Revision pack AS Biology

Module: Cell, exchange and transport

2009

Name: _____

The questions below will allow you to build your own revision pack focusing on some of the key areas of knowledge that you will be required to have come your January examinations. As this revision pack does NOT contain all the relevant material you will need to know for you January examinations, a copy of the specification for this module has been included within the pack, so that you can see which key areas have been included and which have not, so that you yourself can do work on the areas that have not been included, making sure you cover the entire specification.

Contents:

Unit Content

Each unit is divided into a number of teaching modules. Within each module, the content is divided into two columns: **Context and Exemplification** and **Assessable Learning Outcomes**. Only the statements in the right hand column will be examined; statements in the left hand column are included to provide guidance on delivery. References to HSW (How Science Works) are to Appendix B. References to the GCSE Criteria for Science are to Appendix C.

3.1 AS Unit F211: *Cells, Exchange and Transport*

<table>
<tr><td colspan="2">Module 1: Cells</td></tr>
<tr><td colspan="2">Cells are the basic units of all living things. Organisms function because of communication and co-operation between specialised cells.
Cell division is a fundamental process, necessary for reproduction, growth and repair.</td></tr>
<tr><td colspan="2">Links
GCSE Criteria for Science: 3.7(i) (c), (d); 3.9(i) (a)</td></tr>
<tr><td colspan="2">1.1.1 Cell Structure</td></tr>
<tr><td>Context and exemplification</td><td>Assessable learning outcomes</td></tr>
<tr><td>The cell is the basic unit of all living things.
An understanding of how to use a light microscope is developed along with an understanding of why electron microscopes are so important in biology.
Careful observation using microscopes reveals details of cell structure and ultrastructure and provides evidence to support hypotheses regarding the roles of cells and organelles.</td><td>Candidates should be able to:

(a) state the resolution and magnification that can be achieved by a light microscope, a transmission electron microscope and a scanning electron microscope;

(b) explain the difference between magnification and resolution;

(c) explain the need for staining samples for use in light microscopy and electron microscopy;

(d) calculate the linear magnification of an image (HSW3);

(e) describe and interpret drawings and photographs of eukaryotic cells as seen under an electron microscope and be able to recognise the following structures: nucleus, nucleolus, nuclear envelope, rough and smooth endoplasmic reticulum (ER), Golgi apparatus, ribosomes, mitochondria, lysosomes, chloroplasts, plasma (cell surface) membrane, centrioles, flagella and cilia;

(f) outline the functions of the structures listed in (e);

(g) outline the interrelationship between the organelles involved in the production and secretion of proteins (no detail of protein</td></tr>
</table>

	synthesis is required); (h) explain the importance of the cytoskeleton in providing mechanical strength to cells, aiding transport within cells and enabling cell movement; (i) compare and contrast, with the aid of diagrams and electron micrographs, the structure of prokaryotic cells and eukaryotic cells; (j) compare and contrast, with the aid of diagrams and electron micrographs, the structure and ultrastructure of plant cells and animal cells.

1.1.2 Cell Membranes	
Context and exemplification	**Assessable learning outcomes**
Membranes are a fundamental part of the cell. The structure of the cell surface membrane allows cells to communicate with each other. Understanding this ability to communicate is important as scientists increasingly make use of membrane-bound receptors as sites for the action of medicinal drugs. Understanding how different substances enter cells is also crucial to the development of mechanisms for the administration of drugs.	Candidates should be able to: (a) outline the roles of membranes within cells and at the surface of cells; (b) state that plasma (cell surface) membranes are partially permeable barriers; (c) describe, with the aid of diagrams, the fluid mosaic model of membrane structure (HSW1); (d) describe the roles of the components of the cell membrane; phospholipids, cholesterol, glycolipids, proteins and glycoproteins; (e) outline the effect of changing temperature on membrane structure and permeability; (f) explain the term *cell signaling*; (g) explain the role of membrane-bound receptors as sites where hormones and drugs can bind; (h) explain what is meant by *passive transport* (diffusion and facilitated diffusion including the role of membrane proteins), *active transport*, *endocytosis* and *exocytosis;* (i) explain what is meant by *osmosis*, in terms of water potential. (**No** calculations of water potential will be required); (j) recognise and explain the effects that solutions of different water potentials can have upon plant and animal cells (HSW3).

1.1.3 Cell Division, Cell Diversity and Cellular Organisation	
Context and exemplification	**Assessable learning outcomes**
During the cell cycle, genetic information is copied and passed to daughter cells. Microscopes can be used to view the different stages of the cycle. In multicellular organisms, stem cells are modified to produce many different types of specialised cell. Understanding how stems cells can be modified has huge potential in medicine. To understand how a whole organism functions, it is essential to understand the importance of cooperation between cells, tissues, organs and organ systems.	Candidates should be able to: (a) state that mitosis occupies only a small percentage of the cell cycle and that the remaining percentage includes the copying and checking of genetic information; (b) describe, with the aid of diagrams and photographs, the main stages of mitosis (behaviour of the chromosomes, nuclear envelope, cell membrane and centrioles); (c) explain the meaning of the term *homologous pair of chromosomes*; (d) explain the significance of mitosis for growth, repair and asexual reproduction in plants and animals; (e) outline, with the aid of diagrams and photographs, the process of cell division by budding in yeast; (f) state that cells produced as a result of meiosis are not genetically identical (details of meiosis are not required); (g) define the term *stem cell*; (h) define the term *differentiation*, with reference to the production of erythrocytes (red blood cells) and neutrophils derived from stem cells in bone marrow, and the production of xylem vessels and phloem sieve tubes from cambium; (i) describe and explain, with the aid of diagrams and photographs, how cells of multicellular organisms are specialised for particular functions, with reference to erythrocytes (red blood cells), neutrophils, epithelial cells, sperm cells, palisade cells, root hair cells and guard cells; (j) explain the meaning of the terms *tissue*, *organ* and *organ system*; (k) explain, with the aid of diagrams and photographs, how cells are organised into tissues, using squamous and ciliated epithelia, xylem and phloem as examples;

	(l) discuss the importance of cooperation between cells, tissues, organs and organ systems (HSW4).

Module 2: Exchange and Transport	
In order to survive, living cells need a supply of oxygen and nutrients. In single cells and small organisms these materials can enter by passive processes. However, once an organism reaches a critical size it requires specialised exchange surfaces and transport systems.	
Links GCSE Criteria for Science: 3.7(i) (a), (d); 3.9(i) (a)	
1.2.1 Exchange Surfaces and Breathing	
Context and exemplification	**Assessable learning outcomes**
The gas exchange surface in the lungs is used to exemplify the properties and functions of exchange surfaces in living things.	Candidates should be able to: (a) explain, in terms of surface area:volume ratio, why multicellular organisms need specialised exchange surfaces and single-celled organisms do not (HSW1); (b) describe the features of an efficient exchange surface, with reference to diffusion of oxygen and carbon dioxide across an alveolus; (c) describe the features of the mammalian lung that adapt it to efficient gaseous exchange; (d) describe, with the aid of diagrams and photographs, the distribution of cartilage, ciliated epithelium, goblet cells, smooth muscle and elastic fibres in the trachea, bronchi, bronchioles and alveoli of the mammalian gaseous exchange system; (e) describe the functions of cartilage, cilia, goblet cells, smooth muscle and elastic fibres in the mammalian gaseous exchange system; (f) outline the mechanism of breathing (inspiration and expiration) in mammals, with reference to the function of the rib cage, intercostal muscles and diaphragm; (g) explain the meanings of the terms *tidal volume* and *vital capacity;* (h) describe how a spirometer can be used to measure vital capacity, tidal volume, breathing rate and oxygen uptake; (i) analyse and interpret data from a spirometer.

1.2.2 Transport in Animals	
Context and exemplification	**Assessable learning outcomes**
As animals become larger and more active, transport systems become essential to supply nutrients to and remove waste from individual cells. Controlling supply of nutrients and removal of waste requires the co-ordinated activity of the heart and circulatory system.	Candidates should be able to: (a) explain the need for transport systems in multicellular animals in terms of size, level of activity and surface area:volume ratio; (b) explain the meaning of the terms *single circulatory system* and *double circulatory system*, with reference to the circulatory systems of fish and mammals; (c) explain the meaning of the terms *open circulatory system* and *closed circulatory system*, with reference to the circulatory systems of insects and fish; (d) describe, with the aid of diagrams and photographs, the external and internal structure of the mammalian heart; (e) explain, with the aid of diagrams, the differences in the thickness of the walls of the different chambers of the heart in terms of their functions; (f) describe the cardiac cycle, with reference to the action of the valves in the heart; (g) describe how heart action is coordinated with reference to the sinoatrial node (SAN), the atrioventricular node (AVN) and the Purkyne tissue; (h) interpret and explain electrocardiogram (ECG) traces, with reference to normal and abnormal heart activity; (i) describe, with the aid of diagrams and photographs, the structures and functions of arteries, veins and capillaries; (j) explain the differences between blood, tissue fluid and lymph; (k) describe how tissue fluid is formed from plasma; (l) describe the role of haemoglobin in carrying oxygen and carbon dioxide;

	(m) describe and explain the significance of the dissociation curves of adult oxyhaemoglobin at different carbon dioxide levels (the Bohr effect); (n) explain the significance of the different affinities of fetal haemoglobin and adult haemoglobin for oxygen.

1.2.3 Transport in Plants	
Context and exemplification	**Assessable learning outcomes**
As plants become larger and more complex, transport systems become essential to supply nutrients to and remove waste from individual cells. The supply of nutrients from the soil relies upon the flow of water through a vascular system, as does the movement of the products of photosynthesis.	Candidates should be able to: (a) explain the need for transport systems in multicellular plants in terms of size and surface area:volume ratio; (b) describe, with the aid of diagrams and photographs, the distribution of xylem and phloem tissue in roots, stems and leaves of dicotyledonous plants; (c) describe, with the aid of diagrams and photographs, the structure and function of xylem vessels, sieve tube elements and companion cells; (d) define the term *transpiration*; (e) explain why transpiration is a consequence of gaseous exchange; (f) describe the factors that affect transpiration rate; (g) describe, with the aid of diagrams, how a potometer is used to estimate transpiration rates (HSW3); (h) explain, in terms of water potential, the movement of water between plant cells, and between plant cells and their environment. (**No** calculations involving water potential will be set); (i) describe, with the aid of diagrams, the pathway by which water is transported from the root cortex to the air surrounding the leaves, with reference to the Casparian strip, apoplast pathway, symplast pathway, xylem and the stomata; (j) explain the mechanism by which water is transported from the root cortex to the air

	surrounding the leaves, with reference to adhesion, cohesion and the transpiration stream; (k) describe, with the aid of diagrams and photographs, how the leaves of some xerophytes are adapted to reduce water loss by transpiration; (l) explain translocation as an energy-requiring process transporting assimilates, especially sucrose, between sources (eg leaves) and sinks (eg roots, meristem); (m) describe, with the aid of diagrams, the mechanism of transport in phloem involving active loading at the source and removal at the sink, and the evidence for and against this mechanism (HSW1, 7a).

1.1.1 Cell Structure

(a) state the resolution and magnification that can be achieved by a light microscope, a transmission electron microscope and a scanning electron microscope

Use the following link to complete the table below:
http://www.biologymad.com/
Sub menu:
AS Biology > Microscopy, Cells, Diffusion & Membranes > Microscopy

Or use the direct link:
Microscopy

Feature	Light microscope	Electron Microscope (EM)
Wavelength	Light – 400nm	Electron beam – 1.0nm
Resolution	_____nm	0.5nm
Maximum useful magnification	x1500-2000	x_____
Image	Natural colour (e.g. chlorophyll), Coloured if dyes and stains are used	
Specimens		Non-living
Advantages		

(b) explain the difference between magnification and resolution

Magnification is the increasing in size of an object and in microscopy magnification is the lense times the objective lense e.g objective is x40 and the other lense is x10 the overall magnification is x400.

To understand the need of magnification in biology, use the following link to appreciate the sizes of various biological structures:
http://learn.genetics.utah.edu/content/begin/cells/scale/

Resolution is the ability to distinguish between two separate points. The Higher the resolution the easier it will be to see between the two points.

To understand the concept of resolution, consider this simple experiment:
Look at the two dots to your right. ▬
Slowly, move backwards away from the page, at some point, maybe two or three metres away the dots merge into one. This is resolution – the distance between two objects such that they can be seen as two objects

(c) explain the need for staining samples for use in light microscopy and electron microscopy

Use the following link to complete the passage below:
http://www.biologymad.com/
Sub menu:
AS Biology > Microscopy, Cells, Diffusion & Membranes > Microscopy

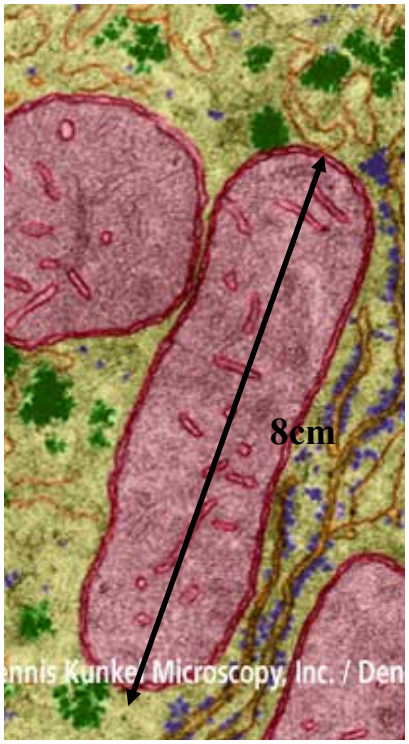
Staining: Most biological material is _____ and needs _____ to increase the contrast between different structures. Different stains are used for different types of tissues. _____ is often used for animal cells, while iodine in KI solution is used for _____ tissues.

(d) calculate the linear magnification of an image

Using the following link below to solve the following equation:

http://www.tutorvista.com/content/physics/physics-ii/light-refraction/magnification.php

Below is an electron micrograph of mitochondria, (Colour enhanced by computer to give false colours)



The magnification of this image is 11, 000 times, as taken by a transmission electron microscope. The size of the image is 8cm (80 000µm).

What is the actual size of the image equal to?

(f) outline the functions of the structures listed in (e)

Use the following link to complete the table below (some have been done for you):
http://www.cellsalive.com/cells/cell_model.htm

Eukaryotic cell	
Organelle	Function
Nucleus	
Nucleolus	
Nuclear Envelope	A double membrane with nuclear pores to allow exchange between cytoplasm and nucleoplasm

Rough And Smooth Endoplasmic Reticulum (ER)	Synthesis of proteins (Rough endoplasmic reticulum for synthesis of proteins that will be secretes and smooth endoplasmic reticulum for synthesis of proteins that will be retained by the cell)
Golgi Apparatus	
Ribosomes	
Mitochondria,	
Lysosomes	
Chloroplasts	
Plasma (Cell Surface) Membrane	
Centrioles	
Flagella And Cilia	Move liquid past the surface of the cell

(i) compare and contrast, with the aid of diagrams and electron micrographs, the structure of prokaryotic cells and eukaryotic cells

Use the following link to complete the table below (some have been done for you): http://www.nslc.wustl.edu/courses/Bio2960/labs/04Microscopy/index.html

Feature	Prokaryotic cells	Eukaryotic cells
Type of genetic material		
Main location of genetic material	In the cytoplasm in a region called the nucleoid	
Mitochondria		
Ribosomes	Small sized. 70S	Larger sized. 80S
Organelles bound by single membrane		Many are present including endoplasmic reticulum, Golgi apparatus and lysosomes

(i) compare and contrast, with the aid of diagrams and electron micrographs, the structure of prokaryotic cells and eukaryotic cells

Use the same link as (f) and (i) to complete the table below (some have been done for you):

Feature	Animal	Plant
Cell wall		
Chloroplasts		
Carbohydrate storage	Glycogen	Starch
Vacuole	Not usually present. Small or temporary vacuoles are	

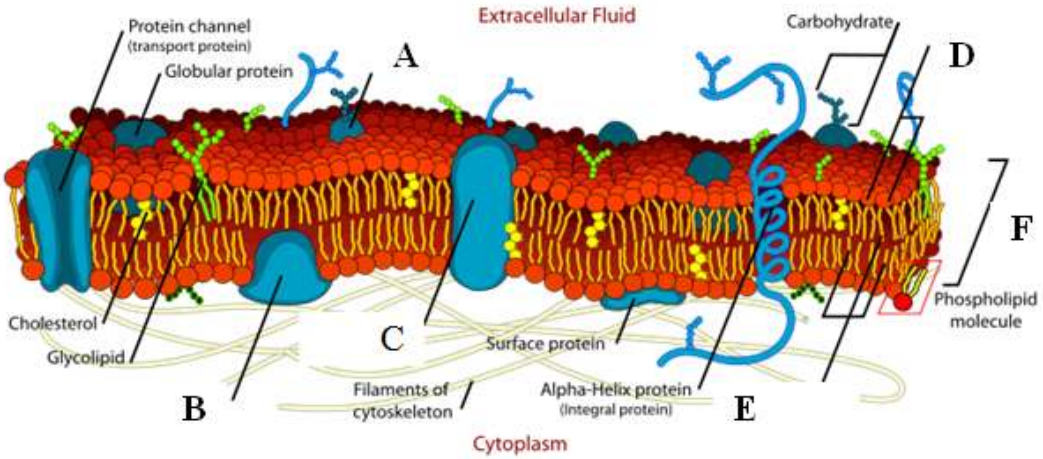
	sometimes found	
Shape		

1.1.2 Cell Membranes

(a) outline the roles of membranes within cells and at the surface of cells;
(b) state that plasma (cell surface) membranes are partially permeable barriers;
(c) describe, with the aid of diagrams, the fluid mosaic model of membrane structure

Cell Membrane, Also known as a plasma membrane, this outer layer of a cell assists in the movement of molecules in and out the cell plays both a structural and protective role

Use the following link to fill in the right letter next to each structure:
http://cellbiology.med.unsw.edu.au/units/science/lecture0803.htm



Letter	Structure
	Integral protein
	Glycoprotein
	Hydrophobic tail
	Phospholipid bilayer
	Hydrophilic head
	Peripheral protein

(f) explain the term *cell signalling*

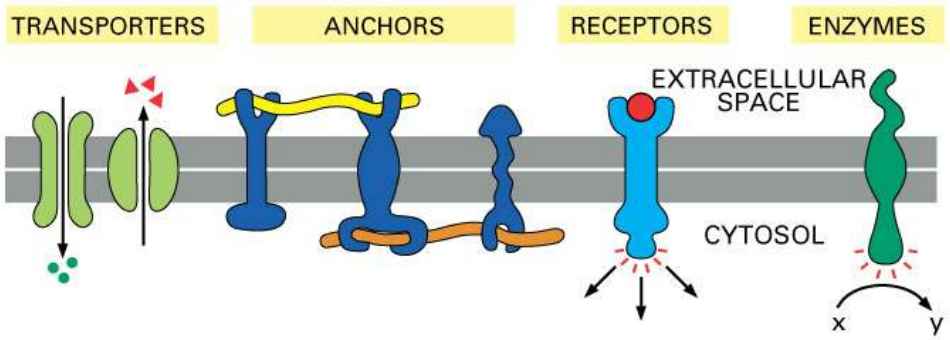
(g) explain the role of membrane-bound receptors as sites where hormones and drugs can bind

Use the following link to give a definition of cell signalling:
http://www.jcu.edu.au/cgc/DictCellBiol.html

Cell Signalling

http://www.bio.miami.edu/~cmallery/150/memb/functions.jpg

Link the right description to the right membrane protein



(a) A protein that spans the membrane may provide a hydrophilic channel across the membrane that is selective for a particular solute. (b) Some transport proteins hydrolyze ATP as an energy source to actively pump substances across the membrane.	Anchors
A protein built into the membrane may be an enzyme with its active site exposed to substances in the adjacent solution. In some cases, several enzymes in a membrane are ordered as a team that carries out sequential steps of a metabolic pathway.	Enzymes
A membrane protein may have a binding site with a specific shape that fits the shape of a chemical messenger, such as a hormone. The external messenger (signal) may cause a conformational change in the protein that relays the message to the inside of the cell.	Transporters
Microfilaments or other elements of the cytoskeleton may be bonded to membrane proteins, a function that helps maintain cell shape and fixes the location of certain membrane proteins. Proteins that adhere to the ECM can coordinate extracellular and intracellular changes.	Receptors

(h) explain what is meant by *passive transport* (diffusion and facilitated diffusion including the role of membrane proteins), *active transport*, *endocytosis* and *exocytosis*

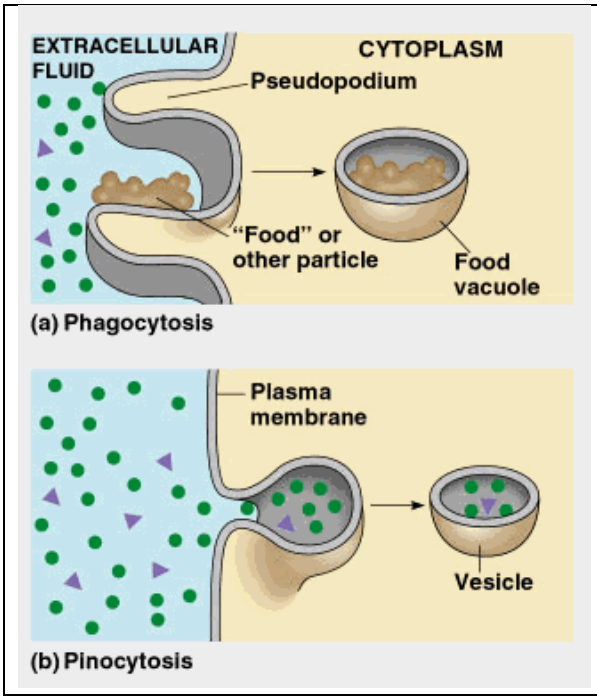
Use the following link to the narrated animations that you will need to fill in the pink section of the following table:
http://bcs.whfreeman.com/thelifewire/content/chp05/0502001.html

Passive Transport	
Diffusion	The movement of molecules from a region of higher concentration to lower concentration of that molecule down a concentration gradient
Facilitated diffusion- Channel proteins	
Facilitated diffusion- Carrier proteins	
Active Transport	
Active Transport	Against a concentration gradient via carrier proteins that use energy from ATP in order to shape
Endocytosis and Exocytosis	Bulk transport of materials via vesicles that can fuse with or break from the cell surface membrane

If the animations are a little difficult to understand, try the step-through version of the animation, alternatively, try reading the introduction before and the conclusion after you have watched the animation; do the quiz at the end to make sure you fully understand.

To reinforce the idea of active Transport, look at the following animation:
http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_the_sodium_potassium_pump_works.html

Use the following link add a brief explanation for each step of endocytosis shown in the picture below:
http://www.maxanim.com/physiology/Endocytosis%20and%20Exocytosis/Endocytosis%20and%20Exocytosis.htm



Use the following link for a more detailed explanation of endocytosis and exocytosis
http://bcs.whfreeman.com/thelifewire8e/content/cat_040/0504003.html

(i) explain what is meant by *osmosis*, in terms of water potential. (**No** calculations of water potential will be required);

(j) recognise and explain the effects that solutions of different water potentials can have upon plant and animal cells

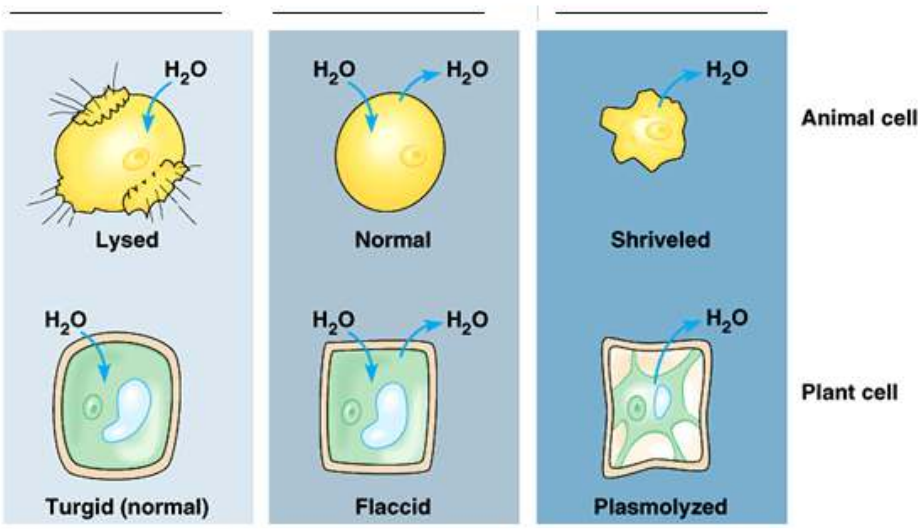
Water potential is a measure of the tendency of water molecules to diffuse from one place to another, using the following animation briefly explain osmosis
http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation__how_osmosis_works.html

Osmosis_____

_____

If you are unsure of your definition/explanation of osmosis, one written for you, just highlight the section below and change the colour to black to view the definition and compare it to yours:

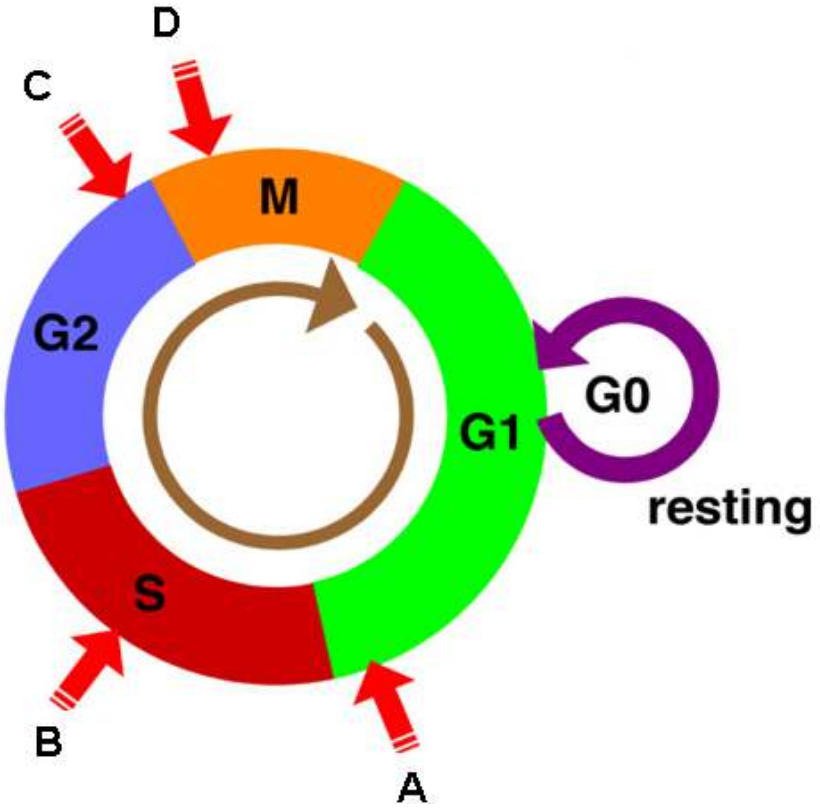
The above animation talks about hypertonic and hypotonic solutions, using the link below, identify on the picture which is a hypertonic and hypotonic and isotonic solution
http://kentsimmons.uwinnipeg.ca/cm1504/Image130.gif



1.1.3 Cell Division, Cell Diversity and Cellular Organisation

(a) state that mitosis occupies only a small percentage of the cell cycle and that the remaining percentage includes the copying and checking of genetic information

Use the following link to label the diagram below:
http://www.le.ac.uk/ge/genie/vgec/sc/cellcycle.html

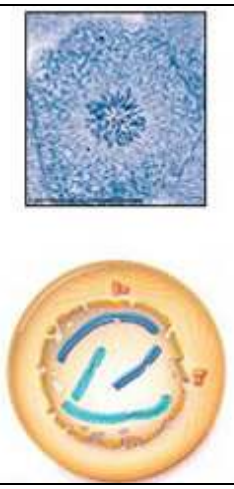
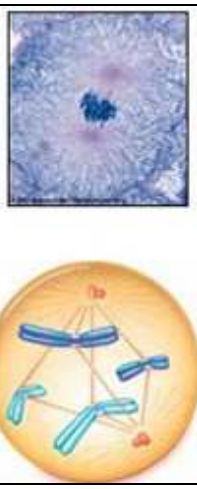
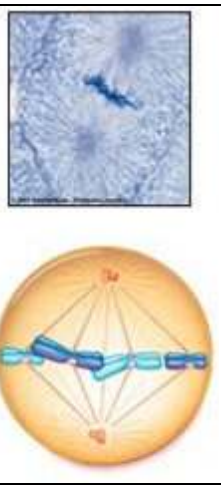


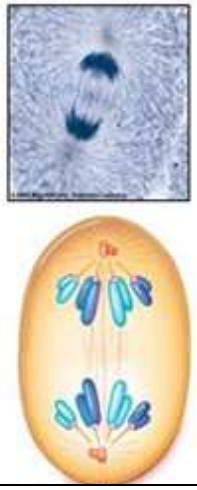
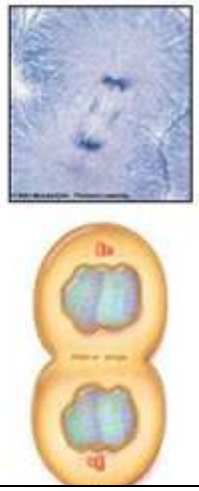
Letter	Explanation
	The cell checks the duplicated chromosomes and gets ready to divide.
	The cell separates the copied chromosomes to form two full sets (mitosis) and the cell divides into two new cells (cytokinesis).
	The cell grows
	The cell checks the duplicated chromosomes and gets ready to divide

Use the following link for a more detailed explanation of the cell cycle
http://www.e-phen.com/images/Cell%20Cycle11-12-05.jpg

(b) describe, with the aid of diagrams and photographs, the main stages of mitosis (behaviour of the chromosomes, nuclear envelope, cell membrane and centrioles)

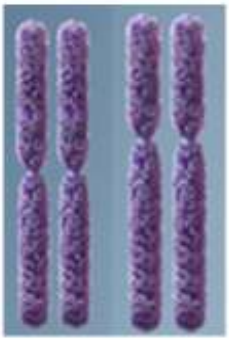
Use the following link (as well as the link used in a) to add a brief description of each stage or mitosis and label the key structure in each diagram:
http://www.sumanasinc.com/webcontent/animations/content/mitosis.html

		
Prophase	Prometaphase	Metaphase

	
Anaphase	Telophase

(c) explain the meaning of the term *homologous pair of chromosomes*

Use the following link to identify which of the following pictures is NOT of a homologous pair of chromosomes (Explain reasons for your answer)
http://www.biology-online.org/dictionary/Homologous_chromosomes

		
A	**B**	**C**

_____

_____

_____

If you are unsure which one is the non-homologous pair of chromosomes and why, highlight the section below and change the colour to black to view the answer:

(f) state that cells produced as a result of meiosis are not genetically identical (details of meiosis are not required)

Use the following link to answer the question below:
http://www.sumanasinc.com/webcontent/animations/content/meiosis.html

State2 processes that take place in Meiosis that allow the cells to be genetically un-identical.

1_____

_____

2_____

_____

If you are unsure highlight the section below and change the colour to black to view the answer:

(g) define the term *stem cell*

(h) define the term *differentiation*, with reference to the production of erythrocytes (red blood cells) and neutrophils derived from stem cells in bone marrow, and the production of xylem vessels and phloem sieve tubes from cambium

Use the following links to define the term stem cell and complete the table below:
http://learn.genetics.utah.edu/content/tech/stemcells/scintro/
http://www.som.tulane.edu/classware/pathology/Krause/Blood/HP.html

	Differentiate to:	**Differentiate by:**
Stem cells in bone marrow	Erythrocytes (red blood cells)	
	Neutrophils	
Cambium		Meristem cells produce small cells that elongate. Their walls become reinforced and waterproofed by deposits of lignin. This kills the cell contents. The ends of the cells break down, so that they become continuous long tubes with a wide lumen.
		The meristem tissue produces cells that elongate and line up end to end to form a long tube. Their

		ends do not break down completely but form sieve plates between the cells. The sieve plates allow the movement of materials up or down the tubes. Next to each sieve tube is a companion cell.

(j) explain the meaning of the terms *tissue*, *organ* and *organ system*

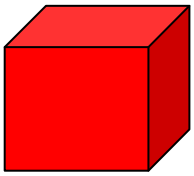
Use the following link to complete the table below:
http://web.jjay.cuny.edu/~acarpi/NSC/14-anatomy.htm

	Definition	One example
Tissues		Heart Muscle
Organs	Groups of tissue that have combined to form a single structure. In an organ the tissues work together to perform an overall function.	
Organ systems		Cardiovascular system

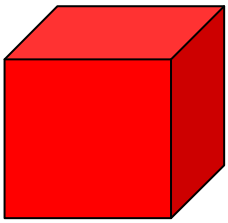
1.2.1 Exchange Surfaces and Breathing

(a) explain, in terms of surface area : volume ratio, why multicellular organisms need specialised exchange surfaces and single-celled organisms do not

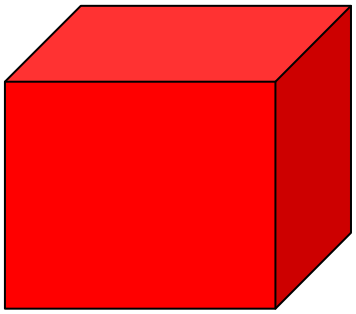
Use the following links to fill in the blanks in the tables and the passage:
http://blogs.mtlakes.org/weeasthonorsbiology/2009/10/30/surface-area-to-volume-ratio/
http://www.nanoed.org/concepts_apps/compu_anime/cubebuilding_final.swf



Dimensions	1 x 1 x 1
Surface area	
Volume	1cm^3
SA: V ratio	



Dimensions	2 x 2 x 2
Surface area	24cm^2
Volume	
SA: V ratio	



Dimensions	3 x 3 x 3
Surface area	
Volume	
SA: V ratio	2:1

The metabolism of a cell is linked to its mass: volume ratio, whereas it is the _____1_____ that provides the exchange surface for heat and substances. The ___2____ cytoplasm the more heat and waste products generated, and the greater demand for oxygen and nutrients; however the models above show that the relative surface area _____3_____ as the 'organism' gets bigger. Thus organism and cells develop strategies to cope with this problem. Examples are –

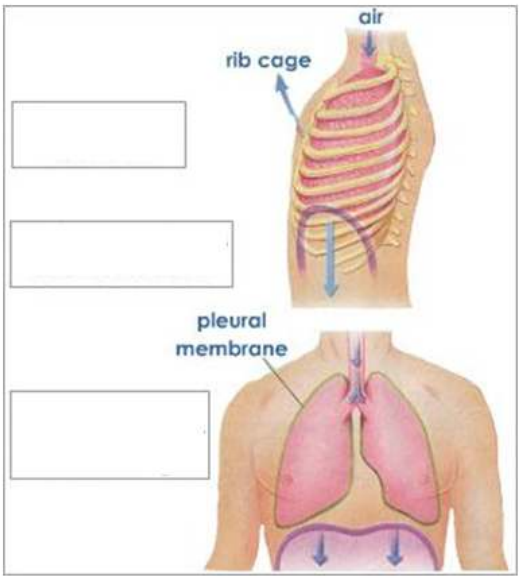
- Plant cells develop a large central vacuole
- The wall of the small intestine is very long folded and the cells have ____4_____

If you are unsure highlight the section below and change the colour to black to view the answers:

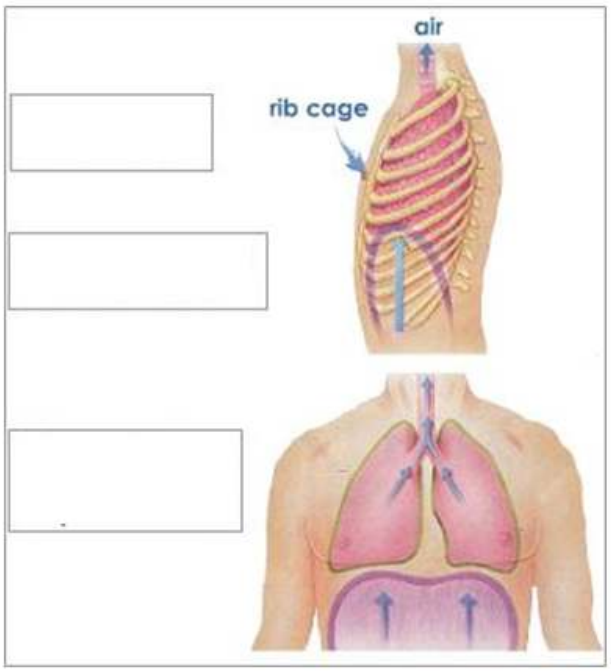
(f) outline the mechanism of breathing (inspiration and expiration) in mammals, with reference to the function of the rib cage, intercostal muscles and diaphragm

Use the following link to fill in the blanks in the passage and the blank boxes in the pictures:
http://www.tutorvista.com/content/biology/biology-ii/respiration/breathing-mechanism.php

Inspiration or Inhalation
During inspiration, the outer intercostal muscles _____, which _____ the chest cavity or the ribs. This is accompanied by the _____ of the diaphragm. Together these movements serve to _____e the area of the thoracic cavity, which _____ the pressure. The air from outside rushes into the lungs.



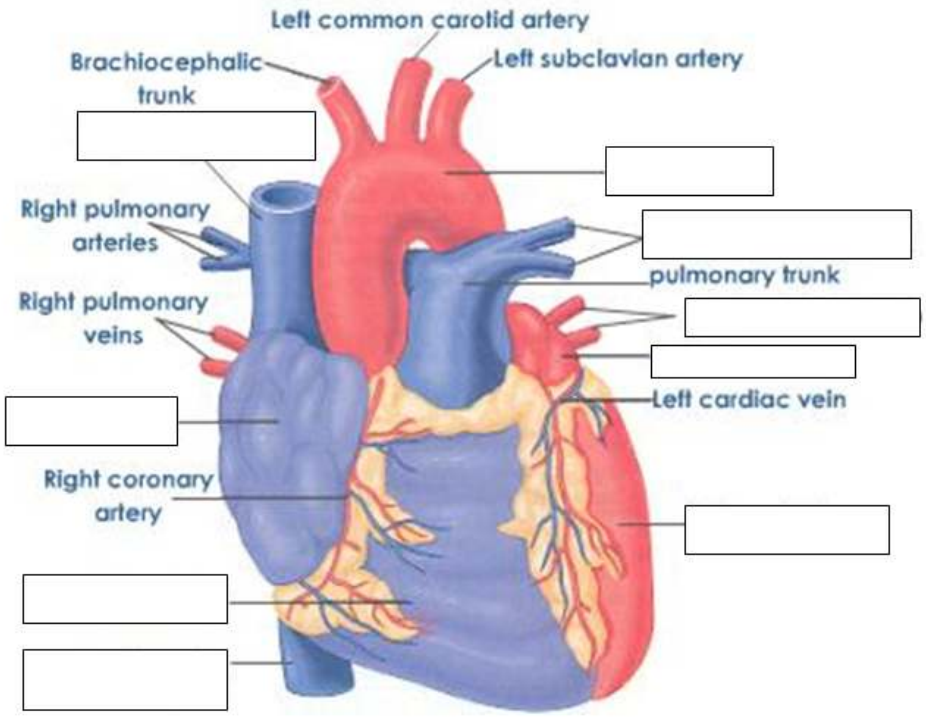
Expiration or Exhalation
The inner intercostal muscles _____ bringing the ribs back to the _____ _____ and the diaphragm is also _____ back by the action of the abdominal muscles. This _____ the space in the chest cavity and _____ the pressure. This expels the air out of the lungs.

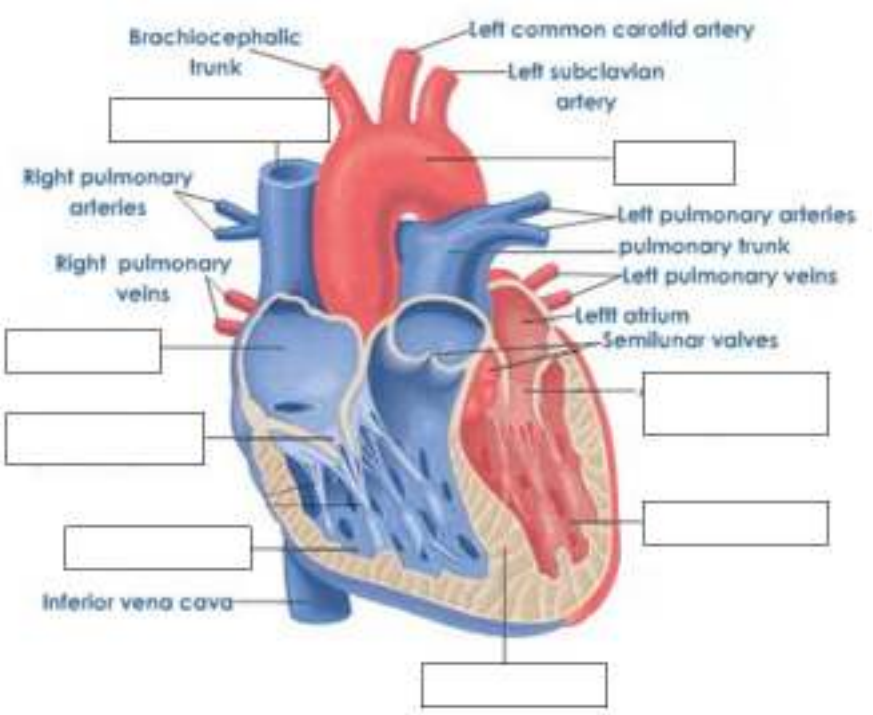

air
rib cage

1.2.2 Transport in animals

(d) describe, with the aid of diagrams and photographs, the external and internal structure of the mammalian heart

Use the following link to fill in the structures of the mamallian heart in the two diagrams below:
http://www.tutorvista.com/content/biology/biology-iv/circulation-animals/heart-shape-position.php





If stuck delete the red box below:

(e) explain, with the aid of diagrams, the differences in the thickness of the walls of the different chambers of the heart in terms of their functions

Use the following link to fill in the table below:
http://www.williamhoward.cumbria.sch.uk/Intranet/Science/KS5/Abiology/Factsheets/factsheets1-72/Bio%20Press%20Factsheets/35%20mammalian%20heart.pdf

Cardiac Wall	Thickness	Function (reason for thickness)
Atrial walls and atrial septum		Pumps blood to ventricles = short distance
	Thick	Pumps blood through lungs = medium distance
Left ventricle wall	Extremely thick	

(f) describe the cardiac cycle, with reference to the action of the valves in the heart

Use the following link to fill in the blanks in the passage:
http://bcs.whfreeman.com/thelifewire/content/chp49/49020.html

The cardiac cycle is a complete heart beat. It consists of two main phases:

- _____phase (period of ventricular contraction)
- _____ phase (period of ventricular relaxation)

Which are defined by whether the ventricles are contracted or relaxed. During the cycle valves open and close producing the heart's familiar "lub-dub" sound.

During the atrial systole, the heart is full of blood and the ventricles are _____. Both the atria _____ and blood passes down to the ventricles. The atrio-ventricular valves _____ due to blood pressure. 70% of the blood flows _____ down to the ventricles so the atria do not have to contract a great amount.

During the systolic phase, the atria _____. The ventricle walls contract, forcing the blood out. The pressure of the blood forces the atrio-ventricular valves to _____ (producing the heart sound 'lub'). The

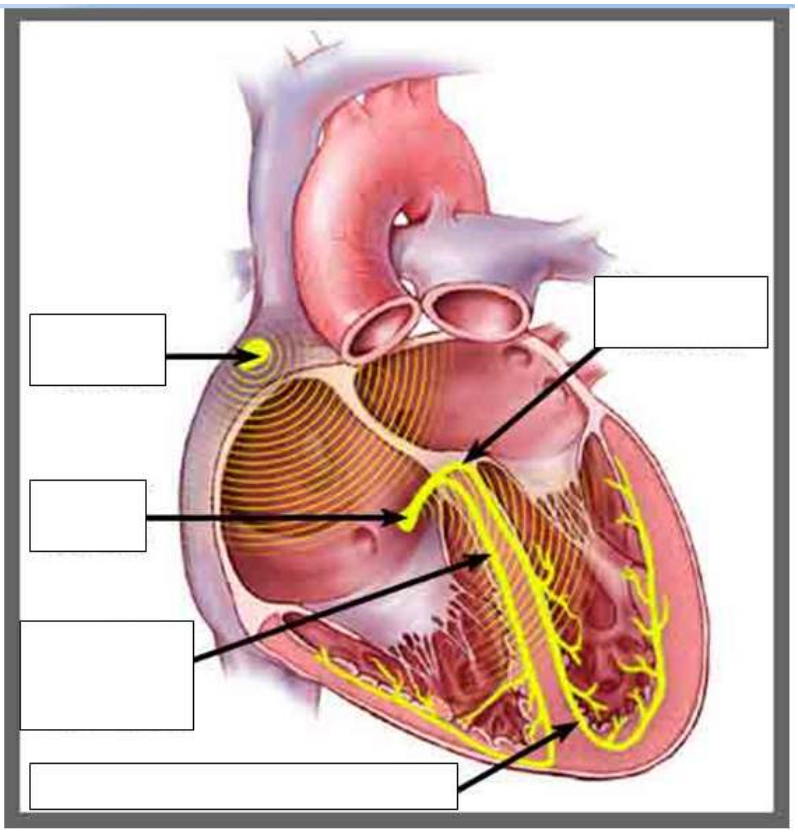
pressure of blood _____ the semi-lunar valves. Blood passes into the aorta and pulmonary arteries.

During the diastolic phase, the ventricles _____. Pressure in the ventricles _____ below that in the arteries. Blood under high pressure in the arteries causes the semi lunar valves to _____. This produces the second heart sound, 'dub'. During diastole, all the muscle in the heart _____. Blood from the vena cava and pulmonary veins enter the atria. The whole cycle starts again.

If you are unsure highlight the section below and change the colour to black to view the answer:

(g) describe how heart action is coordinated with reference to the sinoatrial node (SAN), the atrioventricular node (AVN) and the Purkyne tissue

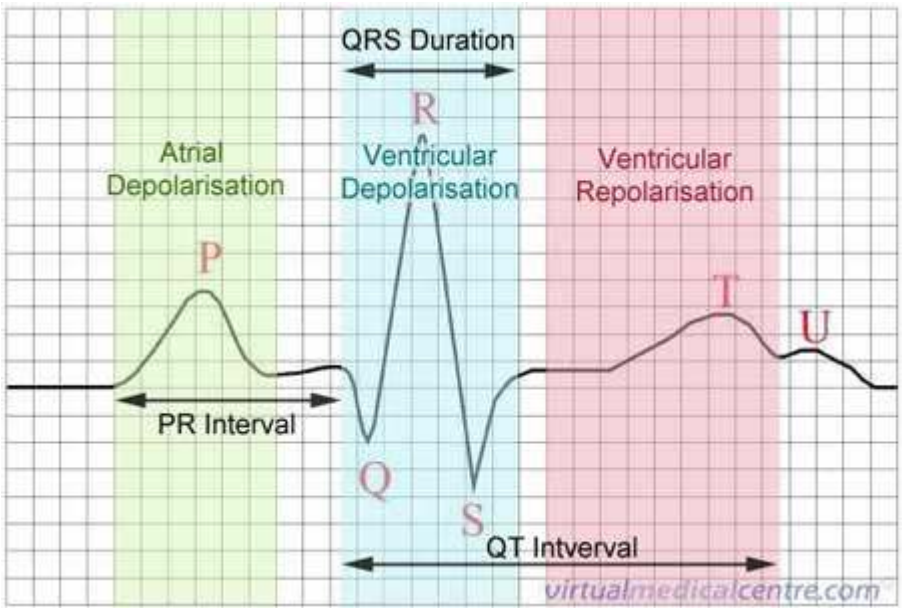
Use the following link to fill in the blanks in the picture and the table below:
http://www.bostonscientific.com/templatedata/imports/HTML/lifebeatonline/summer2004/learning.shtml



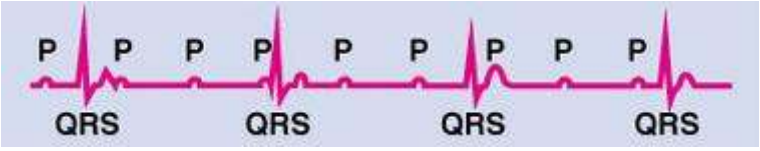
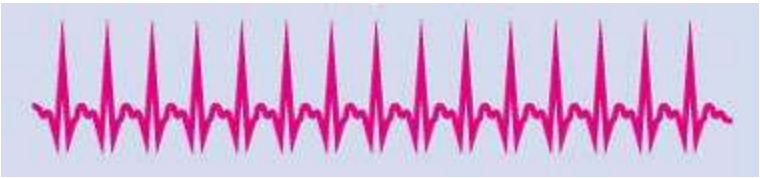
The Path of an Electrical Signal	
STEP 1.	The _____ (natural pacemaker) creates an electrical signal.
STEP 2.	The electrical signal follows natural electrical pathways through both _____. The movement of electricity causes the atria to contract, which helps push blood into the ventricles.
STEP 3.	The electrical signal reaches the _____ (electrical bridge). There, the signal pauses to give the ventricles time to fill with blood.
STEP 4.	The electrical signal spreads through the _____. The movement of electricity causes the ventricles to _____ and push blood out to your lungs and body.

(h) interpret and explain electrocardiogram (ECG) traces, with reference to normal and abnormal heart activity

Use the following link to fill in the blanks in the TWO tables:
http://noodle.med.yale.edu/~staib/bme355/ecg/prep.htm



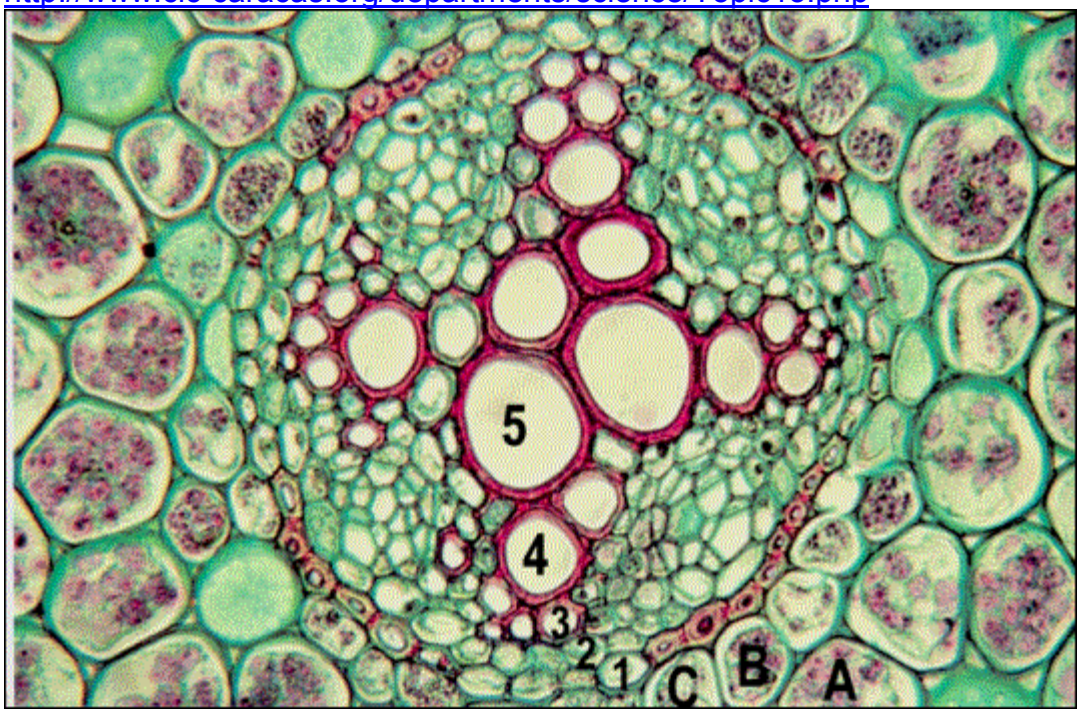
Part of ECG	What it represents
P wave	atrial depolarization
PR interval	
QRS complex	ventricular depolarization
QRS interval	
T wave	ventricular repolarization
QT interval	

ECG Trcae	Type of ECG
	Normal
	
	
	
	
	

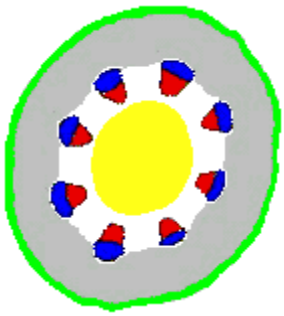
1.2.3 Transport in plants

b) describe, with the aid of diagrams and photographs, the distribution of xylem and phloem tissue in roots, stems and leaves of dicotyledonous plants

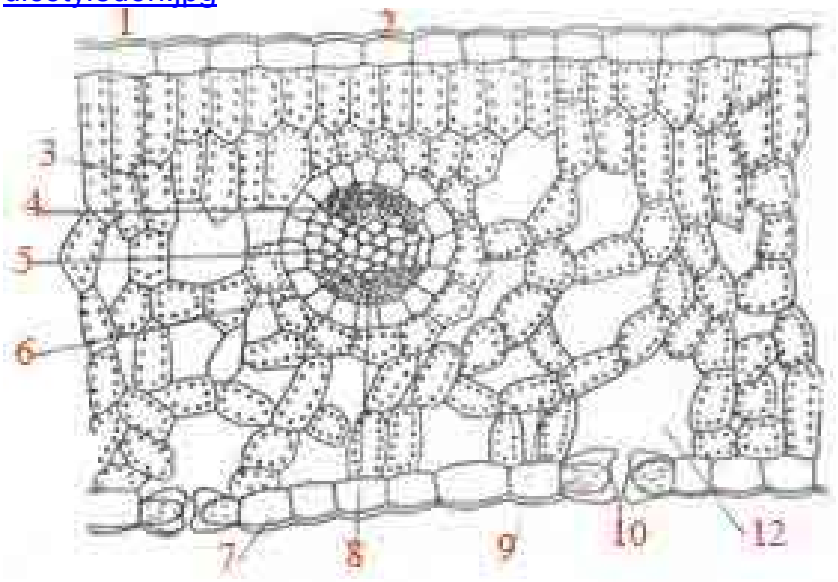
Use the following link to fill the position of the xylem and the phloem in the picture of a dicotyledonous root:
http://www.cic-caracas.org/departments/science/Topic13.php



Use the following link to fill the position of the xylem and the phloem in the picture of a dicotyledonous stem:
hrsbstaff.ednet.ns.ca/.../plantstopic9.1.htm



Use the following link to fill the position of the xylem and the phloem in the picture of a dicotyledonous leaf:
http://encyclopedia2.thefreedictionary.com/_/viewer.aspx?path=mgh_ceb&name=Threedimensional-diagram-of-internal-structure-of-a-typical-dicotyledon.jpg



(d) define the term *transpiration*

(e) explain why transpiration is a consequence of gaseous exchange

(f) describe the factors that affect transpiration rate

Use the following link to answer the following questions below:
http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/T/Transpiration.html

Define Transpiration:_____

_____

Fill in the following passage:

The _____ of oxygen and carbon dioxide in the leaf occurs through pores called _____ .
Normally stomata _____ when the light strikes the leaf in the morning and _____ during the night.

The stomata open and close through the action of the _____. The inner wall of each guard cell is thick and elastic. When turgor develops within the two guard cells flanking each stoma, the thin outer walls bulge out and

force the inner walls into a crescent shape. This _____ the stoma. When the guard cells lose _____, the elastic inner walls regain their original shape and the stoma _____.

Although open stomata are essential for photosynthesis, they also expose the plant to the risk of losing water through _____. Some _____ of the water taken up by a plant is lost in transpiration.

If you are unsure highlight the section below and change the colour to black to view the answer:

Fill in the table below:

Environmental factors that affect the rate of transpiration	
Factor	How factor affects transpiration
Light	
Temperature	Plants transpire more rapidly at higher temperatures because water evaporates more rapidly as the temperature rises. At 30°C, a leaf may transpire three times as fast as it does at 20°C.
Humidity	
Wind	When there is no breeze, the air surrounding a leaf becomes increasingly humid thus reducing the rate of transpiration. When a breeze is present, the humid air is carried away and replaced by drier air
Soil water	