**Chapter 12: Energy and Respiration**

**Use the correct format for the command words (in bold) as listed in the Cambridge syllabus, learners guide and my website which is in the form of a Power Point. By the end of this chapter you should be able to:**

1. **Outline** the need for energy in living organisms, as illustrated by anabolic reactions, active transport, movement and the maintenance of body temperature.
2. **Describe** the structure of ATP as a phosphorylated nucleotide.
3. **Describe** the universal role of ATP as the energy currency in living organisms.
4. **Explain** that the synthesis of ATP is associated with the electron transport chain on the membranes of the mitochondrion.
5. **Outline** glycolysis as the phosphorylation of glucose and the subsequent splitting of hexose phosphate (6C) into two triose phosphate molecules which are then further oxidized with a small yield of ATP and reduced NAD.
6. **Explain** that, when oxygen is available, pyruvate is converted to acetyl (2C) coenzyme A, which then combines with oxaloacetate (4C) to form citrate (6C).
7. **Outline** the Krebs cycle, explaining that citrate is reconverted to oxaloacetate in a series of small steps in the matrix of the mitochondrion.
8. **Explain** that these processes involve decarboxylation and dehydrogenation, and describe the role of NAD.
9. **Outline** the process of oxidative phosphorylation, including the role of oxygen.
10. Explain the production of a small yield of ATP from anaerobic respiration and the formation of ethanol in yeast and lactate in mammals, including the concept of an oxygen debt.
11. **Explain** the relative energy values of carbohydrates, lipids, and protein as respiratory substrates.
12. **Define** the term respiratory quotient (RQ).
13. Know how to use a simple respirometer to measure RQ and the effect of temperature on respiration rate.

**Chapter 13: Photosynthesis**

**Use the correct format for the command words (in bold) as listed in the Cambridge syllabus, learners guide and my website which is in the form of a Power Point. By the end of this chapter you should be able to:**

1. **Explain** how the energy transferred as light is used during the light-dependent stage of photosynthesis to produce complex organic molecules.
2. **Describe** the photoactivation of chlorophyll resulting in the photolysis of water and in the transfer of energy to ATP and reduced NADP (cyclic and non-cyclic photophosphorylation should be described in outline only).
3. **Describe** the uses of ATP and reduced NADP in the light-independent stage of photosynthesis.
4. **Describe**, in outline, the Calvin cycle involving the light-independent fixation of carbon dioxide by combination with a 5C compound (RuBP) to yield two molecules of a 3C compound GP (PGA), and the conversion of GP into carbohydrates, lipids and amino acids.
5. **Describe** the structure of a dicotyledonous leaf, a palisade cell and a chloroplast and relate their structures to their roles in photosynthesis.
6. **Discuss** limiting factors in photosynthesis and carry out investigations on the effects of light intensity and wavelength, carbon dioxide and temperature on the rate of photosynthesis.
7. **Discuss** the role of chloroplast pigments in absorption and action spectra, and know that the pigments can be separated by using chromatography.