

GCSE Biology Mock Exam Revision Topics 1-4

Name -

Teacher -

<p style="text-align: center;"><i>Self-assessment</i> 1 = I understand 2 = I need some help 3 = I don't understand yet</p> <p style="text-align: center;">Mock Revision Checklist Topics 1-4</p>	<i>Self-assessment</i>		
	1	2	3
B1 Cell Biology			
B1.1 Cell Structure			
Name the main organelles of plant and animal cells (eukaryotic cells)			
Recall the relative size of bacterial cells (prokaryotic cells)			
Describe the difference in how the genetic material is found within eukaryotic and prokaryotic cells.			
Explain how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, cell wall and chloroplasts in plant cells and plasmids in bacterial cells are related to their functions			
Explain how the structure of different types of cell relate to their function in a tissue, an organ or organ system, or the whole organism. Including sperm cells, nerve cells and muscle cells in animals and root hair cells, xylem and phloem cells in plants.			
Describe cell differentiation			
Describe the differences in magnification and resolution between electron and light microscopes			
Define binary fission (biology only)			
Explain how to prepare an uncontaminated culture (biology only)			
Required practical activity 1: use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included.			
Required practical activity 2: investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition			
B1.2 Cell division			
Recall that the nucleus of a cell contains chromosomes made of DNA molecules. Each chromosome carries a large number of genes. In body cells the chromosomes are normally found in pairs			
Give an overview of mitosis			
Understand that Cell division by mitosis is important in the growth and development of multicellular organisms			
Recognise and describe situations where mitosis is occurring.			
Define a stem cell			
Recall that stem cells from human embryos and adult bone marrow can be cloned and made to differentiate into many different types of human cells			
Name some conditions which may be helped by treatment with stem cells			
Discuss the ethical or religious objections and potential risk of stem cell use			
Recall that stem cells from meristems in plants can be used to produce clones of plants quickly and economically and describe possible uses			

B1.3 Transport in cells			
Explain how substances may move into and out of cells across the cell membranes via diffusion			
Describe diffusion			
Recall that some of the substances transported in and out of cells by diffusion are oxygen and carbon dioxide in gas exchange, and of the waste product urea from cells into the blood plasma for excretion in the kidney			
Describe factors that affect the rate of diffusion			
Recall that a single-celled organism has a relatively large surface area to volume ratio to allow sufficient transport of molecules into and out of the cell			
Explain how the small intestine and lungs in mammals, gills in fish, and the roots and leaves in plants, are adapted for exchanging materials			
List factors that increase the effectiveness of an exchange surface			
Describe osmosis			
Required practical activity 3: investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue			
Recall that active transport moves substances from a more dilute solution to a more concentrated solution (against a concentration gradient). This requires energy from respiration.			
Link the structure of a root hair cell to its function.			
Describe a use for active transport in both plants and animals.			
Explain the difference between diffusion, osmosis and active transport			
B2 Organisation			
2.1 Principles of organisation			
Explain organisational hierarchy			
Define a cell, tissue, organ and organism			
2.2 Animal tissues, organs and organ systems			
Know that digestive system is an example of an organ system in which several organs work together to digest and absorb food.			
Relate knowledge of enzymes to Metabolism			
Describe the structure function and optimum conditions for enzymes			
Define denaturation			
Recall the sites of production and the action of amylase, proteases and lipases.			
Know that digestive enzymes convert food into small soluble molecules that can be absorbed into the bloodstream.			
State that the products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used in respiration.			
Recall where bile is made and stored and its pH and function			
State conditions that increase the rate of fat breakdown by lipase.			
Required practical activity 4: use qualitative reagents to test for a range of carbohydrates, lipids and proteins			
Required practical activity 5: investigate the effect of pH on the rate of reaction of amylase enzyme			

Recall the structure and functioning of the human heart and lungs, including how lungs are adapted for gaseous exchange.			
Recall that the heart is an organ that blood around the body in a double circulatory system. The right ventricle pumps blood to the lungs where gas exchange takes place. The left ventricle pumps blood around the rest of the body.			
Name the major blood vessels			
Describe the structure of the lungs			
Explain natural and artificial pacemakers			
Name the three different types of blood vessel and explain how the structure of these vessels relates to their functions.			
Describe the components of blood and who they are adapted to function			
Describe coronary heart disease: a non-communicable disease			
State that health is the state of physical and mental wellbeing.			
Know that defects in the immune system mean that an individual is more likely to suffer from infectious diseases.			
Recall that immune reactions initially caused by a pathogen can trigger allergies such as skin rashes and asthma.			
Know that severe physical ill health can lead to depression and other mental illness.			
Explain the effect of lifestyle on some non-communicable diseases and that they can be caused by and their increased by the interaction of a number of factors,			
Recall that benign tumours and malignant tumours result from uncontrolled cell division. Malignant tumour cells are cancers.			
Know lifestyle risk factors for various types of cancer including smoking, obesity, common viruses and UV exposure. There are also genetic risk factors for some cancers.			
2.3 Plant tissues, organs and systems			
Know the function of epidermal tissues palisade mesophyll, spongy mesophyll, xylem and phloem and meristem tissue			
Describe the structures of tissues in the leaf and relate to their functions			
Explain how root hair cells are adapted for the efficient uptake of water and mineral ions			
Know the structure and function of xylem tissue.			
Define factors which affect the rate of transpiration			
Explain the role of stomata and guard cells			
Explain the role of phloem tissue and name this process			
B3 Infection and response			
3.1 Communicable diseases			
Explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants.			
Define the term pathogen			
Explain how bacteria and viruses may reproduce in the body and why they make you fell ill			
Give examples of how the spread of diseases can be reduced			
Know that Measles is a viral disease and describe the symptoms			
Explain the effects of HIV and how it is transmitted			
Describe tobacco mosaic virus (TMV)			

Know that Salmonella food poisoning is spread by bacteria ingested in food, or on food prepared in unhygienic conditions.			
Describe the symptoms of salmonella food poisoning			
Know how Gonorrhoea is transmitted and how its spread can be reduced.			
State the cause of Gonorrhoea and describe the symptoms and how it is treated			
Describe rose black spot and state its cause			
Know how rose black spot is spread in the environment and how it can be treated			
Describe malaria and state its cause			
Know how malaria is spread and how to reduce the spread of the disease			
Define some of body's natural defences to infection			
Explain the role of white blood cells			
Describe the process of vaccination			
Explain "herd immunity"			
State what antibiotics can treat and explain the development of antibiotic resistance bacteria			
Define painkillers			
Explain why it is difficult to develop drugs that kill viruses			
Know that traditionally drugs were extracted from plants and microorganisms and give some common examples including who discovered Penicillin and from what			
State that most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted from a plant.			
For new medicinal drugs explain the stages in preclinical and clinical trial			
Define placebo			
Explain double blind trials			
3.2 Monoclonal antibodies (biology only)			
Explain how they are produced			
Name uses of monoclonal antibodies both diagnostic and therapeutic			
3.3 Plant disease (biology only)			
Know how plant disease is detected and identified			
Plants can be infected by a range of viral, bacterial and fungal pathogens as well as by insects.			
Plants can be damaged by a range of ion deficiency conditions:			
Explain plant physical defence responses			
Explain chemical plant defence responses			
Explain plant mechanical defence adaptations.			
B4 Bioenergetics			
4.1 Photosynthesis			
State the word equation for photosynthesis			
Write a balanced symbol equation for photosynthesis (HT Only)			
Explain where the energy for photosynthesis comes from			
State the factors that affect the rate of photosynthesis			
Explain limiting factors (HT only)			
Explain graphs of photosynthesis rate involving two or three factors and decide which is the limiting factor (HT only)			

Understand and use inverse proportion – the inverse square law and light intensity in the context of photosynthesis. (HT only)			
Explain how limiting factors are important in the economics of enhancing the conditions in greenhouses to gain the maximum rate of photosynthesis while still maintaining profit (HT only)			
Required practical activity 6: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed			
State the six uses of glucose by plants			
Know how plant use nitrate ions that are absorbed from the soil.			
4.2 Respiration			
Compare the processes of aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred.			
Define aerobic and anaerobic respiration			
State that reactions which transfer energy to the environment are exothermic reactions			
Name three things organisms need energy for			
State the word equation for aerobic respiration			
Write a balanced symbol equation for aerobic respiration (HT only)			
State the word equation for anaerobic respiration in muscles			
The energy transferred supplies all the energy needed for living processes.			
State the word equation for anaerobic respiration in plant and yeast cells			
Write a balanced symbol equation for anaerobic respiration in yeast and plant cells (HT only)			
State that anaerobic respiration in yeast cells is called fermentation and has economic importance in the manufacture of bread and alcoholic drinks			
Explain why anaerobic respiration takes place in muscles during exercise			
Explain muscle fatigue and oxygen debt			
Define the role of the liver in the removal of lactic acid (HT only)			
Define metabolism			
The energy transferred by respiration in cells is used by the organism for the continual enzyme controlled processes of metabolism that synthesise new molecules.			
State five metabolic processes			

area, concentration gradient, cell tissue depth, blood supply, active transport, mineral ions, sugar molecule

Keywords: eukaryotes, animal cells, plant cells, prokaryotes, bacterial cells, plasmid, nucleus, cell membrane, cytoplasm, mitochondria, ribosomes, chloroplasts, phloem, xylem, vacuole, magnification, diffusion, osmosis, semi permeable membrane, centri

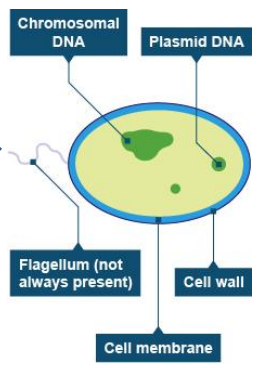
Eukaryotes and prokaryotes;

Animal and plant cells have;

- Cell membrane
- Cytoplasm
- Genetic material in nucleus

Bacterial cells have;

- Cytoplasm
- Cell membrane
- Cell wall
- Single DNA loop
- Small rings of DNA - plasmids
- Smaller than eukaryotes.



Animal and plant cells;

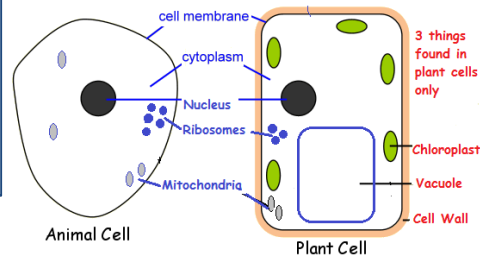
Animal and plant cells share some structures, but plant cells have more

Plant cells only;

- Chloroplasts, which absorb light to make food photosynthesis
- A permanent vacuole filled with cell sap
- A cell wall made of cellulose, which strengthens the cell.

Both animal and plant cells;

- A nucleus, which controls the activities of the cell
- Cytoplasm, in which most of the chemical reactions take place
- A cell membrane, which controls the passage of substances into and out of the cell
- Mitochondria, which is where aerobic respiration takes place
- Ribosomes, which are where protein synthesis occurs.



4.1 Cells (Biology)

Specialised cells;

Animal and plant cells can be specialised to carry out particular roles

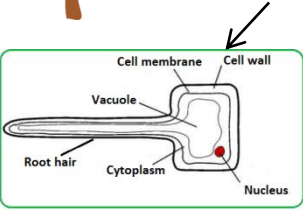
Plants;

- Palisade cell
- Absorbs light for photosynthesis - lots of chloroplasts, regular shape



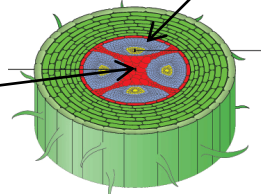
Plants;

- Root hair cell
- Absorbs water and mineral ions - long 'finger-like' section with thin wall, large surface area



Plants;

- Xylem cell
- Movement of water - made of dead cells, waterproof, from root to plant

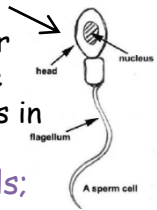


Plants;

- Phloem cell
- Movement of sugar and amino acids - made of living cells, moves all around plant

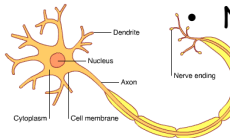
Animals;

- Sperm cell
- Fertilises an egg cell - tail to move, mitochondria for energy in middle section, enzymes in head



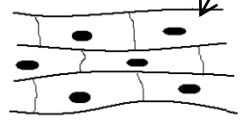
Animals;

- Nerve cell
- Carries electrical impulses around the body - long, connections at each end



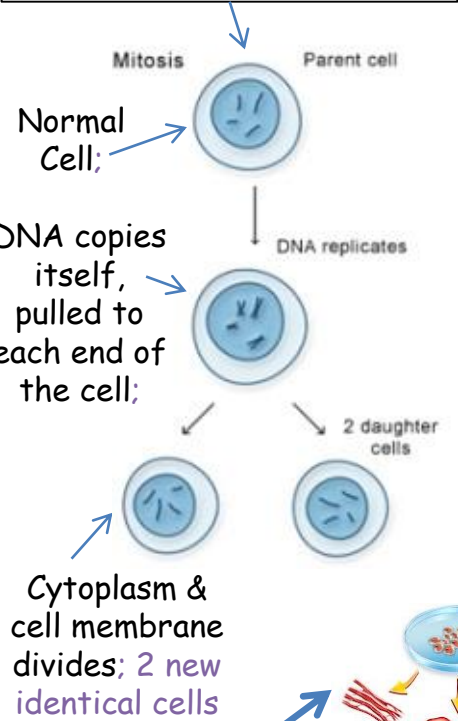
Animals;

- Muscle cell
- Contracts to move the body - filaments that slide over each other to shorten



milli, micro, nano, sperm cell, nerve cell, muscle cell, root hair cell, stem cells, chromosomes, mitosis, meristem, diabetes, dialysis, surface

Mitosis:
This is the process of making an identical copy of a cell

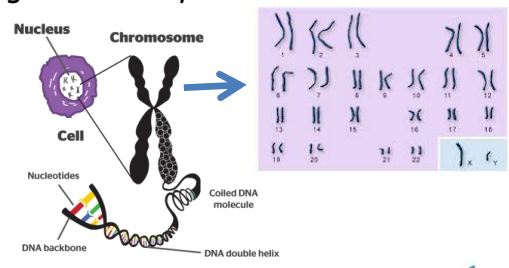


Cell differentiation:
Both animal and plant cells specialise

Animals:
Most cells develop during embryo development, in later life this is repair and replacement

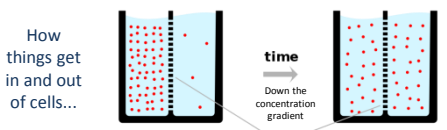
Plants:
Can continue to differentiate throughout a plants life

Chromosomes:
Found in the nucleus of every cell, made of DNA, contains a large number of genes, usually found in pairs



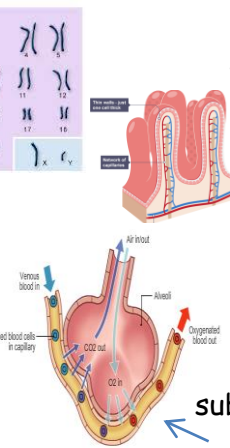
Diffusion is affected by:

- Temperature
- Concentration
- Surface area



Animal cells:

- From human embryos
- Can make most types of human cells
- Adult bone marrow cells can form many cells including blood



Diffusion:
Movement of substances from a **HIGH** concentration to a **LOW** concentration through a semi permeable membrane - no energy is needed

... Like oxygen and glucose.

Stem cells:
This is an undifferentiated cell of an organism that is capable of making more cells of the same type, or make new cells

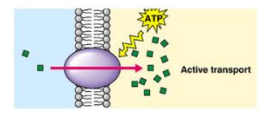
Treatment:
Stem cells may help to treat diabetes and paralysis

Therapeutic cloning:
Embryo is made with the same genes as the patient

- No rejection = medical treatment
- May object on religious grounds

Plants:
Meristem tissue in plants can form any plant cell type

- This can happen at any time throughout the plants life
- Can produce plant clones quickly and economically



Active transport:
Movement **AGAINST** a concentration gradient - needs energy

Microscopy:
Have lead to a better understanding of cells

Light:
First developed, basic understanding of cells

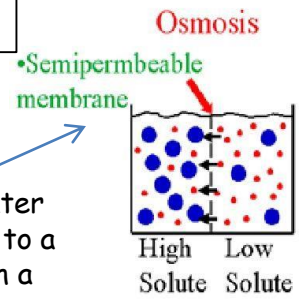
Electron:
can magnify in greater detail, higher magnification



$$\text{Magnification} = \frac{\text{image height}}{\text{object height}}$$

Transport in cells:
Movement of substances into and out of a cell across a membrane

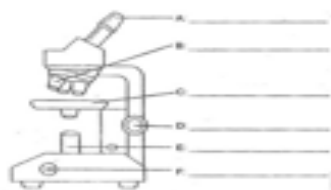
Osmosis:
Osmosis is the diffusion of water particles from a dilute solution to a concentrated solution through a partially permeable membrane.



B1 Cells and Microscopes

This topic looks at:

- Prokaryotic and eukaryotic cells
- Plant and animal cells
- Light and electron microscopes
- Cell adaptations
- Magnification calculations



Give some differences between prokaryotic and eukaryotic cells.

.....

.....

Give the function of the following organelles found in eukaryotic cells

Nucleus

Cell membrane

Mitochondria

Give the function of the following organelles found in plant cells

Chloroplasts

Cell wall

Give the function of plasmids in bacterial cells

Give the functions of the parts of the light microscope

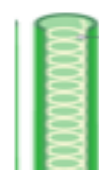
Eyepiece lens	
Objective lens	
Stage	
Mirror	
Course focus	
Fine focus	
Specimen	

Relate the structure of these cells to their function

Animal cells

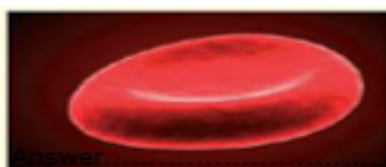


Plant cells



What is the actual size of this Red blood cell if it has been Magnified x 8000?

Answer.....



Example: If the actual size of a cell is 60 μm , how much has it been magnified?

First measure the size of the cell in mm (45mm wide).

Then convert to μm by multiplying by 1000. So, $45 \times 1000 = 45000\mu\text{m}$.

To work out the magnification image size/real size. So, $45000/60$.

So magnification = 750.



Why do electron microscopes have greater magnification?

Give a disadvantage of an electron microscope.

Define the terms:

Tissue –

Organ –

Organ System –

Describe how the small intestine is adapted for maximum food absorption. Include a diagram.

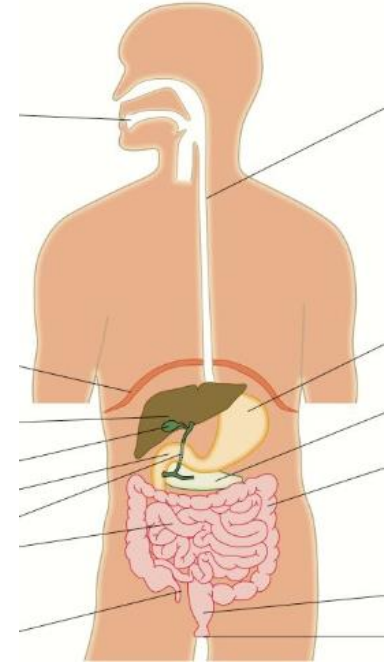
Why do we need to break down the food we eat into smaller molecules?

Organisation and Digestive System

Name the three tissues in the stomach and describe their function:

-
-
-

Label the digestive system below:



State the function of the following:

Small Intestine –

Large Intestine –

Liver –

Gall Bladder -

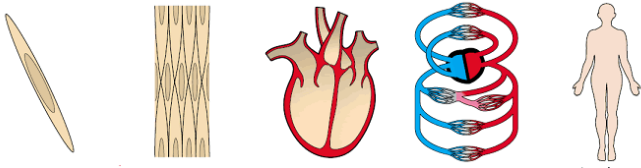
Food	Elements	Structure	Function
Carbohydrate			
Protein			
Lipid			

Organisation Topic Revision Sheet:

The Heart and Disease

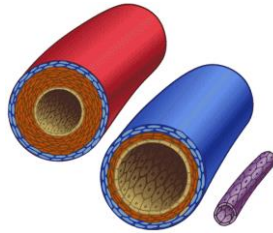
Use these words to label the pictures:

Organ System, Tissue, Organism, Cell, Organ



.....

Which blood vessel is which? Label them!



Explain how you know:

The red vessel is the... because...

The blue vessel is the... because...

The purple vessel is the... because...

If a patient is worried about their risk of cancer, what advice might their doctor give them about what to do/what not to do to reduce their risk?

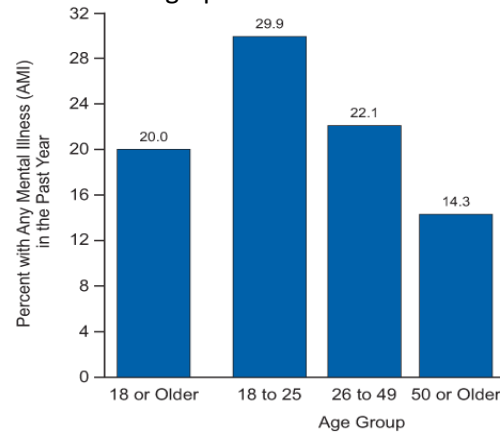
Give THREE risk factors for Coronary Heart Disease:

- 1.
- 2.
- 3.

Explain TWO things doctors can do to reduce the risk of CHD?

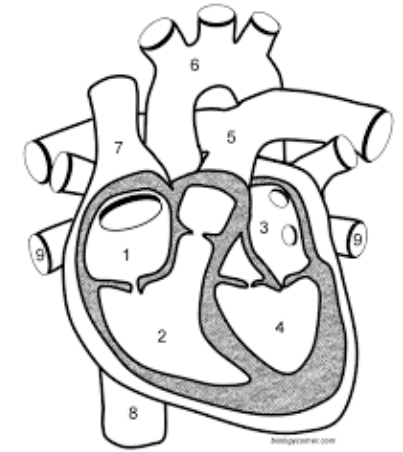
- 1.
- 2.

Look at the data in this graph:



1. Which groups are most and least affected by mental health problems?
2. Give one reason why these groups are most and least affected

Label The Heart



- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

Reflect on your learning!

Write down two new things you have learnt during this topic...

- 1.
- 2.

Write down one thing you would like to know more about...

My question:

Define the term biological catalyst:

Describe the structure of enzymes:

Sketch a graph to show the effect of temperature on an enzyme, and label the optimum temperature.

Describe the shape of your graph:

Explain the shape of your graph:

Explain how enzymes help to break down substances using the lock and key theory. Use a diagram.

Organisation and Digestive System

Describe with examples, the three types of metabolic reactions:

-
-
-

Describe how bile is involved in digestion:

Enzyme	Substrate	Product	Where it's produced	Where it acts	Acid/Alkaline Optimum pH
Amylase					
Protease					
Lipase					

Describe and explain the effect of pH on enzymes:

What is a pathogen?

Explain how vaccination works:

How can the following drugs be used to treat disease?

Painkillers

Antibiotics

Explain how the following make you ill:
Bacteria

Viruses

1.1 Microbes and Disease

What 3 diseases does MMR vaccine protect from?

Why can't antibiotics be used to kill viruses?

Explain how white blood cells protect you from disease.

Why is overuse of antibiotics a problem?

Why are antibiotics used in farming?

How can we reduce this problem?

Explain how antibiotic resistance develops in bacteria.

What is a mutation?

List 4 precautions you must take when carrying out aseptic technique to grow a sterile culture

1.

Why is mutation in pathogens problematic?

What is a sterile culture.

Give 2 reasons it is important to keep cultures sterile. .

What temperature should we incubate cultures at in school and why? How does this compare to industry?

Outline the experiments carried out by Ignaz Semmelweis and explain the contribution of these to modern medicine.

BIOLOGY REVISION: BIOENERGETICS

What is the equation for photosynthesis

Where in the plant does it occur?

How are leaves adapted to perform photosynthesis?

Why do farmers want their plants to do as much photosynthesis as possible?

How can they control conditions to improve the growth of their plants?

Explain how plants use glucose :

The response to exercise:

Heart rate →

Breathing rate →

Equations for:

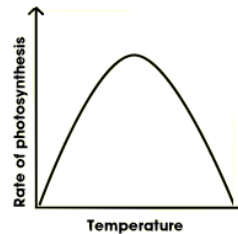
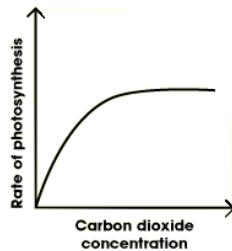
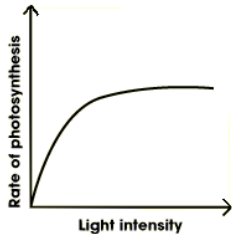
Aerobic respiration:

Anaerobic respiration:

Reasons for respiration (what do we need the energy for):

Why is Photosynthesis so important?

Explain how light, CO_2 and temperature are limiting factors of photosynthesis



•Where and when does anaerobic respiration take place?

•Why do muscles become fatigued if you exercise hard?

•Why is anaerobic respiration much more inefficient than aerobic?

•What is oxygen debt?

Bioenergetics - Quick Fire Questions

This worksheet is fully supported by a video tutorial; <https://youtu.be/1nuYpKaQ3jA>

1. What is the word equation for photosynthesis?
2. What is the chemical symbol for carbon dioxide?
3. What is the chemical symbol for water?
4. What is the chemical symbol for oxygen gas?
5. What is the chemical symbol for glucose?
6. What is the symbol equation for photosynthesis?
7. How is energy transferred in photosynthesis?
8. What factors might affect photosynthesis?
9. How does temperature affect photosynthesis?
10. How does light intensity affect photosynthesis?
11. How does carbon dioxide concentration affect photosynthesis?
12. Sketch the graph to show how light intensity affect photosynthesis (Higher tier only)
13. Sketch the graph to show how temperature affects photosynthesis (Higher tier only)
14. Sketch the graph to show how carbon dioxide concentration affects photosynthesis (Higher tier only)
15. Is respiration exothermic or endothermic?
16. What is the word equation for respiration?
17. What is the symbol equation for respiration?
18. What is anaerobic respiration?
19. What is equation for anaerobic respiration?
20. What is anaerobic respiration in yeast cells?
21. How are the products of anaerobic respiration useful in the food industry?
22. What is oxygen debt?
23. Define metabolism.
24. What do sugars do?
25. What do amino acids do?
26. What do fatty acids do?
27. What does glycerol do?
28. What do carbohydrates do?
29. What do proteins do?
30. What do lipids do?
31. What can glucose be converted to?
32. What are lipids formed from?
33. What are proteins formed from?
34. What are amino acid formed from?
35. What do proteins are broken down into?

Biology Mock Revision Topics 1-4 AQA

Biology Department
Carmel College

