3rd Year: Biology End of Year Exam 2018

1hr written paper

The paper will be out of **70marks** in total. You should aim to spend about **one minute per mark.**

Section A of the paper will be multiple choice questions, **section B** will be longer answer questions.

You will need:
Blue/black pen (+spare)
Pencil
Ruler (mm)
Calculator

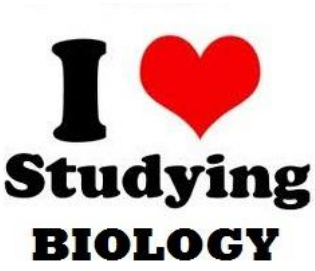
Read each question carefully, paying particular attention to the **command word** (describe, explain, calculate, evaluate etc) and to the **number of marks available** for the question.

Remember good exam technique involves **underlining key words** in the question and **annotating diagrams** provided to you. Answers should be **written clearly**, **without waffle**. **Bullet points** are advisable for organising longer answers.

Remember to make use of the **kerboodle online text book** (ask your teacher regarding problems with access!), **revision guides** and your **class notes**.

The following checklists are based on the **OCR** exam specification.

Remember to **ask for help** if and when you encounter difficulties, either from your teacher or by attending **biology clinic on Tuesday** lunchtimes 1pm.



Good luck,
from
The Biology Dept.

OCR
RECOGNISING ACHIEVEMENT

1.1 Cell Structures & Microscopes

I can…	
Describe the structure of a light microscope (name the different parts) AND explain the function of each part.	
Define the term 'magnification' AND explain the determining factor of magnification in a light microscope.	
Calculate the total magnification of a light microscope by multiplying the magnification of the eyepiece lens and the objective lens.	
Describe how to prepare a slide of a biological specimen INCLUDING the use of an appropriate chemical stain.	
Describe how to produce a focused image of a prepared slide using a light microscope.	
Produce a quality biological drawing of a microscope image AND ***appreciate*** the quality of drawings produced by others.	
Define the term 'resolution' AND explain the determining factor of resolution.	
Compare the light microscope and the transmission electron microscope, TEM (advantages and disadvantages of each microscope type).	
Identify the organelles in a eukaryotic cell (membrane, cytoplasm, nucleus, mitochondria, ribosomes + cellulose wall, vacuole and chloroplasts in plant cells)	
Explain the function of each eukaryotic organelle.	
Identify the structural adaptations of specialised cells that enable them to carry out specific roles effectively.	
Identify the main features of a prokaryotic cell (wall, membrane, cytoplasm, loop of DNA, ribosomes + sometimes plasmids, flagella, capsule)	
Explain the function of each prokaryotic feature.	
Compare the structures of eukaryotes and prokaryotes (similarities and differences).	
Identify the cell structures visible with a light microscope and an electron microscope.	
Describe the relationship between mm, µm and nm.	
Convert values into different units (smaller unit = larger value!)	
Calculate the magnification of an image when provided with the actual size of the object (M = I / A)	
Calculate the actual size of an object when provided with an image and the magnification (A = I / M)	
Convert ordinary numbers in to standard form (A x 10^{-B}) AND vice versa.	

1.2 What happens in cells (and what do cells need)

I can…	
Describe a biological molecule as a molecule that an organism is made up of. All cells are built using the same basic molecules.	
State that water (H_2O) is the most abundant molecule in living cells.	
Name the four main biological molecules as proteins, carbohydrates, lipids (fats) and nucleic acids.	
Identify proteins, carbohydrates and nucleic acids as being polymers AND ***name*** the monomers that each of these polymers is made up of.	
Identify the components of a lipid. (glycerol and fatty acids)	
Describe the main functions of each bio-molecule.	
Name DNA as an example of a nucleic acid.	
Describe the structure of DNA (two polymer strands made up on nucleotide monomers, 'double helix'. Four different bases A,C,G,T. Complementary base pairing between A-T, C-G holding two strands together.)	
Describe how DNA can be replicated to build exact copies needed for when new cells are made (cell division). Semi-conservative replication, original strands act as templates.	
State the function of DNA as a code to build proteins. The sequence of bases is the code that determines the order of amino acids in the final protein.	
Name RNA as another example of a nucleic acid.	
Describe the structure of RNA (single strand of nucleotide monomers. Four different bases A,C,G,U.)	
Identify the differences between the structures of DNA and RNA.	
Describe the basic principle of protein synthesis (including unzipping of the DNA molecule containing the gene, making a mRNA copy of the gene in the nucleus (transcription), the RNA gene copy leaving the nucleus, and a ribosome in the cytoplasm reading the base sequence of the gene copy (3 bases at a time) and joining together amino acids in order (translation)	
Use a genetic code table to determine the amino acid order coded for by a gene.	
Explain how a change in sequence of bases of DNA (a mutation) can affect the function of the protein produced.	

1.2 What happens in cells (and what do cells need)

I can…	
Identify enzymes as protein molecules that lower the activation energy of a chemical reaction. (biological catalysts).	
Use the terms *enzyme, active site, specific, substrate, products, collision,* and *denature* correctly. (Lock and key theory)	
Describe AND ***explain*** the effects of temperature, pH and substrate concentration on enzyme activity. (sketch graphs)	
Describe a method that could be used to investigate enzyme activity for a reaction that produces a gas (PAG4)	
Analyse numerical data, including mean calculations and rate calculations, AND present data graphically.	
Describe digestion as a process of breaking down large (insoluble) molecules into small (soluble) molecules.	
Identify the mechanical aspects (mastication by teeth, squeezing and churning by muscles) and the chemical aspects (enzymes) of digestion.	
Name the specific enzyme used and products made during the digestion of proteins, carbohydrates and lipids (fats).	
Identify where protease, amylase and lipase enzymes are made, AND where they act.	
Describe AND ***explain*** the roles of hydrochloric acid (HCl) and bile during digestion.	
Describe the term balanced diet.	
Identify the required nutrient types in a balanced diet AND give examples of food high in each nutrient.	
Describe the role of each nutrient type in the body.	
State that foods can be investigated using specific chemical tests to see which nutrient types they contain.	
Describe the chemical tests for starch (iodine-blue/black), sugar (benedicts-red/orange), protein (biuret-purple) and lipid (ethanol and water- emulsion)	

1.3 Respiration

I can…	
Describe respiration as a chemical reaction that occurs inside ALL living cells that releases energy from food (glucose)	
Explain that enzymes control ALL chemical reactions that take place inside cells.	
Identify ATP as a small molecule that is used by ALL cells as energy currency. (Respiration produces ATP)	
State processes that require energy in cells (eg. movement, protein synthesis etc)	
Describe respiration as an exothermic reaction (releases heat energy)	
Name the two types of respiration (aerobic and anaerobic)	
Describe aerobic respiration as a reaction that takes place when oxygen is plentiful	
State that aerobic respiration takes place in the mitochondria and produces lots of ATP	
Recall the summary word equation for aerobic respiration	
Write a balanced symbol equation for aerobic respiration	
Link the effects of exercise (including increased heart and ventilation rates) to aerobic respiration.	
Describe anaerobic respiration as a reaction that takes place in the absence of oxygen	
State that anaerobic respiration occurs in the cytoplasm and produces less ATP than aerobic respiration.	
Recall the summary word equation for anaerobic respiration in animals (lactic acid).	
Link a build up of lactic acid during vigorous exercise to muscle fatigue/ cramp.	
Explain the term ‘oxygen debt’.	
Compare anaerobic respiration in animals, plants, fungi and bacteria (lactic acid, CO_2 and alcohol)	

1.4 Photosynthesis

I can…	
Use the term producer to describe green plants (producers are organisms that make their own food using a chemical reaction called photosynthesis)	
Recognise the importance of plants to all other forms of life (start of ALL food chains, plants produce biomass)	
Recall the summary word equation for photosynthesis	
Write a balanced symbol equation for photosynthesis	
Describe and explain early experiments investigating photosynthesis and plant growth (eg. Van Helmont and Priestley)	
Describe photosynthesis as an endothermic reaction (requires energy) that occurs in the chloroplasts (using a pigment called chlorophyll that absorbs light energy)	
State that photosynthesis has two main parts 1- water molecules split into H+ ions and O_2 gas ***using light energy*** 2- H+ ions are added to CO_2 to create glucose	
Explain that enzymes control ALL chemical reactions that take place inside cells.	
Describe the tissue structure of plant leaves including location of palisade cells and stomata, and function of xylem and phloem.	
Describe the effects of different factors on the rate of photosynthesis: temperature, light intensity and CO_2 conc. (including use of sketch graphs)	
Explain the effects of different factors on the rate of photosynthesis: temperature, light intensity and CO_2 conc. using the idea of limiting factors.	
Describe how to measure the rate of photosynthesis by collecting volume of O_2 produced in a set time or, counting number of bubbles in a set time.	
Understand that the **inverse square law** can be used to measure light intensity (as you increase the distance of a lamp from a photosynthesising plant, the light intensity decreases by the square of that distance) Light intensity = $\frac{1}{\text{distance}^2}$	
Describe how to maximise the rate of photosynthesis (eg. green houses) by choosing the best values for several factors limiting the rate of photosynthesis.	

2.1 Supplying the cell (molecular movement)

I can…	
Name substances that are required to move into and out of cells.	
Describe the cell surface membrane as a partially permeable structure.	
Describe the process of diffusion as the movement of a substance from an area of high concentration to an area of lower concentration (a passive process=no ATP/energy required).	
State which factors affect the rate of diffusion, and explain why.	
State some examples of diffusion in organisms.	
Describe the diffusion of water through a partially permeable membrane as OSMOSIS.	
Use the term water potential to describe the amount of 'free' water molecules in a solution.	
Describe a solution as solute dissolved in solvent.	
Explain how the water potential of a solution changes as more solute is added.	
Use the terms isotonic, hypotonic and hypertonic when comparing solutions.	
Describe the effects of osmosis on animal cells (lysis and crenate).	
Describe the effects of osmosis on plant cells (turgid and flaccid/plasmolysed).	
Explain the reason for these different effects .	
State the difference between a passive and an active process.	
Describe how molecules can move by active transport (against the concentration gradient, using ATP/energy and requiring specific helper proteins in the membrane).	
Explain where the ATP/energy for active transport comes from.	
Describe some examples of active transport in organisms including ion uptake by root hair cells and glucose absorption in the small intestine.	