Name:_____

BTEC L3 Diploma

in Applied Science

Pre-Course

Knowledge Assessment

Task

Aim: For you to self-assess your current science knowledge and address any areas of weakness.

Objective: To complete the self-assessment checklist honestly and make notes on areas identified as needing extra work.

This booklet will be taken in by Ms Birchnall in September, reviewed and held on file

Task 1 – Assessing your current knowledge:

Complete the 6 self-assessment checklists according to the following criteria:

- ☺ If you can describe and add detail to statement explaining any keywords and giving examples where possible.
- 😐 If you can add some detail to the statement but would struggle to define keywords or provide an example.
- ☹ If you do not fully understand the statement or any keywords within it.

Topic 1 – Cells, Organs and Genes:

Statement	☺	😐	☹
I can describe the basic structure, function and adaptations of the following eukaryotic cells: a. motor and sensory neurones b. red blood cell c. white blood cell d. egg cell e. sperm cell f. root hair cell g. xylem and phloem cells h. guard cell			
I can describe the function of the following components of eukaryotic cells: a. nucleus – contains genetic information that controls the activities of the cell b. cytoplasm – where most chemical reactions take place c. cell membrane – allows entry and exit of substances d. chloroplasts – the sites of photosynthesis e. cell wall – provides structural support f. vacuole – contains cell sap and provides extra support for the cell g. mitochondria – the sites of respiration.			
I can explain that cells form tissues, tissues form organs and organs work together to form organ systems, as illustrated by the cardiovascular system (it is not necessary to learn the detail of each organ in this system).			
I can describe the functions of the following plant organs: a. roots – take in water from the soil and provide anchorage b. xylem – carries water and mineral salts c. phloem – carries glucose d. leaf – where photosynthesis takes place.			
I can explain how loss of water vapour from the leaves drives transpiration.			
I can describe DNA as a double helix containing a sequence of complementary base pairs: a. adenine pairs with thymine b. guanine pairs with cytosine.			
I know that chromosomes, in the nucleus, are made up of DNA, and sections of DNA which represent genes which give instructions for individual characteristics.			
I know that alleles are different forms of the same gene that give rise to heterozygous and homozygous genotypes.			
I understand monohybrid inheritance and can use Punnett squares and genetic diagrams.			
I can carry out pedigree analysis using homozygous and heterozygous individuals.			
I can determine the genotypes and phenotypes of offspring from genetic diagrams and pedigree analysis.			
I can predict the probability, percentage or ratio of offspring displaying particular inherited characteristics from genetic crosses.			
I can describe that gene mutations occur when the base sequence on a DNA molecule is changed and understand that: a. genetic mutations can change the characteristics of organisms b. genetic mutations can be beneficial or harmful to organisms			

Topic 2 –The Nervous and Endocrine Systems:

Statement	☺	😐	☹
I can explain that homeostasis is the maintenance of a constant internal environment that is controlled by nervous and hormonal communication.			
I can describe the structure of the nervous system as being made up of the central nervous system (CNS) (brain and spinal cord) and the peripheral nervous system (PNS) (sensory and motor neurones). I know that the PNS transmits electrical impulses to and from the CNS.			
I can explain the difference between involuntary and voluntary responses.			
I can describe the transmission of electrical impulses from receptor to effector and the role of chemical transmission across synapses.			
I can state the components of a simple reflex arc and how it protects the body from harm.			
I can explain how that the endocrine system consists of glands that release hormones into the bloodstream, which travel through the blood to target organs.			
I can describe the differences between the endocrine and nervous systems in terms of : a. speed of communication b. method of transport or transmission c. duration of response.			
I can explain how blood glucose concentration is regulated by the endocrine system using insulin and glucagon (insulin lowers blood glucose concentrations and glucagon raises it).			
I can explain the processes for body temperature regulation using the following mechanisms: a. sweating b. shivering c. raising/lowering of body hair d. vasoconstriction and vasodilation.			

Topic 3 –Atomic Structure and the Periodic Table:

Statement	☺	😐	☹
I can describe elements as metals or non-metals according to their position in the periodic table.			
I can describe the structure of the atom as a nucleus containing protons and neutrons, surrounded by electrons in shells (energy levels).			
I know that the nucleus of an atom is very small compared to the overall size of the atom.			
I can describe that atoms of a given element have the same number of protons in the nucleus and that this number is unique to that element.			
I can describe the meaning of the terms 'atomic number', 'mass number' and 'relative atomic mass' and know where I could find this information.			
I know that atoms contain equal numbers of protons and electrons.			
I can describe how elements are arranged in the periodic table in order of increasing atomic number, in rows called periods. Also, that elements with similar properties are placed in the same vertical column – these columns are called groups.			
I can define an isotope of an element, as having the same number of protons but a different number of neutrons.			
I can explain how the existence of isotopes makes some relative atomic masses are not whole numbers.			
I understand that relative atomic mass of an element from the relative masses and abundances of its isotopes.			
I can explain the rules about the filling of electron shells (energy levels) to predict the electronic configuration of the first 20 elements in the periodic table as diagrams.			
I can explain the connection between the number of outer electrons and the position of an element in the periodic table.			

Topic 4 – Substances and Chemical Reactions:

Statement	☺	😐	☹
I can use the periodic table to recognise elements and formulae of simple compounds.			
I can define and give examples of elements, compounds and mixtures.			
I can use word equations to identify reactants and products.			
I can balance simple chemical equations and explain why this is important.			
I can describe how chemicals react to form products with different properties, including acids, alkalis and salts.			
I can define acids, bases and alkalis (soluble bases).			
I can describe neutralisation reactions using hydrochloric acid, nitric acid and sulfuric acid, with a metal oxide (copper oxide or zinc oxide) and sodium hydroxide.			
I can describe the reactions of hydrochloric acid and sulfuric acid with metals (not group 1 metals).			
I can describe the reactions of hydrochloric acid, sulfuric acid and nitric acid with sodium carbonate, copper carbonate and calcium carbonate.			
I can describe the chemical tests for hydrogen, oxygen and carbon dioxide.			
I can complete and interpret pH tests using universal indicator and litmus.			
I understand what hazard symbols mean and why they are important.			
I can describe applications of neutralisation reactions including: a. indigestion remedies (safe dose, chemicals used) b. reducing acidity of soils c. reducing acidity of lakes, caused by acid rain.			
I can use and interpret chemical formulae.			

Topic 5 – Energy Stores, Transfers and Transformations:

Statement	☺	😐	☹
I can describe the following forms of energy and their uses: a. thermal b. electrical c. light d. sound e. mechanical (kinetic and potential) f. nuclear.			
I can describe the following energy stores and their uses: a. chemical b. kinetic (in a moving object) c. gravitational potential (due to being within a gravitational field) d. elastic potential (in a stretched or compressed spring) e. thermal (in a warm object) f. nuclear.			
I can explain the following energy transfers (from one place to another): a. mechanically (when a force moves through a distance) b. electrically (electrical devices) c. by conduction (temperature differences) d. by convection (currents in a fluid) e. by radiation (infrared and sound).			
I can use the following energy transfer measurements: a. joule (J) as the unit of energy b. principle of conservation of energy c. diagrams to represent energy transfers and energy dissipation d. watt (W) as the unit of power e. power calculations using: time (sec s) energy (joules) power (watts) ⍰ f. cost of electricity per unit (kWhr).			

I can explain how to assess the efficiency of energy transfers and transformations: a. as the proportion of energy transferred to useful forms b. using calculations involving efficiency: total energy supplied, useful energy, efficiency x100%□			
I can describe sources and storage of energy including: a. renewable (solar, wind, biofuels, hydroelectric, wave, tidal, geothermal) b. non-renewable (fossil fuels, nuclear) c. using energy stores effectively d. storage of energy using batteries and fuel cells.			

Topic 6 – Waves and the Electromagnetic Spectrum:

Statement	☺	😐	☹
I can use the terms amplitude (m), frequency (Hz), wavelength (m) and wave speed (m/s) to describe wave characteristics.			
I can complete simple wave calculations using wave speed (m/s) = wavelength (m) x frequency (Hz).			
I can describe the electromagnetic (e.m.) spectrum as a continuous flow through. radio waves, microwaves, infrared, visible (including the colours of the visible spectrum), ultraviolet, X-rays and gamma rays with each group having different wavelengths.			
I can describe uses and dangers of electromagnetic radiation in transferring energy: a. radio waves (broadcasting and satellite transmissions) b. microwaves (cooking, satellite transmissions, communications and weather forecasting) c. infrared (cooking, thermal imaging, optical fibres, television remote controls and security systems) d. visible light (vision, photography and illumination) e. ultraviolet (fluorescent lamps, detecting forged bank notes and disinfecting water) f. X-rays (observing the internal structure of objects and medical X-rays) g. gamma rays (sterilising food and medical equipment, and the detection of cancer and its treatment).			
I can explain why excessive exposure to some electromagnetic radiation can be harnful: a. microwaves (internal heating of body cells) b. infrared (skin burns) c. ultraviolet (damage to surface cells and eyes, leading to skin cancer and eye conditions) d. X-rays and gamma rays (mutation or damage to cells in the body).			

Task 2 –Identifying gaps in your knowledge:

- In the table on the following page, summarise in your own words the statements where you have ticked a 😐 or a ☹ (column 2)

- Now, summarise your current understanding (column 2)

These are your personal areas for development which you will need to address in task 3 before starting the BTEC L3 course in September.

Topic number & title	Summary of knowledge gap (task 2)	Summary of current understanding (task 2)	What done about it (task 4)	New self assessment level ☺ 😐 ☹
1 Cells, Organs and Genes				
2 The Nervous and Endocrine Systems:				
3 Atomic Structure and the Periodic Table				
4 Substances and Chemical Reactions				
5 Energy Stores, Transfers and Transformations				
6 Waves and the Electromagnetic Spectrum				

Task 3 – Addressing gaps in your knowledge:

Use the internet and any notes you have from KS4 to look up topics identified above.

- For each area assessed as 😐 define all keywords and give examples where appropriate.
- For each area assessed as ☹ makes notes on the topic in addition to defining keywords and giving examples.

Lists of keywords and examples AND notes made need to be attached to this booklet and handed in to Ms Birchnall in September.

Resources:

Knowing where to find information is one of the biggest challenges on the BTEC L3 course. Use the following as the start of a list of places to go for information. Add in any extra websites or books that you find as you will probably need to refer back to them during the course and it will remind you where the information came from!

TIP: If you number your sources it is easy to add the number to your notes so you know where the information came from!

TIP: Use the last page of this booklet to start a list of resources…..

Ideas: http://www.bbc.co.uk/schools/gcsebitesize/science/ = BBC Bitesize

http://www.docbrown.info/ = Doc Brown's Science

GCSE revision guides

Oak Academy video lessons https://classroom.thenational.academy/subjects-by-key-stage/key-stage-4/subjects/combined-science

Revision videos:

https://www.freesciencelessons.co.uk/

https://www.youtube.com/channel/UCaGEe4KXZrjou9kQx6ezG2w

Task 4 – Reviewing your knowledge update:

- Go back over the gaps you identified in task 2 and complete the third column to summarise what you did to bring up your own knowledge. The evidence of this will be taken in along with this handbook by Miss Merritt in September.

- Finally, reassess how effective you were is bringing up your knowledge was by completing the final column.

- If this is still a 😐 or a ☹ then repeat Task 3 until you feel comfortable assessing yourself as a ☺!!

Task 5 – What do you think plagiarism is and can you give any examples?

Resource List

Resource Number	*Web address/ reference of book*	*What it's useful for*
1		
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