NEW FOR 2015

SALTERS-NUFFIELD
AS and A level Biology
COURSE GUIDE

Developing successful independent biologists for AS, A level and beyond

NEW EDITIONS

www.pearsonschools.co.uk/snab2015

How is A level changing?

Salters-Nuffield Advanced Biology has been developed through extensive research to meet the needs of the new 2015 requirements for A level Science content and assessment criteria. These needs result in key changes to the science specifications.

Key changes include:

- AS and A level have become **linear qualifications** and exams are to be taken at the end of the courses
- **AS will be a stand-alone qualification** meaning it won't form part of a student's full A level grade
- the **inclusion of over-arching questions** that may draw on two or more different topics at a time
- new requirements for the **assessment of mathematics** at Level 2 or above (Biology -10%)
- the **assessment of core practical skills** through written questions in exams and teacher assessment of techniques and competency that will count towards the **Practical Endorsement** at A level
- changes to subject content.

For all the latest information on the new Edexcel AS and A level qualifications, please visit
www.edexcel.com/alevelscience2015rg

Why choose our Salters-Nuffield AS and A level Biology resources?

The SNAB resources have been tried and trusted for over a decade and are the only Biology A level resources that are supported by a dedicated project team, run by the University of York Science Education Group.

Developed in collaboration with schools, educational specialists and scientists from universities
and industry, our new 2015 edition of Salters-Nuffield Advanced Biology continues to offer a context-led approach to A level Biology designed to stimulate scientific interest and enquiry set in real-life contexts.

Salters-Nuffield Advanced Biology focuses on:

Developing a deep subject understanding

SNAB uses real-life contexts to engage students and make learning relevant. Biological principles are introduced as required in each situation, with the whole course carefully designed to develop ideas across contexts, building on ideas to consolidate and extend learning to provide a thorough understanding of the concepts that underpin biology today. Revisiting ideas in this way allows connections to be made between them, and supports a synoptic approach particularly valuable with the changes to a linear qualification and exams at the end of the two year course.

Understanding the core concepts and acquiring key scientific skills

A key feature of the SNAB course is that students not only develop their biological knowledge and understanding to form a solid basis for any further study in the subject, but they also acquire the wider skills essential to biologists working in the 21st century. SNAB embraces an activity based approach to teaching and learning which is supported by a

Turn the page now for more on how our Salters-Nuffield Advanced Biology resources meet the changes to the specifications

How do our new Salters-Nuffield AS and A level resources address the changes to the new specifications?

Change to specification	Where addressed	How addressed
A level exams sat at end of two-year course.	Student Book	• A cumulative approach to learning constantly builds on what has previously been learnt. • Thinking Bigger spreads develop essential assessment skills throughout the course. • Checkpoints consolidate knowledge through summarizing tasks.
	SNAB Online	• End of topic tests provide additional practice over the full duration of the course. • GCSE reviews continue to consolidate GCSE work.
	Revision Guides and Workbooks	• Features such as one-topic-per-page format, practice questions, knowledge checks and skills checks provide hassle-free AS and A level revision. • Build students' confidence in preparation for the exam, with guided questions, unguided questions, practice papers and a full set of answers.
Paper 3 will include synoptic questions that may draw on two or more different topics.	Student Book	• Thinking Bigger spreads require students to use knowledge in new contexts and develop assessment skills throughout the course. Includes extended reading material to develop students' reading and scientific literacy skills.
	SNAB Online	• Online activities consolidate and build learning across topics and throughout the course by providing a range of activities to support the student book.
New requirement for assessment of mathematics at Level 2 or above (Biology 10%).	Student Book	• Integrated maths support directs students to online maths resources.
	SNAB Online	• Maths for Biologists provides a scaffolded method to work through the required maths and takes learners through three levels of each skill. • Maths and stats skills support gives students reference tools with which to build an understanding of maths within a biological context.
Science Practical Endorsement and assessment of practical skills through examinations.	Student Book	• Practical activities integrated into the contextual approach provide opportunities for students to practice their skills and develop an understanding of practical requirements.
	SNAB Online	• Student sheets and Teacher and Technician notes are provided for all core practicals, plus additional practicals, giving further opportunities for students to develop and demonstrate practical skills. • Practical skills support gives students reference tools with which to build an understanding of practical application and technique within a biological context, using an investigative approach.
Co-teaching of AS and A level.	Student Book	• Simple division of content: Student Book 1 supports a standalone AS course and provides the first year of a two-year A level course; Student Books 1and 2 together support the full A level course.
	SNAB Online	• Simple division of content with easy navigation provides all resources to support Student Books 1 and 2 with clear sign-posting.
Changes to subject content.	Student Book	• Material updated to reflect revisions, additions and deletions.
	SNAB Online	

What's in the new Salters-Nuffield AS and A level Biology?

Easy co-teaching of AS and A level.

Student Book 1 supports a standalone AS course and provides the first year of a two-year A level course; Student Books 1and 2 together support the full A level course.

AS

(with free online ActiveBook)

- Salters-Nuffield AS and A level Biology Student Book 1

A level

(with free online ActiveBook)

- Salters-Nuffield AS and A level Biology Student Book 1
- Salters-Nuffield A level Biology Student Book 2

Covering both AS and A level:

- SNAB Online
- Revision Guides and Workbooks

Student Books

Updated to match the new 2015 Edexcel AS and A level Biology A (Salters-Nuffield) specification, our Salters-Nuffield AS and A level Biology Student Books will help develop scientific thinking and provide your students with a deep understanding of the subject, creating confident, independent biologists.

All samples taken from Salters-Nuffield AS/A level Student Book 1

Integrated maths and stats support: directs students to online maths resources.

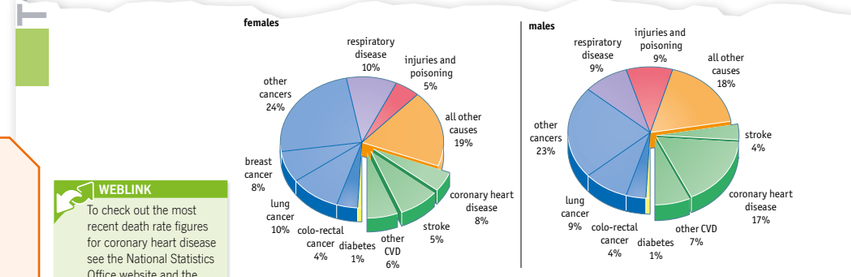


Figure 1.7 Premature deaths by cause in the UK in 2010 for females (left) and males (right). (Premature death is death under the age of 75 years.) One person dies of a heart attack in the UK every 7 minutes. *Reproduced with the kind permission of the British Heart Foundation.*

WEBLINK
To check out the most recent death rate figures for coronary heart disease see the National Statistics Office website and the British Heart Foundation website.

MATHS SUPPORT
Check why the data here in Figure 1.7 is presented as pie charts while the data in Figure 1.1 is in a histogram. See maths support 2 – presenting data graphs.

Cardiovascular diseases (CVDs) are diseases of the heart and circulation. They are the main cause of death in the UK, accounting for almost 180 000 deaths a year, and over 46 000 of these are premature deaths (Figure 1.7). Around one in three people in the UK die from cardiovascular diseases. The main forms of cardiovascular diseases are **coronary heart disease (CHD)**, as experienced by Peter, and **stroke**, as experienced by Mark.

Almost half of all deaths from cardiovascular diseases are from coronary heart disease (45%) and over a quarter are from stroke (28%). Coronary heart disease is the most common cause of death in the UK. About one in five men and one in ten women die from the disease.

KEY BIOLOGICAL PRINCIPLE: WHY HAVE A HEART AND CIRCULATION?

The heart and circulation have one primary purpose – to move substances around the body. In very small organisms such as unicellular creatures where distances are short, substances such as oxygen, carbon dioxide and digestive products move around the organism by diffusion. **Diffusion** is the movement of molecules or ions from a region of their high concentration to a region of their low concentration by relatively slow random movement of molecules. In unicellular organisms diffusion is usually fast enough to meet the organism's requirements.

Most complex multicellular organisms, however, are too large for diffusion to move substances around their bodies quickly enough. These organisms rely on a **mass transport system** to move substances efficiently over long distance by **mass flow**. All the particles in a liquid move in one direction through tubes due to difference in pressure. Animals usually have blood to carry vital substances around their bodies and a heart to pump it instead of relying on diffusion. In other words, they have a circulatory system. Some animals have more than one heart – the humble earthworm, for instance, has five.

Open circulatory systems

In insects and some other animal groups, blood circulates in large open spaces. A simple heart pumps blood out into cavities surrounding the animal's organs. Substances can diffuse between the blood and cells. When the heart muscle relaxes, blood is drawn from the cavity back into the heart through small, valved, openings along its length.

Closed circulatory systems

Many animals, including all vertebrates, have a closed circulatory system in which the blood is enclosed within tubes – blood vessels. This generates higher blood pressures as the blood is forced along fairly narrow channels instead of flowing into large cavities. This means the blood travels faster and so the blood system is more efficient at delivering substances around the body:

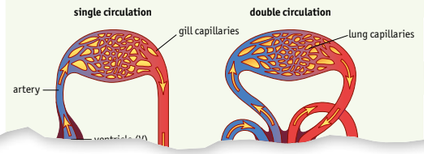
- The blood leaves the heart under pressure and flows along **arteries** and then **arterioles** (small arteries) to **capillaries**.

Single circulatory systems

Animals with a closed circulatory system have either single circulation or double circulation. Fish, for example, have single circulation (Figure 1.8):

- The heart pumps deoxygenated blood to the gills.
- Gaseous exchange takes place in the gills; there is diffusion of carbon dioxide from the blood into the water that surrounds the gills, and diffusion of oxygen from this water into the blood within the gills.
- The blood leaving the gills then flows round the rest of the body before eventually returning to the heart.

Note that the blood flows through the heart once for each complete circuit of the body.



to circulate round the whole body. This allows birds and mammals to have a high metabolic rate, as oxygen and food substances required for metabolic processes can be delivered more rapidly to cells and meet the needs of the organism.

Q 1.1 Why do only small animals have an open circulatory system?

Q 1.2 What are the advantages of having a double circulatory system?

Q 1.3 Fish have two-chamber hearts and mammals have four-chamber hearts.

(a) Sketch what the three-chamber heart of an amphibian, such as a frog, might look like.

(b) What might be the major disadvantage of this three-chamber system?

CHECKPOINT
1.1 Make a bullet point summary which explains why many animals have a heart and circulation.

ACTIVITY
Activity 1.2 demonstrates mass flow. **A1.02S**

Checkpoints consolidate knowledge through summarizing tasks.

Practical activities provide opportunities for students to practise their skills and develop understanding of practical requirements.

Student Books

All samples taken from Salters-Nuffield AS/A level Student Book 1

A cumulative approach to learning constantly builds on what has previously been learnt.

LIFESTYLE, HEALTH AND RISK

Why a topic called Lifestyle, health and risk?

Congratulations on making it this far! Not everyone who started life's journey has been so lucky. In the UK only about 80% of conceptions lead to live births, and about 4 in every 1000 newborn babies do not survive their first year of life (Figure 1.1). After celebrating your first birthday there seem to be fewer dangers. Fewer than 1 in every 1000 children die between the ages of 1 and 14 years old. All in all, life *is* a risky business.

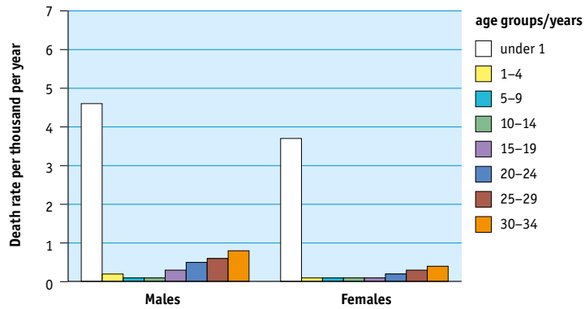


Figure 1.1 Death rates per 1000 population per year by age group and sex. Is life more risky for boys? *Source: England and Wales Office for National Statistics, 2012.*

Figure 1.2 Some activities are less obviously risky than others, but may still have hidden dangers.

In everything we do there is some risk. Normally we only think something is risky if there is the obvious potential for a harmful outcome. Snowboarding, parachute jumping and taking ecstasy are thought of as risky activities, but even crossing the road, jogging or sitting in the sun have risks, and many people take actions to reduce them (Figures 1.2 and 1.3).

Risks to health are often not as apparent as the risks facing someone making a parachute jump. People often do not realise that there are risks associated with lifestyle choices that they make. They underestimate the effect such choices might have on their health.

What we eat and drink, and the activities we take part in, all affect our health and well-being. Every day we make choices that may have short- and long-term consequences which we may be only vaguely aware of. What are the health risks that we are subjecting ourselves to? Will a cooked breakfast set us up for the day or will it put us on course for heart disease? Does the 10-minute walk to work really make a difference to our health?

Cardiovascular disease is the biggest killer in the UK, with around 1 in 3 people (32%) dying from diseases of the circulatory system. Does everyone have the same risk? Can we assess and reduce the risk to our health? Do we need to? Is our perception of risk at odds with reality?

In this topic you will read about Mark and Peter who have kindly agreed to share their experiences of cardiovascular disease. The topic will introduce the underlying biological concepts that will help you understand how cardiovascular diseases develop, and the ways of reducing the risk of developing these diseases.

Material has been updated to reflect revisions, additions and deletions to changes in the subject content.

Each topic is introduced within a wider context. Concepts are revisited and developed in later topics.

OVERVIEW OF THE BIOLOGICAL PRINCIPLES COVERED IN THIS TOPIC

This topic will introduce the concept of risks to health. You will study the relative sizes of risks and how these are assessed. You will consider how we view different risks – our perception of risk. You will also look at how health risks may be affected by lifestyle choices and how risk factors for disease are determined.

Building on your GCSE knowledge of the circulatory system, you will study the heart and circulation and understand how these are affected by our choice of diet and activity.

You will look in some detail at the biochemistry of our food. This will give you a detailed understanding of some of the current thinking among doctors and other scientists about how our choice of foods can reduce the risks to our health.

REVIEW

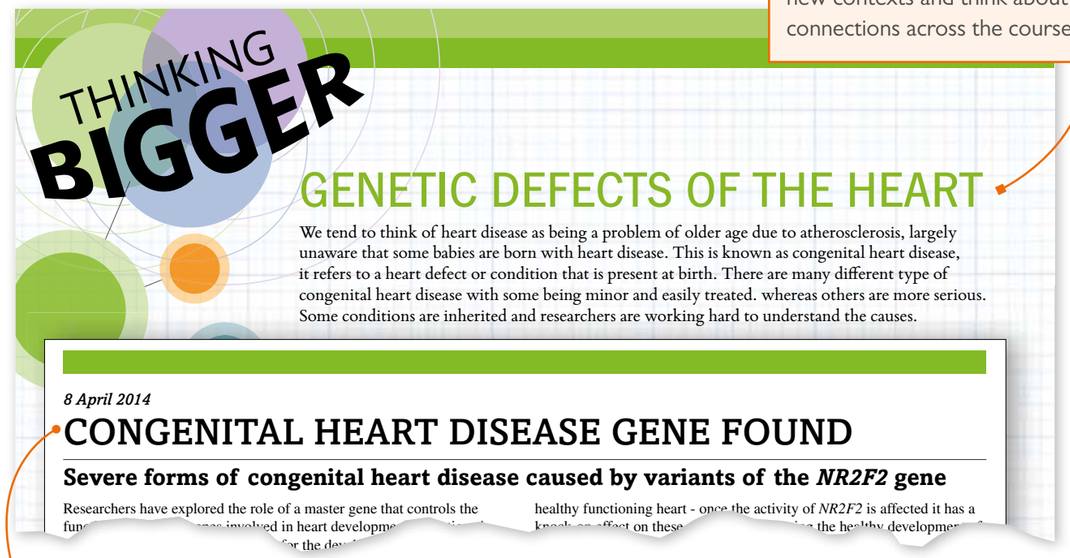
Are you ready to tackle Topic 1 *Lifestyle, health and risk?*

Complete the GCSE review and GCSE review test before you start.

Figure 1.3 A UK male aged 15 to 19 is over three times more likely to have a fatal accident than a female of the same age. *Source: Department for Transport road accidents and safety annual report, 2012.*

Student Books

Thinking Bigger spreads require students to use knowledge in new contexts and think about connections across the course.


THINKING BIGGER

GENETIC DEFECTS OF THE HEART

We tend to think of heart disease as being a problem of older age due to atherosclerosis, largely unaware that some babies are born with heart disease. This is known as congenital heart disease, it refers to a heart defect or condition that is present at birth. There are many different type of congenital heart disease with some being minor and easily treated. whereas others are more serious. Some conditions are inherited and researchers are working hard to understand the causes.

8 April 2014

CONGENITAL HEART DISEASE GENE FOUND

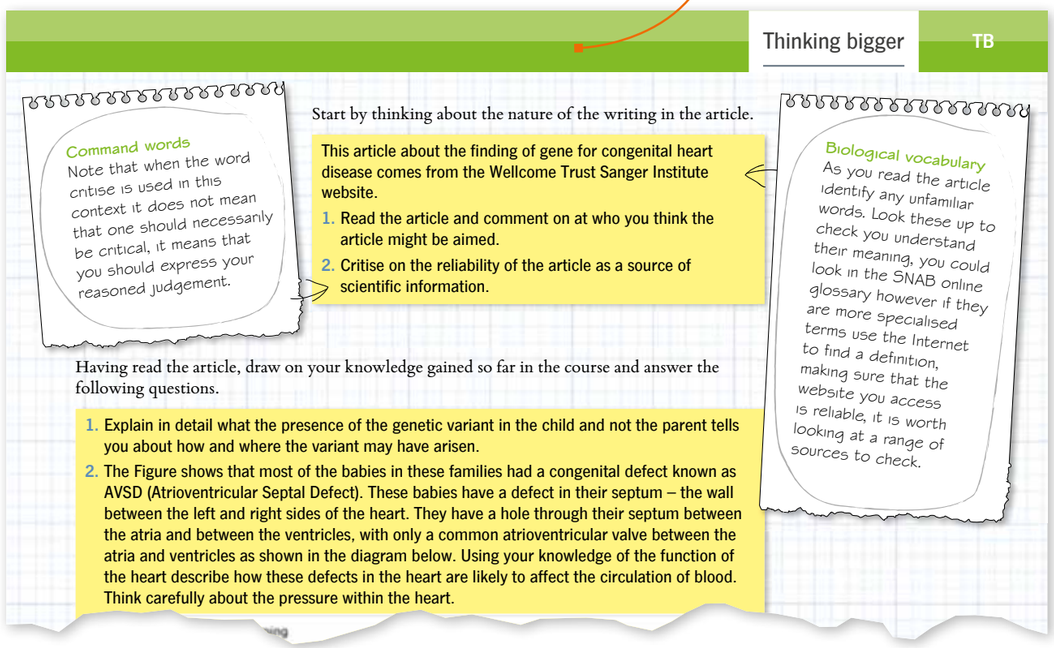
Severe forms of congenital heart disease caused by variants of the *NR2F2* gene

Researchers have explored the role of a master gene that controls the

healthy functioning heart - once the activity of *NR2F2* is affected it has a

Real-life articles engage students with current biological writing and develop scientific literacy skills needed for A level and beyond.

Thinking Bigger spreads develop essential assessment skills throughout course.


Thinking bigger TB

Command words
Note that when the word critise is used in this context it does not mean that one should necessarily be critical, it means that you should express your reasoned judgement.

Start by thinking about the nature of the writing in the article.

This article about the finding of gene for congenital heart disease comes from the Wellcome Trust Sanger Institute website.

1. Read the article and comment on at who you think the article might be aimed.
2. Critise on the reliability of the article as a source of scientific information.

Biological vocabulary
As you read the article identify any unfamiliar words. Look these up to check you understand their meaning, you could look in the SNAB online glossary however if they are more specialised terms use the Internet to find a definition, making sure that the website you access is reliable, it is worth looking at a range of sources to check.

Having read the article, draw on your knowledge gained so far in the course and answer the following questions.

1. Explain in detail what the presence of the genetic variant in the child and not the parent tells you about how and where the variant may have arisen.
2. The Figure shows that most of the babies in these families had a congenital defect known as AVSD (Atrioventricular Septal Defect). These babies have a defect in their septum – the wall between the left and right sides of the heart. They have a hole through their septum between the atria and between the ventricles, with only a common atrioventricular valve between the atria and ventricles as shown in the diagram below. Using your knowledge of the function of the heart describe how these defects in the heart are likely to affect the circulation of blood. Think carefully about the pressure within the heart.

All samples taken from Salters-Nuffield AS/A level Student Book 1

SNAB Online

To complement the Student Book, there is a dedicated website, packed with resources for both students and teachers to support teaching and learning.

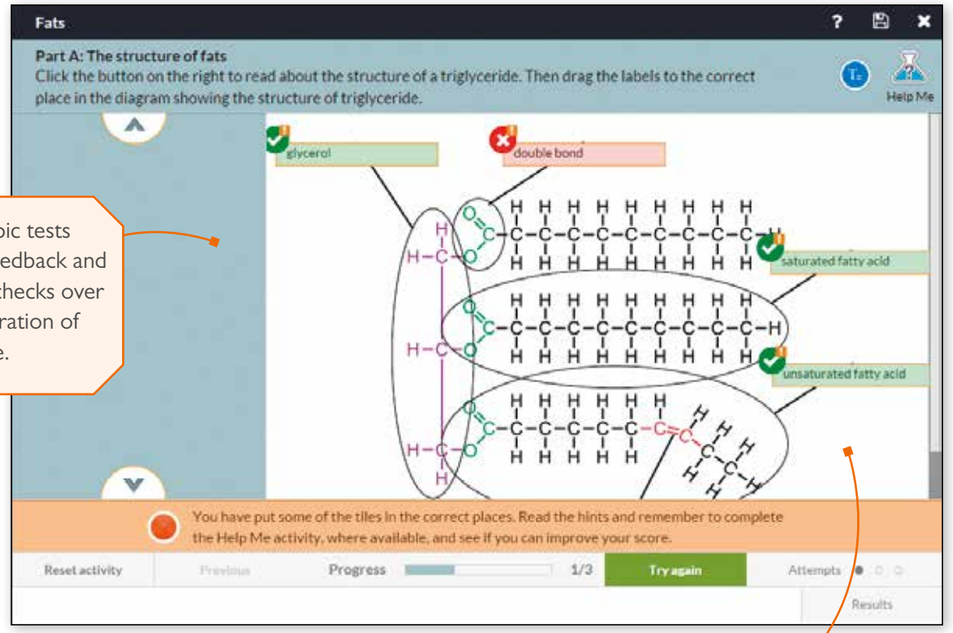
For Students

Throughout the Student Book there are links that direct your students to the SNAB Online website, where they'll find activities, interactive tutorials, and skills support to consolidate their in-class learning and develop the skills needed to progress with Biology.

For Teachers and Technicians

You'll find invaluable resources to aid your teaching, including presentations, 3-D modelling, and all the worksheets and guidance for all the student activities including practical work. A guide on teaching each topic and forward planning is provided for those new to the course. SNAB Online also enables you to monitor students' progress and obtain a range of helpful reports.

End of topic tests provide feedback and progress checks over the full duration of the course.



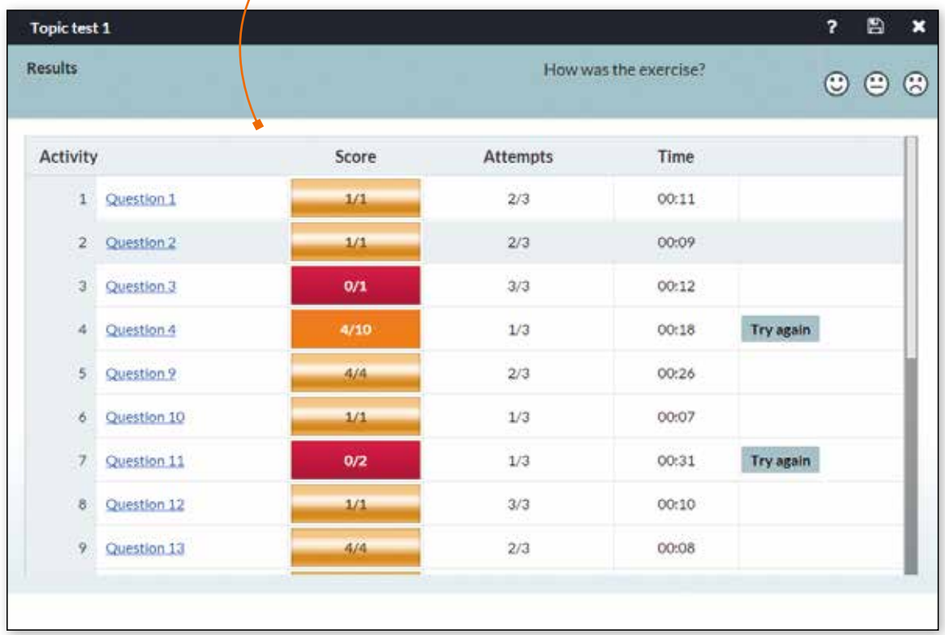
Sample taken from SNAB Online

Online activities: consolidate and build learning across topics and throughout the course by providing a range of activities to support the Student Books.

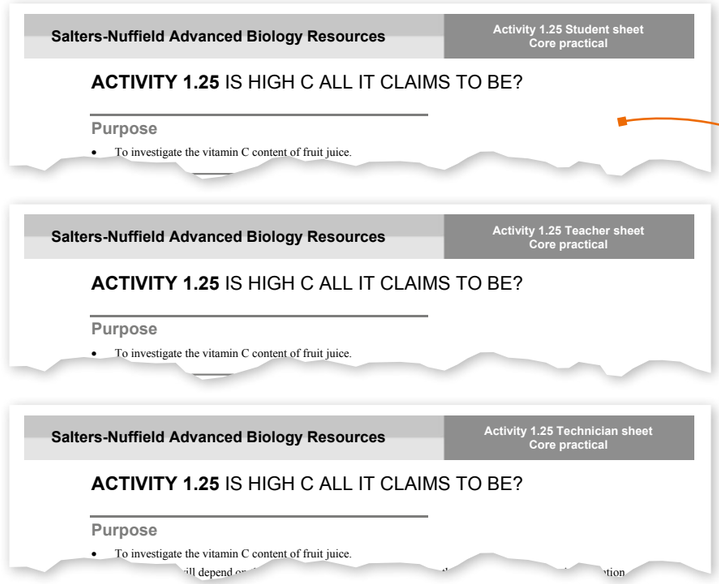
Sample taken from SNAB Online

Maths and stats skills support gives students reference tools with which to build an understanding of maths within a biological context. Extra practice is provided through a series of interactive activities with help and feedback.

Activities come with feedback summaries, so students and teachers can easily see areas that need more practice.

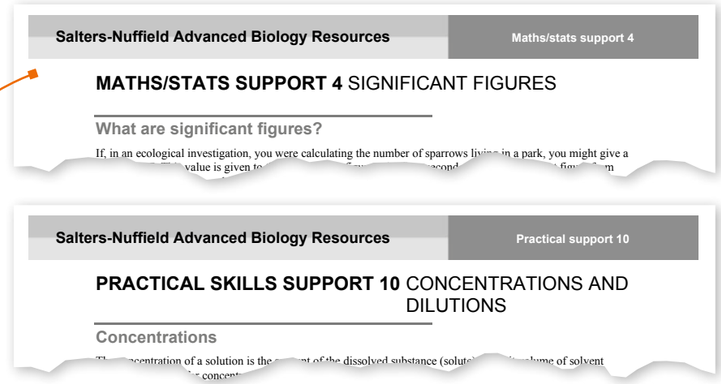


Sample taken from SNAB Online



Student sheets, teacher and technician notes provided for all core practicals, plus additional practicals, provide further opportunities for students to develop and demonstrate practical skills.

Support for maths and practical skills give students reference tools with which to build an understanding of practical and mathematical application and technique within a biological context.

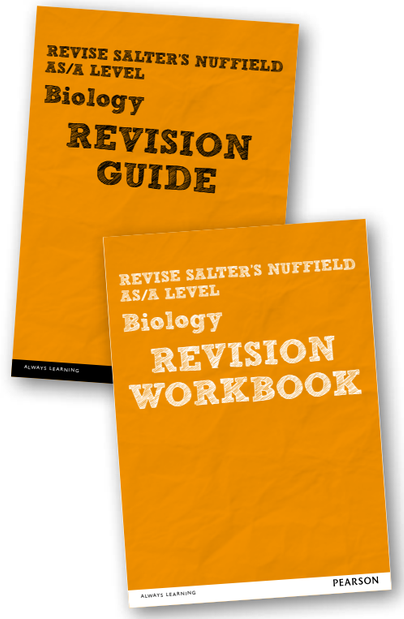


Samples taken from SNAB Online

Revision Guides and Workbooks

The UK's best-selling revision guides are now available for Salters-Nuffield Advanced Biology.

- Designed for hassle-free classroom and independent study, our **Revision Guides** are designed to complement the Student Books with a range of specially designed features such as the one-topic-per-page format, practice questions, knowledge checks and skills checks.
- Our **Revision Workbooks** are designed to help students develop vital skills throughout the course and build their confidence in preparation for the exam, with guided questions, unguided questions, practice papers and a full set of answers.



2015 Price List

Salters-Nuffield AS and A level Biology (SNAB)

Product	ISBN	Price*
STUDENT BOOKS		
All Student Books include a free online ActiveBook. Individual ActiveBooks are also available, please visit the website for details.		
Salters-Nuffield AS/A level Biology Student Book 1	978 1 447991 00 7	£26.99 (inc VAT)
Salters-Nuffield AS/A level Biology Student Book 2	978 1 447991 01 4	£26.99 (inc VAT)
ACTIVELEARN DIGITAL SERVICE		
SNAB ONLINE (powered by ActiveLearn)		
Price is for an annual subscription and includes access to 2008 material.		
SNAB Online	978 1 447979 37 1	£425 (+ VAT)
REVISION GUIDES AND WORKBOOKS		
Salters-Nuffield AS/A level Biology Revision Guide	978 1 447992 714	£10.99
Salters-Nuffield AS/A level Biology Revision Workbook	978 1 447992 70 7	£10.99

** All prices are provisional until publication*

Next Steps

FREE Evaluation

If you haven't already, be sure to order your FREE Evaluation Pack including the Salters-Nuffield AS/A level Biology Student Book 1 now at: **www.pearsonschools.co.uk/snab2015**

Buy online

Build your order online and tailor it to meet your personal requirements at: **www.pearsonschools.co.uk/snab2015**

Call us

Call our Customer Services team to place an order: **0845 630 333**.
We're open Monday – Friday 8.00am – 5.00pm.

NEW FOR 2015

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AS and A level Biology

Developing successful independent biologists for AS, A level and beyond

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