Pearson Edexcel

International GCSE Science

Enhancing Teaching through Exam Insights in International GCSE Biology

Pearson Edexcel

Today’s Agenda

- Specification
- The two routes of assessment
- Production of exam papers
- Development of Mark Schemes
- Marking Activity and Examiner Reports
- Support

Aims and objectives

- Outline the two assessment pathways, and how you can adapt your teaching for the new International GCSE Modular Assessment
- Introduce the writing process of the Pearson Edexcel Examination Papers and Mark Schemes
- Understand how to apply mark schemes to student answers from the 2024 May/June Examination series
- Review the support Pearson offers for teaching the qualification
- Network, discuss best practice and share ideas with other teachers

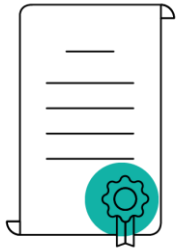
Welcome to Pearson

Welcome to Pearson Edexcel

- We are the world's leading learning company and as the **UK's largest awarding organisation**, best placed to provide qualifications aligned to the British educational system.
- Our international **heritage stretches back over 150 years**.
- Today, we partner with schools, universities and employers worldwide, offering world-class, globally-recognised qualifications to over **3.5 million students a year**.

Pearson Edexcel

Trusted and recognized qualifications partner to **6,500** schools, colleges and employers globally

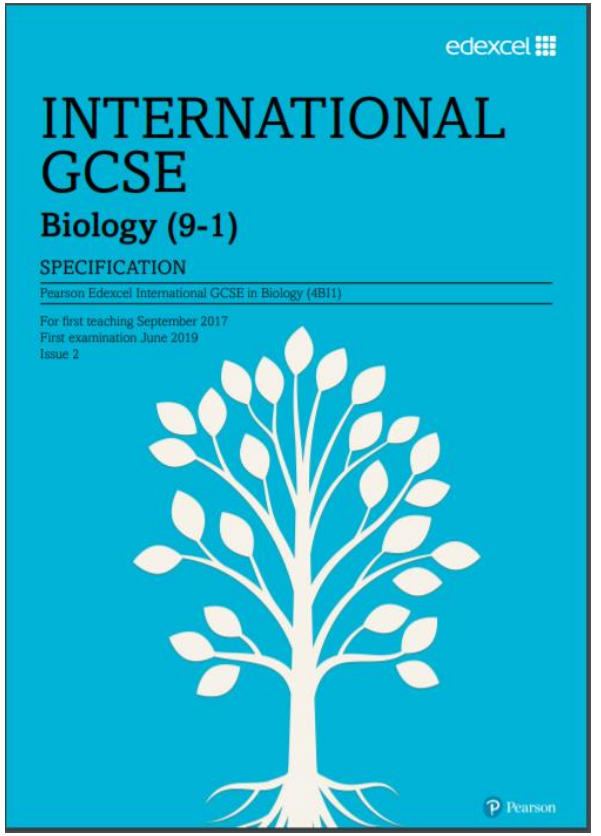


We mark over **10 million** exam scripts on behalf of the UK Department for Education each year

We operate in 70 countries worldwide

The Specification

- The Specification contains all the key information required for teaching the course.
- It can be downloaded directly from the Pearson website.
- Many other useful materials can also be downloaded from the website.



What does the specification contain?

- Assessment model – mark allocations, topics, styles of questions on both papers
- Content – arranged by topics
- Assessment objectives – the skills that we test on the papers AND the proportions of marks allocated to each skill
- Taxonomy – all the command words used in questions
- Mathematical skills – the skills that may be tested in the exams
- Practical skills – the core practicals that students should do and the skills expected
- Transferable skills – other skills that can be taught through International GCSE Biology

Biology qualification content summary

There continue to be five topic areas in the specification:

Nature and variety of living organisms

- Characteristics of living organisms
- Variety of living organisms

Structures and functions in living organisms

- Organisation
- Cell structure
- Bio molecules
- Movement in & out of cells
- Nutrition
- Respiration
- Gas exchange
- Transport
- Excretion
- Coordination & response

Reproduction and inheritance

- Reproduction
- Inheritance

Ecology and the environment

- Organisms in environment
- Feeding relationships
- Cycles within ecosystems
- Human influences on environment

Use of biological resources

- Food production
- Selective breeding
- Genetic modification
- Cloning

Understanding the Assessment

The two different routes of Assessment

If you're happy with the linear approach, there is no pressure to move to the modular route; our linear International GCSEs will continue to be offered and taken widely by students around the world.

Modular route

Unit assessments can be taken over multiple exam series.

Grades are calculated on raw marks which are then converted to a UMS (Uniform Mark Scale).

Students can re-sit individual units in any exam series.

Once a student has all their unit results, they can 'cash in' these results for their grade.

A modular route is only offered by Pearson Edexcel at International GCSE

Linear route

Assessments for all units are taken together in one exam series.

Grades are calculated on raw marks only.

Students can re-sit assessments for all units together in one exam series.

The grade students receive are calculated at the end of the exam series in which they sat their assessments.

Biology: a closer look, Paper 1

The modular and linear approach contact the same content, but the modular approach breaks the journey into two units with an exam at the end of each unit.

Paper 1	
Linear	**Modular**
2-hour written examination.	1-hour-40-minute written examination.
The total number of marks is 110, 61.1% of the total International GCSE.	The total number of marks if 90, 50% of the total International GCSE.
Content summary Assesses core content that is **NOT** in bold and does not have a 'C' prefix. Questions may come from any topic area across the specification. **Topic 1. The nature and variety of living organisms** **Topic 2. Structures and functions in living organisms** **Topic 3. Reproduction and inheritance** **Topic 4. Ecology and the environment** **Topic 5. Use of biological resources**	Content summary **Topic 1: The nature and variety of living organisms** a. Characteristics of living organisms b. Variety of living organisms **Topic 2: Structures and functions in living organisms** a. Level or organisation b. Cell structure c. Biological molecules d. Movement of substances into and out of cells e. Nutrition f. Respiration g. Gas exchange

Biology: a closer look, Paper 2

The modular and linear approach contact the same content, but the modular approach breaks the journey into two units with an exam at the end of each unit.

<table>
<tr><th colspan="3">Paper 2</th></tr>
<tr><th>Linear</th><th colspan="2">Modular</th></tr>
<tr><td>1-hour-15-minute written examination.</td><td colspan="2">1-hour-40-minute written examination.</td></tr>
<tr><td>The total number of marks is 70, 38.9% of the total International GCSE.</td><td colspan="2">The total number of marks if 90, 50% of the total International GCSE.</td></tr>
<tr><td>Content summary
Assesses all the content including content that is in bold and has a ‘C’ prefix.

Questions may come from any topic area across the specification. Bold statements cover some sub-topics in greater depth.</td><td>Content summary
Topic 1: Structures and functions in living organisms
h. Transport
i. Excretion
j. Co-ordination and response
Topic 2: Reproduction and inheritance
a. Reproduction
b. Inheritance</td><td>Topic 4: Ecology and the environment
a. The organism in the environment
b. Feeding relationships
c. Cycles within ecosystems
d. Human influences on the environment
Topic 5: Use of biological resource
a. Food production
b. Selective breeding
c. Genetic modifications (genetic engineering)
d. Cloning</td></tr>
</table>

Q based on Scientific Articles

Scientists think that the giant, predatory toothed whales that replaced the extinct megalodon consumed the same sources of food.

Explain how the evolution of giant, predatory toothed whales may have caused the extinction of megalodon. (lines 5 to 7)

(3)

Teaching in a Modular Way

You may want to change the way you teach the International GCSE Biology Specification Content if you take the Modular route for assessment.

- To support your planning and teaching of the course, we have produced course planners, editable schemes of work and Getting Started Guide.

- First teaching for International GCSE Biology (Modular) is September 2024
- First assessment of International GCSE Biology (Modular) is May/June 2025

Re-sits for Modular International GCSE

- Learners can re-sit any unit irrespective of whether the qualification is to be cashed in.
- If a learner resits a unit more than once, only the better of the two most recent attempts of that unit will be available for aggregation to a qualification grade.
- Results of units will be held in Pearson Edexcel's unit bank for as many years as this specification remains available.
- Once International GCSE in Biology (Modular) has been certificated, all unit results are deemed to be used up at that level. These results cannot be used again towards a further award of the same qualification at the same level.

Assessment Objectives

Assessment objectives and weightings

- The balance of the assessment objectives is the same on Paper 1 and Paper 2.

		International GCSE
AO1	Knowledge and understanding of biology	38–42%
AO2	Application of knowledge and understanding, analysis and evaluation of biology	38–42%
AO3	Experimental skills, analysis and evaluation of data and methods in biology	19–21%
		100%

Taxonomy (Command words)

Add/Label	Requires the addition or labelling of a stimulus material given in the question, for example labelling a diagram or adding units to a table.
Calculate	Obtain a numerical answer, showing relevant working.
Comment on	Requires the synthesis of a number of variables from data/information to form a judgement.
Complete	Requires the completion of a table/diagram.
Deduce	Draw/reach conclusion(s) from the information provided.
Describe	To give an account of something. Statements in the response need to be developed, as they are often linked but **do not** need to include a justification or reason.
Determine	The answer must have an element that is quantitative from the stimulus provided, or must show how the answer can be reached quantitatively. To gain maximum marks, there must be a quantitative element to the answer.
Design	Plan or invent a procedure from existing principles/ideas.
Discuss	• Identify the issue/situation/problem/argument that is being assessed within the question. • Explore all aspects of an issue/situation/problem/argument. • Investigate the issue/situation etc. by reasoning or argument.
Draw	Produce a diagram either using a ruler or freehand.
Estimate	Find an approximate value, number or quantity from a diagram/given data or through a calculation.
Evaluate	Review information (e.g. data, methods) then bring it together to form a conclusion, drawing on evidence including strengths, weaknesses, alternative actions, relevant data or information. Come to a supported judgement of a subject's quality and relate it to its context.
Explain	An explanation requires a justification/exemplification of a point. The answer must contain some element of reasoning/justification – this can include mathematical explanations.
Give/State/Name	All of these command words are really synonyms. They generally all require recall of one or more pieces of information.
Give a reason/reasons	When a statement has been made and the requirement is only to give the reason(s) why.
Identify	Usually requires some key information to be selected from a given stimulus/resource.

Command word	**Definition**
Justify	Give evidence to support (either the statement given in the question or an earlier answer).
Plot	Produce a graph by marking points accurately on a grid from data that is provided and then draw a line of best fit through these points. A suitable scale and appropriately labelled axes must be included if these are not provided in the question.
Predict	Give an expected result.
Show that	Verify the statement given in the question.
Sketch	Produce a freehand drawing. For a graph, this would need a line and labelled axes with important features indicated. The axes are not scaled.
State what is meant by	When the meaning of a term is expected but there are different ways for how these can be described.
Suggest	Use your knowledge to propose a solution to a problem in a novel context.
Verb preceding a command word	
Analyse the data/graph to explain	Examine the data/graph in detail to provide an explanation.
Multiple choice questions	
What, Why	Direct command words used for multiple-choice questions.

Writing the exam paper

- The paper is written by the principal examiner
- It goes through a series of reviews by the Chair and Chief examiner and other Senior examiners
- Amendments are made based on comments from the reviews
- The paper is then ready to print
- At the end of the exam series, the paper is reviewed following student responses to determine what worked well and what caused difficulties for candidates

Balance

Each paper is checked to ensure it has the correct balance of

- Assessment objectives
- Mathematics content (10%)
- Different types of questions including multiple choice (10%)

Training Examiners

- Students sit the exams
- Papers are then scanned into the epen system
- Examiners mark approximately 15 of each item and report back to the PE
- Mark scheme is amended
- PE selects a number of items for practice and qualification
- Examiners mark these to check they understand the mark scheme
- Team leaders regularly check their examiners marking to ensure marking is consistent

Mark Scheme

- The mark scheme is developed alongside the exam paper
- It is written by the Principal Examiner
- The command word used in the question will be reflected in the mark scheme

Activity 1 - Describe

A reflex is a rapid response to a stimulus.

(a) The withdrawal of a hand when a finger touches a hot object is an example of a reflex.

Describe the pathway of a nerve impulse in the reflex arc involved in this response.

(4)

Question Number	Answer	Additional guidance	Mark
6(a)	A description that makes reference to four of the following points: 1. receptor (generates impulse) / eq (1) 2. (impulse) passes along sensory neurone (to relay / motor neurone / to CNS / spinal cord) (1) 3. (sensory / relay / CNS / spinal cord) to motor neurone (1) 4. to muscle / effector (1) 5. crosses synapses (1) 6. (using) neurotransmitters (1)		**4**

Activity 2 - Explain

A farmer has two varieties of a plant species.

One variety has a red flower colour and no scent.

The other variety has a white flower colour and a perfumed scent.

The farmer wants to produce a variety that has the red flower colour and the perfumed scent.

Explain how the farmer could achieve this.

(3)

Question Number	Answer	additional guidance	Mark
2(e)	An explanation makes reference to three of the following: • selective breeding / artificial selection (1) • cross red (flower)/ unscented (flower) with white (flower) / scented (flower)/ eq (1) • select / breed / offspring with red and scent /eq (1) • repeat / for many generations eq (1)	Ignore ref to GM as it is the farmer Cross varieties / the plants ignore desired characteristics alone	**3**

Marking

Activity 3

(a) Increased release of greenhouse gases are a threat to many ecosystems.

(ii) Explain what is meant by the term greenhouse effect.

(2)

Question Number	Answer	Mark
5(a)(ii)	An explanation that makes reference to the following: • IR / long wave radiation is absorbed / traps IR / long wave radiation / traps heat / prevents heat escaping / eq (1) • (so) increases (global) temperature / earth warms / global warming /eq (1)	**2**

Examiners Report

Question 5 was about greenhouse gases. In Q05(a)(ii) candidates were asked to explain what is meant by the term greenhouse effect.

(ii) Explain what is meant by the term **greenhouse effect**.

(2)

The greenhouse ~~gasses~~ gases reflect longer-wavelength frequencies of EM radiation (originating from the sun) back to earth after they have reflected off of the surface of the earth and as attempting to leave the atmosphere. The trapping of infrared radiation contributes to global warming.

ResultsPlus
Examiner Comments

This response gains both marks for explaining that greenhouse effect is the trapping of infra-red radiation leading to global warming.

Activity 4

a) Human blood contains red blood cells and white blood cells.

Scientists collect data from men and women living at different altitudes.

The scientists determine

- the mean mass of haemoglobin in one litre of blood
- the mean number of red blood cells in one litre of blood

The table gives the scientists' results.

Altitude in m	Mean mass of haemoglobin in 1 litre of blood in g		Mean number of red blood cells in 1 litre × 10^{12}		Number of people in sample	
	men	women	men	women	men	women
0 (sea level)	148	138	5.15	4.84	18 453	27 559
1890	152	147	5.37	5.20	2175	3510
2270	151	142	5.18	4.88	2023	2943

Discuss the relationship between altitude and mean mass of haemoglobin in 1 litre of blood and the number of red cells in 1 litre of blood in men and women.

Use the data in the table and your own knowledge in your answer.

1. large numbers / study / reliable results / eq (1)			
2. fewer people in study / lower numbers at altitude than sea level /eq(1)			
3. more women than men / eq (1)			
4. no information on age /health / body mass / eq (1)			
5. Hb increases from 0 to 1890 / from 0 to 2270 / with altitude eq (1)			
6. (as) more red cells (produced) (at 1890) (at 2270) / eq (1)			
7. as less partial pressure of oxygen / less (availability of) oxygen / eq (1)	allow lower oxygen concentration		
8. to enable oxygen transport / uptake / aerobic respiration / eq (1)	allow for gas exchange		
9. little change in Hb / (slight) reduction from 1890 to 2270 / eq (1)			
10. as small(er) increase in altitude / eq (1)			
11. drop in red cells from 1890 to 2270 / eq (1)			

Examiners Report

This item is the second evaluative response on this paper. Candidates were asked to discuss the relationship between altitude and mean mass of haemoglobin in 1 litre of blood and the number of red cells in 1 litre of blood in men and women. They were told to use the data in the table and their own knowledge in their answer. This item was very well answered by most candidates with many gaining full credit.

Example

(iii) Discuss the relationship between altitude and mean mass of haemoglobin in 1 litre of blood and the number of red cells in 1 litre of blood in men and women.

Use the data in the table and your own knowledge in your answer.

(5)

The greater the altitude, the greater the number of red blood cells per litre and the greater the mass of haemoglobin in 1 litre of blood as air is thinner at higher altitude, there there is less O_2 for respiration, so the body make more red blood cells and haemoglobin to transport enough O_2 to cells in body for respiration.

There is more red blood cells per litre and mass of haemoglobin per litre in men than women, may be because men are generally taller and they have more cells. Therefore need O_2 for respiration and CO_2 removed, there men need more red blood cells to carry O_2 to cells and CO_2 away.

* cells needed O_2

ResultsPlus

Examiner Comments

This response scores full marks. It discusses the increase in red blood cells and haemoglobin with altitude. It notes that at altitude there is less oxygen available so more haemoglobin enables transport of oxygen for respiration. It also notes that men have more haemoglobin and more red cells than women.

Activity 5 - Comment

A degu is a rodent that lives in a very dry environment in South America. The degu gets its water input by feeding on plants.

The water intake of the degu changes during the winter and summer months.

Table 2 shows the body mass, water intake and urine concentration of the degu in the winter and in the summer. It also shows the total rainfall in winter and in summer.

Measurement	Winter	Summer
total rainfall in mm	245	12
body mass in g	119.7	124.8
water intake in one day in cm^3	40.4	10.3
urine concentration in arbitrary units	1123	3137

Comment on the differences in body mass, water intake and urine concentration

in winter and summer.

Use the data in the table and your own knowledge in your answer.

(4)

In winter	In summer
1. body mass lower / eq (1)	higher in summer
2. as fewer plants available / less food / hibernating / eq (1)	more plants
3. less sunlight / lower temp / less photosynthesis / eq (1)	more sunlight
4. (much) more water intake / eq (1)	less water intake
5. as more rainfall/ eq (1)	less rainfall
6. less concentrated urine in winter / more urine / eq (1)	more concentrated
7. (so) more water lost in urine / eq (1)	less water lost
8. Ref to data for urine 3× less concentrated in winter / water input 4 × higher in winter / eq (1)	urine x 3 more conc/ water input 4 x lower

Examiners Report

Question 2 (c)

In Q02(c) candidates were told that a degu is a rodent that lives in a very dry environment in South America. The degu gets its water input by feeding on plants. The water intake of the degu changes during the winter and summer months. Candidates were given a table showing the body mass, water intake and urine concentration of the degu in the winter and in the summer. It also showed the total rainfall in winter and in summer. Candidates were asked to comment on the differences in body mass, water intake and urine concentration in winter and summer.

Candidates did really well on this evaluative item and many gained full marks. They commented on the lower body mass in winter and linked this to fewer plants available as less sunlight. They also commented on the higher rainfall leading to higher water intake. They noted that this led to a more dilute urine containing more water.

32

Comment on the differences in body mass, water intake and urine concentration in winter and summer.

Use the data in the table and your own knowledge in your answer.

(4)

The body mass increases in the summer and the water intake in summer is low, hence resulting in a higher concentration of urine because most of the water is reabsorbed by the collecting duct due to its increased permeability done by the release of more ADH. The volume of ~~water~~ urine decreases and less urine is produced. The body mass increases because there is less water loss from the body. However in winter the water intake is high resulting in less concentrated urine because less water is reabsorped which also decreases the body mass as water is lost from the body resulting in more volume of urine. However there are other factors that influence this such as the sweat production and etc.

(Total for Question 2 = 13 marks)

ResultsPlus
Examiner Comments

This answer gains full marks. It comments on increased body mass in summer, lower water intake and more concentrated urine containing less water.

Activity 6 - Investigation

Carbon dioxide can be added to a glasshouse to increase the yield of a crop plant.

Design an investigation to find the carbon dioxide concentration needed for maximum crop yield.

Include experimental details in your answer and write in full sentences.

(6)

An answer that makes reference to six of the following: C use glasshouses with three or more concentrations / levels / amounts of carbon dioxide / eq (1)	at least 3 concentrations of CO_2 use 3 different conc. OK the conc. don't need to be stated allow high / medium /zero	**6**
O use crop plants of same species eq/ (1) R repeat each concentration /eq (1)		
M1 measure mass / kg / amount of seeds / number of leaves / fruit / size (of leaves) / eq (1) M2 after **stated** time / eq (1) S1 temperature / (sun)light / same season / eq (1) S2 same soil / water / humidity / fertiliser / minerals/ pH/ eq (1)	Not yield alone not height	

Examiners report

Candidates were asked to design an investigation to find the carbon dioxide concentration needed for maximum crop yield. This item produced the whole range of scores with many candidates scoring 5 or 6 marks. This item differed slightly from previous CORMS items as candidates were asked to find the concentration that produces most yield. Therefore the examiners expected candidates to use a range of carbon dioxide concentrations rather than carbon dioxide and no carbon dioxide. Most candidates were able to do this. Some responses did not specify how they would measure yield or used height of a crop as their measure.

Design an investigation to find the carbon dioxide concentration needed for maximum crop yield.

Include experimental details in your answer and write in full sentences.

M ✓
S ✓
S ✓

(6)

add a range of concentrations of carbon dioxide to 5 glasshouses. keep the same species of crop plant in each glasshouse, for example strawberries. count how many crops have grown before, and count again every 24 hours for a week. repeat this 3 times for each concentration of carbon dioxide. keep the temperature and size of each glasshouse the same.

ResultsPlus
Examiner Comments

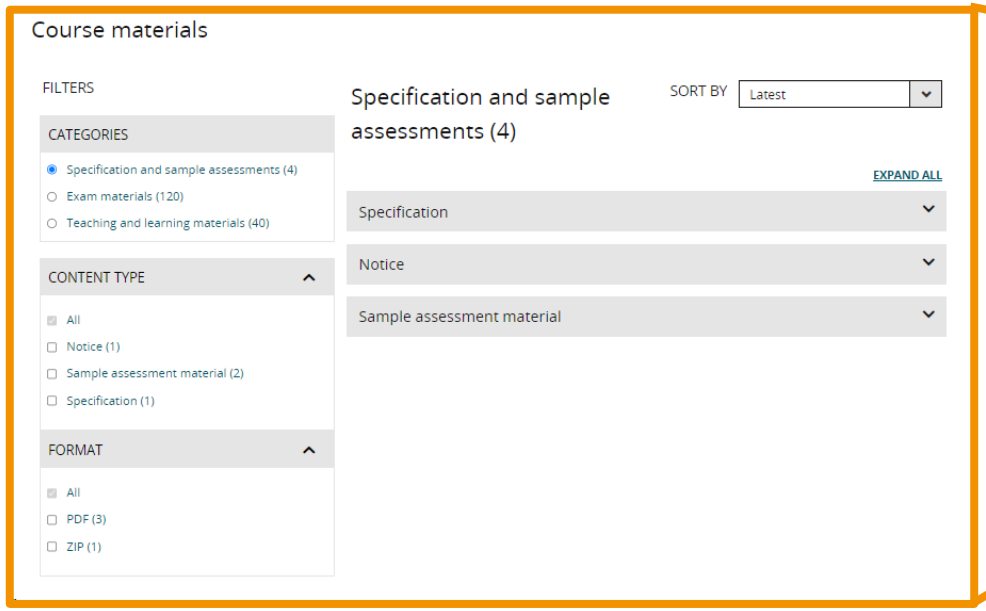
This response also scores full marks for C, O, M1 , M2, R and S1. M1 was allowed for how many strawberries were produced.

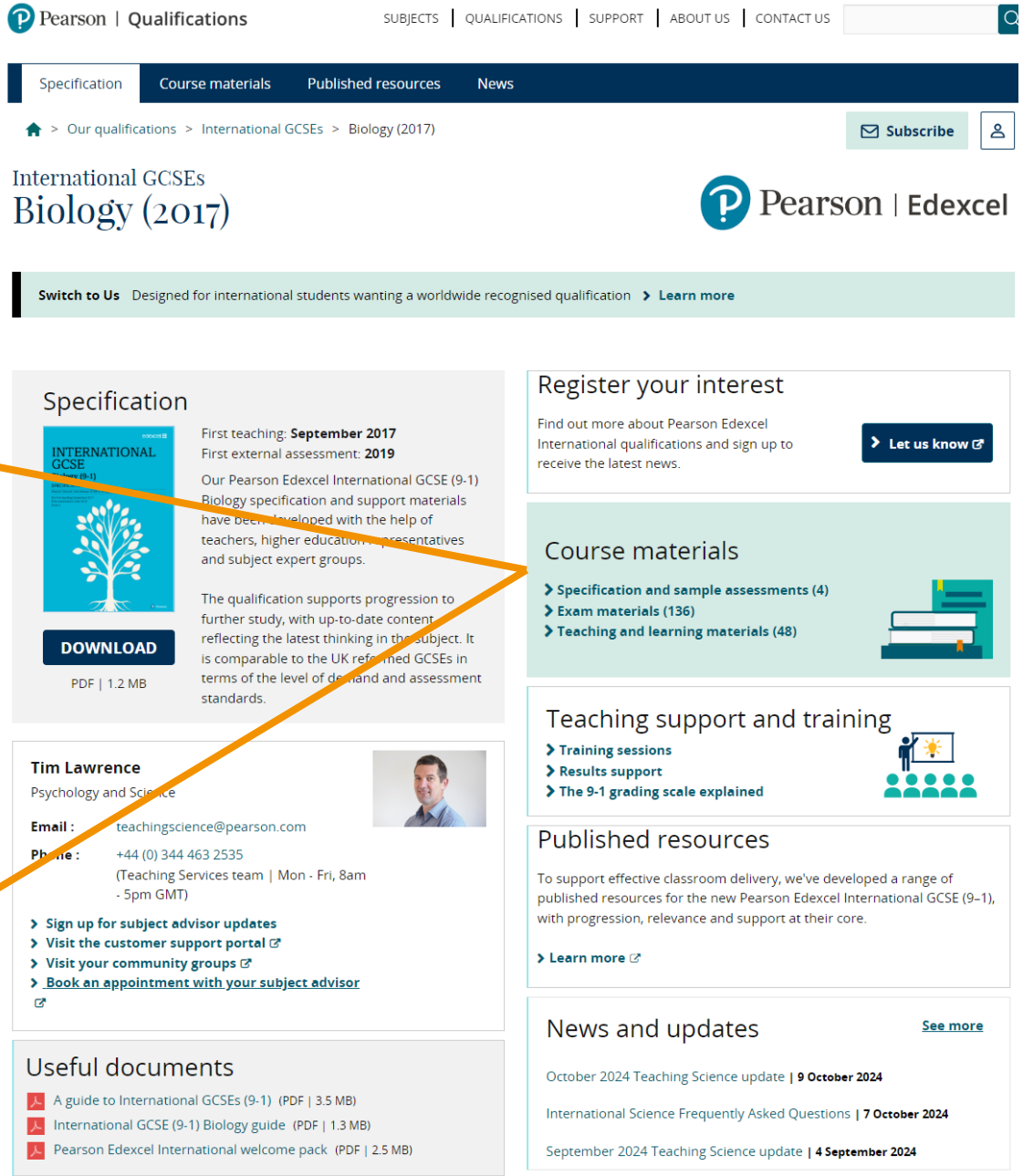
Support

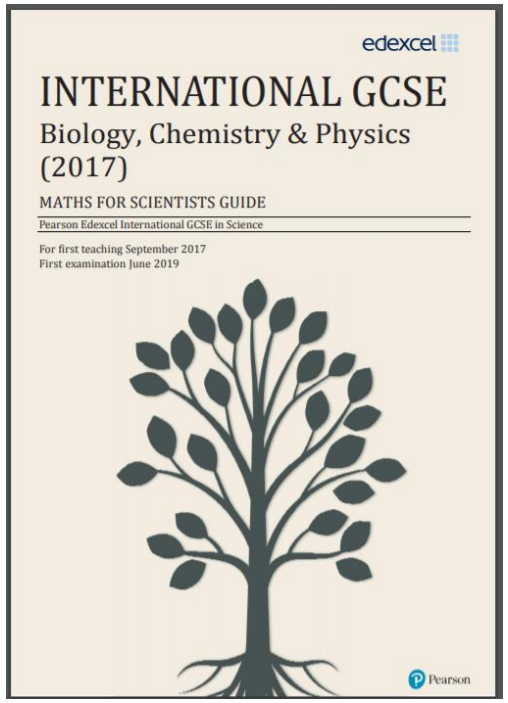
Support for you at every stage

Free Resources and support	Planning, teaching and learning	Exam preparation and assessment	Results support
Getting Started Guide	✓		
Training Events (Face-to-Face & Online)	✓		
Subject Advisor Support	✓	✓	✓
Community Forums	✓	✓	✓
Schemes of Work	✓		
Skills Mapping	✓		
Sample Assessment Materials	✓	✓	
Examiner Reports	✓	✓	✓
Exemplar Marked Responses		✓	
Past Papers		✓	
examWizard		✓	
Mark Schemes		✓	
ResultsPlus Mock Exam Analysis		✓	
Results Plus		✓	✓
Access to Scripts Service (ATS)			✓

Teaching and Learning Materials online



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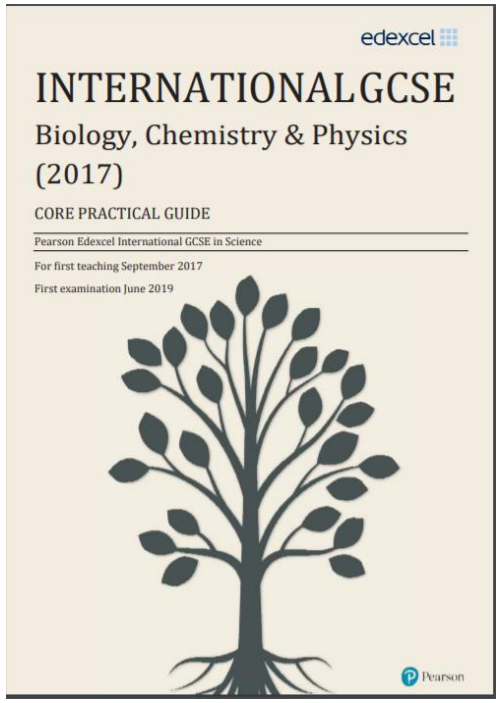
INTERNATIONAL GCSE
Biology, Chemistry & Physics (2017)
MATHS FOR SCIENTISTS GUIDE
Pearson Edexcel International GCSE in Science
For first teaching September 2017
First examination June 2019
Pearson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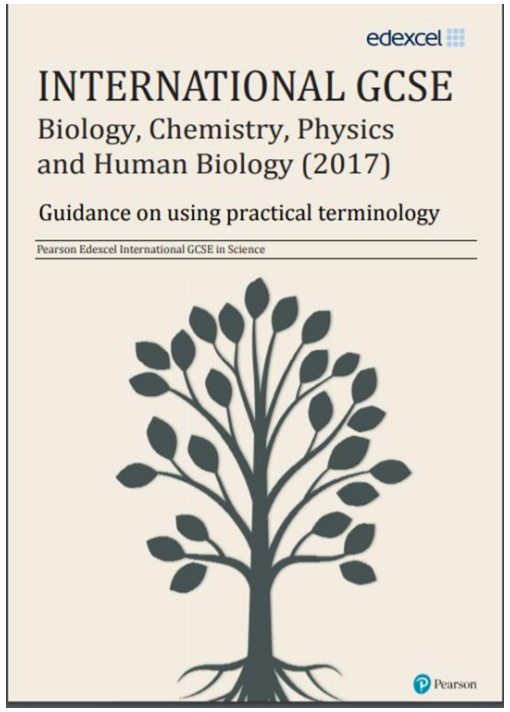
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Biology, Chemistry, Physics and Human Biology (2017)
Guidance on using practical terminology
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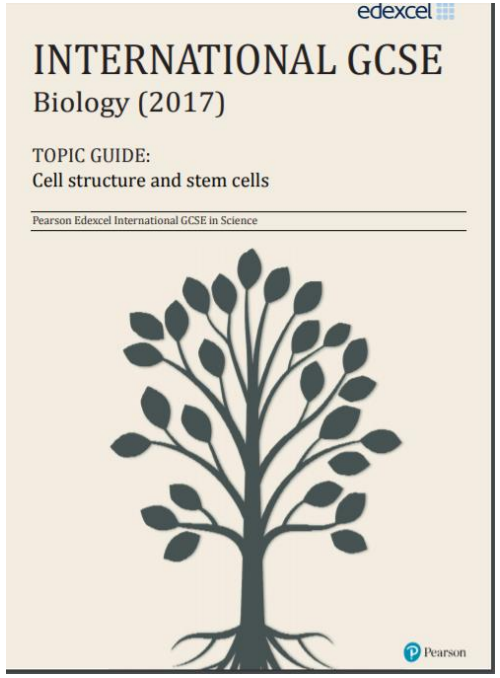
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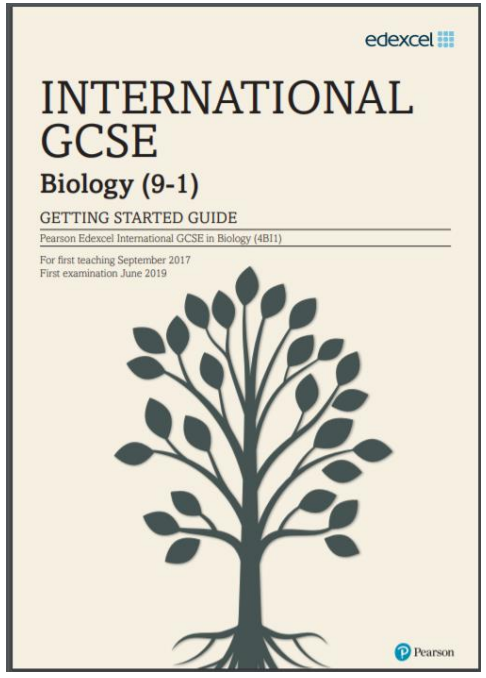
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INTERNATIONAL GCSE
Biology (9-1)
GETTING STARTED GUIDE
Pearson Edexcel International GCSE in Biology (4BI1)
For first teaching September 2017
First examination June 2019
Pearson

Support for Exam preparation and post results

ResultsPlus

- Free online results analysis tool for teachers.
- Provides a detailed breakdown of student performance in Pearson Edexcel exams.
- Identify topics and questions where the student could benefit from further learning and inform teaching strategies and approaches.
- Benchmark your school's performance against other Pearson Edexcel schools in your country.
- Not just a post-results tool: Mock exam results can also be fed into the system to produce analysis.
- Find student results analysis from their previous Pearson Edexcel school.
- ResultsPlus Direct gives your students access to their final grades and performance breakdown, wherever they are.
- Schools can sign up for free ResultsPlus account in just a few quick and easy steps: https://qualifications.pearson.com/en/support/Services/ResultsPlus.html

ResultsPlus

1. Student takes exam on paper

2. Exam papers scanned

3. Examiners mark papers online

4. Performance reports shared

examWizard

- A free tool for teachers which helps you make quick homework assignments, topic tests and mock exams.
- Questions tagged against unit, topic and assessment objective or simply choose a whole past paper.
- Use existing mark schemes for accurate marking.
- Use examiner report for insight.
- Most recent exam content available sooner.
- Use the results to understand where students need more support, informing teaching strategies.

Access to Script (ATS) Online Portal

Access to Scripts (ATS) is a free online portal which allows teachers to immediately access electronically marked exam papers

Provides enhanced transparency and

- Offers transparent approach to marking process
- Provides better understanding of marking before requests for enquiries about results are made
- Provides excellent aid for teaching and preparing other cohorts for examinations by helping you to evaluate a student's performance on particular questions in relation to what they have been taught.

Available instantly from results day for all our examination series, for a defined window, you can view and download scripts which have been marked online free of charge from our Self-Service Portal.

For more information on ATS, and the post results windows, visit our post-results pages.

Additional Paid Resource

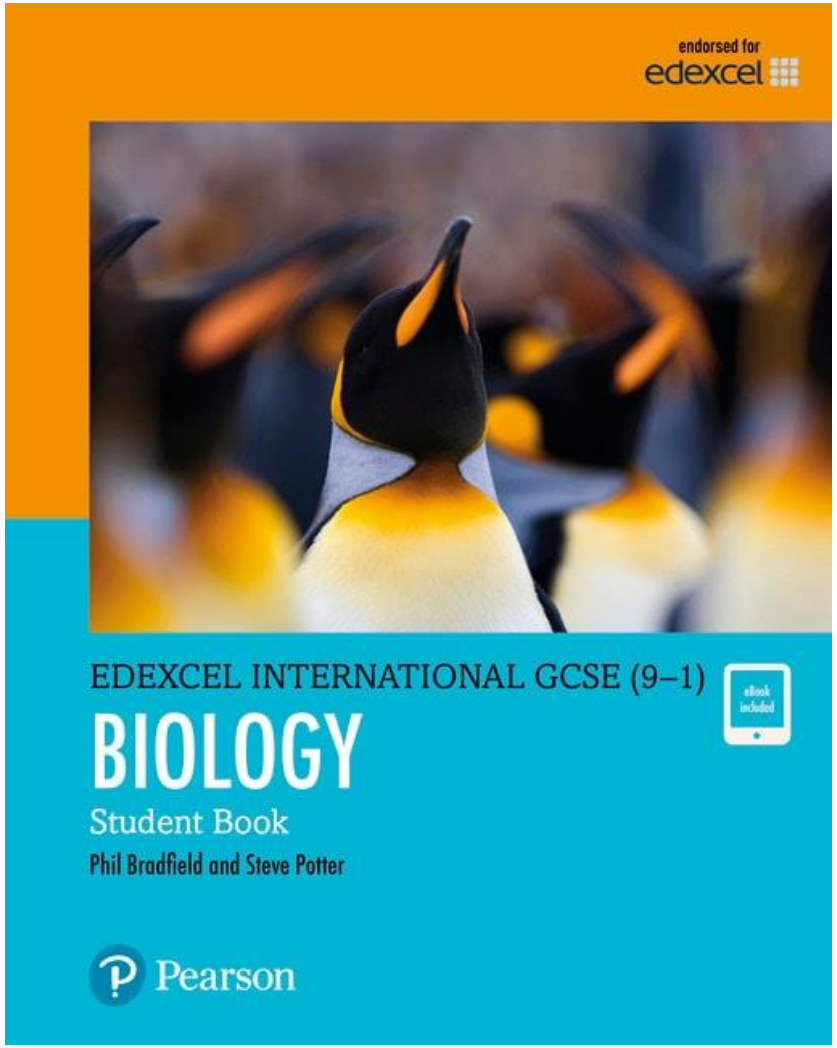
Resource	Planning, teaching and learning	Exam preparation and assessment	Results support
Curriculum-matched Student Books with ActiveBooks	✓	✓	
Teaching Hubs	✓	✓	

Pearson published resources

Student Book
Edexcel International GCSE (9-1): Biology Student Book
ISBN: 9780435185084

For more information and access to samples visit:

www.pearson.com/international-schools



International GCSE (9–1)

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