SVKM International School, Mumbai
– SCHEME OF WORK
AS level (9700) Batch: 2019-20

(Scope and Sequence)

Teacher: Ms. Gursimran kaur **Subject: AS Biology (9700)**

Week and Month	Topic	Sub topics &Learning Outcomes	Teaching activities / Integration of ICT components	AssSubjectment Summative / formative	Course work / practical component	Resources
July CYCLE 1 (2 Weeks)	Unit 2. **Cells as the basic units of life**	➢ **1.2 Cells as the basic units of living organisms** ➢ a) describe and interpret electron micrographs and drawings of typical animal and plant cells as seen with the electron microscope. ➢ b) recognize the following eukaryotic cell structures and outline their functions: • cell surface membrane • nucleus, nuclear envelope and nucleolus • rough endoplasmic reticulum • smooth endoplasmic reticulum • Golgi body (Golgi apparatus or Golgi complex) • mitochondria (including small circular DNA) • ribosomes (80S in the cytoplasm	Interactive session using diagrams and electron micrographs. Learners will label the cell structures on diagrams drawn from electron micrographs of both plant cell and animal cells, and annotate each with a function Learners will discuss with the help of a teacher the function of cell organelles in detail. Learners will list	1. Worksheet 2. Tests after completion of the topic.	. Course work.	Pearson Baccalaureate *Bio Factsheet 75*: Microscopes and their uses in Biology **Past Papers** Paper 31, Nov 2012, Q2 (b)(c) Paper 33, Nov 2012, Q2 (b) Paper 35, Nov 2012, Q2 (b) Paper 12, Nov

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		and 70S in chloroplasts and mitochondria) • lysosomes • centrioles and microtubules • chloroplasts (including small circular DNA) • cell wall • plasmodesmata • large permanent vacuole and tonoplast of plant cells ➢ c) state that ATP is produced in mitochondria and chloroplasts and outline the role of ATP in cells . ➢ d) outline key structural features of typical prokaryotic cells as seen in a typical bacterium (including: unicellular, 1–5μm diameter, peptidoglycan cell walls, lack of membrane-bound organelles, naked circular DNA, 70S ribosomes) e) compare and contrast the structure of typical prokaryotic cells with typical eukaryotic cells (reference to mesosomes should not be included) ➢ f) outline the key features of viruses as non-cellular structures (limited to protein coat and DNA/RNA)	down all the function after discussion. Learners label a diagram, or draw a labelled diagram, of a typical bacterium / prokaryote and list down important features of the same With the help of a photograph learners will understand the structure of a virus and list its important features.	Formative on structure and function of animal and plant cell.	To draw the plan diagram using microscope or photomicrograph	2011, Q5 **Textbooks/Publications** *Bio Factsheet 4*: Structure to function in eukaryotic cells. **Past Papers** Paper 22, Nov 2011, Q6 (a) Paper 21, June 2012, Q2 (b)(c)(e) **Textbooks/Publications** *Bio Factsheet 73:* The prokaryotic

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AUGUST (1st WEEK)		➢ 1.1 The microscope in cell studies ➢ a) compare the structure of typical animal and plant cells by making temporary preparations of living material and using photomicrographs. ➢ b) calculate the linear magnifications of drawings, photomicrographs and electron micrographs. ➢ c) use an eyepiece graticule and stage micrometer scale to measure cells and be familiar with units (millimetre, micrometre, nanometre) used in cell studies ➢ d) explain and distinguish between resolution and magnification, with reference to light microscopy and electron microscopy ➢ e) calculate actual sizes of specimens from drawings, photomicrographs and electron micrographs	Lab activity	Diagram of bacterial cell will be taken as a formative to check previous knowledge.	Practical component of making temporary slides of plant and animal cells. Teacher will teach them to calculate magnification and use graticule . Learners will learn to calculate actual size of the specimen using microscope.	cell **Past Papers** Paper 22, June 2011, Q4 Paper 23, Nov 2011, Q1 **Textbooks/Publications** *Bio Factsh*) *eet 8*: The cell surface membrane. **Past Papers** Paper 21, Nov 2011, Q1(a) Paper 22, Nov 2012, Q2(a

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AUGUST (2nd & 3rd WEEK) .		**4.1 Fluid mosaic membranes** ➢ a) describe and explain the fluid mosaic model of membrane structure, including an outline of the roles of phospholipids, cholesterol, glycolipids, proteins and glycoproteins ➢ b) outline the roles of cell surface membranes including references to carrier proteins, channel proteins, cell surface receptors and cell surface antigens. ➢ c) outline the process of cell signalling involving the release of chemicals that combine with cell surface receptors on target cells, leading to specific responses	With the help of a diagram learners will understand the structure, location and functions of various proteins on the membrane. With the help of a teacher learners will outline the role of each types of protein in detail and list them individually using a flow chart.	Worksheet	Course work	www.ultranet.com/~jkimball/BiologyPages/C/CellMembranes.html

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		➢ **4.2 Movement of substances into and out of cells** ➢ a) describe and explain the processes of diffusion, facilitated diffusion, osmosis, active transport, endocytosis and exocytosis (no calculations involving water potential will be set) ➢ b) investigate diffusion and osmosis using plant tissue and nonliving materials, such as Visking tubing and agar. ➢ c) calculate surface areas and volumes of simple shapes (including cubes) to illustrate the principle that surface area to volume ratios decrease with increasing size ➢ d) investigate the effect of changing surface area to volume ratio on diffusion using agar blocks of different sizes ➢ e) investigate the effects of immersing plant tissues in solutions of different water	A reminder of cell receptors introduces the idea of cell signalling. Learners draw one or more annotated diagrams to show the general sequence of events occurring in cell signalling Learners refer to the list of substances that enter/leave cells. And discuss the		Practical: learners add glucose solution and/or starch suspension to lengths of Visking tubing tied at one end, tie at the other end and place in water (and vice versa) for a set time. The appearance of the tubing and the results of biochemical tests on the internal and external solutions is recorded and results explainedn Potato cube size and raisin experiment to demonstrate and observe the process of osmosis.	http://www.open.edu/openlearn/scien ce-maths-technology/cellsignalling/content-section-0# http://teachers.net/lessons/posts/251 8.html http://www.neiljohan.com/projects/bio logy/sa-vol.htm Paper Paper 35, Nov

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		potentials, using the results to estimate the water potential of the tissues ➢ f) explain the movement of water between cells and solutions with different water potentials and explain the different effects on plant and animal cells			Onion root cell slides to show process of plasmolysis	2011, Q1 http://www.biotopics.co.uk/life/carrot. html#top http://www.saps.org.uk/secondary/te aching-resources/286-measuringthe-water-potential-of-a-potato-cell Textbooks/Publications King p.60-63 Siddiqui p.38, 40-43. Past papers Paper 52, June 2011, Q1
August (4th week)	**Biological molecule**	**Water** 2.3d) explain how hydrogen bonding occurs between water molecules and relate the properties of water to its roles in living organisms (limited to solvent action, specific heat capacity and latent heat of	Learners will brainstorm the importance of water to the life of a cell, including	Worksheet 2. Tests after completion of		Pearson Baccalaureate

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August (5th week) Summative & revision SEPTEMBER CYCLE 2		vapourisation) 2.2.b define the terms monomer, polymer, macromolecule, monosaccharide, disaccharide and polysaccharide.	hydrogen bonding and as a solvent in biological systems (e.g. blood, phloem sap, cytosol/cytoplasm). Learners make notes, including the following: Draw and describe hydrogen bonding between water molecule	the topic Tests after completion of the topic	Benedicts test, emulsification test, Biurret test. Practical booklet 2 and 3	**Textbooks/Publications** *Bio Factsheet 152*: Phospholipids **Past Papers** Paper 21, June 2011, Q5 Paper 22, June 2011, Q5 (a)(b)(i)(ii) (c)(d) Paper 22, Nov 2011, Q4 (b)

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(1st Week)		2.2.a describe the ring forms of □-glucose and □□glucose 2.2.c describe the formation of a glycosidic bond by condensation, with reference both to polysaccharides and to disaccharides, including sucrose 2.1 Testing for biological molecules a) carry out tests for reducing sugars and non-reducing sugars, the iodine test for starch, the emulsion test for lipids and the biuret test for proteins to identify the contents of solutions . b) carry out a semi-quantitative Benedict's test on a reducing sugar using dilution, standardising the test	Learners write definitions for macromolecule, monomer and polymer and consolidate and discuss its example. Teacher will introduce the terms condensation and hydrolysis by discussing the synthesis and breakdown of polymers Teacher will provide details of the molecular structure of glucose which, in solution, is mainly in ring form	Tests after completion of the topic Paper 22, Nov 2011, Q4 (b)	Learners will conduct experiment on biomolecules test and identify the biomolecules. Using the knowledge learners will solve questions of paper 3 based on biomolecules test.	**Textbooks/Publications** *Bio Factsheet 78*: Chemical bonding in biological molecules *Bio Factsheet 80*: Structure and biological functions of proteins **Past Papers** Paper 21, June 2011, Q5

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SEPTEMBER (2nd &3rd WEEK)		and using the results (colour standards or time to first colour change) to estimate the concentration disaccharides, including sucrose. d) describe the breakage of glycosidic bonds in polysaccharides and disaccharides by hydrolysis, with reference to the non-reducing sugar test. e) describe the molecular structure of polysaccharides including starch (amylose and amylopectin), glycogen and cellulose and relate these structures to their functions in living organisms	Learners will draw alpha and beta form of gluscoe molecule. Learners will also draw the formation and breaking of glycosidic bond and formation of disaccharide molecule like Maltose, sucrose and lactose. Teacher will explain how a glycosidic bond can be broken by hydrolysis, referring to monomers and monosaccharides. Learners draw diagrams of the breakage of	Tests after completion of the topic Past Papers Paper 21, June 2011, Q5 Paper 22, Nov 2012, Q1 (d)		Practical booklet 2 http://www.rsc.org/Education/Teachers/Resources/cfb/carbohydrates.htm#2 http://www.rpi.edu/dept/bcbp/molbiochem/MBWeb/mb1/part2/sugar.htmhttp://www.calfnotes.com/pdf

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OCTOBER (2 weeks)		f) describe the molecular structure of a triglyceride with reference to the formation of ester bonds and relate the structure of triglycerides to their functions in living organisms 2.1.a (iii) carry out tests for reducing sugars and non-reducing sugars, the iodine in potassium iodide solution test for starch, the emulsion test for lipids and the biuret test for proteins to identify the contents of solutions	glycosidic bonds (by hydrolysis) of maltose and sucrose Teacher will use the molecular models to show short sections of amylose and amylopectin (or strings of beads on wire) and discuss glycogen structure. Learners describe the difference between the structures (include bonds formed) and highlight the idea of 'structure to function Learners will draw the general	Past Papers Paper 21, June 2011, Q5 Paper 22, June 2011, Q5 (a)(b)(i)(ii) (c)(d) Paper	Practical booklet 2 Practical work, testing for proteins using the biuret test on a solution of egg white, skimmed milk.	files/CN 102.pdf http://www.biotopics.co.uk/as/lipidcondensation.html http://www.chemguide.co.uk/organicprops/esters/background.html

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		2.3 Proteins a) describe the structure of an amino acid and the formation and breakage of a peptide bond b) explain the meaning of the terms primary structure, secondary structure, tertiary structure and quaternary structure of proteins and describe the types of bonding (hydrogen, ionic, disulfide and hydrophobic interactions) that hold	formula for a fatty acid. o Explain that it is a carboxylic acid and outline -COOH as the carboxyl group. o Explain R is a hydrocarbon chain, and extend this to explain saturated or unsaturated fatty acids. Learners label a printed diagram showing the structure of a phospholipid molecule and discuss how the presence of polar groups relates to phospholipid behaviour when in contact with	22, Nov 2011, Q4 (b)		http://www.learnerstv.com/animation/animation.php?ani=161&cat=Biology http://www.biotopics.co.uk/as/aa.html http://www.worldofmolecules.com

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		these molecules in shape c) describe the molecular structure of haemoglobin as an example of a globular protein, and of collagen as an example of a fibrous protein and relate these structures to their functions (The importance of iron in the haemoglobin molecule should be emphasised. A haemoglobin molecule is composed of two alpha (α) chains and two beta (β) chains, although when describing the chains the terms α-globin and β-globin may be used. There should be a distinction between collagen molecules and collagen fibres) 6.1.a describe the structure of nucleotides, including the phosphorylated nucleotide ATP (structural formulae are not required)	watery liquids. Learners write out the general formula of an amino acid, and on the diagrams use a colour code to identify the: R group; part common to them all; amine group; carboxylic acid group Learners draw simple diagrams of: peptide bond formation (choose two amino acids from their diagram sheet) by condensation. With the help of a diagram teacher will explain different type of protein	Past Papers Paper 21, Nov 2011, Q3 (a)		/life / http://en.wikipedia.org/wiki/Hemoglob in

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November (4 weeks)		6.1.b describe the structure of RNA and DNA and explain the importance of base pairing and the different hydrogen bonding between bases (include reference to adenine and guanine as purines and to cytosine, thymine and uracil as pyrimidines. Structural formulae for bases are not required but the recognition that purines have a double ring structure and pyrimidines have a single ring structure should be included	structure with examples. Teacher will Display a diagram / image of haemoglobin for learners to identify the features of a globular protein and consolidate knowledge of levels of protein structure. Teacher will also discuss in detail the function of each example. Draw a labelled diagram of a nucleotide to show the three components:			http://hyperphysics.phyastr.gsu.edu/hbase/biology/atp.html http://www.dnaftb.org http://www.hhmi.org/biointeractive/dn a/index.html

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NOVEMBER		**3.1 Mode of action of enzymes** a) explain that enzymes are globular proteins that catalyse metabolic reactions b) state that enzymes function inside cells (intracellular enzymes) and outside cells (extracellular enzymes) c) explain the mode of action of enzymes in terms of an active site, enzyme/substrate complex, lowering of activation energy and enzyme specificity (the lock and key hypothesis and the induced fit hypothesis should be included) d) investigate the progress of an enzyme-catalysed reaction by measuring rates of formation of products (for example, using catalase) or rates of disappearance of substrate (for example, using amylase)	phosphate, pentose sugar and nitrogenous organic base (e.g. using a circle, pentagon and rectangle) Teacher will also give out images of the structural formulae of the four RNA and four DNA nucleotides, ensuring learners know the names of the bases and explaining carbon atom numbering Teacher with the help of an image and diagram explain students formation of DNA and RNA	Fomative MCQ on types of proteins.	Practical component Practical booklet 4 and 5 and	http://www.ncbe.reading.ac.uk/ncbe/PROTOCOLS/DNA/extracting.html http://learn.genetics.utah.edu/content/labs/extraction/ http://www.nature.com/nature/dna50/ archive.html

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		3.2 Factors that affect enzyme action a) investigate and explain the effects of the following factors on the rate of enzyme-catalysed reactions: • temperature • pH (using buffer solutions) • enzyme concentration • substrate concentration • inhibitor concentration b) explain that the maximum rate of reaction (Vmax) is used to derive the Michaelis-Menten constant (Km) which is used to compare the affinity of different enzymes for their substrates c) explain the effects of inhibitors, both competitive and noncompetitive, on the rate of enzyme activity	molecules. Teacher ill also explain complementary base pairing, Structue of purine and pyramidine bases and their ratios. Learners construct a summary table of the similarities and differences between DNA and RNA .Teacher will explain the term inter and intra enzymes function. With the help of an image teacher will discuss the	Paper 32, June 2013, Q1	Practice from paper 3 questions. Booklet 5 Past paper question	Hills animation video on enzymes and its function. **Textbooks/Publications** King p.69-73 Siddiqui p.72-73 *Bio Factsheet 148*:Industrial uses of enzymes. **Past Papers**

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		d) investigate and explain the effect of immobilising an enzyme in alginate on its activity as compared with its activity when free in solution	structure of an enzyme and various methods of enzyme substrate complex formation. Teacher will also highlight the function of an enzyme by lowering activation energy. Explain that the course of an enzyme-catalysed reaction can be shown by substrate disappearance or product formation over time Explain Vmax and Km (great	Worksheet on Km and Vmax value. Past Papers Paper 21, Nov 2011, Q2 (b)		Paper 32, June 2012, Q1 (b) Paper 43, June 2011, Q2 Paper 43, Nov 2011, Q2 (b) http://www.wiley.com/college/boyer/0470003790/animations/enzyme_inhibition/enzyme_inhibition.htm

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			detail not required) before learners make notes Learners obtain (Vmax) and (Km) using one of the graphs constructed from their practical work Learners construct a summary table showing the differences between competitive and non-competitive inhibition (include the different graph	worksheet		
November	Unit 3. **DNA and the mitotic cell**	**5.1 Replication and division of nuclei and cells** a) describe the structure of a chromosome, limited to DNA,	Learners draw			http://www.dnalc.org/resources/3d/07-how-dna-is-packaged-basic.html

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December (3 Weeks)	**cycle**	histone proteins, chromatids, centromere and telomeres c) outline the cell cycle, including interphase (growth in G1 and G2 phases and DNA replication in S phase), mitosis and cytokinesis 6.1.c describe the semi-conservative replication of DNA during interphase	and annotate a chromosome at prophase/metaphase to include two sister chromatids, the centromere and telomeres Teacher will explain the detail of cell cycle to learners. Teacher will also discuss the main events of each phase. Learners will draw and note down the important feature of the cell cycle. Teache with the help of	Past Papers Paper 22,		http://ghr.nlm.nih.gov/handbook/basics/chromosome 2. SUBJECT Pearson Baccalaureate Cell cycle http://www.cellsalive.com/cell_cycle.htm Hills animation Replication of DNA

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		d) outline the significance of telomeres in permitting continued replication and preventing the loss of genes. e) outline the significance of stem cells in cell replacement and tissue repair by mitosis and state that uncontrolled cell division can result in the formation of a tumour **5.2 Chromosome behaviour in mitosis** a) describe, with the aid of	presentation and previous knowledge about DNA structure will explain the replication of DNA Teacher will explain about the Meselson and Stahl's classic experiment. Explain that DNA replication results in loss of a short section of the ends of the chromosome and that telomeres are made from repeating sequences of nucleotides.	Nov 2011, Q4 (c)(d) Paper 23, Nov 2011, Q5 (b) Formative to be conducted on the topic		Textbooks/Publications Bio Factsheet 207: How science works: Meselson and Stahl's classic experiment.

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DECEMBER (2nd week)		photomicrographs and diagrams, the behaviour of chromosomes in plant and animal cells during the mitotic cell cycle and the associated behaviour of the nuclear envelope, cell surface membrane and the spindle (names of the main stages of mitosis are expected) b) observe and draw the mitotic stages visible in temporary root tip squash preparations and in prepared slides of root tips of species such as those of Vicia faba and Allium cepa	Learners research examples, e.g. the repair of damage to intestinal epithelial cells, replacement of old cells in the gas exchange system. Learners will also list down the use of stem cell. With the help of a diagram and video learners will understand the stages if mitosis.	Formative on Stages of mitosis.Drawing	Learners prepare a root tip squash (e.g. garlic or onion root tips with acetic orcein or toluidine blue) and examine their slide and those of others for stages of mitosis	http://stemcells.nih.gov/info/basics/pages/basics4.aspx http://www.medicalnewstoday.com/info/stem_cell/ Hills animation Mitosis http://www.microscopyuk.org.uk/micropolitan/index.html http://www.saps.org.uk/secondary/teaching-resources/552-floatinggarlic-growing-roots- http://www.saps.org.uk/secondary/teaching-resources/288investigating-

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			Learners will observe the microscope images and draw the diagrams of mitosis.			mitosis-in-allium-roottip-squash
DECEMBER (3 WEEK)		**6.2 Protein synthesis** a) state that a polypeptide is coded for by a gene and that a gene is a sequence of nucleotides that forms part of a DNA molecule b) state that a gene mutation is a change in the sequence of nucleotides that may result in an	Learners recall primary structure and a polypeptide (Unit 1) and suggest a definition of a genUse of ppts, o Discuss the fact that the sequence of nucleotides comprising a gene codes for the amino acid sequence in a polypeptide chain. Teacher will	1. Worksheet 2. Tests after completion of the topic		Hills animation video on mutation http://ghr.nlm.nih.

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JANUARY (5 WEEKS)		altered polypeptide c) describe the way in which the nucleotide sequence codes for the amino acid sequence in a polypeptide with reference to the nucleotide sequence for HbA (normal) and HbS (sickle cell) alleles of the gene for the β-globin polypeptide d) describe how the information in DNA is used during transcription and translation to construct polypeptides, including the role of messenger RNA (mRNA), transfer	explain to learners how change in nucleotide leads to wrong protein. Students will refer to case studies. Teacher with the help of a video explain leaners the alteration I nucleotide in sickle cell anemia condition. Learners produce an annotated flow chart representing the flow of	**Summative on units done till now.**		gov/handbook/mutationsanddisorders/genemutation http://www.yourgenome.org/dgg/general/var/var_3.shtml Hills animation on Transcription and translation http://learn.genetics.utah.edu/conte

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	Transport and gas exchange	RNA (tRNA) and the ribosomes **7.1 Structure of transport tissues** a) draw and label from prepared slides plan diagrams of transverse sections of stems, roots and leaves of herbaceous dicotyledonous plants using an eyepiece graticule to show tissues in correct proportions (see 1.1c) b) draw and label from prepared slides the cells in the different tissues in roots, stems and leaves of herbaceous dicotyledonous plants using transverse and longitudinal sections c) draw and label from prepared slides the structure of xylem vessel elements, phloem sieve tube elements and companion cells and be able to recognise these using the light microscope d) relate the structure of xylem vessel elements, phloem sieve tube elements and companion cells to their functions	information, beginning with DNA and ending in a functioning protein. o Learners identify the point at which the nucleotide sequence becomes an amino acid sequence. Teacher will discuss and explain the process of transcription and translation in detail with the help of a video.		With the help of prepared slides leraners will make plan diagram of root and stem. Past paper 3 question solving Practical component Q 2 of Paper 3 From various year will practiced. Paper 23, June 2011, Q3 Paper 35, June 2011, Q2 Paper 31, June 2011, Q2 Paper 34, June 2011, Q2 Paper 33, June 2013, Q2	nt/molecules/transcribe/ http://www.brookscole.com/chemistry_d/templates/student_resources/shared_resources/animations/protein_synthesis/protein_synthesis.html http://www.pbs.org/wgbh/aso/tryit/dna/ Practical booklet Paper 23, June 2011, Q3 Paper 35, June 2011, Q2 Paper 31, June 2011, Q2 Paper 34, June 2011, Q2 Paper

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						33, June 2013, Q2
JANUARY (2nd Week)	Transport mechanisms	**7.2 Transport mechanisms** a) explain the movement of water between plant cells, and between them and their environment, in terms of water potential (see 4.2. No calculations involving water potential will be set) b) explain how hydrogen bonding of water molecules is involved with movement in the xylem by cohesion-tension in transpiration pull and adhesion to cell walls c) describe the pathways and explain the mechanisms by which water and mineral ions are transported from soil to xylem and from roots to leaves (include reference to the symplastic pathway, apoplastic pathway and Casparian strip)	Teacher will Provide learners with an overview diagram of the movement of water down a water potential gradient from soil to air. Students will refer to different websites and case studies. From a diagram, learners suggest how a root hair cell is adapted for water and mineral ion uptake Teacher will	Students will	Practical to	http://www.microscopyuk.org.uk/mag/artmar00/watermvt .html http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/X/Xylem.html http://highered.mcgrawhill.com/olcweb/cgi/pluginpop.cgi?it=swf::600::480::/sites/dl/free/0073532224x/788092/Water_Uptake.swf::Water%20Uptake

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January (3rd Week)		d) define the term transpiration and explain that it is an inevitable consequence of gas exchange in plants e) investigate experimentally and explain the factors that affect transpiration rate using simple potometers, leaf impressions, epidermal peels and grids for determining surface area f) make annotated drawings, using prepared slides of cross-sections, to show how leaves of xerophytic plants are adapted to reduce water loss by transpiration g) state that assimilates, such as sucrose and amino acids, move between sources (e.g. leaves and storage organs) and sinks (e.g. buds, flowers, fruits, roots and storage organs) in phloem sieve tubes h) explain how sucrose is loaded into phloem sieve tubes by	discuss in detail the pathwaystaken while transport if water, Learners will define term transpiration. Learners will discuss I detail the process of transpiration and factors affecting the rate. Explain the term assimilates and	present case studies on different species as extinct, endangered and recovered species. Fomrative on transport in	determine species diversity and population diversity Practical for Natural Selection Practical booklet 6 Use pf potometer.	http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/T/Transpiration.html Textbooks/Publications Bio Factsheet 64: Transpiration Bio Factsheet 81: Gas exchange in plants Past Papers Paper 23, Nov 2011, Q3 (b) Paper 22, Nov 2013, Q3 (a)

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JANUARY (4 WEEK)		companion cells using proton pumping and the co-transporter mechanism in their cell surface membranes i) explain mass flow in phloem sap down a hydrostatic pressure gradient from source to sink 8.1.a state that the mammalian circulatory system is a closed double circulation consisting of a heart, blood vessels and blood 8.1.b observe and make plan diagrams of the structure of arteries,	discuss examples. Teacher will introduce translocation as the movement of assimilates from the source (area where they are produced) to the sink Teacher with the help of video will explain the mechanism sucrose is loaded in phloem and transported through the same. Display an image giving an overview of the whole circulatory system and check that	plants Students will present case histories on areas of natural importance and their current status.		Hills animation Transport in plants video http://www.uic.edu/classes/bios/bios100/lectf03am/sucrosepump.jp g Past Papers Paper 23, June 2011, Q5 (c) Paper 21, Nov 2011, Q5 (b) Paper 22, Nov 2011, Q6 (b) Hills animation Circulatory system

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		veins and capillaries using prepared slides and be able to recognise these vessels using the light microscope ➢ . 8.1.c explain the relationship between the structure and function of artery ➢ 8.1.d observe and draw the structure of red blood cells, monocytes, neutrophils and lymphocytes using prepared slides and photomicrographs ➢ ies, veins and capillaries	learners can describe what is meant by pulmonary and systemic circulations. Learners label diagrams of double circulation, including the heart chambers, the two types of circulation and the names of the main blood vessels Learners study photomicrographs of (muscular) arteries and veins (TS), and an electron micrograph of	Formative on structure of heart to judge previous knowledge.		http://sln.fi.edu/biosci/vessels/vessels.html http://www.histology.leeds.ac.uk/circulatory/arteries.php http://www.nuffieldfoundation.org/practical-biology/elastic-recoilarteries-and-veins http://library.med.utah.edu/WebPa

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February (1 WEEK)		8.1.e state and explain the differences between blood, tissue fluid and lymph. 8.2.a describe the external and internal structure of the mammalian heart 8.2.b explain the differences in the	capillaries. Learners label the layers and, with prompting, annotate with details Learners construct a table showing the relationship between structure to function for each of the three blood vessel types Learners draw labelled diagrams of the different cell types and make tables to compare: red blood cells with white blood cells; monocytes	Past Papers Paper 21, June 2011, Q2 (b)		th/CVHTML/CVIDX.html http://nsb.wikidot.com/2-2-3compare-the-structure-of-arteriescapillaries-and-vein http://micro.magnet.fsu.edu/index.html http://education.vetmed.vt.edu/Curriculum/VM8054/Labs/Lab6/Lab6.htm Bio Factsheet 36:

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		thickness of the walls of the different chambers in terms of their functions with reference to resistance to flow 8.2.c describe the cardiac cycle (including blood pressure changes during systole and diastole) 8.2.d explain how heart action is	with neutrophils. Learners use resources to explain how the structural features of a red blood cell are related to the function of oxygen transport Learners will brainstorm the composition of blood and discuss the need for exchange with cells. Leaners also discuss the composition and formation of all fluids. With the help of a diagram		Dissection of lamb heart.	Structure and function of blood and lymph Bio Factsheet 89: Tissue fluid Bio Factsheet 171: Answering exam questions: the formation and drainage of lymph http://www.physiologymodels.info/cardiovascular/arterioles.htm http://www.pbs.org/wgbh/nova/eh

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February (2nd week)		initiated and controlled (reference should be made to the sinoatrial node, the atrioventricular node and the Purkyne tissue, but not to nervous and hormonal control) 9.1.a describe the gross structure of the human gas exchange system. 9.1.b observe and draw plan diagrams of the structure of the walls of the trachea, bronchi, bronchioles and alveoli indicating the distribution of cartilage, ciliated epithelium, goblet cells, smooth muscle, squamous epithelium and blood vessels	learners will label the structure of heart With the help of dissected heart learners will observe the thicknes of wall of chambers and discuss its reasons Learners produce a table. Learners annotate a set of diagrams (prepared by you) showing the heart during one cardiac cycle Teacher will discuss the cardiac cycle to be myogenic in	Formative on Transport in humans		eart/human.html http://library.med.utah.edu/kw/pharm/hyper_heart1.html http://www.medde

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		9.1.d describe the process of gas exchange between air in the alveoli and the blood	nature and not regulated by CNS. Learners revise previous knowledge by labelling familiar structures on a diagram of the human gas exchange system, using resources to complete labelling and add annotations Project images or show photomicrographs of the named structures and give guidance as to how to identify the named			an.luc.edu/lumen/MedEd/Histo/frames/Histo15.ht ml http://micro.magnet.fsu.edu/index.html http://library.med.utah.edu/WebPath/HISTHTML/EM/EM040.html Textbooks/Publications King p.89-91 Siddiqu http://www.johnwiley.net.au/highered/interactions/media/Respiration/content/Respiration/resp1a/frameset.htm http://www.johnwiley.net.au/highered/interactions/media/Respiration/content/Respiration/resp2a/bot.ht

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			structures and learn about the distribution of the named features. Learners draw and annotate diagrams with key features of the process, adding arrows to indicate the direction of exchange of oxygen and carbon dioxide Learners also write a short account of how concentration gradients are maximised for efficient gas exchange			m i p.184-18

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FEBRUARY (3rdWEEK) 2nd Week)		8.1.f describe the role of haemoglobin in carrying oxygen and carbon dioxide with reference to the role of carbonic anhydrase, the formation of haemoglobinic acid and carbaminohaemoglobin (details of the chloride shift are not required)	Teacher will discuss the role of hemoglobin in detail with the students.			http://www.mrothery.co.uk/circulation/circulationotes.htm#BLOOD Textbooks/Publications Bio Factsheet 175: Haemoglobin: structure & function
	8.1.g	8.1.g describe and explain the significance of the oxygen dissociation curves of adult oxyhaemoglobin at different carbon dioxide concentrations (the Bohr effect)	Teacher will introduce the oxygen dissociation curve step-by-step. Learners annotate their own diagrams of the oxygen dissociation curve of adult haemoglobin Teacher will explain the Bohr shift in relation to	Learners complete worksheets involving data extraction and interpretation of the curve		http://www.biology4all.com/resources_library/details.asp?ResourceID=8 http://www.mrothery.co.uk/circulation/circulationotes.htm#BLOOD http://www.wiley.com/college/fob/anim/ http://www.wiley.com/college/fob/quiz/quiz07/7-7.html http://www.wiley.c

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			carbon dioxide carriage by haemoglobin, using a summary diagram			om/college/fob/quiz/quiz07/7-12.html
FEBRUARY (4^{th} week)	Disease and protection against disease	10.1.a define the term disease and explain the difference between an infectious disease and non-infectious disease (limited to sickle cell anaemia and lung cancer)	Lerners will discuss the difference between infectious and no infectious diseases stating their exmaples	Past Papers Paper 21, Nov 2011, Q4 (b) Paper 22, Nov 2011, Q2 (b)(i)		http://edis.ifas.ufl.edu/in722 Textbooks/Publications Bio Factsheet 40: Disease and defence
Cont.		9.2.a describe the effects of tar and carcinogens in tobacco smoke on the gas exchange system with reference to lung cancer and chronic	In a question and answer session, learners explain why chronic bronchitis and emphysema are also non-infectious diseases (in addition to lung	Learners collect, display and analyse data about a smoking-related		http://www.insidecancer.org/ http://www.cancer.org/cancer/cancer causes/geneticsandcancer/oncogene sandtumorsuppressorgenes/oncogen es-tumor-suppressor-

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			cancer). Learners investigate how carcinogens can promote the mutation of two important types of genes involved in the control of cell division, protooncogenes (form oncogenes, associated with the development	disease of the gas exchange system and give a short presentation to the class		genes-andcancer-mutations-and-cancer http://www.who.int/en/ http://www.sanger.ac.uk/genetics/CG P/Census/ http://www.parliament.the-stationeryoffice.co.uk/pa/cm199900/cmselect/cmhealth/27/912007.htm
March (1st Week)		9.2.b describe the short-term effects of nicotine and carbon monoxide on the cardiovascular system	Teacher will introduce carbon monoxide and nicotine as two components of smoke that can easily pass across the alveolar wall to the bloodstream State that	Learners research the short-term effects of nicotine and		http://www.ash.org.uk/files/documents/ASH_111.pdf http://www.bhf.org.uk/ http://library.med.utah.edu/WebPath/ATHHTML/ATHIDX.html http://library.med.

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			carbon monoxide can also cause damage to the endothelial lining, which is a starting point for vascular disease (atheroma/atherosclerosis). Learners make bullet-point notes about the effects of carbon monoxide	produce a concept map or spider diagram		utah.edu/WebPath/CVHTML/CV005.html Textbooks/Publications Bio Factsheet 218: Biology of risk factors 1: Smoking Bio Factsheet 37: Ischaemic (coronary) heart disease (for extension work)
		10.1.b state the name and type of causative organism (pathogen) of each of the following diseases: cholera, malaria, tuberculosis (TB), HIV/AIDS, smallpox and measles (detailed knowledge of structure is not required. For smallpox (Variola) and measles (Morbillivirus) only the name of genus is needed)	Learners will be divided ingroups to research about the causative agents of mentioned diseases.		Research activity	http://textbookofbacteriology.net/chol era.html http://library.med.utah.edu/WebPath/HISTHTML/EM/EM018.html

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MARCH (2nd Week)		10.1.c explain how cholera, measles, malaria, TB and HIV/AIDS are transmitted	Discuss what is meant by a transmission cycle, noting that the causative organism is transmitted when a disease spreads Learners assign a mode of transmission to each named disease and write a paragraph for each and discuss with the class.	worksheet	Extended research	http://www.biology4all.com/resources_library/details.asp?ResourceID=36
Cont.		10.1.d discuss the biological, social and economic factors that need to be considered in the prevention and control of cholera, measles, malaria, TB and HIV/AIDS (a detailed study of the life cycle of the malarial parasite is not required.	Learners begin with a general discussion, learners suggesting what is meant by 'social' factors (relating to	Past Papers Paper 23, Nov 2011, Q4		http://www.who.int/en/ http://www.who.int/research/en/ http://www.cdc.gov/

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			human society and interdependence. Learners will discuss the availability of vaccines and treatments (including drugs) for the disease			
		10.1.e discuss the factors that influence the global patterns of distribution of malaria, TB and HIV/AIDS and assess the importance of these diseases worldwide	From the research learners give reasons why some countries are better able to prevent and control a particular disease	Learners choose one of the named diseases to research and produce a short report.		http://www.cdc.gov/malaria/malaria_worldwide/impact.html http://www.ncbi.nlm.nih.gov/pubmed/ 21728152 http://www.who.int/hiv/mediacentre/n ews60/en/
March (3rd WEEK) 2nd Week)		11.1.d explain the meaning of the term immune response, making reference to the terms antigen, self and non self	Learners suggest mechanisms considered as 'first line of			

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			defence' (e.g. skin, stomach acid). Learners write a definition of antigen, referring to self and non-self, the production of specific antibody to form an antigen-antibody complex			
		11.1.a state that phagocytes (macrophages and neutrophils) have their origin in bone marrow and describe their mode of action	Teacher will explain the mode of action of phagocytes and neutrophils with help of video .			Bioscope – relevant images. http://library.med.utah.edu/WebPath/HISTHTML/EM/EM001.html http://library.med.utah.edu/WebPath/HISTHTML/EM/EM002.html http://highered.mcgrawhill.com/sites

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						/0072507470/student_view0/chapter3/animation__phagocyto sis.html
March (4th WEEK) 2nd Week)		11.1.b describe the modes of action of B lymphocytes and T-lymphocytes.	Teacher will discuss how the non-specific response of phagocytes to infection differs from the specific response of B-lymphocytes and T-lymphocytes, which each have different modes of action. Using a step-by-step teacher-prompted approach or by individual research, learners draw an annotated flow diagram to show			http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/B/B_and_Tcells.html http://www.merckmanuals.com/home/immune_disorders/biology_of_the_immune_system/acquired_immunity.html?qt=immune%20response&alt=sh http://www.cellsalive.com/antibody.htm http://library.med.utah.edu/WebPat

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		Past paper practice.	how specific B-lymphocytes respond			h/ HEMEHTML/HEMEIDX.html http://www.bu.edu/histology/p/2100
April (1 week)		Revision.				