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B1 - Cell Structure and transport

Lesson	Aiming for 4	Aiming for 6	Aiming for 8
B1.1 The world of the microscope	I can use a light microscope.	I can describe the difference between magnification and resolution.	I can compare and contrast the magnification and resolution obtained by using light and electron microscopes.
	I can state why microscopes are useful in the study of cell biology.	I can describe the advantages and disadvantages of using a light and electron microscope.	I can justify the use of an electron microscope.
	I can calculate total magnification.	I can use the formula: magnification = size of image/ size of real object.	I can re-arrange the magnification equation and measure the size of cells.
B1.2 Animal and plant cells	I can identify a plant and animal cell from a diagram.	I can describe the functions of the parts of cells.	I can explain how the main structures of cells are related to their functions.
	I can name the main parts of cells.	I can compare plant and animal cells.	I can suggest reasons why some cells do not contain all cell structures.
	I can prepare a microscope slide.	I can use a microscope to study plant and algal cells.	I can compare sizes of cells using units of length and standard form.
B1.3 Eukaryotic cells and prokaryotic cells	I can identify structures in prokaryotic cells.	I can compare prokaryotic and eukaryotic cells.	I can explain how the main structures of prokaryotic cells are related to their functions.
	I can state that bacterial (prokaryotic) cells do not contain a nucleus and eukaryotic cells do.	I can describe the functions of the parts of a prokaryotic cell.	I can perform calculations to work out orders of magnitude.

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	I can use orders of magnitude to correctly order objects according to size.		I can use orders of magnitude to compare sizes of organisms.	
B1.4 Specialisation in animal cells	I can identify specialised animals cells from diagrams.		I can explain why animals have specialised cells.	I can discuss how the structure of specialised animal cells are related to their function within the organ and whole organism.
	I can describe the function of specialised animal cells.		I can compare the structure of a specialised and generalised animal cell.	I can suggest the function of an unknown specialised cell based on its structure.
	I can write a basic explanation of how animal cells are adapted.		I can write a coherent explanation of how animal cells are adapted.	I can write an effectively structured explanation of how animal cells are adapted.
B1.5 Specialisation in plant cells	I can identify specialised plant cells from diagrams.		I can compare the structure of a specialised and generalised plant cell.	I can discuss how the structure of specialised plant cells is related to their function within the organ and whole organism.
	I can describe the function of specialised plant cells.		I can describe the adaptations of specialised plant cells.	I can design a cell, tissue or organ to perform a certain function.
	I can use a light microscope to view a root hair cell.		I can draw a scientific drawing of a root hair cell observed using a light microscope.	I can measure a root hair cell observed using a light microscope.
B1.6 Diffusion	I can state that diffusion is the spreading of the particles of any substance in solution, or particles of a gas.		I can predict which way substances will move across a cell membrane.	I can explain how temperature and concentration gradient affects rate of diffusion.
	I can list the factors that affect the rate of diffusion.		I can explain why surface area affects the rate of diffusion.	I can write a hypothesis using detailed scientific knowledge and explain how it could be tested.

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	I can write a simple hypothesis.		I can write a hypothesis using scientific knowledge.	
B1.7 Osmosis	I can describe what osmosis is.		I can state the differences between osmosis and diffusion.	I can explain how a model shows osmosis in a cell.
	I can state that if animal cells lose or gain too much water by osmosis they can stop working properly.		I can use ideas about osmosis to explain why maintaining constant internal conditions in living organisms is important.	I can use the terms isotonic, hypotonic or hypertonic to explain the movement of water across a cell membrane.
			I can write a prediction using scientific knowledge of osmosis.	
B1.8 Osmosis in plants	I can state that if a plant loses too much water from its cells they become soft.		I can use osmosis to explain the effect of placing plant tissue in salt or sugar solutions.	I can explain the mechanisms that lead to turgid or flaccid plant cells and plasmolysis.
	I can write a simple method with support.		I can write a suitable plan to investigate into the effect of salt or sugar solutions on plant tissue.	I can write a detailed plan independently.
	I can use given data to plot a suitable graph with some support.		I can calculate percentage change and use this to plot a line graph with negative numbers and draw a line of best fit.	I can use a line graph to estimate the concentration of solution inside a plant cell.
B1.9 Active transport	I can define active transport as the movement of a substance against a concentration gradient using energy.		I can explain why active transport is important for living organisms.	I can describe how active transport takes place.
	I can identify where active transport takes place.		I can explain the differences between diffusion, osmosis, and active transport.	I can suggest how a cell that carries out active transport is adapted to this function.

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	I can use a representational model to show active transport.		I can suggest some improvements/ limitations to a representational model that shows active transport.		I can design and evaluate a representational model to show active transport.	
B1.10 Exchanging materials	I can state the function of exchange surfaces in plants and animals.		I can describe how the effectiveness of exchange surfaces is increased.		I can link ideas about diffusion to explain how the adaptations of exchange surfaces increases their effectiveness.	
	I can state that a single-celled organism has a relatively large surface area to volume ratio.		I can use ideas about surface area to volume ratio to describe why multicellular organisms need exchange surfaces.		I can use ideas about surface area to explain the shape of a leaf.	
	I can calculate the surface area to volume ratio of a cube.		I can calculate the surface area to volume ratio of a cylinder.		I can calculate the surface area to volume ratio of a sphere.	

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
B2.1 Cell division	I can state that human body cells have 46 chromosomes and gametes have 23.		I can explain why chromosomes in body cells are normally found in pairs.		I can explain why genetic material must be doubled during mitosis.	
	I can state that mitosis is a stage in cell division.		I can describe situations where mitosis is occurring.		I can explain in detail what happens at each stage of the cell cycle.	
	I can state the meaning of most of the keywords – mitosis, chromosomes, gene, gametes.		I can use the keywords to describe the process of mitosis.		I can use the keywords to write detailed explanations on why mitosis is an important process in living things and how characteristics are inherited.	
B2.2 Growth and differentiation	I can define the terms growth and differentiation.		I can describe the importance of cell differentiation in multicellular organisms.		I can compare and contrast differentiation in plants and animals.	
	I can state why plant clones are genetically identical to each other.		I can explain how using tissue culture creates a clone of a plant.		I can explain why it is easier to clone a plant compared to an animal.	
	I can attempt to clone a plant by using apparatus correctly.		I can attempt to clone a plant by using the apparatus correctly and following safety rules.		I can explain and carry out a practical accurately and safely in order to successfully clone a plant.	
B2.3 Stem cells	I can state that a stem cell is a cell that is not differentiated.		I can describe differences between embryonic and adult stem cells.		I can explain why embryonic stem cells are more useful for helping medical conditions.	
	I can state that plant stem cells can be used to create clones.		I can explain why plant clones are produced in the agriculture industry.		I can write a well-structured article about stem cells which has impact by the use of precise vocabulary and real-life examples.	
	I can write a simple article which states ways that stem cells can be used to help medical conditions.		I can write an well-structured article which communicates effectively how stem cells can be used to help medical conditions.			
B2.4 Stem cell dilemmas	I can list some arguments for and against the use of stem cells.		I can describe what therapeutic cloning can be used for.		I can explain the process of therapeutic cloning organism.	
	I can verbally communicate simple ideas during a group discussion.		I can explain the reasons for ethical and religious objections against stem cells.		I can evaluate the use of stem cells.	
			I can verbally communicate well-constructed arguments.		I can clearly communicate strong, well-researched arguments in a persuasive manner.	

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Lesson	Aiming for 4	Aiming for 6	Aiming for 8
B3.1 Tissues and organs in animals	I can state examples of cells, tissues, organs, and organ systems.	I can define the terms tissue, organ, and organ system.	I can relate levels of organisation to familiar organ systems in order to give examples of cells, tissues, and organs.
	I can name organs found in a given organ systems.	I can describe the function of certain organs and organ systems.	I can explain why the cells of multicellular organisms are organised into tissues, organs, and organ systems.
	I can order cells, tissues, organs, and organ systems according to their relative sizes.	I can identify tissues that make up organs.	I can suggest the function of glandular, epithelial, and muscular tissue in organs.
B3.2 The human digestive system	I can identify some of the organs of the digestive system.	I can name all of the organs of the digestive system.	I can link the process of digestion to other processes in the body in order to explain its function.
	I can state the function of some of the organs of the digestive system.	I can state the functions of the organs.	I can explain in detail how the small intestine is adapted to its function.
	I can state simply what happens to food during digestion.	I can summarise the process of digestion.	I can explain in detail what happens to food during digestion.

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B3.3 The chemistry of food	I can recall that food contains the molecules carbohydrates, lipids (fats), and protein.	I can describe the structure of simple sugars, starch, lipids, and proteins.	I can explain which food molecules are polymers.
	I can state the function of each food molecule in the diet.	I can carry out multiple food tests in an organised manner.	I can apply knowledge of the function of food molecules in the body to give diet advice.
	I can carry out a food test and record results in a table.	I can design a results table to clearly record results from food tests.	I can use scientific knowledge to make predictions of what nutrients a food contains.
B3.4 Catalysts and enzymes	I can recall that enzymes are proteins which are biological catalysts – they speed up reactions.	I can describe how enzymes are used in digestion.	I can explain how enzymes speed up reactions.
	I can state one function of enzymes inside the body.	I can use the 'lock and key theory' to explain why the shape of the enzyme is vital for it to function.	I can explain how enzymes control metabolism.
	I can state the independent variable in an investigation.	I can state the variables in an investigation.	I can plan an experiment to investigate how different catalysts affect the rate of a reaction.
B3.5 Factors affecting enzyme	I can state that temperature and pH affects how well an enzyme works.	I can explain why high temperatures and changes in pH prevent enzymes from catalysing reactions.	I can explain in detail how a change in temperature or pH affects the rate of an enzyme-catalysed reaction.

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enzyme action	I can plan a simple method to carry out an investigation.	I can plan and carry out an investigation in order to gather accurate results.	I can plot a line graph with error bars.	
	I can state simply what a line graph shows about how temperature or pH affects the rate of an enzyme catalysed reaction.	I can plot a line graph and use it to draw conclusions about how temperature and pH affects the rate of an enzyme catalysed reaction.	I can analyse results in order to evaluate a method and the validity of conclusions, explaining suggestions for possible improvements.	
B3.6 How the digestive system works	I can recall that enzymes are used in digestion to break down food molecules.	I can explain why enzymes are needed for digestion.	I can suggest how to test for substrates and products in the model gut.	
	I can identify that carbohydrases break down carbohydrates, proteases break down proteins, and lipases break down lipids.	I can for each food molecule, name the enzyme that acts on it, where it is produced, and which products are formed.	I can make a prediction with a scientific explanation.	
	I can follow a method to set up and test for substances in a model gut.	I can make a prediction on the results from the model gut.	I can evaluate a model by discussing its limitations.	
3.7 Making digestion efficient	I can state that the stomach contains acid.	I can describe the functions of bile.	I can explain how acid in the stomach increases the efficiency of pepsin.	
	I can state that the liver produces bile.	I can calculate the mean rate of an enzyme-catalysed reaction.	I can explain how bile increases the efficiency of fat digestion.	

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	I can write a simple hypothesis and prediction.	I can analyse data in order to determine if a hypothesis is correct.	I can explain how the rate of an enzyme catalysed reaction shows how efficient the reaction is.	
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Lesson	Target 4	Target 6	Target 8
B4.1 The blood	I can state the main components in blood.	I can summarise the process of blood clotting.	I can suggest how white blood cells are adapted to their function.
	I can recognise the components of blood from photomicrographs.	I can view blood under a light microscope and recognise components.	I can estimate the diameter of a red blood cell and comment on its uncertainty.
	I can describe the function of each component in blood.	I can explain how red blood cells are adapted to their function.	I can evaluate in detail a model of the blood.
B4.2 The blood vessels	I can state the three main types of blood vessel and recognise them from diagrams.	I can explain how the structure relates to the functions of blood vessels.	I can explain in detail the importance of a double circulatory system.
	I can estimate heart rate.	I can comment on how accurate estimations are.	I can explain how to make estimates more accurate in terms of precision of data.
B4.3 The heart	I can state the function of the heart.	I can describe the function of the main structures of the human heart.	I can explain in detail how the structure of the different parts of the human heart is related to their function.
	I can state the main structures of the human heart.	I can describe the problems that can develop with blood vessels in the heart and their treatments.	I can recognise the main structures of the heart when carrying out a heart dissection.

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	I can state examples of problems that can develop in blood vessels in the human heart.	I can suggest advantages and disadvantages of using stents and statins.	I can evaluate the use of stents and statins in treating problems with blood vessels.	
B4.4 Helping the heart	I can state that heartbeat is maintained by a group of cells that act as a pacemaker.	I can explain why an irregular heartbeat is detrimental to health.	I can explain how a natural pacemaker maintains the heartbeat.	
	I can state some ways in which the heart can stop functioning efficiently.	I can describe why people may have objections to heart transplants.	I can suggest how an artificial pacemaker regulates an irregular heartbeat.	
	I can describe why a person may need an artificial pacemaker or an artificial heart.	I can summarise the advantages and disadvantages different treatments of heart problems.	I can evaluate in detail the different methods used in the treatment of heart problems.	
B4.5 Breathing and gas exchange	I can list the main structures of the gas exchange system.	I can describe the function of the main structures of the gas exchange system.	I can evaluate in detail a model of the lungs.	
	I can state that gas exchange happens in the alveoli.	I can describe how alveoli are adapted.	I can explain in detail how adaptations of alveoli result in efficient gas exchange.	
	I can use data in the form of percentages to describe the differences in the composition of inhaled and exhaled air.	I can describe the processes of ventilation and gas exchange.	I can explain the differences between the composition of inhaled and exhaled air.	
B4.6 Tissues	I can recognise examples of plant organs and state their functions.	I can describe how plant organs are involved in the transport system.	I can suggest what type of plant organs unfamiliar structures are.	

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and organs in plants	I can use a light microscope to view a cross-section of a leaf.	I can use a microscope to identify the different tissues in a cross-section of a leaf.	I can use a light microscope to draw a leaf cross-section and calculate scale.	
	I can state the functions of different plant tissues.	I can explain how the structures of tissues in the leaf are related to their functions.	I can suggest functions for unknown plant tissues.	
B4.7 Transport systems in plants	I can state the function of xylem and phloem tissue.	I can describe why transport in plants is important.	I can explain in detail how the rate of transport through a plant can be measured.	
	I can collect evidence for movement of water through xylem.	I can explain how the structure of xylem and phloem are adapted to their functions.		
B4.8 Evaporation and transpiration	I can state that transpiration is the evaporation of water vapour from the leaves.	I can describe how transpiration maintains the movement of water from roots to leaves.	I can evaluate drinking from a straw as a model for transpiration.	
	I can state the function of stomata.	I can describe how the opening and closing of stomata is controlled by guard cells.	I can explain in detail how stomata control transpiration.	
	I can calculate the mean number of stomata on a given area of leaf.	I can use sampling to estimate the number of stomata on a leaf.	I can suggest reasons for differences in the number and distribution of stomata, as well as their adaptations.	

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B4.9 Factors affecting transpiration	I can recognise the factors that affect transpiration.	I can explain why temperature, humidity, light intensity and the amount of air flow affect the rate of transpiration.	I can apply particle model to explain in detail why temperature, humidity, light intensity and the amount of air flow affect the rate of transpiration.	
	I can describe how a potometer can be used to estimate the volume of water lost by a plant.	I can describe the differences between a moving bubble potometer and a mass photometer.	I can summarise adaptations to control water loss and explain how they work.	
	I can identify variables when investigating rate of transpiration.	I can make a prediction using scientific knowledge when investigating rate of transpiration.	I can evaluate in detail the use of a potometer to measure the rate of transpiration.	

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Lesson	Aiming for 4	Aiming for 6	Aiming for 8
B5.1 Health and disease	I can describe health as a state of physical and mental wellbeing.	I can describe the difference between communicable and non-communicable diseases.	I can suggest how communicable diseases are spread.
	I can state some causes of ill health.	I can use a scatter diagram to identify a correlation between two variables.	I can suggest links between lifestyle and health.
	I can state a simple conclusion from data on health.	I can construct and interpret bar charts, frequency tables, frequency diagrams and histograms.	I can discuss the validity of a statement based on evidence in the form of data.
B5.2 Pathogens and disease	I can state that pathogens are microorganisms that cause disease.	I can describe how bacteria and viruses cause disease.	I can explain why viruses are always pathogens but not all bacteria are.
	I can describe ways that pathogens can be spread.	I can explain why communicable diseases spread rapidly following a natural disaster.	I can explain how pathogens are passed from one organism to another and use this to suggest ways of preventing the spread.
	I can state that bacteria reproduce by cell division and this is called binary fission.	I can explain why numbers of bacteria on an agar plate will eventually stop growing.	I can explain what is meant by exponential growth and analyse a graph showing it.

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B5.3 Growing bacteria in the lab	I can prepare a bacterial culture on agar gel.	I can explain why it is important to use an uncontaminated culture to investigate bacterial growth.	I can suggest how to measure the growth of bacteria and discuss uncertainty.	
	I can follow the rules needed to prepare an uncontaminated culture.	I can describe and explain why each rule is needed in order to safely prepare, incubate and dispose of a culture.	I can plan a detailed investigation to find out how a variable affects the growth of bacteria.	
B5.4 Preventing bacterial growth	I can describe the difference between an antiseptic, disinfectants and antibiotic.	I can explain when an antiseptic, disinfectant, and antibiotic would be used	I can write a prediction using detailed scientific knowledge.	
	I can write a prediction.	I can calculate the number of bacteria in a population after a certain time if given the mean division time.	I can calculate the number of bacteria in a sample when using a counting chamber.	
	I can measure the diameter of clear areas around colonies.	I can calculate the area of the clear circle around colonies using r^2 .	I can apply knowledge of sampling techniques to ensure samples are representative.	
B5.5 Preventing infections	I can state some ways that communicable diseases are spread.	I can describe how the spread of diseases can be reduced or prevented.	I can use scientific knowledge to explain in detail how methods reduce or prevent the spread of disease.	

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	I can take a role in designing a form of communication to inform the public about how to prevent the spread of a disease.	I can communicate to the public about how to stop the spread of a disease.	I can use an example to explain how the scientific method has been applied to help prevent the spread of disease.	
B5.6 Viral diseases	I can name some diseases that are caused by viruses.	I can describe how measles, HIV and tobacco mosaic virus affect the infected organism.	I can explain how measles, HIV and tobacco mosaic virus affect the infected organism.	
	I can state how measles and HIV are spread.	I can use a microscope to identify the different tissues in a cross-section of a leaf the UK has changed over time.	I can explain why viral infections are often more difficult to prevent and treat than bacterial infections.	
	I can summarise information in a table.	I can design a table and use it to summarise information.	I can write a persuasive letter to parents urging them to vaccinate their children against measles.	
B5.7 Bacterial diseases	I can name some diseases that are caused by bacteria.	I can describe similarities and differences between salmonella and gonorrhoea.	I can suggest why more people die from viral diseases compared to bacterial diseases.	
	I can state how salmonella and gonorrhoea are spread.	I can describe how the spread of salmonella and gonorrhoea is controlled.	I can explain in detail how methods to control the spread of salmonella and gonorrhoea work.	
B5.8 Diseases caused by	I can state that rose black spot is caused by fungi and malaria is caused by protists.	I can describe how rose black spot affects the plant and how it is treated.	I can explain how rose black spot affects the growth of a plant.	

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fungi and protists	I can use a diagram to describe the life cycle of the malaria protist.	I can link ways of controlling the spread of malaria to specific parts of the protist's life cycle.	I can explain why it is so expensive to stop the spread of malaria.	
	I can state some ways that malaria is controlled.			
B5.9 Human defence responses	I can state some ways in which the human body defends itself against the entry of pathogens.	I can describe how human body defence mechanisms stop the entry of pathogens.	I can explain how a reduced or over active immune system can cause illness.	
	I can state that white blood cells help defend the body against pathogens.	I can describe the role of white blood cells in the defence against disease.	I can explain in detail how antibody production fights pathogens.	
	I can state how one part of a model is similar to real life.	I can use a model to explain how the body defends itself against disease.	I can evaluate an analogy of the human defence systems against disease.	
B5.10 More about plant diseases	I can describe some signs of plant disease.	I can describe how a plant disease is detected and the methods used to identify the cause.	I can analyse data on plant growth to write conclusions using scientific knowledge.	
	I can name organisms that can cause disease in plants.	I can explain how disease damages a plant.	I can suggest how plant diseases affect food security.	
	I can state that plants can be damaged by ion deficiency.	I can match signs of plant disease to ion deficiency.	I can explain in detail how and why ion deficiencies affect plant growth.	
B5.11 Plant	I can state examples of plant defence responses.	I can classify plant defences as physical, chemical or mechanical.	I can explain in detail how plant defence responses work.	

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defence responses	I can describe why plants need to defend themselves.	I can carry out research using secondary resources of own choice to present examples of plant defence responses.	I can interpret information from a scientific article to explain how plant to plant communication can be used as a form of defence.	
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Lesson	Aiming for 4	Aiming for 6	Aiming for 8
B6.1 Vaccination	I can describe why people are vaccinated.	I can explain how vaccination works.	I can explain why, if a large proportion of the population is vaccinated, the spread of the pathogen is reduced.
	I can state that vaccines contain dead or inactive forms of a pathogen.	I can describe what an antibody and antigen are.	I can apply ideas about specificity of antibodies.
B6.2 Antibiotics and painkillers	I can describe what an antibiotic is.	I can describe how antibiotics work.	I can suggest a reasoned explanation for a pattern in data.
	I can state that viral infections cannot be treated with antibiotics.	I can describe what is meant by antibiotic resistant bacteria.	I can explain in detail how antibiotic resistant bacteria arise.
	I can decide when a painkiller or antibiotic should be used to treat an illness.	I can explain why it is difficult to develop drugs to treat viral infections.	I can explain why scientists are constantly developing new antibiotics.
B6.3 Discovering drugs	I can name some drugs based on extracts from plants or microorganisms.	I can describe how new antibiotics are tested for effectiveness.	I can suggest why mould naturally produces antibiotics.
	I can order the events that led to the production of penicillin.	I can discuss the advantages and disadvantages of looking for new drugs from living organisms.	I can discuss how effective herbal remedies are.

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	I can state a simple conclusion using data.	I can analyse data to draw conclusions on the effectiveness of new antibiotics.	I can analyse data to evaluate the effectiveness of new antibiotics and make a reasoned decision which one to develop further.	
B6.4 Developing drugs	I can state that new medical drugs have to be tested to check that they are safe and effective.	I can explain why each procedure in drugs testing and trialling is used.	I can describe in some detail how new medical drugs are tested and trialled for safety, effectiveness, toxicity, efficacy, and dose.	
	I can state the procedures used to trial a new drug in the correct order.	I can describe how a double blind trial is carried out.	I can critically analyse the results from a double blind trial.	
	I can state what is meant by a placebo.	I can explain why a placebo is used during drug trialling.	I can explain why the results of drug trials are published in journals.	
B6.5 Producing monoclonal antibodies		I can describe what a monoclonal antibody is.	I can explain why hybridoma cells are used to produce monoclonal antibodies.	
		I can outline the procedure used to produce monoclonal antibodies.	I can explain in detail how pregnancy tests work.	
		I can state some uses of monoclonal antibodies.	I can describe how monoclonal antibodies are used to produce ELISA tests and outline how they are used.	

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B6.6 Using monoclonal antibodies	I can describe the ways that monoclonal antibodies can be used to treat cancer.	I can explain in detail how the methods of using monoclonal antibodies to treat cancer work.	
	I can outline the advantages and disadvantages of using monoclonal antibodies.	I can evaluate the use of monoclonal antibodies in treating cancer compared to other treatments.	

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B7 Non-communicable diseases

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Name		Class		Date
B7.1 Non-communicable diseases	I can name some non-communicable diseases.	I can classify diseases as communicable and non-communicable.	I can describe some impacts of non-communicable diseases.	
	I can list some risk factors that are linked to an increased rate of disease.	I can draw conclusions from data on risk factors.	I can identify risk factors from data.	
	I can identify correlations in data.	I can decide whether a link is causal.	I can explain why a correlation does not prove a causal mechanism.	
B7.2 Cancer	I can define a tumour as a mass of abnormally growing cells.	I can describe the difference between benign and malignant tumours.	I can explain how benign and malignant tumours can be life-threatening.	
	I can state some causes of cancer.	I can describe why carcinogens and ionising radiation increase the risk of tumours.	I can link a lack of control in the cell cycle to tumour formation.	
	I can list some of the benefits and risks of chemotherapy.	I can analyse data to assess the risks and benefits of chemotherapy.	I can evaluate the risks of chemotherapy in relation to data, drug testing, and consequences in order to come to an informed decision.	

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Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B7.3 Smoking and the risk of disease	I can name the harmful substances found in tobacco smoke.	I can describe the effects of the harmful substances found in tobacco smoke.	I can explain in detail the effects of the harmful substances found in tobacco smoke.	
	I can state that smoking increases your risk of developing lung diseases.	I can analyse data to describe evidence for the link between smoking and lung disease.	I can suggest possible causal mechanisms to explain trends shown in data, and explain how	
B7.4 Diet, exercise, and disease	I can describe some health problems caused by a poor diet and lack of exercise.	I can describe causal mechanisms for the link between exercise and health.	I can suggest reasons for the correlation between exercise and health, and decide which are	
	I can list some ways in which people can avoid becoming overweight.	I can suggest measures to prevent a further rise in the number of people with type 2 diabetes.	I can explain in detail why eating a poor diet can lead to health problems.	
B7.5 Alcohol and other carcinogens	I can state that drinking too much alcohol can affect liver and brain function.	I can describe the short- and long-term effects of drinking alcohol.	I can explain in detail how drinking alcohol affects the nervous system.	
	I can state that alcohol can affect unborn babies.	I can describe the effects of alcohol on unborn babies.	I can evaluate the evidence on the effects of alcohol on a developing baby.	
	I can define the term carcinogen.	I can describe the link between ionising radiation and cancer.	I can explain the link between radiation and cancer.	

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B8 Photosynthesis

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B8.1 Photosynthesis	I can describe how plants get the materials they need for growth.	I can describe how the leaf is adapted for photosynthesis.	I can explain how adaptations of the leaf make photosynthesis efficient.	
	I can state the word equation for photosynthesis.	I can write the balanced symbol equations for photosynthesis.	I can explain how adaptations of the leaf make photosynthesis efficient.	
	I can describe why plants need light to carry out photosynthesis.	I can describe an experiment to prove that plants carry out photosynthesis when exposed to light.	I can explain why chlorophyll is needed for photosynthesis.	
B8.2 The rate of photosynthesis	I can list the factors that affect the rate of photosynthesis (temperature, carbon dioxide concentration, light intensity, amount of chlorophyll).	I can describe why low temperature, shortage of carbon dioxide, shortage of light and shortage of chlorophyll limit the rate of photosynthesis.	I can apply knowledge of enzymes to explain why a high temperature affects the rate of photosynthesis.	
	I can state simply the relationship between these factors and the rate of photosynthesis.	I can suggest which factor limits the rate of photosynthesis in a given situation.	I can predict how the rate of photosynthesis will be affected with more than one limiting factor.	
	I can plot a line graph and write a simple conclusion.	I can interpret and explain graphs of photosynthesis rate involving one limiting factor.	I understand and can use the inverse square law and light intensity in the context of photosynthesis.	
B8.3 How plants use glucose	I can list some ways in which plants use glucose.	I can describe all the ways in which plants use glucose, including how they make proteins.	I can explain how carnivorous plants are adapted to their environment.	
	I can test a leaf for starch and state some safety rules.	I can evaluate risks involved in the starch test.	I can explain how and why plants convert glucose to starch for storage.	

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GCSE Student Checklist

B8 Photosynthesis

Name Class Date

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
B8.4 Making the most of photosynthesis			I can describe why greenhouse increase plant growth.		I can explain in detail how using greenhouses can help control limiting factors and increase the rate of photosynthesis.	
			I can comment on the cost-effectiveness of adding heat, light, or carbon dioxide to greenhouses.		I can use data to comment on the cost-effectiveness of greenhouses.	
			I can discuss the benefits of using greenhouses and hydroponics.		I can evaluate the use of greenhouses and hydroponics in terms of economics.	

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GCSE Student Checklist

B10 The human nervous system

Lesson	Aiming for 4	Aiming for 6	Aiming for 8
Name		Class	Date
B10.1 Principles of homeostasis	I can name some human internal conditions that are controlled.	I can define homeostasis.	I can apply knowledge of enzymes and osmosis to explain in detail why internal conditions need to be maintained.
	I can state the pathway of a control system as receptor, coordination centre, effector.	I can explain why internal conditions need to be maintained.	I can explain how drugs affect homeostasis.
		I can identify stimuli, receptors, coordination centres and effectors in examples of nervous and chemical responses.	I can explain how nervous and chemical responses differ.
B10.2 The structure and function of the human nervous system	I can identify the stimuli that sense organs detect.	I can describe the pathway of impulses from receptor to effector.	I can explain in detail how the nervous system coordinates a response.
	I can state what a neurone and nerve are.	I can describe how information is passed along neurones.	I can evaluate results in detail in order to discuss precision and accuracy.
	I can measure reaction times using repeats to increase accuracy.	I can evaluate a method and describe how accuracy could be increased.	
B10.3 Reflex actions	I can identify reflex reactions.	I can describe how reflex actions are fast and automatic.	I can explain in detail how impulses travel across a synapse.
	I can state why reflex actions are important.	I can describe the events involved in a reflex action.	I can apply knowledge of synapses to explain the effects of drugs.
	I can order the events involved in a reflex action.	I can describe the function of synapses.	

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GCSE Student Checklist

B10 The human nervous system

Name Class Date

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GCSE Student Checklist

B10 The human nervous system

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B10.4 The brain	I can state the main structures of the brain.	I can describe the function of brain structures.	I can evaluate in detail the benefits and risks of investigating and treating brain disorders.	
	I can display data as a suitable graph or chart.	I can describe how regions of the brain have been mapped to particular functions.	I can consider ethical dilemmas surrounding brain research.	
		I can choose the correct way to display data.	I can independently plan a method to test a hypothesis.	
B10.5 The eye	I can list the main structures of the eye.	I can relate the structures of the eye to their functions.	I can draw an accurate ray diagram to show how to eye focuses light.	
	I can describe what happens to the eye in bright light.	I can describe how the eye focuses light.	I can explain in detail the changes to the eye in response to changes in light intensity.	
B10.6 Common problems of the eye	I can state that the lens changes shape to focus on near or distant objects.	I can describe how the lens changes shape to focus on near or distant objects.	I can draw accurate ray diagrams to explain what happens during accommodation and what causes long and short sightedness.	
	I can describe what causes long and short sightedness.	I can describe how lenses and surgery can help with long and short sightedness.	I can evaluate the risks and benefits of surgery to treat long and short sightedness.	

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GCSE Student Checklist

B11 Hormonal coordination

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B11.1 Principles of hormonal control	I can match the pituitary gland, pancreas, thyroid, adrenal gland, ovary and testes to their position on a diagram of the human body.	I can explain why the pituitary gland is known as a 'master gland'.	I can compare and contrast nervous and hormonal action.	
	I can state that hormones are chemicals secreted into the bloodstream by glands and have an effect on a target organ.	I can describe the role of hormones released by endocrine glands.	I can apply knowledge to suggest and explain how changes in hormone production could affect the body.	
B11.2 The control of blood glucose levels	I can state that blood glucose concentration is controlled by the pancreas.	I can describe what happens when blood glucose levels become too high or too low.	I can explain how glucagon interacts with insulin to control blood glucose levels.	
	I can state that there are two types of diabetes.	I can describe the difference in the causes of Type 1 and Type 2 diabetes.	I can explain why it is important to control the level of glucose in the blood.	
B11.3 Treating diabetes	I can state that Type 1 diabetes is normally treated with insulin injections.	I can explain why Type 1 diabetes is treated with insulin injections.	I can evaluate different treatments for Type 1 diabetes.	
	I can state that Type 2 diabetes can be treated by changes to diet and exercise.	I can explain how Type 2 diabetes can be treated by changes to diet and exercise.	I can explain in detail how lifestyle choices affect the risk of developing Type 2 diabetes.	
	I can describe data that shows a link between obesity and Type 2 diabetes.	I can describe how the production of insulin for people with diabetes has developed over time.	I can summarise how scientists are working to find a cure for diabetes.	

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GCSE Student Checklist

B11 Hormonal coordination

Lesson	Aiming for 4	Aiming for 6	Aiming for 8
Name		Class	Date
B11.4 The role of negative feedback		I can describe the function of adrenaline and thyroxine.	I can explain how adrenaline prepares the body for 'fight or flight'.
		I can interpret and explain diagrams of negative feedback control.	I can design labelled flow diagrams of negative feedback control.
B11.5 Hormones in human reproduction	I can identify oestrogen and testosterone as reproductive hormones in women and men respectively.	I can compare and contrast the changes to boys and girls during puberty.	I can explain why fertility changes with age in men and women.
	I can describe what happens during the menstrual cycle.	I can name the hormones involved in the menstrual cycle.	I can explain the role of each hormone in the menstrual cycle.
B11.6 Hormones and the menstrual cycle		I can name the glands that produce the hormones oestrogen, progesterone, LH and FSH.	I can explain the interactions of hormones in the control of the menstrual cycle.
		I can describe the function of the hormones that control the menstrual cycle.	I can interpret in detail a graph showing how the levels of hormones change.

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GCSE Student Checklist

B11 Hormonal coordination

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B11.7 Artificial control of fertility	I can state what contraception is and list examples.	I can explain how contraceptives work.	I can apply knowledge of hormones in the menstrual cycle to suggest how hormonal contraceptives work.	
	I can categorise contraceptives as hormonal and non-hormonal.	I can list the advantages and disadvantages of different contraceptives.	I can evaluate different methods of contraception in detail.	
B11.8 Infertility treatments		I can describe what is meant by infertility and suggest reasons for it.	I can describe FSH and IVF can be used to help treat infertility.	
		I can describe the steps used in IVF.	I can evaluate the advantages and disadvantages of IVF.	
		I can outline the issues surrounding IVF.	I can use different viewpoints to make an informed decision on unused IVF embryos.	
B11.9 Plant hormones and plant responses	I can state that plant shoots grow towards the light and away from the force of gravity and roots grow in the direction of the force of gravity.	I can explain why plants need tropism.	I can explain in detail how the production and diffusion of auxin affects the growth of shoots and roots.	
	I can identify responses as phototropism or gravitropism.	I can use diagrams and descriptions to explain how plant shoots and roots respond to light and gravity.	I can independently plan and carry out an investigation into the effect of light on plant growth.	
	I can plan and carry out an investigation into the effect of light on plant growth with support provided.	I can plan and carry out an investigation into the effect of light on plant growth with limited guidance.	I can predict the results of an investigation of tropisms, with detailed scientific reasons.	

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GCSE Student Checklist

B11 Hormonal coordination

Lesson	Aiming for 4	Aiming for 6	Aiming for 8
Name		Class	Date
B11.10 Using plant hormones		I can state some uses of plant hormones (giberellins, ethane and auxins) in agriculture, horticulture and food industry.	I can explain how the effects of plant hormones are useful in agriculture, horticulture and the food industry.
		I can observe the effects of plant hormones.	I can evaluate the use of synthetic plant hormones.

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GCSE Student Checklist

B14 Variation and evolution

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B14.1 Variation	I can list some examples of human variation.	I can list some examples of variation in plants and categorise as being due to genetic, environmental causes or both.	I can explain why some traits are only due to genetic causes.	
	I can categorise some human traits as being due to genetic, environmental causes or both.	I can suggest reasons why identical twins will start to show variation as they get older.	I can explain why it is so hard to get valid results from identical-twin studies.	
	I can describe why identical twins share the same genes.	I can use data to explain why studying identical twins helps scientists investigate which traits have genetic causes.	I can discuss some of the issues scientists face when conducting twin studies.	
B14.2 Evolution by natural selection	I can state that a mutation is a change in the DNA code.	I can explain how a mutation may lead to a new phenotype.	I can explain why it is rare that a mutation leads to a new phenotype.	
	I can describe the theory of evolution by natural selection as a process by which living things have evolved from simple life forms.	I can describe the steps that take place during evolution by natural selection.	I can apply the theory of evolution by natural selection to suggest how a specific organism evolved.	
	I can state some useful adaptations.	I can analyse data from an activity modelling natural selection.	I can explain how a change in a model can make it useful for explaining something else.	
B14.3 Selective breeding	I can describe selective breeding as a process where humans choose which plants or animals to breed together.	I can explain the process of selective breeding.	I can compare and contrast natural and artificial selection.	
	I can give one examples where selective breeding has been used.	I can explain why humans have used selective breeding.	I can explain in detail how the variation of alleles in a population is reduced through selective breeding.	

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GCSE Student Checklist

B14 Variation and evolution

Name	I can choose organisms to breed together to result in desired traits in the offspring.	Class	I can explain what inbreeding is and why it is a problem in dog breeding.	I can explain in detail why the reduction of variation is a problem.	Date
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Lesson	Aiming for 4	Aiming for 6	Aiming for 8
B14.4 Genetic engineering	I can describe GM organisms as containing a gene from another organism and order the stages of genetic engineering.	I can describe the steps used in genetic engineering to produce GM organisms.	I can explain the process of genetic engineering using technical vocabulary, e.g. plasmid, vector, restriction enzymes, marker genes, recombinant DNA.
	I can give examples of GM organisms and describe why they are useful to humans.	I can analyse data to describe why growing GM crops maybe be beneficial to a farmer.	I can explain how genetic engineering could be used to cure people with inherited disorders and discuss the limitations.
B14.5 Cloning	I can describe how to take stem and leaf cuttings of plants.	Describe the benefits of reproduction using cuttings or tissue culture rather than seeds, for plant growers.	I can explain the benefits of embryo transplants over sexual reproduction for farmers.
	I can define the term clone and use a diagram to describe why embryo transplants are clone.	I can describe how embryo transplants are produced and why they are clones.	I can compare and contrast tissue culture in plants and embryo transplantation in animals.
B14.6 Adult cell	I can describe adult cell cloning as producing a complete clone of an adult animal.	I can explain why the animal produced using adult cells cloning is a clone.	I can use advanced terminology to explain the process of adult cell cloning.

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GCSE Student Checklist

B14 Variation and evolution

Name	I can describe the process of adult cell cloning using a diagram.	I can design a flow chart to describe the process of adult cell cloning.	I can compare and contrast the process of adult and embryo cloning.	Date
	I can state one reason why scientists may want to clone an adult animal.	I can list some benefits and drawbacks of adult cell cloning.	I can evaluate the possible uses of adult cell cloning.	

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
B14.7 Making choices about genetic technologies	I can state one concern people may have about growing GM crops.		I can outline the potential benefits and risks of genetic engineering.		I can evaluate the potential benefits and risks of genetic engineering.	
	I can describe why some people are against the cloning of animals.		I can describe economic and ethical concerns that people may have about cloning animals.		I can explain in detail the significance of events in the field of genetics.	

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GCSE Student Checklist

B15 Genetics and evolution

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B15.1 From Mendel to modern genetics	I can use an example to describe the results from Mendel's experiment.	I can discuss why Mendel's work was not recognised until after his death.	I can use a Punnett square to draw conclusions from the results of Mendel's experiments.	
	I can describe some important discoveries in gene theory.	I can correctly order important discoveries in gene therapy.	I can suggest why Mendel's work was not recognised during his lifetime but the work of Watson and Crick was.	
B15.2 Theories of evolution	I can define the term evolution.	I can compare and contrast Darwin's and Lamarck's theories of evolution.	I can explain why we no longer accept Lamarck's theory in the vast majority of cases.	
	I can state that Charles Darwin proposed the theory of evolution by natural selection.	I can describe the theory of inheritance of acquired characteristics proposed by Jean-Baptiste Lamarck.	I can describe an example of where Lamarck's theory could be correct.	
	I can describe the stages of evolution by natural selection.	I can design a storyboard to highlight important events that helped Darwin develop his theory.	I can explain how and why theories, such as how evolution takes place, change over time.	
B15.3 Accepting Darwin's ideas	I can state that finches have different shaped beaks so they can eat different foods.	I can explain how finches on different islands evolved different shaped beaks by natural selection.	I can explain how the finch species on the different Galapagos islands is evidence for evolution by natural selection.	
	I can state one piece of evidence that supports Darwin's theory of natural selection.	I can describe several reasons why most people did not accept his theory when it was first published.	I can discuss why Darwin was conflicted over publishing his theory.	
	I can state one reason why most people did not accept his theory when it was first published.	I can explain why it was important that Darwin collected a variety of evidence.	I can explain why scientists eventually accepted his theory.	

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GCSE Student Checklist

B15 Genetics and evolution

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B15.4 Evolution and speciation	I can state what a species is.	I can describe the steps in the process of speciation.	I can explain the relationship between the length of isolation and number of unique species that evolve.,	
	I can state that speciation is the process by which new species form.	I can explain why there are species living on Madagascar that share some similarities with species found elsewhere.	I can suggest how new species of organisms evolved.	
	I can give an example of an important discovery by Wallace.	I can carry out research to describe other examples of speciation.	I can explain why Wallace's work prompted Darwin to publish <i>The Origin of Species</i> .	
B15.5 Evidence for evolution	I can describe what a fossil is and give an example.	I can describe how fossils are formed.	I can evaluate the use of fossils as evidence for evolution by natural selection and how life first formed.	
	I can state that fossils are evidence for evolution by natural selection.	I can describe how fossils are evidence for evolution by natural selection.	I can use standard form to discuss the large time scales that we use when considering the evolution of life.	
	I can order geological events.	I can explain why the fossil record is not complete.	I can create a geological timeline to scale.	
B15.6 Fossils and extinction	I can state what is meant by extinction.	I can describe how other organisms can cause an animal or plant to become extinct.	I can suggest alternative hypotheses for why an organism became extinct.	
	I can describe one way that an animal could become extinct.	I can suggest a hypothesis for why an organism became extinct.	I can evaluate in detail the need to conserve endangered plants.	
	I can order fossil diagrams to show the evolution of the horse.	I can explain how fossil diagrams show how the horse has evolved.	I can apply knowledge of speciation to explain why dodos were only found on one island.	

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B15 Genetics and evolution

Name Class Date

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GCSE Student Checklist

B15 Genetics and evolution

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B15.7 More about extinction	I can describe what a mass extinction is.	I can suggest the effects of an asteroid, comet or meteorite strike on Earth.	I can link ideas to give a scientific explanation why an asteroid could have caused the dinosaurs to become extinct.	
	I can state that environmental change and a catastrophic event are two possible causes of mass extinction.	I can explain how environmental change can cause mass extinctions.	I can suggest why mass extinctions are important for the evolution of life on Earth.	
	I can describe one theory that explains why the dinosaurs became extinct.	I can identify strengths and weaknesses in two different theories of mass extinction.	I can evaluate two theories to come to a conclusion about which is more believable and explain why scientists are not sure what caused the extinction of dinosaurs or mammoths.	
B15.8 Antibiotic resistant bacteria	I can state what is meant by an antibiotic resistant bacteria.	I can describe how antibiotic resistant bacteria evolve.	I can explain how a fast reproduction rate is linked to the development of antibiotic resistance strains.	
	I can describe why scientists want to slow down the rate of development of new strains of antibiotic resistant bacteria.	I can explain why scientists need to develop new antibiotics.	I can explain how antibiotic resistant bacteria are evidence for evolution.	
	I can list some ways scientists can slow down the development of new strains of antibiotic resistant bacteria.	I can create an information sheet outlining important facts about antibiotic resistant bacteria to the public.	I can summarise the reasons why the development of new antibiotics is unlikely to keep up with the emergence of new strains of antibiotic resistant bacteria.	

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GCSE Student Checklist

B15 Genetics and evolution

Name	I can state what classification is.	I can describe the classification system developed by Carl Linnaeus, to include the order of the taxonomic groups.	I can use the Linnaean system to name the groups that given organisms belong to.	Date
B15.9 Classification	I can classify animals into groups based on their shared characteristics.	I can identify genus and species from a scientific name.	I can suggest why hybrids are not assigned scientific names using the binomial system.	
	I can write an organism's name correctly using the binomial system.	I can explain why a binomial naming system is useful.		

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GCSE Student Checklist

B15 Genetics and evolution

Lesson	Aiming for 4	Aiming for 6	Aiming for 8	
Name		Class		Date
B15.10 New systems of classification	I can name the three domains.	I can describe how organisms are divided in the three domain system.	I can compare and contrast the Linnaean system with the three domain system.	
	I can state that ideas about classification have changed over time.	I can describe why the three domain system was proposed.	I can outline how ideas about classification have developed over time.	
	I can draw a conclusion from a simple evolutionary tree.	I can draw several conclusions from a simple evolutionary tree.	I can draw conclusions from a more complex evolutionary tree.	