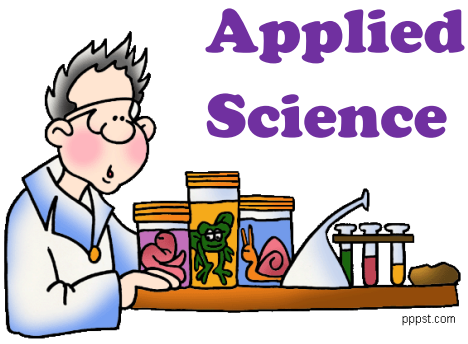

AS Applied Science

Course Information

2011 – 2012

Course Details:

AS Applied Science

AQA Applied Science 8771

http://web.aqa.org.uk/qual/gce/science/app_science_materials.php?id=03&prev=03

Teachers:

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Name: _____

Tutor Group: _____

Contents

Drop –in Study and Homework club

Monday after school you will be able to go to SC7 for help with Applied science homework and work covered within the week.

Assessment

Course: AQA AS Applied Science 8771

Unit	Title	weightings	Assessment
AS Unit 1	Investigating science at Work	33.3% of total AS mark	Portfolio- internally assessed. (60 marks)
AS Unit 2*	Energy transfer	33.3% of total AS mark	1½ hour exam- externally assessed. (80 marks)
As Unit 3	Finding out about substances	33.3% of total AS mark	Portfolio- internally assessed. (60 marks)

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

Assessment Objectives	Unit weightings (%)			Overall weighting of AOs (%)
	Unit 1	Unit 2	Unit 3	
Demonstration of knowledge and understanding (A01)	22.2	21.7	4.4	48.3
Application of knowledge, skills and understanding (A02)	11.1	8.3	4.4	23.8
Experimentation and investigation (A03)	-	3.3	24.4	27.7

Overall weighting of units (%)	33.3	33.3	33.2	100

	Assessment Objective 1	Assessment Objective 2	Assessment Objective 3
Assessment objectives	Demonstration of knowledge and understanding (A01)	Application of knowledge, skills and understanding (A02)	Experimentation and investigation (A03)
A/B boundary performance descriptions	Candidates: • demonstrate their knowledge and understanding of science with few omissions; • use scientific terminology and conventions accurately in all their work; • select relevant information, present it clearly and logically, and then evaluate it.	Candidates: • describe, interpret and explain phenomena and effects using scientific principles; • apply scientific facts and principles to familiar and unfamiliar situations; • describe, interpret and evaluate quantitative and qualitative data; • identify and explain issues arising from scientific activities, which impact on society; • carry out straightforward calculations, obtaining correct solutions to an appropriate degree of accuracy.	In given practical tasks, candidates: • produce risk assessments, consistent with COSHH guidelines, and use them to carry out given tasks safely, using a range of techniques and equipment with an appropriate degree of accuracy; • make and record relevant observations and measurements with appropriate precision and process these accurately; • interpret their results and draw conclusions.
E/U boundary performance descriptions	Candidates: • demonstrate some knowledge and understanding of science. There may be significant omissions • use basic scientific terminology and conventions in their work; • select and clearly present information.	Candidates: • describe phenomena and effects using scientific principles; • apply scientific facts and principles to familiar situations; • describe and give limited interpretation of quantitative and qualitative scientific data; • describe issues arising from scientific activities, which impact on society; • carry out straightforward calculations sometimes obtaining correct solutions.	In given practical tasks, candidates, with guidance: • use risk assessments and carry out given tasks safely using a range of techniques and equipment; • make and record relevant observations and measurements; • provide some interpretation of their results.

Course Outline: AS Applied Science 2011 – 2012

Week	Date	PSM/SBN	ASSESSMENT
1	5th Sept		
2	12th Sept	Course introduction – introduction to unit 1 energy transfer	
		2.1 Circulatory system	
3	19th Sept	2.1 Circulatory system	
4	26th Sept	2.2 Respiratory system	Unit 2:- circulatory system HW due Oct 4th
5	3rd Oct	2.2 respiratory system	
6	10th Oct	2.3 Homeostasis	
7	17th Oct	2.4 Respiration	Unit 2 Circulatory system - Practical task
			Unit 2 mid unit test
8	31st Oct	2.5 Ethics	
		2.6 Monitoring	
9	7th Nov	2.7 Energy	
10	14th Nov	2.7 Energy	Unit 2 Energy Homework due Nov 19th
11	21st Nov	2.8 Energy transfer	Unit 2 Crumple zone - Practical task
12	28th Nov	2.9 Energy in life	
13	5th Dec	2.10 Power	
14	12th Dec	Revision	Unit 2 energy transfer Mock exam 16th Dec

Week			
15	2nd Jan	Revision	
16	9th Jan	Revision	**Unit 2 SC02 Energy Transfer exam** (1 hr 30 mins written exam) **Jan12th pm**
		Introduction to Unit 1 investigating science at work	
17	16th Jan	1.1 Organisations using science	Unit 1:- organisation Homework due Jan 24th
18	23rd Jan	1.2 Science used in organisations	Unit 1:- Science in organisation Homework due Jan 24th
19	30th Jan	1.3 Health and safety in the workplace	
20	6th Feb	1.4 Impact on local community	Unit 1 Portfolio analysis
21	13th Feb	Portfolio catch up and finish	**Unit 1Final Portfolio grade**
22	27th Feb	Unit 3 Finding out about substances	
		3.1 Qualitative analysis	
23	5th March	3.2 Colorimetric analysis	Unit 3 Colorimetry homework due March 28th
24	12th March	3.4 Chromatographic analysis	
25	19th March	3.5 Volumetric analysis	Unit 3 Portfolio analysis due March 30th
26	26th March	3.6 Energy changes	
27	2nd April	Portfolio completion and catch up	**Unit 3 Final Portfolio grade due April 6th**

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.

UNIT 2 – Energy Transfer Systems *	Date completed
The structure and function of the circulatory and respiratory systems	
How to find out about physiological status through monitoring	
The process of respiration	
The process of respiration	
Ethical issues relating to monitoring, diagnosis and treatment of the circulatory and respiratory systems	
Imaging methods used in monitoring and diagnosis	
Applications of energy transfer	

Examiners' Tips

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

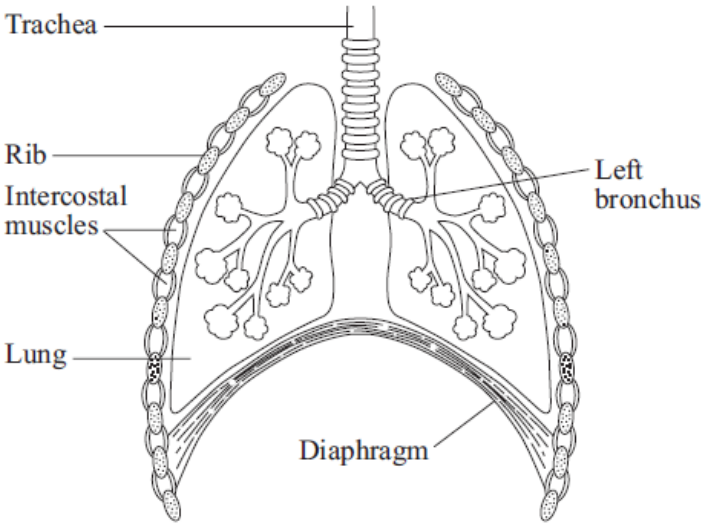
- Candidates who fail to make a comparison when using simple comparison tables. A comparison needs *two* statements, for instance, "phloem consists of living cells while xylem is dead". If you simply state that "phloem is alive", you have not given a comparison.

Sample Exam Questions:

Unit 2: Energy Transfer

Unit 2	
Question 1	**Total marks: 4**
A group of students wanted to find out how fit they were. They decided to use pulse rate change as an indicator of fitness. (a) Describe a laboratory investigation they could carry out to find out how pulse rate changes during and after exercise.	
Mark scheme: Measure pulse rate prior to exercise Count number of beats in one minute / specified time Engage in exercise Measure pulse rate again following exercise Continue to monitor (measure) pulse rate until it returns to normal (resting/ rate prior to exercise) Time taken for pulse rate to return to normal indicates their level of fitness Compare with tables (AO3)	
(b) When the students exercise, their heart rate increases. Describe how inputs from nerves make heart rate increase.	**Marks available: 3**
Mark scheme Increased frequency of impulses travel in Sympathetic nerve to S-A node in right atrium of heart from the cardiovascular centrein hypothalamus / brain (to) medulla (oblongata) (AO1)	

(c) As part of their course, the students were taught about the link between heart rate and breathing rate.
Describe how air is taken into the lungs during breathing.
Use the diagram below to help in your description.



Marks available: 4

Mark scheme:

Intercostals' muscles contract**,** Ribs move up (and) / out**.**

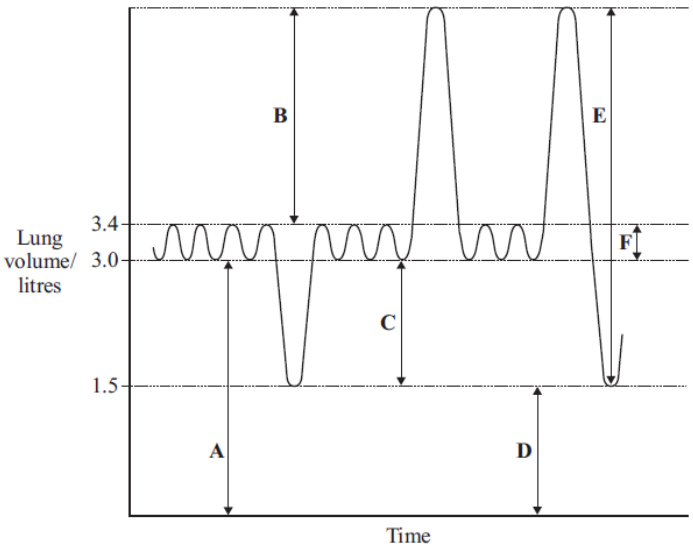
Diaphragm contracts, Diaphragm moves down / flattens

(Thoracic) cavity increases in size

Pressure surrounding lungs lowers compared with atmospheric pressure (a vacuum is created)

Air rushes into lungs (down the trachea). it is an Active process (AO1)

(d) One of the students had her lung function tested using a spirometer.
The diagram below shows the spirometer trace produced, along with the main lung volumes. These all indicated that the student had normal lung function.



(i) What is meant by vital capacity?

.....

.....

(1 mark)

(ii) Which letter on the spirometer trace shows vital capacity?

.....

(1 mark)

(iii) What is meant by tidal volume?

.....

.....

(1 mark)

(iv) Which letter on the spirometer trace shows tidal volume?

.....

(1 mark)

Marks available: 4

Mark scheme:

The maximum possible tidal volume / max. amount of air that can be breathed in after a maximum expiration / max.
amount of air that can be breathed out after a max.
inspiration / max. amount of air you can breathe in and out (AO1)
(ii) E (AO1)
(iii) The volume of air breathed in or out during one ventilation
cycle (AO1)
(iv) F (AO1)

(e) (i) Residual volume may be defined as: 'The volume of gases remaining in the alveoli after a person has breathed out as hard as they can'.
Select the letter from the spirometer trace on **page 4** that shows this volume.

.....

(1 mark)

(ii) Expiratory reserve volume may be defined as: 'The extra air that a person can force out of their lungs after a normal expiration.'
Select the letter from the spirometer trace on **page 4** that shows this volume.

.....

(1 mark)

(f) People with asthma can monitor their lung function using a peak flow meter. This measures peak expiratory flow rate.
What is the normal value of peak expiratory flow rate for a healthy adult at rest?

.....

(1 mark)

Marks available: 3

Mark scheme:

(e) (i) D (AO1) **1**
(ii) C (AO1) **1**
(f) 400 - 600 ($dm^3\ min^{-1}$)
Allow any number between 400 and 600 (AO1)

Getting the basics right- study skills

- **Keep your notes organised**

Your folder (with dividers) should be taken to every lesson. You should have a section in your folder for the following:

- SBN notes
- SBN homework
- PSM notes
- PSM homework
- Formal assessments (Anything with a green sticker!)

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

Ensure you have a copy of the learning outcomes – they are available on the AQA website. 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 date it – 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. 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, you should still file any practical work with the corresponding theory.

- **Note summary**
  - folder divided into sections
  - each section labelled
  - learning outcomes at front of section
  - class/theory notes with diagrams
  - worksheets/answers to set work included
  - practical notes incorporated

- **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. 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

- **What to look for**:
    - 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

- **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.

Stretch yourself Study skills

- **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
- Exams Tutor – Biology study resources
- S-cool – Free revision resources
- Specialised textbooks – AQA provides a suggested reading list.
- Periodicals such as *New Scientist*
- 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.

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

- using flashcards 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

- Examiners' reports on previous examinations – these are available on the AQA website and can be very useful. They list which topics candidates usually have trouble with and note typical errors made each year.
- Another way to improve your study skills is to practise examination questions. Try to practise questions from AQA examination papers only – other examination boards do not always have the same content or emphasis within a topic as AQA. Sample question papers are available on the AQA website (see above).

- **Making effective use of sample examination questions**

  - Read the question and underline 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 AQA 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

- **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 above). 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!

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.

- **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.
- ***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

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 the process when gases are exchanged between the atmosphere and the blood through the respiratory surfaces of the lungs.

2 Describe the relationship between volume and pressure in an enclosed space.

3Compare the structure of an artery with that of a vein.

4Define the term efficiency.

Formulae sheet

You will need to be able to recall, use and manipulate the formulae below, showing consideration for correct units to obtain correct values.

You will then be required to compare calculated values and relate, where applicable, to known values.

Unit 2 . *Energy Transfer Systems*

- **Potential energy (E_p)** = mass (m) × acceleration (g) × height (h)
  due to gravity

- **Kinetic energy (E_k)** = ½ × mass (m) × velocity^2 (v^2)

- **Power (P)** = $\frac{\text{energy transferred (E) or work done (W)}}{\text{time taken (t)}}$

- **Cost (C)** = power (P) × time (t) × cost per unit (u)

- **Efficiency (%)** = $\frac{\text{useful energy output } (E_0)}{\text{total energy input } (E_i)} \times 100\%$