UNIT 1 Characteristics of living organisms, Photosynthesis and carbon/nitrogen cycles

	Learning Outcomes	Suggested Teaching Activities	Online Resources	Other resources
	1 (a) Define the characteristic activities of living organisms: nutrition, respiration, excretion, growth, response to stimuli, movement and reproduction	Simple models and other analogies should be used with students to show that NON living things do show SOME of the properties of life. E.g. wind up toy moves, candle flame needs oxygen. There may be a need to discuss some of the less obvious ones, like movement in plants. Time lapse of phototropism is good for this, or use a *Mimosa pudica* (sensitive plant). Students should be introduced to the idea of MNEMONIC (e.g. MRS GREN or GERMS N RCs, the former does not include 'made of cells', the latter does)	http://www.sambal.co.uk/mrsgren.html (MRS GREN). http://www.cornwallis.kent.sch.uk/Primary%20Liason/Living%20things.ppt#3 A MRS GREN Power Point from Cornwallis School http://www.snv.jussieu.fr/bmedia/sensitive/mimosa5-320.mov and http://www.dl.cc.va.us/srollinson/CR2002/16Jul-05.htm Movies of sensitive plant	Wind up toys, candles, P.Gadd pg 6-9 D. Mackean pg 2-3
	1 (b) Describe viruses as non-cellular, parasitic and reproducing only in living host cells	Students can be shown photographs of viruses, to show the very non-living look of them, but that they also complex.	http://www.dinofan.com/dfanimals/kingdoms/viruses/viruses_main.aspx a picture of many virus types http://members.aol.com/aidsacthsv/stdinfo.htm Picture of HIV	Pictures in Books P.Gadd pg 10; fig 3.1 and pg 166-167 fig 17.6 D. Mackean pg 2 and pg 200 fig 25.5 and 25.6
	1(c) Describe bacteria as unicellular, with a cell wall and DNA but no nucleus, some being pathogenic and some non-pathogenic and useful	Students can be shown photographs of bacterial types, many available on Internet. Also shown prepared slides of bacteria, esp. if a microscope camera facility is available. Good views of mouth bacteria can be seen in human cheek cell preparations	http://www.bioschool.co.uk/bioschool.co.uk/images/pages/cheek%20cell_JPG.htm Human cheek cell, stained with methylene blue, mouth bacteria visible as dark rods. http://ghs.gresham.k12.or.us/science/ps/sci/soph/cells/pics/prokaryote1.gif A fairly simply labelled bacterium diagram.	P.Gadd pg 10; fig 3.2 and pg 167-171 fig 17.13 and 17.15 D. Mackean pg 2 and pg 199-200 fig 25.3 and 25.4

			http://www.ucmp.berkeley.edu/bacteria/bacteria.html A fairly detailed Introduction to Bacteria	
	1(d) describe fungi as having a mycelium of threadlike hyphae, some being pathogenic and causing athlete's foot and ringworm (species of Tinea)	Students can be shown photographs of fungi; they can make a collection (best done in the Autumn in Europe). They can see live fungi growing on bread. (Plan ahead!!). One very good protocol is the one devised by NCBE to grow oyster mushrooms on a toilet roll, see online resources. Commercially available mushroom growing kits could be used as well. Photographs of fungal diseases could be shown.	http://www.ncbe.reading.ac.uk/NCBE/MATERIALS/MICROBIOLOGY/oyster.html NCBE Oyster mushroom protocol. http://www.ucmp.berkeley.edu/fungi/fungi.html Online Introduction to Fungi	P.Gadd pg 10; fig 3.3 and pg 171-172 fig 17.22 and 17.23 D. Mackean pg 2 and pg 200-201 fig 25.7
	1 (e) Describe protozoa as unicellular animals, reproducing by fission, some forming gametes and spores and causing disease (malaria, caused by Plasmodium)	Students can be shown photographs and movies (see online links) of a variety of species.	http://sciences.aum.edu/bi/BI2033/thomson/paramecium.html Introduction to Protozoa http://www.fcps.k12.va.us/StratfordLandingES/Ecology/mpages/amoeba.htm Lovely photos of Amoeba, incl. binary fission. http://sciences.aum.edu/bi/BI2033/thomson/binaryfission.html Binary fission in Paramecium http://www.mic-d.com/gallery/moviegallery/pondscum/protozoa/amoeba/ Movies of Amoeba here http://www.microscopy-uk.org.uk/index.html?http://www.microscopy-uk.org.uk/pond/protozoa.html Movies of movement in	P.Gadd pg 11 fig 3.5 and pg 198-199; fig 19.19, 19.20 and 19.21 and pg 172-173 fig 17.24 and 17.26 D. Mackean pg 2 and pg 201-202 fig 25.8

			ciliates	
	1 (f) Describe flatworms as multicellular animals, reproducing both sexually and asexually, with complex life histories involving at least two host organisms (blood fluke, Schistosoma)	Students can observe free living flatworms (Flatworms of the free living type can be easily found in freshwater streams.) Pathogenic flatworms can be observed by students in photographs, internet and textbooks.	http://faculty.washington.edu/kepeter/118/photos/schistosoma_life_cycle.jpg Schistosoma life cycle diagram http://www.dpd.cdc.gov/dpdx/HTML/Schistosomiasis.asp?body=Frames/S-Z/Schistosomiasis/body_Schistosomiasis_page1.htm and another	P.Gadd pg 11 and pg 173 fig 17.27 and 17.28 Fluke D. Mackean pg 204-206 fig 25.17 and pg 229 fig 29.25 and 29.28
	1 (g) Describe insects as multicellular animals with exoskeletons, segmented bodies and jointed limbs, reproducing sexually, with life cycles involving several stages; some insects being vectors of disease (anopheline mosquito, housefly)	Students should examine a range of insects and observe the common features of their anatomy	http://www.earthlife.net/insects/six.html World of Insects Home Page, much inside!	P.Gadd pg 11 fig 3.7 and pg 196 fig 19.17-Mosquito and pg 194 fig 19.13-Housefly D. Mackean pg 245 fig 31.11 and 31.13 Housefly and pg 242 fig 31.4 Culex and fig 31.3 and Anopheles
	1 (h) Describe the structure of animal and plant cells as composed of cytoplasm, cell membrane, cell wall (plant cells and bacteria only), nucleus and nuclear membrane Mount and examine under a microscope cells from a plant epidermis (e.g. onion bulb) and cells obtained by squashing a very small portion of fresh animal liver between a slide and cover slip	Students should prepare and observe animal and plant cell slides and draw their basic features that are visible	http://www.cartage.org.lb/en/themes/Sciences/Physics/Optics/OpticalInstruments/Microscope/GlassSphere/GlassSphere.htm#15 and another http://www.bbc.co.uk/schools/ks3bitesize/science/biology/lifecells1_2.shtml Plant and animal cells compared	P.Gadd pg 16-17 fig 4.3 and 4.4 and pg 20 Summary tables and pg 15-Practical fig 4.2 D. Mackean pg 6-8 fig 2.3 and pg 6 fig 2.2 and pg 13-Experiment 1+2 fig 2.11
	1 (i) describe the functions of the cell membrane in controlling the passage of	Students should be given a sheet of the basic functions with gaps to fill in from text	http://www.iit.edu/~smile/bi9508.html	P.Gadd pg 17-19 fig 4.10 explain osmosis and

	materials into and out of the cytoplasm 1 (j) Define and distinguish between diffusion and osmosis Carry out experiments to illustrate diffusion, (e.g. of colour diffusing into water as a coloured crystal dissolves) and osmosis (e.g. using Visking (dialysis) tubing as a membrane or using cells of onion epidermis or the large cells from the segment of a citrus fruit) 1 (k) Define active transport	or internet. Students should observe diffusion using Potassium Permanganate crystals in a large beaker of clear water for good effect. This should be stood in an undisturbed place for a day or so. They should also see a demonstration of osmosis using visking tubing. Both of these practical needs writing up with explanation. A table comparing the two processes and active transport could be produced by the students with help from staff/internet or textbooks.	Some simple experiments with model membranes http://www.microscopy-uk.org.uk/dww/home/hombrown.htm Downloadable movie of Brownian Motion http://www.bioschool.co.uk Link to plasmolysis time lapse movie http://www.biologycorner.com/bio1/diffusion.html Shows an osmosis animation and links to active transport http://www.colorado.edu/eeb/web_resources/osmosis/ Good osmosis animation… http://www.colorado.edu/eeb/web_resources/osmosis/	pg 18 fig 4.9-Practical and pg 18-Practical fig 4.11 D. Mackean pg 22-23 fig 4.4, 4.5, 4.6 and 4.7 and pg 25 fig 4.12 and 4.9 – Osmosis P.Gadd pg 19 fig 4.12
	1 (l) Describe the structure and functions of the following tissues: epithelium (lining of trachea and covering of villus), blood and bone 1 (m) Define the term organ with reference to the arm: bone, muscle, cartilage, fibrous tissues (tendons and ligaments).	Students should be given a sheet explaining tissue/organ definition and examples to be filled in from text or internet	http://www.vicksburg.com/~lahatte/me/elbow/arminfo.jpg Good arm diagram with all the parts	P.Gadd pg 21-23 fig 4.13 pg 23-Summary table D. Mackean pg 10 fig 2.7(a) and pg 12 fig 2.10 D. Mackean pg 119-Arm fig 16.24 P.Gadd pg 100 fig 10.20-Summary table
	2 (a) State the function of green plants as	Students should engage in class	http://www.bbc.co.uk/schools	

	primary producers of carbohydrate and protein 2 (b) Define photosynthesis as the production of carbohydrate from water and carbon dioxide, using light energy, in the presence of chlorophyll and with the release of oxygen	discussion as to what is obtained from plants, working round to acknowledging their role as a provider of organic material. Notes on photosynthesis should be given/copied from text, to show the reactants and products.	/gcsebitesize/biology/plants/photosynthesishrev1.shtml Everything you need to know about Photosynthesis	P.Gadd pg 43-44 fig 6.2 D. Mackean pg 42 D. Mackean pg 40-41 fig 7.2
	2 (c) State the dependence of all living organisms, including humans, directly or indirectly on photosynthesis	Students should be shown a good few examples of food chains/webs and shown how ALL start with green plants (with a good group you might discuss deep sea vent ecosystems and how this exception proves the rule) Students could come up with these food chains for themselves. A food chain game could be played with less able/less motivated/or just for fun!	Food Chain/Web links http://www.life.uiuc.edu/bio100/lectures/s02lects/foodweb.gif http://www.starfish.govt.nz/shared-graphics-for-download/ocean-foodchain.gif http://www.vtaide.com/png/foodchains.htm You can find many others with a Google image Search http://www.ecokidsonline.com/pub/eco_info/topics/frogs/chain_reaction/index.cfm# A food chain game	D. Mackean pg 57-Food chain
	2 (d) Describe the carbon cycle in terms of the fixation of carbon from carbon dioxide in photosynthesis, its transfer as carbohydrate to animals and its release back into the atmosphere as carbon dioxide, as a result of respiration	The carbon cycle could be developed through a brain storm type of activity with students giving their own example of local habitats. This can then be copied down into their notes	http://www.purchon.com/ecology/carbon.htm Very useful interactive Carbon Cycle	P.Gadd pg 44-45 fig 6.3 pg 45-Summary table D. Mackean pg 57-58 fig 9.5

	2 (e) Describe the nitrogen cycle in terms of the uptake of nitrate ions from the soil by green plants and the formation of plant protein, which is then eaten by animals and converted to animal protein, broken down to urea and released as urine. This is followed by the breakdown of urea and dead animal protein by bacteria and conversion, by stages, to nitrate ions: conversion of atmospheric nitrogen to nitrate ions by nitrogen-fixing bacteria (names of specific bacteria are not required).	Students can create this as with the carbon cycle being lead more by the teacher this time to cover the more obscure aspects of the cycle	http://www.bbc.co.uk/schools/gcsebitesize/biology/ecology/nitrogencyclerev1.shtml Nitrogen cycle summary http://www.biology.ualberta.ca/facilities/multimedia/index.php?Page=280 Look for the downloadable (and useful!) N cycle animation on this page, right click and save target as to get it.	P.Gadd pg 45-46 fig 6.5 Pg 46-Summary table D. Mackean pg 51fig 8.2