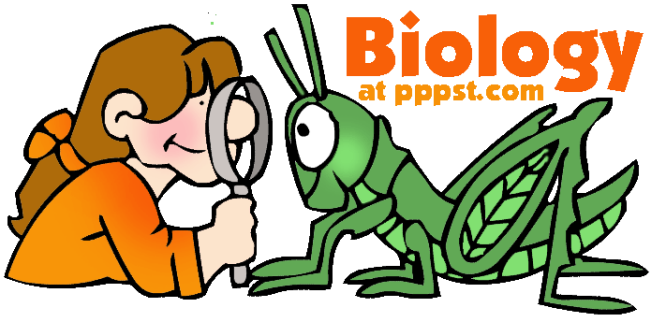

AS Biology

Course Information

2011 - 2012

Course Details:
A2 Biology
OCR Biology A H421

http://www.ocr.org.uk/qualifications/type/gce/science/biology/documents/index.html

Teachers:

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Tutor Group: _____

Contents

Drop –in Study and Homework club

Monday after school you will be able to go to Sc10 for help with Biology homework and work covered within the week.

Assessment

Course: OCR Biology A H021/ H421

Module	Weightings	Assessment details
Cells, Exchange and Transport	15% (30% of AS)	Jan Yr 12 (60 min)
Molecules, Biodiversity, Food and Health	25% (50% of AS)	June Yr 12 (105 min)
Practical Skills in Biology 1	10% (20% of AS)	Throughout Yr 12
Communication, Homeostasis and Energy	15%	Jan Yr 13 (60 min)
Control, Genomes and Environment	25%	June Yr 13 (105 min)
Practical Skills in Biology 2	10%	Throughout Yr 13

Assessment Criteria

Exam questions will assess the following objectives in relation to the content covered within each module (see the Learning Objectives section):

- Knowledge and understanding of science and of How Science Works
- Application of knowledge and understanding of science and of How Science Works
- How Science Works

AO weightings in AS GCE

Unit	% of AS GCE			Total / %
	AO1	AO2	AO3	
AS Unit F211: *Cells, Exchange and Transport*	14	14	2	30
AS Unit F212: *Molecules, Biodiversity, Food and Health*	21	24	5	50
AS Unit F213: *Practical Skills In Biology 1*	3	2	15	20
	38	40	22	100

	Assessment Objective 1	Assessment Objective 2	Assessment Objective 3
Assessment Objectives	**Knowledge and understanding of science and of How Science Works** Candidates should be able to: • recognise, recall and show understanding of scientific knowledge; • select, organise and communicate relevant information in a variety of forms.	**Application of knowledge and understanding of science and of How Science Works** Candidates should be able to: • analyse and evaluate scientific knowledge and processes; • apply scientific knowledge and processes to unfamiliar situations including those related to issues; • assess the validity, reliability and credibility of scientific information.	**How Science Works** Candidates should be able to: • demonstrate and describe ethical, safe and skilful practical techniques and processes, selecting appropriate qualitative and quantitative methods; • make, record and communicate reliable and valid observations and measurements with appropriate precision and accuracy; • analyse, interpret, explain and evaluate the methodology, results and impact of their own and others' experimental and investigative activities in a variety of ways.
A/B boundary Performance Descriptions	Candidates characteristically: a) demonstrate knowledge and understanding of most principles, concepts and facts from the AS specification; b) select relevant information from the AS specification; c) organise and present information clearly in appropriate forms using scientific terminology.	Candidates characteristically: a) apply principles and concepts in familiar and new contexts involving only a few steps in the argument; b) describe significant trends and patterns shown by data presented in tabular or graphical form; interpret phenomena with few errors; and present arguments and evaluations clearly; c) comment critically on statements, conclusions or data; d) carry out accurately most of the calculations specified for AS; e) translate successfully data that is presented as prose, diagrams, drawings, tables or graphs from one form to another.	Candidates characteristically: a) devise and plan experimental and investigative activities, selecting appropriate techniques; b) demonstrate safe and skilful practical techniques and comment effectively on ethical issues; c) make observations and measurements with appropriate precision and record them methodically; d) interpret, explain, evaluate and communicate the results of their own and others' experimental and investigative activities, in appropriate contexts.
E/U boundary Performance Descriptions	Candidates characteristically: a) demonstrate knowledge and understanding of some principles and facts from the AS specification; b) select some relevant information from the AS specification; c) present information using basic terminology from the AS specification.	Candidates characteristically: a) apply a given principle to material presented in familiar or closely related contexts involving only a few steps in the argument; b) describe some trends or patterns shown by data presented in tabular or graphical form; c) identify, when directed, inconsistencies in conclusions or data; d) carry out some steps within calculations; e) translate data successfully from one form to another, in some contexts.	Candidates characteristically: a) devise and plan some aspects of experimental and investigative activities; b) demonstrate safe practical techniques and comment on ethical issues; c) make observations and measurements and record them; d) interpret, explain and communicate some aspects of the results of their own and others' experimental and investigative activities, in appropriate contexts.

AS Biology Route through 2011-2012

Week	Date	RMI/ PKN	NMN	ASSESSMENT
1	Mon 5th Sept			
2	12th Sept	1.1.1 Living Organisms consist of cells 1.1.2 Cell size & magnification	1.2.1 Special surfaces for exchange	
		1.1.3 Electron Microscopes 1.1.4 Cells and living processes	1.2.2 The lung as organ	
3	19th Sept	1.1.5 Organelles-structure and function	1.2.3 Tissues in lungs	
		1.1.6 Organelles at work	1.2.4 Measuring lung capacity	
4	26th Sept	1.1.7 Biological membranes 1.1.8 The fluid mosaic model	1.2.5 Transport in animals	
		1.1.9 Communication and cell signalling	1.2.6 Structure of mammalian heart	Unit 1: Module 1 Cells HW
5	3rd Oct	1.1.10 Crossing membranes(passive) 1.1.11 Crossing membranes(active)	1.2.7 Cardiac cycle	
		1.1.12 Water transport	1.2.8 Control of the cardiac cycle	
6	10th Oct	Practical assessment prep	1.2.9 Blood vessels	
		Practical assessment (AT2)	1.2.10 Blood, tissue fluid and lymph	Qualitative Assessment Task 3
7	17th Oct	1.1.3 New cells;	1.2.11 Carriage of oxygen	
		1.1.4 Two nuclei from one	1.2.12 Carriage of carbon dioxide	Unit 1: Module 1, 2 Test
8	Mon 31st Oct	1.1.15 Cell cycles & life cycles	1.2.13 Transport in plants	
		1.1.16 Cell Specialisation	1.2.14 Xylem and phloem	Quantitative and Evaluative task 2
9	7th Nov	1.1.17 Organising the organism	1.2.15 Plant cells and water	
		Revision of module 1	1.2.16 Water uptake	
10	14th Nov	**Module 1 test**	1.2.17 Transpiration	
		Practical assessment prep	1.2.18 Reducing water loss -xerophytes	Unit 1, Module 2 Homework Exchange and transport
11	21st Nov	**Practical assessment (AT5)**	1.2.19 Movement of sugars - translocation	
			Revision	

12	28th Nov	**Revision**	2.1.1 Biochemistry and metabolism	
		Revision	2.1.2 Biochemicals and bonds	
13	5th Dec	**Revision**	2.1.3 Carbohydrates 1: simple sugars	
		Revision	2.1.4 Carbohydrates 2: energy storage	
14	12th Dec	**MOCKS (AT6)**	**MOCKS (AT6)**	
				Unit 1 Mock
15	Wed 4th Jan	**Revision**	**Revision**	
16	9th Jan	**Exam week**	**Exam week**	
		2.2.1 Nutrition 2.2.2 Diet & CHD	2.1.5 Carbohydrates 3: structural units	
17	16th Jan	2.2.3 Improving Food production 2.2.4 Microorganisms & food	2.1.6 Amino acids 2.1.7 Proteins from amino acids	
		2.2.5 Organisms that cause disease 2.2.6 Transmission of diseases	2.1.8 Levels of protein structure	
18	23rd Jan	2.2.7 Worldwide diseases 2.2.8 Non-specific responses to diseases	2.1.9 Proteins in action	
		2.2.9 Antibodies 2.2.10 Communication between cells	2.1.10 Lipids are not polymers	
19	30th Jan	Practical assessment prep	2.1.11 Essential Oils?	
		Practical assessment (AT8)	2.1.12 Water - a vital biological molecule	Unit 2, Module 1 Homework: Biological molecules
20	6th Feb	2.2.11 Specific immune response 2.2.12 Vaccination	2.1.13 & 2.1.14 Practical biochemistry 1 & 2	
		2.2.13 Finding new drugs 2.2.14 The effects of smoking	2.1.15 Nucleotides - coding molecules	
21	Tues 21st Feb	2.2.15 Nicotine & carbon monoxide 2.2.16 Cardiovascular diseases	2.1.16 DNA - information storage	
		Module 1+2 Test (AT9)	**Module 1+2 Test (AT9)**	Unit 2, Module 1 and 2 Test
22	27th Feb	2.2.17 Evidence linking smoking to disease	2.1.17 Reading the instructions	
		2.3.1 Biodiversity	2.1.18 Enzymes are globular proteins	

23	5th March	2.3.2 Sampling plants 2.3.3 Sampling animals	2.1.19 Inside out - where enzymes work best	
		2.3.4 Measuring biodiversity 2.3.5 Classification & taxonomy	2.1.20 Enzyme actions	
24	12th March	2.3.6 The 5 kingdoms 2.3.7 Classifying 2.3.8 Naming living things	2.1.21 Enzymes and temperature	
		2.3.9 Modern classification 2.3.10 Variation	2.1.22 Enzymes at work- pH effects	Unit 2, Module 2 Homework Biodiversity and evolution
25	19th March	2.3.11 Adaptation 2.3.12 Natural selection	2.1.23 Enzymes at work- concentration effects	Quantitative and Evaluative Practical Assessment
		2.3.13 Evidence for evolution 2.3.14 Evolution today	2.1.24/25 Enzymes at work- inhibitors & coenzymes	
26	26th March	2.3.15 Conservation of species 2.3.16 Effect of global climate change	2.1.26 Interfering with enzymes- Poisons	
		2.3.17 Conservation in situ 2.3.18 Conservation ex situ	2.1.27/28 Investigating enzyme action 1 & 2	Unit 2, Module 2 Homework: Enzymes
27	Wed 18th April	2.3.19 International cooperation	2.1.29 Enzymes & Metabolism	
		Module 1+2 Test (AT12)	**Module 1+2 Test (AT12)**	Unit 2 Mock
28	23rd April	**Revision**	**Revision**	

Lesson Objectives

You will be given an objective sheet at the start of each module. You will use this at the start of each lesson to complete the date section on the handout. You must keep this in your folder and take it to every lesson. See below for an example.

AS Unit F211: Cells, exchange and transport

Module 1- Cells	
Cell structure	**Date**
State the resolution and magnification that can be achieved by a light microscope, a transmission electron microscope and a scanning electron microscope.	
Explain the difference between magnification and resolution.	
Explain the need for staining samples for use in light and electron microscopy.	
Calculate the linear magnification of an image.	
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, Golgi apparatus, ribosomes, mitochondria, lysosomes, chloroplasts, plasma (cell surface) membrane, centrioles, flagella and cilia.	

Examiners' Tips

The tips outlined here are to help you improve your study skills for your AS biology course. They identify the key points of your AS biology specification.

By and large, most examiners are pleased with the level of knowledge and understanding displayed by the majority of candidates. There are, however, a few general points that crop up each year. These include:

- Candidates who appear to learn past mark schemes and simply rewrite the mark schemes from questions that have already been asked just because they relate to the same topic. You should be aware that questions are *never* repeated. The emphasis of a question one year will *not* be the same as for a question that has appeared previously.
- The quality of handwriting and use of English. This has a direct effect upon your marks. It can be difficult to award marks if the response is poorly worded – even if the candidate appears to have a good level of knowledge and understanding.
- Candidates who fail to use the units or the figures correctly to give a proper comparison when interpreting data from a table or graph. You must remember that a comparison needs *two* figures quoted along with their *units*. For example, HIV/AIDS is more common in Sub-Saharan Africa (15-39% prevalence) than in Western Europe (1% prevalence).

- Candidates who fail to make a comparison when using simple comparison tables. A comparison needs *two* statements, for instance, “phloem consists of living cells while xylem is dead”. If you simply state that “phloem is alive”, you have not given a comparison.

Points to note by module

Each module of the AS biology specification consists of a series of *Learning Outcomes*. This is the information that you, the student, are expected to know and it forms the basis of what the examiner will ask you in an examination. Consequently, it is important that you are prepared and know as many of these learning outcomes as possible before you start your exams.

You will be given an Examiner’s Tips section for each module. See below for an example.

Unit 1: Cells, exchange and transport

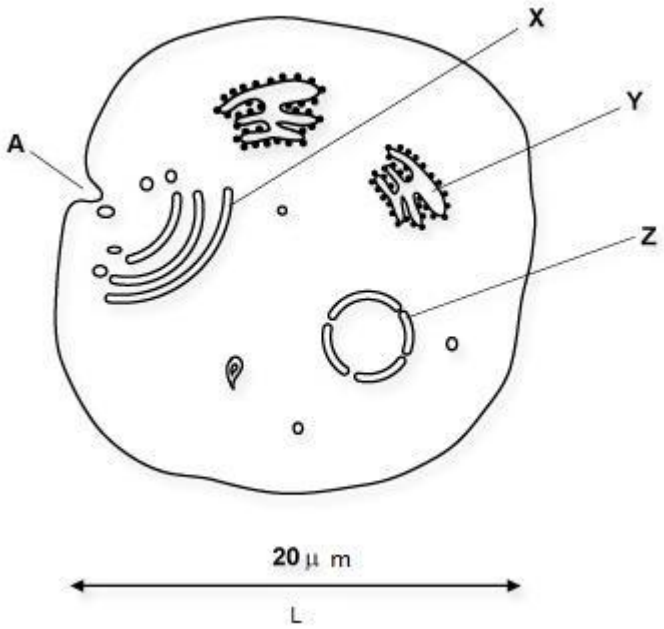
Module 1 - Cells
Cell structure
• You need to understand the difference between the nucleus and the nuclear membrane. Studying both drawings and photomicrographs of cells at a variety of magnifications should help you when answering questions on cell structure. • There is often a calculation associated with a cell diagram or photograph. If you are asked to calculate the magnification you will be given a scale line that states the *actual* size of the object. Do *not* measure the diagram – measure the length of the scale line and calculate the magnification from that. • The other type of calculation often asked is to calculate the actual size of the object. In this case you will be told the magnification. Now you will need to measure a part of the diagram and divide by the magnification.

Sample Exam Questions:

Unit 1: Cells, exchange and transport

Module 1: Cells	
Question 1	**Total marks: 15**

The drawing below is of a cell as seen under an electron microscope.



(a) Assume that the arrow marked 'L' is actually 90 mm long. Calculate the magnification of the drawing. Show your working.

Marks available: 2

Student answer:

(a) $\frac{90\text{mm}}{20\mu} = \frac{90\,000\mu}{20\mu} = 4500$

Examiner comments:

(a) A good well-organised response. If a line is provided as a scale, measure the *line* not the diagram. It is a good idea to measure in mm rather than cm. There are 1000μm in a mm.

(b) Name the components of the cell in the drawing labelled X, Y and Z.

Marks available: 3

Student answer:

b) X = Golgi apparatus

Y = rough endoplasmic reticulum

Z = nuclear membrane

Examiner comments:

(b) Correct.

(c) Outline the roles of X and Y in the synthesis and release of an enzyme.

Marks available: 3

Student answer:

(c) Enzymes are proteins which are manufactured at Y. The enzymes are then passed to X where they are packaged into vesicles for release from the cell.

Examiner comments:

(c) A good response which would be even better if you used the names of the structures involved. Enzymes are synthesised in the ribosomes on the rough endoplasmic reticulum (Y). They are then passed on to the Golgi apparatus (X) where they are repackaged and put into secretory vesicles.

(d) Suggest what is happening at point A to enable secretion of the enzyme.

Marks available: 2

Student answer:

(d) Vesicles containing enzyme molecules attach to the membrane of the cell. The vesicles open up to become part of the membrane releasing the enzyme molecules.

Examiner comments:

(d) Good, but a slightly better version might use the term *fuse* rather than *attach*.

(e) Review the mechanisms by which substances may pass through cell membranes.

Marks available: 2

Student answer:

(e) Osmosis: water molecules can pass through the membrane from a region with a high water potential to a region with a low water potential. The water molecules go down their potential gradient.

Examiner comments:

(e) Good – always remember to use the term *water potential*, never *water concentration*. You can abbreviate water potential to φ. Remember that water molecules always move *down* their potential gradient from a region of high(er) potential to a region of low(er) potential.

Student answer:

Diffusion: many small non-polar molecules can diffuse through the membrane. Any fat soluble molecules can pass through the phospholipid bilayer in this way.

Examiner comments:

Non-polar molecules and fat-soluble molecules can diffuse directly through the phospholipid bilayer.

Student answer:

Facilitated diffusion: small, polar molecules and ions can diffuse through the proteins in the membrane, the proteins have holes or pores in them to let the ions through.

Examiner comments:

Small polar molecules and ions can diffuse through specialised channel proteins.

Student answer:

Active transport: molecules can be moved against their concentration gradient using energy from ATP. This needs special transport proteins in the membrane.

Examiner comments:

Active transport involves special transport proteins in the membrane that use energy from respiration to move molecules *against* a concentration gradient. These transport proteins act as enzymes that break down ATP to release the energy.

Student answer:

Endocytosis and exocytosis: Endocytosis is where the membrane folds inwards to form a vesicle. Exocytosis is where vesicles join on to the membrane to release substances from the cell. Molecules that are too large to pass by diffusion can be taken through the membrane in this way.

Examiner comments:

An excellent response as it is clear that vesicles are involved in both endocytosis and exocytosis. Using annotated diagrams can be a good way to describe these processes.

Question 2	Total marks: 10

(a) State the meaning of the terms *stem cell* and *differentiation.*

Marks available: 4

Student answer:

(a) Stem cells are unspecialised cells that have no special features, they can divide by mitosis to produce new cells. Each new cell is genetically identical to the original one.

Differentiation means making it different. Cells are made different to do different jobs in the body. For example, red blood cells can carry oxygen and white blood cells help fight disease. These cells show specialisations to help them carry out their role effectively.

Examiner comments:

(a) A good clear answer. Stem cells are not ordinary or typical, they are not specialised. This allows them to divide by mitosis into cells that can then differentiate to become specialised. You should always remember to add in extra little details such as the name of the division process. Mitosis produces cells that are genetically identical.

(b) Explain the ways in which a red blood cell is specialised to perform its function.

Marks available: 4

Student answer:

(b) Red blood cells carry oxygen.

- A red blood cell has a biconcave shape – this gives it a large surface area for its volume so that it can take up lots of oxygen easily.
- It is full of haemoglobin – haemoglobin has a high affinity for oxygen.
- There is no nucleus so that more haemoglobin can fit into the cell – this means that it can carry more oxygen.
- Its shape is flexible so that it can squeeze into capillaries – this means that the oxygen is close to the wall of the capillary and has only a short distance to move into the tissues.

Examiner comments:

(b) This answer covers all the points clearly. It is well organised into bullet points. Each feature of the cell has been listed and for each one there is an explanation of why it makes the cell well adapted. This is important as the question asks you to *explain* rather than just list the features. The question could also be answered using a table. The features of the red blood cell would be listed in one column and the reason for that feature in the second column.

(c) Suggest why differentiation and specialisation of cells is beneficial to multicellular organisms.

Marks available: 2

Student answer:

(c) Different cells can perform different tasks in the body. Cells specialise to perform their particular tasks more effectively. If a cell is part of a muscle it can be specialised to contract. If a cell is part of the lungs it will be thin to allow easy diffusion.

Examiner comments:

(c) Some questions require answers that are very clearly worded. This is a good answer to such a question. If it is not worded well the examiner may find it hard to give full marks even if you know the answer.

What are practical skills?

- Your practical and investigative skills will be developed during the AS course under the guidance of your teacher(s).
- There is the formal internal assessment of your practical work, entitled *Practical Skills in Biology 1* (unit code F213).
- You will need to carry out three different types of task set by OCR.

How much is the formal internal assessment of your practical skills worth?

- The practical skills are worth 40 marks. This is out of a total of 200 marks for the whole AS course, so they represent 20% of the AS course (and 10% of an A level course).
- Centres will supply OCR with a single mark out of 40.
- Remember that for *every two* marks you gain from your practical skills you will achieve 1% towards your final AS percentage.

Who does the marking and when?

- Your teacher will mark your practical skills tasks as you do them throughout the course, using a mark scheme provided by OCR.
- Within each teaching centre marks will be internally moderated by your teacher(s).
- The marking will be checked by OCR moderators. Marks can be changed to bring the marks of your school or college into line with those from other teaching centres.

What proportion of the formal assessment will be done in lessons?

- All the tasks will be carried out under supervision during lesson time.
- Your teacher must be able to say that the work is yours.
- Both you and your teacher will have to sign documents to this effect.

What tasks do I have to do?

- A qualitative task worth 10 marks
- A quantitative task worth 10 marks
- An evaluative task worth 20 marks

What is covered by the qualitative task?

- You will carry out a practical task using instructions supplied by OCR.
- You are expected to carry out the task skilfully and safely using qualitative techniques.
- You will need to make and record valid observations and organise them in an appropriate way.

What is covered by the quantitative task?

- You will carry out a practical task using instructions supplied by OCR.
- You are expected to carry out the task skilfully and safely using quantitative techniques.
- You will need to make and record accurate observations and organise them in an appropriate way.
- You will then process your results to reach valid conclusions.

What is covered by the evaluative task?

- You will carry out an evaluative task using instructions supplied by OCR.
- Evaluative tasks will be based on a quantitative task.
- Evaluative tasks will *not* require additional data collection.
- The data along with your own knowledge will be used to reach valid conclusions.
- You will need to assess the reliability and accuracy of an experimental task.
- You will need to identify anomalies as well as identify significant weaknesses in procedures and measurements.
- You will use your knowledge to understand and select simple improvements to procedures and measurements.

Do I have to plan a practical?

- No, but you may be required to suggest changes to techniques or apparatus which will improve the accuracy or reliability of the results and/or the validity of the conclusions.

Will every piece of practical work be assessed?

- No. OCR provides certain tasks which can be done at any point during the course, but your teacher should do other work with you to develop your skills.

- The *minimum* number of practical assessments would be one for each of the three types of task. However, it is likely that you will do more than three.

If I do more than three practical assessments, which ones count towards AS?

- Your final mark out of a possible 40 will comprise the *best* scores that you achieve for a qualitative task, a quantitative task and an evaluative task.

The qualitative task

Possible qualitative tasks include:

- Root tip squashes
- Using a light microscope and making annotated drawings of plant and animal tissue
- Measuring species richness in a habitat
- Taking measurements and producing annotated drawings from a heart dissection.

When carrying out qualitative tasks:

- You may be expected to make comments about safety. These comments should be relevant to the practical and *not* be general safety comments.
- An explanation as to *why* taking a safety precaution is helpful; for example, including a reference to a hazard.
- Wear safety glasses and gloves when advised to do so.
- Organise your work area and wipe up any spillages immediately.
- Dispose of chemicals as instructed – this may *not* be down a sink.
- When choosing which measurements to take, use as large a range as possible and make sure the intervals between the measurements cover the whole range.
- Data should be measured with a degree of precision consistent with the equipment used to make the measurement.
- Repeat measurements where necessary and calculate an average.
- Record all your results in a table.
- All column headings should be labelled with a quantity *and* a unit.
- Carefully describe any observations. Diagrams may also be helpful.
- Make a record of *all* observations such as colour changes, temperature changes etc.

The quantitative task

Possible quantitative tasks include:

- Investigation of water potential in plant tissues
- Following the progress of an enzyme-catalysed reaction
- Using a potometer to compare water loss from two types of plant
- Using a colorimeter
- Measuring distribution in a habitat and calculating species diversity.

When carrying out quantitative tasks:

- The points already listed for carrying out qualitative tasks also apply to quantitative tasks.
- All the raw readings should be recorded to the same number of decimal places.
- Calculations should be calculated to no more decimal places than the input data.
- Scales on graphs must be labelled with the quantity being measured along with its unit and the value being changed along with its unit. Scales must be linear and simple.
- Each axis should be labelled.
- The scale must be correctly selected to make good use of the graph paper.
- All points must be plotted accurately and clearly. Use a sharp pencil and check carefully any points that do not appear to fit a trend.
- Draw lines with a ruler through the plots if there is any uncertainty about the intermediate values between your readings, otherwise draw a line of best-fit through your points. The line must be thin and clear.
- When calculating the gradient, clearly show both the points on the line and the calculation.
- Give your final answer to an appropriate number of significant figures (sf). The accuracy of the final answer is dictated by the *least* accurate piece of data. Avoid going from fewer to more significant figures during your working.

The evaluative task

Possible evaluative tasks include:

- Extensions of the quantitative tasks
- Identifying limitations in the procedure you follow and identifying anomalies in the data
- Identifying significant limitations that may lead to inaccurate or unreliable data.

When carrying out evaluative tasks:

- You may have to carry out some calculations using the correct mean of a set of data.
- Concentrate on the difficulties encountered while actually doing the experiment.
- Make a note of procedural errors as you go if you carry out a practical.
- Explain how each of these difficulties or errors could have affected your results.
- You should *not* just describe the procedure you have followed.
- To assess the reliability of the experiment, identify anomalous results and refer to the scatter of points of the replicates about the mean or best-fit line.
- You may well be asked to put errors in order of significance.
- You need to be able to calculate the percentage error of measurements. Take care with stopwatches – often a stopwatch will read to 0.01s; however, human reaction time is at least 0.1s, therefore Δt is not 0.01s but 0.1s.
- Explain how these procedural errors may be overcome by suggesting improvements to the procedure and to the apparatus used which would improve the accuracy of the experiment. Your improvements *must* relate to the experiment and be possible within a school laboratory.

What you need for a practical assessment

Equipment

- Calculator
- 30cm ruler
- Sharp pencil
- Pencil eraser
- Blue or black pen

Reference items

- Unless stated otherwise on the front of your assessment, you may not take any reference materials into your practical assessment.

Getting the basics right – study skills

Good study skills are essential if you want to achieve your potential in your AS biology exam. You are expected to be much more responsible for your own learning. This may seem daunting at first but there are a few simple things you can do to make the process easier.

- **Keeping your notes organised**

AS biology is a fascinating course – but there are many topics and much information for you to study. You must take care right from the start to keep a set of full and well-organised notes. It is probably best to keep these in a folder(s) at home as you don't want to risk losing a whole term's work by taking it into school or college every day.

- **What you need to know**

The OCR biology specification is perhaps the most important document you'll need to refer to during your AS course. This lists everything you're required to know for your AS biology course. The material is divided into topics and each topic contains a list of statements called *Learning Outcomes*. The examiner will set questions based on these learning outcomes – so ensure that you are familiar with them.

- **Making good use of all the resources**

Ensure you have a copy of these learning outcomes – they are available on the OCR website: http://www.ocr.org.uk. Your teacher will probably go through the specification one topic at a time. When you start a new topic place the list of learning outcomes for that topic at the start of a new section in your notes folder. As you cover a topic in class or at home tick it off the list – don't cross it out as you will need to read it later! This will ensure that you have covered all the relevant work.

- **Which notes to keep**

Your notes folder will expand very rapidly as you go through the course. It is a good idea to use dividers which can be labelled according to the specification sections. After each lesson (or perhaps each week), file your work in sequence in the relevant section. Practical work is best used to consolidate the theory; it will have analysis and evaluation sections that relate directly to the theory. Many schools and colleges may be unable to carry out the practical work at the same time as the corresponding theory teaching. However, you should still file any practical work with the corresponding theory.

- **Note summary**

  Your folder (with dividers) should be taken to every lesson. You should have a section in your folder for the following:
  - NMN notes
  - NMN homework
  - RMI/PKN notes
  - RMI/PKN homework
  - Formal assessments (Anything with a green sticker!)

- **The need for study time**

In the section *Getting Started in AS Biology* on the Exam Café CD, we highlighted the need for you to spend time studying. Your biology lessons will guide you through the material required on the specification. However, lesson time is limited and may often be used for practical work. So it is essential that you make use of any extra time to consolidate and extend your knowledge.

- **Planning your study time**

Planning is important. There is a revision planner on the Exam Café CD which should help you plan your study time. Set aside a certain amount of time each week. Many schools and colleges will suggest how much extra time you should aim to spend each week on extra study.

- **Where you should study**

Study time may be during lessons or at home. Wherever it is, you should try to ensure that there are no distractions such as TV or loud music. Ideally, you should be sitting at a desk or table – it may be tempting to lie on the bed but you are more likely to fall asleep! Try to break up your study time into reasonable chunks. Studying loses its effectiveness if you keep going for too long – you will lose concentration. Everyone has their own way of studying effectively. How long you study for at one time is up to *you*. Aim to study for about 45 minutes, have a 15 minute break, and then carry on for another 45 minutes etc. Plan a timetable which will work for *you* and stick to it!

- **Study methods**

When you study it must be an active process – don't just sit there looking at the textbook expecting to absorb knowledge by diffusion; unfortunately it doesn't work that way! During your study time read over the notes you made in class. Ensure that you fully *understand* everything. Highlight areas where you are uncertain. Use your textbook, look up the relevant section and read it through. As you do this, add some additional explanations to your class notes. If your class notes are untidy it may be worth rewriting them, incorporating more detail as you go. Make use of the questions in the textbook to test your knowledge. You may also find it useful to try the multiple choice questions on the Exam Café CD. If there are still areas that you are uncertain about, make a note to ask your teacher for help.

- **Study summary**
    - planned
    - no distractions
    - active
    - read and improve class notes
    - refer to textbook
    - answer questions

Getting the basics right – exam skills

Exams are not designed to catch you out. Their aim is to assess your knowledge in a fair and reliable way. However, there are a few simple things you can do to ensure you attain the grade you deserve for your AS biology exam.

- **Preparation**

Having studied the course it may seem obvious to suggest that you need to revise. However, don't underestimate how much there is to learn or how long this will take. You should be certain that you know when your AS biology examinations are scheduled and how this affects any other arranged subject examinations. Your examinations officer will give you a personalised exam timetable – keep it safe. However, if you do lose it you can look up your examination times on the OCR website.

- **Planning your revision**

The main holiday before an examination session is an important time to ensure your notes are complete and that you get as much revision done as possible. The Exam Café CD contains a *Revision Planner* that you should find helpful. Plan to revise for a certain length of time each day – perhaps one hour for biology and one hour for each of your other subjects. Plan to spend time revising every day of the holiday – not just in the last few days! If you do four hours each day there will be plenty of time to do other activities as well. Keep on revising until your examinations actually start!

- **How to revise**

Everyone has a method of revising that works best for them. Try a few different techniques and decide which is best for you. Tackle the subject one topic at a time. Whichever method you choose, your revision must be *active* – this means doing something that makes you think! Here are some revision techniques you could try after reading through your notes:

  - use the *Revision Flashcards* provided on the Exam Café CD
  - highlight important points
  - make summary notes as you go
  - try to write brief notes from memory
  - try to answer some questions
  - write out some revision cards that contain important facts
  - use a revision guide

- **Last-minute revision**

This type of revision can be very useful but don't leave it *all* until the last minute. Any revision technique that provides you with some concise notes or cards is a good idea. These can be used as your source for any last-minute revision.

- **Approaching the examination**

Again, you must be certain you know when your examinations are scheduled – what time of day do they start? Make sure you arrive at the examination centre in plenty of time. You will need certain equipment for the examination, including:

  - a blue or black pen (plus a spare)
  - a pencil
  - a ruler
  - a sharpener
  - an eraser
  - a calculator

Make sure you have *all* these items ready the day *before* the examination.

- **In the examination**

Be sure to read the instructions on the *front* page of the examination paper. It is also important to read *each* question *carefully* – it is often worth reading it twice!

- **What to look for**

There are a number of important points in each question:

- look for words written in **bold** text – these are there to guide you;
- check the number of marks allocated;
- use the number of lines allocated to the answer to guide you on how much to write; and
- look for the important words that tell you what the examiner wants you to do. These are called *command words*.

Getting the basics right – command words

The list below includes the command words used most often in examinations. The command words that are in *italics* ask you to use relatively basic skills. You must be comfortable with using these skills and must not underestimate how important it is to practise using them. Even the very best candidates sometimes gloss over them and lose credits as a result.

- **Compare** – identify similarities. This can be done using a table.
- **Contrast** – identify differences. This can also be done using a table.
- **Define** – specify meaning of the word or term.
- **Describe** – provide a detailed account (using diagrams/data from figures or tables where appropriate). The depth of the answer should be judged from the marks for the question.
- **Explain** – set out reasons or purposes using biological background. The depth of treatment should be judged from the marks allocated for the question.
- **Identify –** name or otherwise characterise
- **List** – provide a number of points with no elaboration. If you are asked for **two** points, then give only two!
- **Name** – give the name of
- **Plot** – mark points between a pair of axes
- **Record** – note down
- **Sketch** – produce a simple, freehand drawing. A single, clear sharp line should be used. In the context of a graph, the general shape of the curve would be sufficient.
- **State** – a concise answer is expected with no supporting argument.

Getting the basics right – practice questions

Here are some questions for you to try. Think carefully about the command words and the basic skills required.

1 **Name** three types of cell found in the lungs.

2 **Describe** the structure of a starch molecule.

3 **Compare** the structure of a prokaryotic cell with that of a eukaryotic cell.

4 **Sketch,** on axes, a curve to show how rising temperature affects the rate of an enzyme-controlled reaction.

5 **Define** the terms active immunity and passive immunity.

Stretch yourself – study skills

In the *Getting the basics right* section of the Exam Café CD we suggested ways of ensuring that your study time is as effective as possible. Here we will be considering ways to go beyond just *doing enough*. In order to reach your full potential your studying needs to be well directed and focused on achieving good quality answers in your examinations.

Questions with sample student answers and examiner annotations are included in the Exam Café CD. Don't expect to be able to write such answers straight away! However, with practice and some concentrated study your answering technique should improve.

- Improving study skills

In order to gain a deeper understanding of the subject matter you need to refer to your textbook. Your teacher will probably tell you which topic is coming next – so try to read about that topic *before the lesson*. Then during the actual lesson you should be able to listen more attentively, make clear notes, contribute to discussion and ask any relevant questions.

Having made use of one excellent resource and reread the topic in your textbook, what about other resources? Your textbook, good as it is, is limited by space and the need to keep to the specification. There are many other potential resources available to you, including:

- Websites
  - http://www.examstutor.com/biology/
  - http://www.s-cool.co.uk
  - http://www.biologymad.com/
- Specialised textbooks – OCR provides a suggested reading list.
- Periodicals such as *New Scientist* – there is a link to the *New Scientist* website on the Exam Café CD.
- Your teacher – teachers usually have a deep interest and enthusiasm for their subject and have spent many years studying it, so please make use of their expertise.
- Examiners' reports on previous examinations – these are available on the OCR website (http://www.ocr.org.uk) and can be very useful. They list which topics candidates usually have trouble with and note typical errors made each year. You should also refer to the *Examiner's Tips* section on the Exam Café CD.
- There are also multiple choice quizzes and sample student answers available on the Exam Café CD.

Another way to improve your study skills is to practise examination questions. Try to practise questions from OCR examination papers only – other examination boards do not always have the same content or emphasis within a topic as OCR. Sample question papers are available on the OCR website (see above). There are also sample questions following each module in your textbook.

- Making effective use of examination questions

You could simply write answers to these questions by using your notes or from memory. Although both these techniques are fine, there are other, perhaps better, ways to make use of the sample questions.

- Read the question and <u>underline</u> the command word; *highlight* words in bold.
- Write an answer and ask a friend to mark it – mark their work at the same time.
- Work in a small group (three or four students) to discuss ideas for the answer.
- Draw a spider diagram or mind map linking all aspects of the topic.
- Try to extend the question by writing further subsections.
- Write your own question on the same topic and ask a friend to answer it.

- Using the mark scheme

You will find sample mark schemes on the OCR website as well as mark schemes for previous examinations. Try not to look at the mark scheme until *after* you have attempted the question. These mark schemes are designed for the examiners to use while marking your examinations. When you have written an answer refer to the mark scheme to mark your work. Remember to mark *your work* not the mark scheme! It is all too easy to read the mark scheme and tick points thinking, “Yes, I said that”, or, “Yes, that is what I meant”. Be careful to read your answer *thoroughly* and check that you really have made the same point as appears in the mark scheme.

Stretch yourself – exam skills

Good exam technique is essential. AS exams are less forgiving than GCSE ones and you need to approach them appropriately. Here are some pointers to help you.

- Reading the question

Some candidates read the question too quickly. They see the topic and start to write all they know about it. This is poor technique. Better candidates read the question at least twice. They will look for the important words that tell them *what* the examiner wants them to do. These are called *command words* (see below). A good candidate will check the command word and consider carefully what is being asked. Does the examiner really want to know about the *structure* of the heart when the question actually says, "Explain why the mammalian heart has four chambers but a fish heart has only two chambers"? In this case the examiner wants to know about *single* and *double circulation systems* rather than detailed heart structure.

Remember that the number of marks allocated and the number of lines set aside for the answer are important clues about the level of detail required in your response. If three marks are allocated, ensure that you write down at least *three* main points.

It is a good idea to keep your examination paper open so that you can see the *whole* double-page spread. This is because each question is written over a double-page spread and there may be information on one side that you need to refer to while answering later parts of the question. If the paper is folded over you may miss some vital information given in the question.

Finally, read on until you see the statement "End of Examination Paper". Sometimes pages are left blank to ensure that subsequent questions are on a double page. This can mean that you may miss the final question or questions if you think you have already finished the paper.

- Answering the question

When writing answers you must be able to express yourself clearly and concisely. This is particularly true when writing longer responses. Just stop and think *before* writing your answer. Plan your answer and write a few notes. Select the relevant points and decide on the best sequence in which to write the key points. Only then start to write your answer.

Read your response through after you have written it. In the rush and pressure of an examination it is all too easy to write sentences that are missing words or are incomplete. Make sure that what is written down is *exactly* what you wanted to write!

Don’t forget that some types of question require you to make links. For instance, if asked to describe how the lungs are well adapted as a surface for gaseous exchange, you will be expected to note each structural feature *and* explain how it benefits the exchange of gases. If you describe *all* the features in one go and then try to link them to gaseous exchange, it will be more difficult to make any clear links between the features and their specific benefits. You could answer this type of question very well in table form, by writing the structural feature in one column and the corresponding benefit in a second column.

To help you make links and describe things concisely you could try:

- using flashcards (such as the ones provided on the Exam Café CD) to pair up the structure with the benefit or to make other sets of pairs – this could be done with a friend or even in a group
- mixing the flashcards together and then sorting them into topic groups
- using the flashcards in each group to create a mind map for the topic
- picking cards that could be in more than one topic group and discussing with friends which topic groups they could be added to
- modifying the flashcards by adding brief text descriptions or diagrams
- planning answers to longer questions by writing a few bullet-pointed notes

Stretch yourself - command words

The list below includes the command words used most often in examinations. The command words that are in *italics* ask you to use higher skills. This means you are expected to *process* your knowledge rather than simply recall it. You may need to select certain information or apply your knowledge and understanding to give a detailed account.

- *Analyse* – separate information into components and identify their characteristics
- *Calculate* – generate a numerical answer, with working shown
- *Comment* – this is an open-ended instruction inviting you to recall or infer points of interest relevant to the context of the question
- *Deduce* – draw conclusions from information provided
- *Determine* – the quantity cannot be measured directly but can be obtained by calculation. A value can be obtained be following a specific procedure or substitute values into a formula.
- *Discuss* – give a detailed account that addresses a range of ideas and arguments.
- *Explain* – set out purposes or reasons
- *Illustrate* – present clarifying examples
- *Interpret* – translate information into recognisable form
- *Outline* – restrict the answer to essential detail only
- *Predict* – suggest possible outcome(s)
- *Review* – survey information
- *Suggest* – apply your biological knowledge and understanding to a situation which you may not have covered in the specification.
- *Summarise* – present principal points without detail

Stretch yourself - practice questions

Here are some questions for you to try. Think carefully about the command words and the basic skills required.

1. Outline the way in which the immune system provides long-term immunity to a disease such as TB.

2. Explain how the Bohr effect causes the release of extra oxygen from haemoglobin.

3. Review the evidence for evolution.

4. Suggest how the Malaysian Tapir (an endangered species of mammal) could be conserved.

5. Comment on the following statement and illustrate your answer with clear examples. “Global warming will lead to a whole new range of diseases affecting the UK.”