutation on protein synthesis. Compare the different types of mutations – insertions, deletions and substitutions, with regard to the base sequence.
Describe the importance of mitosis in asexual reproduction. Explain in details the different stages of mitosis. Explain the importance of DNA replication in mitosis.
Describe the importance of meiosis in the formation of gametes in sexual reproduction. Determine the number of chromosomes changes during meiosis. Differentiate between meiosis and mitosis.
Complete genetic diagrams (Punnet squares) to show sex inheritance. Construct a genetic diagram to describe sex inheritance. Predict the outcomes of genetic diagrams using proportions and simple ratios.

Label genetic crosses using genetic terms appropriately. Complete genetic diagrams (Punnet squares) to show single gene inheritance. ? Construct a genetic diagram to describe monohybrid crosses.
State two inherited disorders and simple describe their symptoms. Explain why a person can have polydactyly if only one parent has the allele. Explain why a person will suffer from cystic fibrosis if only both parents have the faulty allele.
Explain why Mendel's work was not appreciated. Explain how Mendel reached to his conclusion by referring to genetic diagrams. ? Construct genetic diagrams to show Mendel's work with tall and dwarf pea plants.
State what extinction is and describe the factors that may contribute to the extinction of a species. Explain the importance of variation in preventing extinction. Explain how mutations can lead to variation. Define variation.
Describe how the process of natural selection leads to evolution. Explain why Darwin's work was not accepted.? Explain the evidence that led Darwin to propose the theory of evolution. ? Evaluate the work of Darwin and Lamarck in understanding genetics.
State an example of an antibiotic-resistant bacteria Explain why we use bacteria to explain evolution.? Explain how antibiotic resistance in bacteria supports the theory of evolution.
Describe the process of selective breeding.? Explain the importance of selective breeding.? Evaluate the process of selective breeding.

Describe the uses of genetic engineering. Explain how genetic engineering works, with regard to the human insulin gene. Evaluate the process of genetic engineering.
Describe ways of cloning plants. Describe the process of embryo transplants. Describe the process of adult cell cloning.
State what fossils are. Describe ways fossils are formed. Explain the importance of fossils as evidence for evolution.
Define speciation. Describe how isolation happens and lead to a new species. Explain the steps of speciation.
State the definition and the importance of classification. Describe how living things have been classified into groups using the Linnaean systems. Compare the Linnaean system, the three-domain system, the binomial system and evolutionary trees.
Identify the resources being competed for in a given habitat. Interpret data related to how organisms in a community interact with each other. Describe a stable community.
List some examples of biotic and abiotic factors. Explain how these factors affect a community. Describe data related to abiotic and biotic factors.
Describe what adaptation is. Describe the different types of adaptations and provide examples for each adaptation. Identify and explain adaptations about any organism and its environment.

Draw a simple food chain. Identify the producer, the primary, the secondary and tertiary consumers. Describe the importance of food chains. Explain why all food chains start with plants.
State what a trophic level is. Label the trophic levels (1, 2, 3, and 4) in a food chain. Explain the differences between the different trophic levels of an ecosystem.
Describe what pyramids of biomass show. Explain how the number of organisms at each trophic level is affected by the loss of biomass at each trophic level. Construct accurately a pyramid of biomass using given data. Draw a simple pyramid of biomass.
Explain how biomass is lost. Explain why only 10% of the biomass in a trophic level is passed on to the next trophic level. Calculate the efficiency of biomass transfer from one trophic level to the next.
Describe these 2 sampling techniques. Plan an investigation to work out the size of a population of a certain species. Calculate percentage cover of a species. Evaluate the use of quadrats and transects in sampling.
Describe some seasonal, geographic and human interactions with the ecosystem can affect the distribution of species. Explain how seasonal, geographic and human interactions with the ecosystem can affect the distribution of species. Evaluate data showing the effect of environmental changes on the distribution of organisms.

Describe the water cycle. Label the carbon cycle. Explain a stable community in terms of recycling of elements. Explain the different stages of the carbon cycle.
List the factors that affect the rate of decay. Explain why compost is used in gardens and on crops. Describe the processes involved in a biogas generator. Explain the importance of decay. Compare the batch and continuous generators.
Explain the importance of biodiversity. Explain how humans impact on biodiversity. Suggest what can be done to prevent the loss in biodiversity.
Describe the causes of global warming. Explain the consequences of global warming. Suggest what can be to reduce the effects of global warming.
Explain why deforestation happens. Explain the problems caused by deforestation. Evaluate the removal of peat.
List some programmes set up to reduce the effects of human activities on ecosystems and biodiversity. Describe in detail some of these protection programmes. Explain the importance of these protection programmes.
Define food security Describe some sustainable methods to ensure food security. Explain how food production can be made more efficiently.
Describe how mycoprotein is made. Explain the importance of biotechnology in food protein. Explain how human insulin is produced by genetically modified bacteria.