	Order	Title and content	Additional Info	Specification link	Literacy/Numeracy/FBV/SMSC links	Alleynes skills for life
Transporting substances	1	Diffusion	Describe diffusion. Explain how different factors affect the rate of diffusion. Factors which affect the rate of diffusion are: the difference in concentrations (concentration gradient), the temperature, the surface area of the membrane. Practical idea: thistle funnel with pot perm	4.1.3.1	Literacy: Correct use of tier 3 vocab	Independence
	2	Diffusion Prac	Alkali Agar jelly cubes with acid. Calculate and compare SA:V. Explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area to volume ratio	4.1.3.1	Calculating surface area to volume ratio	Numeracy
	3	Exchange surface adapations	Explain how the small intestine and lungs in mammals, gills in fish, and the roots and leaves in plants, are adapted for exchanging materials (a large surface area, a membrane that is thin, to provide a short diffusion path, (in animals) having an efficient blood supply, (in animals, for gaseous exchange) being ventilated)	4.1.3.1	Literacy: Correct use of tier 3 vocab	Literacy
	4	PEER STAR Asessment -Diffusion in …				
	5	Osmosis	Theory of Osmosis. Recognise, draw and interpret diagrams that model osmosis. Use of osmosis in cells	4.1.3.2	Literacy: Correct use of tier 3 vocab	Literacy
	6	Osmosis prac	Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue. Calculate percentage change in mass	Required practical 3	Calculating percentage change in mass, Mutual respect and tollerance	Teamwork
	7	Active Transport	Theory of Active transport & examples. Describe how substances are transported into and out of cells by diffusion, osmosis and active transport. Explain the differences between the three processes	4.1.3.3	Literacy: Correct use of tier 3 vocab	Literacy
	8	Revision - optional				
	9	TEST - Teacher STAR				
	10	Test feedback - address misconceptions				
Communicable diseases	11	Spreading Communicable disease	Explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants. Explain how the spread of diseases can be reduced or prevented. Pathogens are microorganisms that cause infectious disease. Pathogens may be viruses, bacteria, protists or fungi. They may infect plants or animals and can be spread by direct contact, by water or by air. Bacteria and viruses may reproduce rapidly inside the body. Bacteria may produce poisons (toxins) that damage tissues and make us feel ill. Viruses live and reproduce inside cells, causing cell damage	4.3.1.1	SMSC: Empathy for stuggles loved ones may face	Empathy
	12	Growing microbes	Practical investigation	4.3.1.1	Mutual respect and tollerance	Leadership

	13	Viral and bacterial disease	HIV, Measles, Tobacco Mosaic Virus, Salmonella, Gonorrhoea Measles is a viral disease showing symptoms of fever and a red skin rash. Measles is a serious illness that can be fatal if complications arise. For this reason most young children are vaccinated against measles. The measles virus is spread by inhalation of droplets from sneezes and coughs. HIV initially causes a flu-like illness. Unless successfully controlled with antiretroviral drugs the virus attacks the body's immune cells. Late stage HIV infection, or AIDS, occurs when the body's immune system becomes so badly damaged it can no longer deal with other infections or cancers. HIV is spread by sexual contact or exchange of body fluids such as blood which occurs when drug users share needles. Tobacco mosaic virus (TMV) is a widespread plant pathogen affecting many species of plants including tomatoes. It gives a distinctive 'mosaic' pattern of discolouration on the leaves which affects the growth of the plant due to lack of photosynthesis. Salmonella food poisoning is spread by bacteria ingested in food, or on food prepared in unhygienic conditions. In the UK, poultry are vaccinated against salmonella to control the spread. Fever, abdominal cramps, vomiting and diarrhoea are caused by the bacteria and the toxins they secrete. Gonorrhoea is a sexually transmitted disease (STD) with symptoms of a thick yellow or green discharge from the vagina or penis and pain on urinating. It is caused by a bacterium and was easily treated with the antibiotic penicillin until many resistant strains appeared. Gonorrhoea is spread by sexual contact. The spread can be controlled by treatment with antibiotics or the use of a barrier method of contraception such as a condom.	4.3.1.2, 4.3.1.3	SMSC: Empathy for stuggles loved ones may face	Empathy
	14	Scientific literacy				
	15	Resistant bacteria	MRSA. Bacteria can evolve rapidly because they reproduce at a fast rate. Mutations of bacterial pathogens produce new strains. Some strains might be resistant to antibiotics, and so are not killed. They survive and reproduce, so the population of the resistant strain rises. The resistant strain will then spread because people are not immune to it and there is no effective treatment MRSA is resistant to antibiotics. To reduce the rate of development of antibiotic resistant strains: • doctors should not prescribe antibiotics inappropriately, such as treating non-serious or viral infections • patients should complete their course of antibiotics so all bacteria are killed and none survive to mutate and form resistant strains • the agricultural use of antibiotics should be restricted. The development of new antibiotics is costly and slow. It is unlikely to keep up with the emergence of new resistant strains.	4.6.3.4	SMSC: Development of new treatments for disease	Literacy
	16	Fungal and Proticst disease	Rose black spot, Malaria. Rose black spot is a fungal disease where purple or black spots develop on leaves, which often turn yellow and drop early. It affects the growth of the plant as photosynthesis is reduced. It is spread in the environment by water or wind. Rose black spot can be treated by using fungicides and/or removing and destroying the affected leaves. The pathogens that cause malaria are protists. The malarial protist has a life cycle that includes the mosquito. Malaria causes recurrent episodes of fever and can be fatal. The spread of malaria is controlled by preventing the vectors, mosquitos, from breeding and by using mosquito nets to avoid being bitten.	4.3.1.4, 4.3.1.5	SMSC: Empathy for stuggles loved ones may face	Empathy
	17	PEER STAR Asessment -Pathogens				Independence

	18	Body defences	How the body defends against pathogens. Describe the non-specific defence systems of the human body against pathogens, including the: • skin • nose • trachea and bronchi • stomach. Explain the role of the immune system in the defence against disease. If a pathogen enters the body the immune system tries to destroy the pathogen. White blood cells help to defend against pathogens by: • phagocytosis • antibody production • antitoxin production.	4.3.1.6	Literacy: Correct use of tier 3 vocab	Literacy
	19	Vaccincation	How does it work? Why is it needed? Explain how vaccination will prevent illness in an individual, and how the spread of pathogens can be reduced by immunising a large proportion of the population. Vaccination involves introducing small quantities of dead or inactive forms of a pathogen into the body to stimulate the white blood cells to produce antibodies. If the same pathogen re-enters the body the white blood cells respond quickly to produce the correct antibodies, preventing infection. Students do not need to know details of vaccination schedules and side effects associated with specific vaccines.	4.3.1.7	SMSC: importance of vaccination for herd immunity	Communication
	20	Antibiotics	Explain the use of antibiotics and other medicines in treating disease. Antibiotics, such as penicillin, are medicines that help to cure bacterial disease by killing infective bacteria inside the body. It is important that specific bacteria should be treated by specific antibiotics. The use of antibiotics has greatly reduced deaths from infectious bacterial diseases. However, the emergence of strains resistant to antibiotics is of great concern. Antibiotics cannot kill viral pathogens. Painkillers and other medicines are used to treat the symptoms of disease but do not kill pathogens. It is difficult to develop drugs that kill viruses without also damaging the body's tissues.	4.3.1.8	SMSC: problems with overuse of antibiotics and doctors ethical dilemas	Empathy
	22	Medical drugs and clinical trials	Describe the process of discovery and development of potential new medicines, including preclinical and clinical testing. Traditionally drugs were extracted from plants and microorganisms. • The heart drug digitalis originates from foxgloves. • The painkiller aspirin originates from willow. • Penicillin was discovered by Alexander Fleming from the Penicillium mould. Most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted from a plant. New medical drugs have to be tested and trialled before being used to check that they are safe and effective. New drugs are extensively tested for toxicity, efficacy and dose. Preclinical testing is done in a laboratory using cells, tissues and live animals. Clinical trials use healthy volunteers and patients. • Very low doses of the drug are given at the start of the clinical trial. • If the drug is found to be safe, further clinical trials are carried out to find the optimum dose for the drug. • In double blind trials, some patients are given a placebo.	4.3.1.9	SMSC: Ethics of drug development	Empathy
	23	Revision				Independence
	24	TEST - Teacher STAR				Independence
	25	Test feedback - address misconceptions				Resilience

Digestion	26	The Digestive system	RECAP KS3 knoweldge of the Structure and function of the digestive system. The digestive system is an example of an organ system in which several organs work together to digest and absorb food. recall the sites of production and the action of amylase, proteases and lipases. Digestive enzymes convert food into small soluble molecules that can be absorbed into the bloodstream. Carbohydrases break down carbohydrates to simple sugars. Amylase is a carbohydrase which breaks down starch. Proteases break down proteins to amino acids. Lipases break down lipids (fats) to glycerol and fatty acids. The products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used in respiration.	4.2.2.1	Literacy: Correct use of tier 3 vocab	Literacy
	27	Enzymes theory	Role, structure and function of enzymes. Enzymes catalyse specific reactions in living organisms due to the shape of their active site. Use the 'lock and key theory' as a simplified model to explain enzyme action.	4.2.2.1		
	28	Scientific literacy				Literacy
	29	Enzymes and temp (PRAC)	Amylase and starch prac. Describe the nature of enzyme molecules and relate their activity to temperature and pH changes.	4.2.2.1	Numeracy: interpreting data	Numeracy
	30	Enzymes and pH (PRAC)	Pepsin and Eggwhite prac	4.2.2.1	Numeracy: interpreting data	Numeracy
	31	PEER STAR Asessment -sample enzymes and pH data analysis				Independence
	32	Digestion of fats & bile (PRAC)	Milk, lipase and bile prac. Bile is made in the liver and stored in the gall bladder. It is alkaline to neutralise hydrochloric acid from the stomach. It also emulsifies fat to form small droplets which increases the surface area. The alkaline conditions and large surface area increase the rate of fat breakdown by lipase.	4.2.2.1	Numeracy: interpreting data	Numeracy
	33	Enzymes (Amylase) & pH (buffer) (PRAC)	Required practical 4		Mutual respect and tollerance	Teamwork
	34	Data analysis (Graph drawing)	Calculating rate of reaction	4.2.2.1	Numeracy: Calculating rates, graphs	Numeracy
	35	Revision				Independence
	36	TEST - Teacher STAR				Independence
	37	Test feedback - address misconceptions				Resilience
Plants	38	Photosynthesis 1	What is it & Uses of Glucose, Testing leaves for starch. Photosynthesis is represented by the equation: carbon dioxide + water (light) --> glucose + oxygen. Recognise the chemical symbols: CO_2, H_2O, O_2 and $C_6H_{12}O_6$. Describe photosynthesis as an endothermic reaction in which energy is transferred from the environment to the chloroplasts by light. The glucose produced in photosynthesis may be: • used for respiration • converted into insoluble starch for storage • used to produce fat or oil for storage • used to produce cellulose, which strengthens the cell wall • used to produce amino acids for protein synthesis. To produce proteins, plants also use nitrate ions that are absorbed from the soil.	4.4.1.1, 4.1.1.3	Literacy: Correct use of tier 3 vocab	Literacy
	39	Photosynthesis 2	Required practical 5 - light and pondweed		Mutual respect and tollerance	Teamwork

	40	Photosynthesis 3	Data analysis & graph drawing. Explain the effects of temperature, light intensity, carbon dioxide concentration, and the amount of chlorophyll on the rate of photosynthesis. Measure and calculate rates of photosynthesis. Extract and interpret graphs of photosynthesis rate involving one limiting factor. Plot and draw appropriate graphs selecting appropriate scale for axes. Translate information between graphical and numeric form. HIGHER ONLY use inverse proportion –the inverse square law and light intensity in the context of photosynthesis. Limiting factors are important in the economics of enhancing the conditions in greenhouses to gain the maximum rate of photosynthesis while still maintaining profit. Use data to relate limiting factors to the cost effectiveness of adding heat, light or carbon dioxide to greenhouses.	4.4.1.2	Numeracy: interpreting data, graphs	Numeracy
	41	Plant tissue/ layers of the leaf	Understand the roles of plant tissues. Explain how the structures of plant tissues are related to their functions. Plant tissues include: • epidermal tissues • palisade mesophyll • spongy mesophyll • xylem and phloem • meristem tissue found at the growing tips of shoots and roots. The leaf is a plant organ. Knowledge limited to epidermis, palisade and spongy mesophyll, xylem and phloem, and guard cells surrounding stomata.	4.2.3.1	Literacy: Correct use of tier 3 vocab	Literacy
	42	Transpiration & Translocation	How does it work? Why is it needed? explain how the structure of root hair cells, xylem and phloem are adapted to their functions. explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpiration. Understand and use simple compound measures such as the rate of transpiration. The roots, stem and leaves form a plant organ system for transport of substances around the plant. Describe the process of transpiration and translocation, including the structure and function of the stomata. Root hair cells are adapted for the efficient uptake of water by osmosis, and mineral ions by active transport. Xylem tissue transports water and mineral ions from the roots to the stems and leaves. It is composed of hollow tubes strengthened by lignin adapted for the transport of water in the transpiration stream. The role of stomata and guard cells are to control gas exchange and water loss. Phloem tissue transports dissolved sugars from the leaves to the rest of the plant for immediate use or storage. The movement of food molecules through phloem tissue is called translocation. Phloem is composed of tubes of elongated cells. Cell sap can move from one phloem cell to the next through pores in the end walls. Detailed structure of phloem tissue or the mechanism of transport is not required.	4.2.3.2	Literacy: Correct use of tier 3 vocab	Literacy: Correct use of tier 3 vocab
	43	PEER STAR Asessment -Plants				Independence
	44	Quadrats	Required practical 7		Mutual respect and tollerance	Leadership
	45	Transects	Practical investigation using transects	Required practical 7	Mutual respect and tollerance	Teamwork
	46	Data analysis of field work	Looking at data & 6 mark exam Q's	Required practical 7	Numeracy: analysis of data	Numeracy
	47	Revision				Independence
	48	TEST - Teacher STAR				Independence
	49	Test feedback - address misconceptions				Resilience

Ecosystems	50	Communities, Abiotic and Biotic factors	Define key termonology. Describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem and the importance of interdependence and competition in a community. o explain how a change in an abiotic or biotic factor would affect a given community given appropriate data or context	4.7.1.2	Key terms and using them in the correct context	Literacy
	51	Adaptation	Explain how organisms are adapted to live in their natural environment, given appropriate information. Describe how extermophiles are adapted	4.7.1.3	Adapting to a changing world	Communication
	52	Food chains and webs	Feeding relationships within a community can be represented by food chains. All food chains begin with a producer which synthesises molecules. This is usually a green plant or alga which makes glucose by photosynthesis. Including predator prey cycles	4.7.2.1	Key terminology in the correct context	Literacy
	53	Scientific literacy				Literacy
	54	PEER STAR Asessment -food webs				Independence
	55	Carbon Cycle & Water cycle	How carbon and water are cycled in the environment. Recall that many different materials cycle through the abiotic and biotic components of an ecosystem Explain the importance of the carbon and water cycles to living organisms. Explain the role of microorganisms in cycling materials through an ecosystem by returning carbon to the atmosphere as carbon dioxide and mineral ions to the soil	4.7.2.2	Impact of man on the environment	Literacy
	56	Waste, Pollution, land use, deforestation	Sources of waste & pollution, causes & effects of deforestation. Explain how waste, deforestation and global warming have an impact on biodiversity. Understand the conflict between the need for cheap available compost to increase food production and the need to conserve peat bogs and peatlands as habitats for biodiversity and to reduce carbon dioxide emissions	4.7.3	Impact of man on the environment	Communication
	57	Global Warming and biodiversity	How GW is caused, impact & factors affecting biodiversity. Describe some of the biological consequences of global warming. Understand that the scientific consensus about global warming and climate change is based on systematic reviews of thousands of peer reviewed publications. Explain why evidence is uncertain or incomplete in a complex context. Evaluate given information about methods that can be used to tackle problems caused by human impacts on the environment. Explain and evaluate the conflicting pressures on maintaining biodiversity given appropriate information	4.7.3.5, 4.7.3.6	Impact of man on the environment	Problem solving
	58	Revision				Independence
	59	Test - Teacher STAR				Independence
	60	Test feedback - address misconceptions				Resilience