

# SALTERS-NUFFIELD AS and A level Biology Course Guide

Developing successful independent biologists  
for AS, A level and beyond



Explore Salters-Nuffield AS and A level Biology resource



## 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 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:

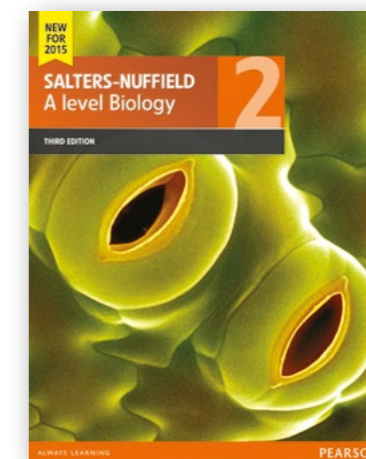
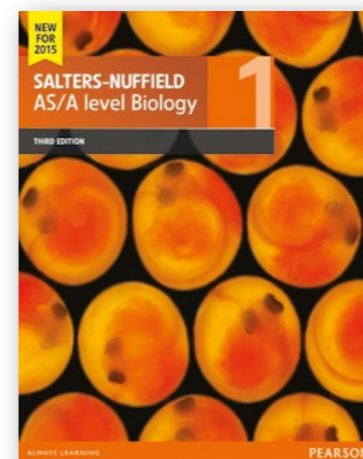
### Developing a deep subject understanding

SNAB uses real-life contexts to engage students and make learning relevant. The course has been 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.

### Understanding the core concepts and acquiring key scientific skills

A key feature of the SNAB course is that students develop their biological knowledge and understanding to form a solid basis for any further study in the subject. 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 wealth of print and online resources.

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



### ActiveBook

- free digital\* copy of the Student Book for each copy purchased
- available to buy as multi user licences

### SNAB online

- dedicated website for both students and teachers

ActiveLearn

### Students

- activities, interactive tutorials, end of topic tests with feed back and progress charts

### Teacher and Technicians

- presentations, 3-D modelling plus student sheets and technician notes provided for all practicals

### Revision Guides and Workbooks

- revision support and practice questions

\*ActiveBook is also available to buy as an institution licence.

# How do the Salters-Nuffield AS and A level Biology resources support the qualifications?

Salters-Nuffield specification	Where addressed	How addressed?
Fully co-teachable	Student book and ActiveBook	<ul style="list-style-type: none"> <li>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 1 and 2 together support the full A level course.</li> </ul>
	SNAB Online	<ul style="list-style-type: none"> <li>Simple division of content with easy navigation provides all resources to support Student Books 1 and 2 with clear sign-posting.</li> </ul>
Distinct topics cover fundamental areas. Later topics build for a broad knowledge base for progression.	Student book and ActiveBook	<ul style="list-style-type: none"> <li>A cumulative approach to learning constantly building on what has previously been learnt.</li> <li>Checkpoints consolidate knowledge through summarizing tasks.</li> </ul>
Synoptic understanding	Student Book and ActiveBook	<ul style="list-style-type: none"> <li>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.</li> </ul>
	SNAB Online	<ul style="list-style-type: none"> <li>Online activities consolidate and build learning across topics and throughout the course by providing a range of activities to support the student book.</li> </ul>
Integrated maths skills	Student book and ActiveBook	<ul style="list-style-type: none"> <li>Integrated maths support directs students to online maths resources.</li> </ul>
	SNAB Online	<ul style="list-style-type: none"> <li>Maths for Biologists provides a scaffolded method to work through the required maths and takes learners through three levels of each skill.</li> <li>Maths and stats skills support gives students reference tools with which to build an understanding of maths within a biological context.</li> </ul>
Core practical skills in a familiar context	Student Book and ActiveBook	<ul style="list-style-type: none"> <li>Practical activities integrated into the contextual approach provide opportunities for students to practice their skills and develop an understanding of practical requirements.</li> </ul>
	SNAB Online	<ul style="list-style-type: none"> <li>Student sheets, Teacher and Technician notes are provided for all core practicals plus additional practicals, providing many opportunities for students to develop and demonstrate practical skills.</li> <li>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.</li> </ul>
Assessment support	Student Book and ActiveBook	<ul style="list-style-type: none"> <li>Thinking Bigger spreads develop essential assessment skills throughout the course.</li> </ul>
	SNAB Online	<ul style="list-style-type: none"> <li>End of chapter tests provide additional practice over the full duration of the course.</li> <li>GCSE reviews continue to consolidate GCSE work</li> </ul>
	Revision Guides and Workbooks	<ul style="list-style-type: none"> <li>Features such as one-topic-per-page format, practice questions, knowledge checks and skills checks provide hassle-free AS and A level revision.</li> <li>Build students' confidence in preparation for the exam, with guided questions, unguided questions, practice papers and a full set of answers.</li> </ul>

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

## Easy co-teaching of AS and A level

Supporting a standalone AS course and the first year of a two-year A level course

- Student Book and ActiveBook 1

Supporting the full A level course

- Student Books and ActiveBook 1 and 2 together

## Covering both AS and A level

- SNAB Online
- Revision guides
- Revision workbooks



### SNAB AS/A Level 1

Student book with free ActiveBook	9781447991007
Activebook licences	
<10	9781292103228
10-74	9781292103242
>75	9781292103266

### SNAB A Level 2

Student book with free ActiveBook	9781447991014
Activebook licences	
<10	9781292118406
10-74	9781292118437
>75	9781292118468

### SNAB AS/A Level 1 and Level 2

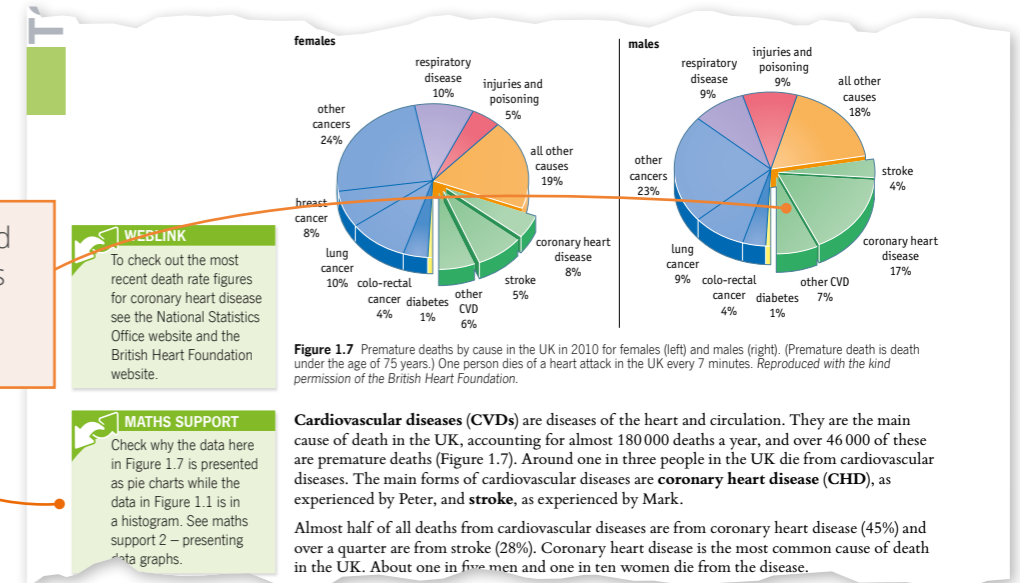
SNAB Online	9781447979371
Revision guide	9781447992714
Revision workbook	9781447992707

# Student Books

Updated to support the 2015 Biology A (Salters-Nuffield) qualification the student books 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.



### 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**.

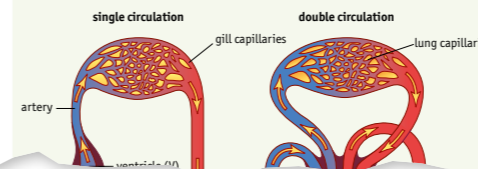
Checkpoints consolidate knowledge through summarizing tasks.

#### 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.



...the lungs are... that reduces the... 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.
  - Sketch what the three-chamber heart of an amphibian, such as a frog, might look like.
  - 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**

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

# Student Books

**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

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

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

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

**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.

**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.

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.

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 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

ActiveLearn

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.

Fats

Part A: The structure of fats  
Click the button on the right to read about the structure of a triglyceride. Then drag the labels to the correct place in the diagram showing the structure of triglyceride.

glycerol double bond saturated fatty acid unsaturated fatty acid

You have put some of the tiles in the correct places. Read the hints and remember to complete the Help Me activity, where available, and see if you can improve your score.

Reset activity Previous Progress 1/3 Try again Attempts Results

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.

# Active Learn

**Order of magnitude of common physical quantities**

Part A: Order of magnitude  
Match the statements on the left with their respective values on the right.

When making a rough estimate, it is sometimes useful to round off a number to no significant figures, which is the nearest power of 10. A number rounded to the nearest power of 10 is called an **order of magnitude**.

Numbers of the form  $10^x$ , that is with positive powers (denoted by  $x$ ), are greater than 10. The more positive the power, the greater the number is. Numbers of the form  $10^{-x}$ , that is with negative powers (denoted by  $-x$ ), are less than 1. The more negative the power, the smaller the overall number is.

Some examples of orders of magnitude are

Age of the Universe, in years	$10^{-15}$
Width of a human hair, in metres	$10^{-7}$
Distance, in metres, between two copper atoms in a metal	$1.4 \times 10^{10}$
Temperature, in Kelvin, at the instant of the Big Bang	$10^{28}$
Wavelength of light, in metres	$25 \times 10^{-6}$

Reset activity    Check answers    Attempts 0/0

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.

**Topic test 1**

Results    How was the exercise? 😊 😐 😞

Activity	Score	Attempts	Time
1 Question 1	1/1	2/3	00:11
2 Question 2	1/1	2/3	00:09
3 Question 3	0/1	3/3	00:12
4 Question 4	4/10	1/3	00:18    Try again
5 Question 9	4/4	2/3	00:26
6 Question 10	1/1	1/3	00:07
7 Question 11	0/2	1/3	00:31    Try again
8 Question 12	1/1	3/3	00:10
9 Question 13	4/4	2/3	00:08

Sample taken from SNAB Online

# Active Learn

**Salter-Nuffield Advanced Biology Resources**    Activity 1.25 Student sheet Core practical

**ACTIVITY 1.25 IS HIGH C ALL IT CLAIMS TO BE?**

Purpose

- To investigate the vitamin C content of fruit juice.

**Salter-Nuffield Advanced Biology Resources**    Activity 1.25 Teacher sheet Core practical

**ACTIVITY 1.25 IS HIGH C ALL IT CLAIMS TO BE?**

Purpose

- To investigate the vitamin C content of fruit juice.

**Salter-Nuffield Advanced Biology Resources**    Activity 1.25 Technician sheet Core practical

**ACTIVITY 1.25 IS HIGH C ALL IT CLAIMS TO BE?**

Purpose

- To investigate the vitamin C content of fruit juice.

Student sheets and Teacher and Technician notes are provided for all core practicals, plus additional practicals, providing many 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.

**Salter-Nuffield Advanced Biology Resources**    Maths/stats support 4

**MATHS/STATS SUPPORT 4 SIGNIFICANT FIGURES**

What are significant figures?

If, in an ecological investigation, you were calculating the number of sparrows living in a park, you might give a value is given to ...

**Salter-Nuffield Advanced Biology Resources**    Practical support 10

**PRACTICAL SKILLS SUPPORT 10 CONCENTRATIONS AND DILUTIONS**

Concentrations

The concentration of a solution is the amount of the dissolved substance (solute) ...

Samples taken from SNAB Online

# ActiveBooks

Every Student Book includes access to an ActiveBook. ActiveBook is an online, digital version of the textbook.

ActiveBook is the perfect way for students to personalise their learning as they progress through their Salters-Nuffield AS and A level Biology course.

ActiveBook supports learning, wherever it may be happening.

Students can:

- Access content online, anytime, anywhere
- Use the inbuilt highlighting and annotation tools to personalise the content and make it really relevant to them
- Search the content quickly using the index

## Highlight tool

Use this to pick out key terms or topics to be ready and prepared for revision.

## Annotations tool

Use this to add personal notes, for example links to your wider reading, such as websites or other files. Or make a note to remind yourself about work you need to do.



Example of highlight and notes tool

An ActiveBook gives your students easy online access to the content in the Student Book.

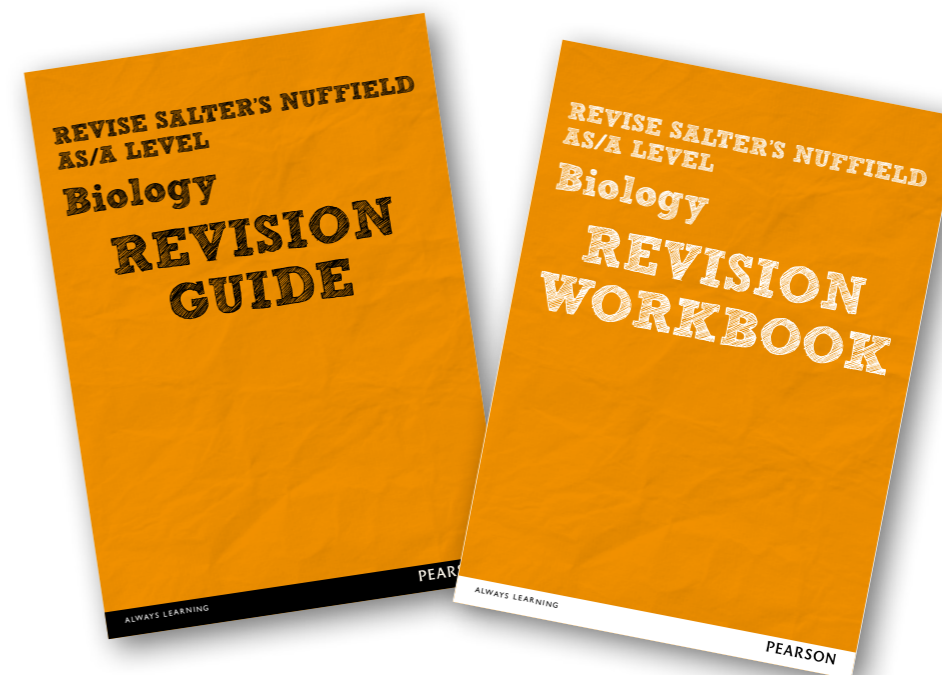
Perfect for supporting their course work and revision activities.

*ActiveBook is also available to buy as an institution licence.*

# Revision Guides and Workbooks

The revision series from Pearson for those studying the Edexcel A level Biology specification, including 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.



## Salters-Nuffield AS and A level Biology at a glance

	Student book with free ActiveBook	ActiveBook licences			SNAB Online	Revision guide	Revision workbook
		<10	10-74	>75			
SNAB AS/A Level 1	9781447991007	9781292103228	9781292103242	9781292103266	9781447979371	9781447992714	9781447992707
SNAB A Level 2	9781447991014	9781292118406	9781292118437	9781292118468			

## Next Steps

### Find out more

Go on our website to find out more about:

**Salters-Nuffield  
AS/A level Biology  
Student Book 1**



### Buy online

Build your order online and tailor it to meet your personal requirements.



### Contact us

Drop us a line about your query and we'll get back in touch with you.



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for AS, A level and beyond

