All change at A-level

The rules for A-level examinations have changed recently. So what is Bill Indge's advice on making sure you get the best grade possible, first time around, whether you are tackling AS or A2?

Teachers and examiners have become used to an A-level system that has offered unit tests in January and in June. If a student's start to either AS or A2 biology was not quite all it should have been and he or she did not achieve the hoped-for results in the January unit test, there was always the option of a retake in June. If June was a disappointment, then the student could try again in January. All this, however, is to stop. From 2014 onwards there will be no more January unit tests.

Where does this leave us? In the course of my work, I visit a number of schools and colleges and this gives me an opportunity to talk to students. Many seem to believe that this change is going to make A-levels more demanding. It won't. Let me explain why not.

It won't get harder

A-level grades are awarded by a rather complex method. It doesn't matter what subject or what examination board we are talking about, A-level grades are awarded in the same basic way. Let's discuss the principle involved. Say, for convenience, that last year 25% of students taking AS biology with your exam board gained a grade A and 75% managed at least a grade E. What would we expect to happen this year? If everything was the same, we would not expect any difference, particularly with a subject with a large and stable number of entries such as biology. Things are, however, seldom exactly the same, so we also look carefully at the overall GCSE performance of everyone entered for a particular unit test. If GCSE performances were better than in previous years, then this is a good indicator that we are dealing with a particularly able group and we would expect more candidates to gain higher grades. If GCSE performances were not so good, then fewer candidates should gain the higher grades.

What this all means is that removing unit tests in January should not make any difference to the overall percentage of candidates getting a particular grade. But, and this is an important but, it might make a difference to you as an individual. The rest of this column is devoted to thinking about how you can make sure you get the best grade possible, first time around.

Learning and understanding

If you are just starting your A-level biology course, GCSE is probably still fresh in your mind. The odds are that you did reasonably well — otherwise you would not be taking A-level biology. Think back to your GCSE examinations. You may feel that you didn't really have to learn much. If you 'coasted' through GCSE, making just enough effort to survive, you may have got a reasonable mark but you should not continue this approach into A-level. This is probably the largest single contributor to disappointing results in the first unit test. Without the wake-up call of January modules, some students could be caught out in June, not in one unit test but in two.

One obvious piece of advice, therefore, is that you should learn all your work as you go along. This does become much easier if your learning is accompanied by understanding. If you understand something, you are much more likely to retain that information. Consider this simple illustration. You open your textbook and are confronted with the following sequence of letters:

NRAE LOTR EISA EHCU MSIT IDNA TSRE DNUU OYFI

You should learn this, and you could do so, but it would take quite a time. Now, read the sequence backwards. What we have is:

IF/YO U/UND ERST AND/I T/IS/M UCH/E ASIE R/TO/L EARN

When you appreciate this, remembering the sequence is much, much easier.

My first point then is, if you are looking for success, make sure that you understand what you have been taught. Understanding means asking when in doubt. You may not be able to learn all your work as you go along but there is no excuse for failing to make the effort to ask if you don't understand something.

Principles are important

Much of the A-level biology course is devoted to establishing a number of basic principles — ideas that you will encounter frequently and in a variety of contexts. Box 1 shows one of these important principles, the relationship between size and surface area to volume ratio. You will probably first encounter this principle when you study gas exchange. Small organisms have a large surface area to volume ratio. Consequently they are able to meet their respiratory requirements by diffusion through their surface.

This principle, however, does not just apply to gas exchange. You will probably encounter it again when you study temperature control. Figure 1 shows one of the grey seals on the Farne Islands in Northumbria. These seals spend much of their time in the cold waters of the North Sea. Their large size is one of their adaptations to these conditions. A large size means a small surface area to volume ratio and, therefore, less heat is lost to the surrounding water.

Box 1 Size and surface area to volume ratio

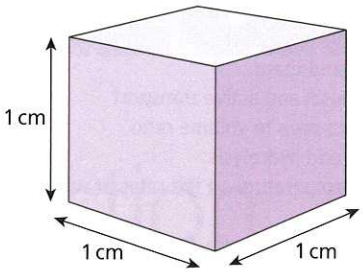

Figure A

Look at the cube shown in Figure A. Each face has a surface area of 1 cm^2. The cube has six faces, so its total surface area is 6 cm^2. Since its volume is 1 cm^3, the surface area to volume ratio is 6:1 or 6.

If we calculate the surface area to volume ratios for a series of cubes, each a little larger, we can plot the results as a graph:

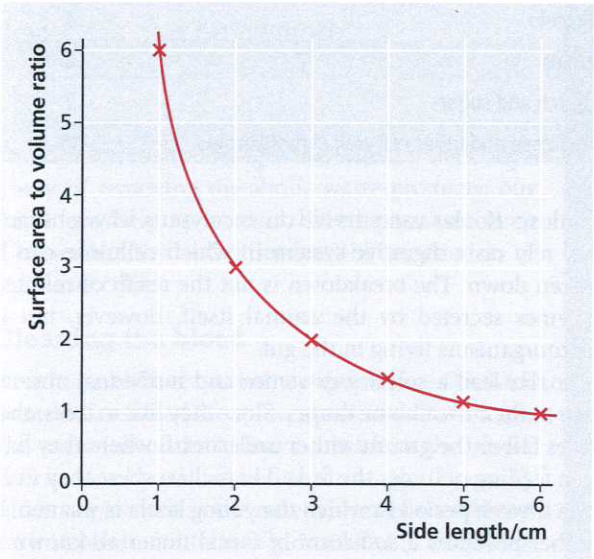

Figure B

The graph in Figure B shows an important relationship: the larger the cube, the smaller its surface area to volume ratio. This relationship also applies to living organisms: the larger the organism, the smaller its surface area to volume ratio.

Blue tits and great tits

Now look at Figure 2. Blue tits and great tits are common British birds. They differ in size. The mean mass of blue tits in winter is around 11 g; that of great tits is approximately 20 g. The graph shows how the percentage of daylight hours spent feeding by these two species varies over the autumn and winter months. Day length gets shorter towards mid-winter so plotting time spent feeding as a percentage of day length allows different months to be compared. If you look carefully at this graph, you should be able to pick out two important features. The smaller blue tit spends more time feeding than the great tit throughout the period shown, and both species spend a higher percentage of the day feeding in mid-winter.

Figure 1 A grey seal on the Farne islands in Northumbria. Grey seals are large mammals and males may reach 2.5 m in length

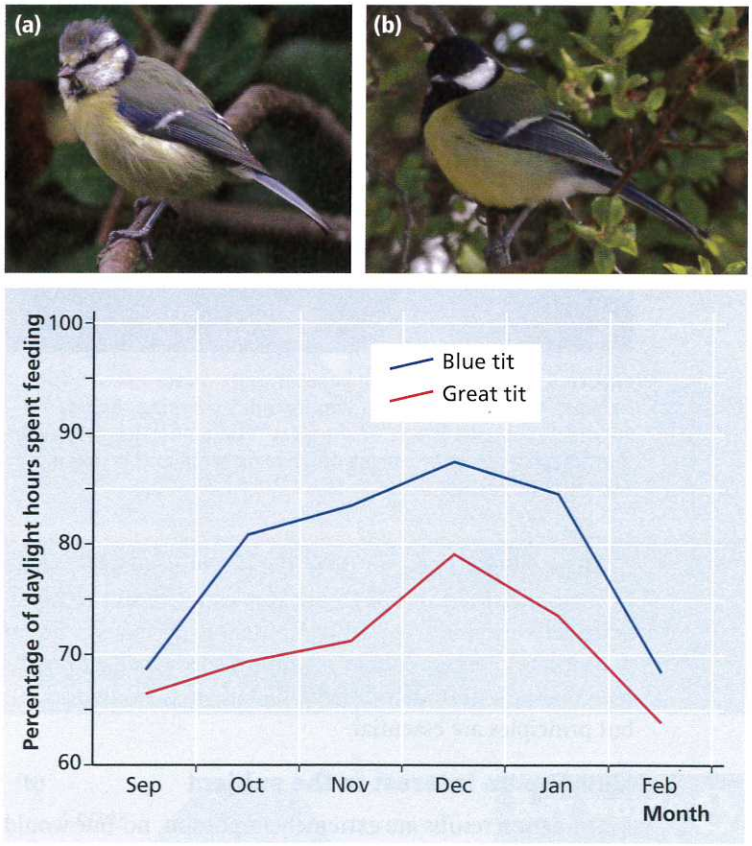

Figure 2 Graph showing the percentage of daylight hours spent feeding over the winter months by two species: **(a)** the blue tit and **(b)** the great tit.

If you appreciate the considerable difference in size between the two species, you should be able to suggest an explanation for the pattern in the results. The blue tit is smaller. Therefore it will have a larger surface area to volume ratio and will lose more heat to its environment over the cold winter months. The heat comes from the metabolism of the bird which, in turn, is dependent on its food supply. Not only are winter days short but the nights are correspondingly long. A long night means more time over which to lose heat so more of the shorter day will be devoted to feeding.

Figure 3 Finding an active koala is quite a rare event because they spend up to 17 hours a day sleeping. Being relatively inactive is one of the adaptations they have to their diet. It releases little energy on fermentation and is low in essential nutrients

There are a number of these important principles. Some of them are listed in Box 2, but this is not meant to be an exhaustive list. Since you will encounter them many times in your A-level biology course, it would seem sensible to make sure that you understand them. Details may be important, but principles are essential.

Develop an interest in the subject

Examination results are extremely important, no-one would deny that, but they are not everything. You are lucky in that you are studying a fascinating subject. Take the time to develop genuine interest.

I was in Australia earlier this year and walking through a patch of eucalyptus woodland I came across a considerable number of koalas. I found two of them, a baby with its mother, particularly intriguing. The baby wasn't riding, as I expected, on her back but was sprawled head downwards over her rear end. What was it doing?

Koalas feed entirely on eucalyptus leaves. Look at Table 1. You will see that this diet is not particularly nutritious — rather like humans surviving on a diet of tinned tomato soup with a lot of added fibre. You will notice that much of the carbohydrate in eucalyptus leaves is in the form of cellulose. Koalas can survive on eucalyptus leaves because they rely on a digestive system in which cellulose can be broken down. The breakdown is not the result of cellulose enzymes secreted by the animal itself, however, but by microorganisms living in the gut.

Koalas lead a solitary existence and individual animals keep to their own home ranges. Since they live in trees, their faeces fall to the ground either underneath where they have been feeding or under the forked branches where they sleep. For a 6-week period in which the young koala is weaned, its mother produces a soft form of faecal material, known as 'pap', from the contents of her caecum. This is thought to infect the young animal with the microorganisms that will allow it to subsist on a eucalyptus-leaf diet. This explains why the young koala I saw was in a position that I had initially failed to understand.

You may not get the chance to go to Australia but opportunities to probe topics a little more deeply come up all the time. It could be something you see, as in the example above; it could equally well be something that you read, watch in a documentary or find on the internet. A genuine interest in your subject will help you to do well. It will also unlock doors for you, doors that lead to university acceptance and the career of your choice.

Box 2 Some important principles

This box lists some of the topics that you will meet, although it is by no means exhaustive. You will encounter them many times in your A-level biology course, so I recommend that you make sure you understand them.

- Diffusion, osmosis and active transport
- Size and surface area to volume ratio
- Condensation and hydrolysis
- The effect of temperature on the rates at which reactions and processes occur
- Enzymes and the factors affecting the rate of enzyme-controlled reactions
- DNA and complementary base pairing
- The concept of a species

Table 1 Composition of eucalyptus leaves

Nutrient	Percentage of fresh mass
Protein	4
Lipids	6
Starch and sugars	7
Cellulose and other cell wall carbohydrates	15

Bill Indge is a member of the Biological Sciences Review editorial board and the author of a number of books, including the *Biology A–Z Handbook* published by Philip Allan. Visit **www.hoddereducation.co.uk** for more information and to see Bill's other publications.