



GCSE

Biology



GCSE
Biology

Introduction

Welcome to your GCSE Biology course. This introduction will serve as a guide to what you can expect from the course, and it will show you how to plan your study of this course effectively. Take your time to read this Introduction thoroughly before you start the lessons.

The course is designed to prepare students for the **AQA GCSE Biology specification (syllabus)**.

The AQA subject code is **4411 GCSE Biology**

Please note that this course has four examined components:

Examination paper Biology 1
Examination paper Biology 2
Examination paper Biology 3, plus

An ISA (see below), which consists of

- An item of practical coursework, *and*
- An examination paper based on the practical work

Full details of these components are given below and during the course.



The Course

The course is different from GCSE Biology courses of the past in that it attempts to look at the way biology affects your everyday life and how you can evaluate the scientific material that you come across in newspapers, magazines and on the television. The course is an ideal preparation for those who wish to go on to study biology at AS and A2 level.

If you have some background in biology then you will find some of the lessons will touch upon things that you have met before, but the course is designed to be fully understandable with those who have little or no previous background in science.

Arrangement of Lessons

The lessons are planned so that material for the four examination papers are covered by the four modules of the course;

Biology 1
Biology 2
Biology 3
Science Skills

You should note that the fourth module is common to examinations for GCSE Chemistry and GCSE Physics. If you are doing more than one of these courses with Oxford Open Learning then you will find that this material is common to all three courses but TMA J based on this material is different so you will need to send separate TMAs to each of your tutors for science subjects.

You should do the three main biology modules in order but the Science Skills module can be completed whenever you like but this must be before you start on your practical assessment (see below).

Textbook

The textbook that is referred to throughout this course is

AQA GCSE Biology
Anne Fullick – Nelson Thornes - ISBN 978-0748796410

You will need a copy of *AQA GCSE Biology* throughout the course; you can buy a copy through the Oxford Open

Learning website. It is referred to in almost every lesson and provides excellent coverage of the material. By using the textbook and the course you will have very full coverage of all the material and two chances to understand difficult ideas.

Although *AQA GCSE Biology* is an excellent textbook, please note that it does not include answers to the tests it sets – these are in a separate (expensive) text for teachers. But there are sufficient activities, tests and exercises in this course, including answers, to give you a thorough preparation for the exam.

You should not need other books throughout the course but you may like to look in other science books from time to time. If you feel that you would like to use a revision guide before the examination you should ask your tutor which one they recommend.

Lesson Contents and Textbook References

Biology Module 1		
<i>Lesson</i>	<i>Title</i>	<i>Book Reference</i>
1	Responding to change	B1.1
2	Keeping Healthy	B1.2
3	Uses and Abuses of Drugs / TMA A	B1.3
4	Cause and Prevention of Disease	B1.4
5	Survival in the Environment/ TMA B	B.1.5
6	Genes and Genetics	B.1.6
7	Darwin and Evolution / TMA C	B1.7
8	Humans and the Environment	B1.8

Biology Module 2		
<i>Lesson</i>	<i>Title</i>	<i>Book Reference</i>
9	Cells	B2.1
10	Movement of Substances / TMA D	B2.1
11	Green Plants	B2.2
12	Energy and Food Chains / TMA E	B2.3
13	Enzymes	B2.4
14	Homeostasis	B2.5
15	Inheritance / TMA F	B2.6

Biology Module 3		
<i>Lesson</i>	<i>Title</i>	<i>Book Reference</i>
16	Respiration	B3.1
17	Transportation	B3.2
18	Movement / TMA G	B3.2
19	The Kidney	B3.2
20	Micro-organisms (1)	B3.3
21	Micro-organisms (2) / TMA H	B3.3

Science Skills		
<i>Lesson</i>	<i>Title</i>	<i>Book Reference</i>
22	What is Science All About?	H1
23	Can we Believe Scientists?	H8 and H9
24	Investigating and Observing/ TMA I	H3 and H4
25	Gathering Data	H H6 and H7
26	Coursework / TMA J	-

27	Your Practice ISA Test	-
Appendices	Glossary/Biology Fieldwork/More on ISAs	—

Internet Resources

In each lesson of the course, internet sites are given which have been carefully selected to illustrate points in the course and to provide additional activities. These are an important tool in your understanding of your biology course and you should make every effort to view them and use the activities that they contain. If you do not have an internet connection at home, consider building in regular trips to a library or internet café as part of your study schedule.

The Structure within each Lesson: how to study

Front Page

The front page of each lesson shows:


- The title.
- **Aim(s)** for the lesson. These set out the position that you should reach after working through the lesson; keep these in mind while reading the lesson material.
- **Context.** This gives a very brief summary and shows how the lesson fits in with the rest of the course.
- **Reading.** The individual references for each lesson.

Lesson Notes

There then follow the notes; these are an outline of the subject material to be studied in the lesson. Read the notes carefully several times until you feel that you have understood the broad outline of the theory involved, and then tackle the reading references. The textbook may deal with the subjects in greater detail, and, as with the notes, you will probably need to read the passages several times.

Activities

Most activities in the course are placed in the notes at the relevant point. Activities are indicated as follows:

Activity 7	Investigate how a nucleus is held together, particularly how the binding energy of the nucleus relates to Einstein's equation, $E = mc^2$.
	

The pencil symbol indicates that you should make your own notes in the space provided.

Self-Assessment Tests

When you feel that you have mastered the topics and completed the activities, tackle the practice tests, which are at the end of every lesson that does not contain a tutor-marked assessment.

Tutor-marked Assignments

After every two or three lessons there is a tutor-marked assignment. Most of these are in GCSE examination style. Some students may opt to tackle them under timed conditions as examination practice. These tests will thoroughly check your understanding of the previous few topics. You should send your answers to these tests to your tutor, who will return your marked script, together with a set of suggested answers.

Revision

Do **not** leave all your revision until the end of the course. You will need to revise thoroughly for your examination, but frequent revision throughout the course is **essential**. Plan your revision sensibly, and re-read as you feel necessary, if your knowledge is beginning to fade.

Coursework

You will need to discuss the coursework with your tutor once you have made a start on the course. AQA will specify the topic that you will be working on. Do not start the coursework before discussing it with you tutor.

You should not need too much in the way of specialist equipment for your coursework – mainly items that you can find in the kitchen. If the coursework involves you in some

biology fieldwork an appendix to the course gives you plenty of advice on how to go about this.

Checking the Syllabus

As you know, this course has been written to cover the contents of the **AQA syllabus 4411** which is available to download (you will need an Adobe Acrobat reader on your computer) at www.aqa.org.uk.

You should read the syllabus throughout the course, so either keep a copy on your computer or print it out. If you do not have access to the internet, the syllabus is available from:

AQA Logistics Centre (Manchester)
Unit 2, Wheel Forge Way,
Trafford Park,
Manchester M17 1EH

A Choice of AQA Exams

Within the individual **Biology, Chemistry** and **Physics** specifications, AQA offers an **alternative Paper 1**. Candidates can take a 45 minute short-answer paper *or* they can tackle *two* (30 minute) objective (multiple choice) tests instead. These are Papers 1a and 1b. If so, candidates can *either* do the new objective tests on paper *or* on screen. They can do (or re-do) them in November, March *and* June. Nonetheless, OOL recommends sticking to the 45 minute short-answer paper (but please note that this can only be taken in January or June).

When you enter for the 4411 exam, you will need to ensure that the correct Entry Codes are inserted on the entry form. These are:

BLY1 tiers F or H (a written paper) **or** **BLY1AP** and **BLY1BP** (a paper-based objective test) **or** **BL1AS** and **BL1BS** (an on-screen objective test), tiers F or H

plus **BLY2** tiers F or H, **plus** **BLY3** tiers F or H (these are written papers), **plus** **BLYC** (not tiered, comprising PSA and ISA)

The last normal exam sitting for the main science specifications is **2012** (there is a theoretical possibility of re-taking in January 2013 but it may be hard to find an exam centre holding such exams). Changes to the GCSE Science

specifications (i.e. the introduction of controlled assessment) mean that it is unlikely to be possible to take GCSE Science exams after 2012 as a distance learner. If you wish to take exams in 2013 (or later years), you will need to take (or transfer to) an IGCSE course. Please see our website for the latest details.

Tiering and Assessment

In each of the main Science GCSEs, there is a choice between Foundation Level and Higher Level examinations papers. These are called “tiers”. You do not need to make a choice at the start of your studies. This course is designed to give you a full preparation for the *Higher* Level examinations. Foundation Level exams cover the same topics but not quite to the same depth and the questions are designed to be a lot easier. As time goes by, your tutor should be in a position to advise which level of examination it would be best to take.

The ISA is not tiered. In the other assessments for this specification, the papers are tiered with Foundation Tier being aimed at grades C–G, and Higher Tier being aimed at grades A*–D. Questions for the Higher Tier will be more demanding requiring higher level skills allowing candidates to access the higher grades. See Section 9.4 of the specification for information about tiering and subject content. Different tiers can be taken for different papers.

In Biology 1a and Biology 1b, the questions for both tiers are contained within the same question paper. Candidates choose at the time of the examination which tier to take.

Past Papers

AQA now makes all (but the very last set) of past papers available online for free download at www.aqa.org.uk

Discuss with your tutor how to approach these.

Your Tutor

You have a lot of resources to help you in your studies; your course file, textbook, internet resources and your tutor. You should make good use of your tutor to help you with any difficulties that you may have during the course.

And finally... very good luck with your studies.

**Biology
GCSE ISA**

Your Coursework Practical (ISA)

Aims

By the end of this lesson you should be able to:

- understand how to work effectively on the coursework component for your GCSE qualification

Context

This section is designed to give you a preliminary understanding of how the coursework element of your GCSE course is carried out and marked. It is important that you read through it carefully, as many of the procedures for the ISA are different for Private Candidates. More detailed information is given in an Appendix at the back of the pack but this does not need to be studied at the outset.



To prepare for your ISA, carefully read through the appropriate part of the syllabus. You can view or download this at www.aqa.org.uk.



Oxford Open Learning

Introduction

Your coursework instructions are included in the following pages. Please read them carefully and talk to your tutor about what you intend to do.

What is an ISA?

An 'ISA' ('Investigative Skills Assessment') is the practical element of your GCSE Science course. It is made-up of two parts;

Part 1: A Practical Experiment

This is carried out by you, the student. Because you are a private candidate, you should do this practical part of the ISA at home. You should then record the results of your experiment in a table and use them to produce a graph or a chart.

Part 2: A 45-minute written test

You must take this at an exam centre of your choice. You will need to contact your chosen centre well in advance to arrange a time when you can take Part 2 of your ISA (the written test) under exam conditions.

This test will be based on the experiment you did in Part 1 (see above). It will contain a section with questions related to your own experiment and results and a second section related to a similar experiment which you will not have seen before. The data obtained from Part 1 (the practical experiment) will be taken into the related written examination with you. You will need to use your data to answer questions (more about the written examination later).

You must *not* take any written explanations, write-ups or methodology into the written test part of your ISA. This is not allowed.

When you have completed both parts of the ISA, your test paper, along with the results from your experiment and any graphs or charts you might have produced, will be sent off to a moderator to be marked.

Risk Assessment

All experiments are undertaken at the student's own risk, so it is essential that you should be aware of (and minimise) the risks associated with your chosen experiment(s). You should therefore read and consider the Risk Assessment sections that precede each experiment.

Drawing up a Table of Results

Before you carry out your practical investigation, you should draw up a table you can use to record your results. You should design your table based on the requirements of the investigation. Guidelines on drawing up a table can be found in Lesson 25 'Gathering and Using Data'.

Labelling your tables, graphs and charts

There are strict rules about what you can and cannot take into the written exam for your ISA. You should label the axes on your graph with the appropriate titles, but the only other writing you may have on your graphs or charts is that of the ISA title (e.g. 'Biology ISA 1.6 'Distribution of Plants'). N.b. The wording must be **exactly the same** as the title you have chosen to investigate. There must be **no other writing** on tables, graphs or charts, including that which identifies dependent or independent variables.

Writing up your Practical (Optional)

For both the practice ISA and the final ISA, we would advise you to write up your chosen experiment(s) using the lessons on practical work (in particular Lessons 24 onwards, plus the Appendices) to help you. Your tutor will talk to you about what they expect from a write-up.

You *cannot* take your write-up into the written exam part of the ISA. It is to help you understand your experiment, but does not form part of the final assessment.

Practice ISAs (Part 1: Practical Experiment)

You should complete the practice ISA on 'Reaction Times' before you attempt your final ISA.

The instructions for practice ISAs are outlined in the pages that follow. It is very important that you carry out a practice ISA in order to familiarise yourself with the processes involved

in carrying out a practical scientific experiment. Doing a practice ISA should mean you are better equipped with the skills of planning, observation and evaluation which you will be tested on in the actual ISA.

Practice ISAs (Part 2: Written Test)

A past paper relating to your practice ISA on 'Reaction Times' is included at the end of this course. Once you have completed your practical experiment and written it up (Part 1), you should complete the past paper under test conditions, as if it were the real thing. You should refer only to your table of results and the graph(s) or chart(s) you produced when you take the practice written test. Look carefully at the mark scheme for the written test (see lesson 26) to see how marks are allocated for each question.

Which ISA should I take?

AQA releases a number of ISA options at regular intervals during the course of the year, which are valid for a certain period only. It is important that you understand which ISAs you can choose from, so that you do not end up submitting an ISA which is no longer accepted.

The tables below show the ISA options for the years 2011 and 2012.

If you are taking your exams in June **2011**, you should choose **one** ISA from **Table 1** to carry out for your coursework.

If you are taking your exams in June **2012**, you should choose the ISA from **Table 2** to carry out for your coursework. A further set of options will be released by AQA in due course, and OOL will update you of any developments. You should also make sure that your student advisor at OOL knows which year you have decided to sit your exams.

Final ISA (Part 1: Practical Experiment)

Table 1 (2011)

Option	June 2011 GCSE Biology Final ISA Options
Option 1	Biology 2.4 Staying Cool, Set 4
Option 2	Biology 1.6 Distribution of Plants, Set 5

Table 2 (2012)

Option	June 2012 GCSE Biology Final ISA Options
Option 2	Biology 1.6 Distribution of Plants, Set 5

You should discuss which ISA you will choose with your tutor. The instructions for these options are outlined in the pages that follow, and each is labelled as a 'Final ISA'.

Experiments should be all your own work and AQA ask schools not to announce the experiments until they are actually to be attempted (to prevent students from accessing model answers on the internet). Your tutor and the exam board will be on the look out for work that has been copied from elsewhere.

Final ISA (Part 2: Written Test)

This will be sat at an Exam Centre of your choice. It is the student's responsibility to find a centre. For more information, see the 'Oxford Open Learning Guide to finding a Centre'.

Not sure about anything?

You should find further useful information about ISAs in an Appendix at the back of this course. But that is as much as you need to know at the outset.

Practice ISA and Final ISAs

Please note that the following section includes 1 practice ISA and 2 final ISAs. You should carry out the practice ISA first and then choose the final ISA that you are going to submit for assessment. Please ask your tutor if you are not sure how to proceed.

PRACTICE ISA

Reaction Times



Risk Assessment

It is the responsibility of the candidate (and any relevant parent or guardian) to ensure that a risk assessment is carried out. This ISA has been chosen, in part, because the risks are small.

This experiment has no particular risks involved but;

- When dropping sticks care should be taken that toes are protected.
- Keep young children out of the way while doing this experiment.
- Take care of your eyes and of the eyes of your partner when performing this experiment.
- This experiment is best performed on a carpeted area or outdoors.

Area of investigation

This work relates to the section of your course which investigates:

How do human bodies respond to changes inside them and to their environment?

Related Lessons

You should re-visit **Lesson 1 on 'Responding to Change'** in your course pack before you carry out this ISA, to refresh your memory of the topic.

Background

When an event occurs, the brain takes a certain time to react to it. For example, when driving along a road, a driver can take roughly two thirds of a second to react to the car in front beginning to brake. This time is called the *reaction time*. How far would a car travelling at, for example, 50 mph go in this two thirds of a second?

It is important for drivers to allow for the time they take to react when driving, and to be aware of the fact that they may have a

reaction time that is slower than average. A simple experiment to measure reaction times can be carried out using a metre ruler. A friend holds the metre ruler vertically and drops it, while you try to catch it as soon as possible after it is released.

Equipment

- a piece of lightweight, sanded wood of about one metre in length (available from your local DIY supplier).
- an accurate tape measure or steel rule that measures in millimetres.

Part One: The Practical Work

You should aim to carry out an investigation concerning how changes in your external environment can affect your reaction time.



You will need a helper for this experiment.

Method

1. Place a mark on a smooth, even stick of light wood close to one end.
2. Sit with your forearm on a table surface so that your hand extends over the edge.
3. Have your partner hold the stick with the mark between, but not touching, your thumb and fingers.
4. Ask your partner to release the stick without warning.
5. Catch the stick as quickly as you can between your thumb and fingers.

6. Mark where you caught the stick.
7. Measure the distance between the original mark and point where the stick was caught as accurately as you can.
8. Repeat the experiment a number of times.
9. Change places with your partner and repeat the experiment.

Part Two: the Data Processing

You should draw up a table of results and process the data in an appropriate way, e.g. charts, graphs, diagrams or line of best fit.

Remember:

You must decide:

1. How you will make this investigation a 'fair test'.
2. The species that you will investigate.
2. Which variable will be your independent variable.
- 3 The number of tests. (Each test with a different value for the independent variable.)
4. How many repeats of each test you should carry out so that you can calculate the average value of the dependent variable for each test.
- 5 The type of graph/chart to plot.

Before you start the practical work you must draw up a table ready to record your results.

When you have finished your investigation:

1. Make sure that you have produced a clear table of results as close to the standard table layout as possible.
2. Process your results to produce what you think is the most appropriate **graph** or **chart**.

The written ISA Test which matches this Practice ISA can be found in Lesson 27.

FINAL ISA

Option 1 (Valid for June 2011 only)

Biology ISA 2.4 Staying Cool

This ISA relates to Unit B2: Additional Science (4463) Section 11.7, Biology (4411) Section 12.7.



Risk Assessment

It is the responsibility of the candidate (and any relevant parent or guardian) to ensure that a risk assessment is carried out. This ISA has been chosen, in part, because the risks are small.

Your attention is drawn in particular to the dangers associated with using hot water.

Area of investigation

This work relates to the section of your course which investigates:

How do human bodies keep internal conditions constant?

Related Lessons

You should re-visit **Lesson 14 on 'Homeostasis'** in your course pack before you carry out this ISA, to refresh your memory of the topic, and also **Section B2 5.2, pages 194 – 195 in the AQA Science GCSE Biology Textbook** by Ann Fullick.

Equipment

- Two boiling tubes (or small pyrex jugs)
- Hot water
- A thermometer
- A stopwatch

The Practical Work

A suggested method is described below, but you may adapt this method to suit your own situation.

You should aim to carry out an investigation concerning how evaporation of sweat affects the loss of heat from the body.

One approach would be to wrap newspaper round two boiling tubes. Fill each tube with hot water and then wet the paper of one tube with more hot water. Record the temperature of the water in the two tubes at suitable intervals. It may be necessary to add further hot water to the paper of the one tube every few minutes (perhaps using a paint brush). Carry out the temperature recording for up to 15 minutes.

Candidates need to produce a table for the results and draw a graph or bar chart to show their results.

The Data Processing

Each candidate must draw up his or her own table for the results and should process the data in an appropriate way, e.g. charts, graphs, diagrams, line of best fit.

Candidates' work must **not** be annotated with additional information, by either the tutor or the candidate, which would give them an unfair advantage during the ISA, e.g. the use of the terms independent/dependent variable.

Remember:

You must decide:

1. How you will make this investigation a 'fair test'.
2. Which variable will be your independent variable.
3. The number of tests. (Each test with a different value for the independent variable.)
4. How many repeats of each test you should carry out so that you can calculate the average value of the dependent variable for each test.
5. The type of graph/chart to plot.

Before you start the practical work you must draw up a table ready to record your results.

When you have finished your investigation:

1. Make sure that you have produced a clear table of results as close to the standard table layout as possible.
2. Process your results to produce what you think is the most appropriate **graph** or **chart**.

FINAL ISA

Option 2 (Valid for June 2011 and June 2012)

Biology ISA 1.6 Distribution of Plants

This ISA relates to Unit B1: Science A (4461) Science B (4462)
Biology (4411) Section 11.5.



Risk Assessment

This is a low risk activity but you should be aware of the following:

- Take care if you are working near water.
- Take into account any allergies that you have and how these will be affected by working in your chosen environment.
- Fieldwork can bring you close to stinging plants and insects.
- Always let someone know where you are working.
- Keep a close eye on young children if they accompany you.

It is the responsibility of the candidates (and any relevant parent or guardian) to ensure that a risk assessment is carried out.

In addition to the normal risk assessment, please read the ecologists' code of conduct which is reproduced in the **Appendix: Fieldwork**, page 15.

Many areas, including certain parks and forestry commission land, require written permission to conduct fieldwork within them. You will need to apply for this in advance.

Area of investigation

This work relates to the section of your course which investigates:

What determines where particular species live and how many of them are there?

- To suggest reasons for the distribution of plants in a particular habitat.

Related Lessons

You should re-visit **Lesson 5** on ‘**Surviving in the Environment**’ in your course pack as well as the **Appendix: Fieldwork** before you carry out this ISA, to refresh your memory of the topic, and also **Section B1b, pages 80 – 91 in the AQA Science GCSE Biology Textbook** by Ann Fullick.

Equipment

- Quadrat (see below)
- Metric tape measure

You should find that the wood necessary to build a quadrat is readily available from your local DIY store. A metric tape measure will be necessary for the transect (see below). If you decide to use other equipment - light meters, thermometers, etc, you should build your plan around the equipment readily available to you.

Inexpensive digital read-out thermometers are available from:

www.toolstation.com/search.html?searchstr=thermometer

The Practical Work

You should aim to carry out an investigation concerning the distribution (by percentage cover) of one plant species in a changing habitat, using a transect.

A suggested method is described below, but you may adapt this method to suit your own situation.

A simple method would be to extend a tape measure or string from the goal line of a football or hockey pitch to the edge of the goal area. Half metre quadrats could be placed on this at suitable intervals and the percentage cover of one species, e.g. grass, dandelions or plantain plants, in each quadrat could be estimated. It may be helpful to candidates to use quadrats that are internally divided into 100 squares. (Plastic fencing bought from a garden centre and cut into 50 cm x 50 cm squares makes a cheap alternative to commercially produced quadrats; there are one hundred 50 cm x 50 cm squares in this size quadrat.)

It is not necessary to measure the environmental factor that is changing, although it should be clear to candidates what that factor might be.

The Data Processing

Each candidate must draw up his or her own table for the results and should process the data in an appropriate way, e.g. charts, graphs, diagrams, line of best fit.

Candidates' work must **not** be annotated with additional information, by either the tutor or the candidate, which would give them an unfair advantage during the ISA, e.g. the use of the terms independent/dependent variable.

Remember:

You must decide:

1. How you will make this investigation a 'fair test'.
2. The species that you will investigate.
2. Which variable will be your independent variable.
- 3 The number of tests. (Each test with a different value for the independent variable.)
4. How many repeats of each test you should carry out so that you can calculate the average value of the dependent variable for each test.
- 5 The type of graph/chart to plot.

Before you start the practical work you must draw up a table ready to record your results.

When you have finished your investigation:

1. Make sure that you have produced a clear table of results as close to the standard table layout as possible.
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