PEARSON EDEXCEL INTERNATIONAL GCSE (9-1)

Approaches to Teaching the Pearson Edexcel International GCSE in Biology

GETTING READY TO TEACH

Event code: 4BI1-20IF2

First teaching in 2017, first assessment in 2019.

Session Agenda

10:00 Welcome & Introductions
10.00 International GCSE Features
10:10 The new Edexcel International GCSE in Biology – Content and the Specification
11.00 Assessment Objectives
12.00 Question styles and marking candidate answers
1.00 Lunch
2.00 Command words
3.30 Practical assessment, mathematics, and support from Pearson 3.55 Questions
4.00 Finish

Aims and Objectives

By the end of today's meeting you should:

- Understand the content of the Biology specification
- Have developed an understanding of how to plan lessons and a scheme of work
- Understand the Assessment Objectives
- Be able to apply mark schemes
- Understand the support that is available

And you will also have the opportunity to share good practise with other teachers

About Pearson Edexcel

Pearson is the world's leading learning company.

Our mission is to help people make progress in their lives through learning – because we believe that learning opens up opportunities, creating fulfilling careers and better lives.

- **Qualifications**: our qualifications and assessments help to educate millions of people worldwide.
- **Support**: we provide innovative textbooks, curriculum materials, multimedia learning tools, IT platforms, professional development.
- **Impact**: At the core of everything we do is the desire to make a measurable impact on improving people's lives through learning.

Edexcel is part of Pearson Education and is the UK's largest awarding body.

- **Worldwide recognition**: over 150 years of international education experience, more than 3.4 million learners in 70+ countries. Over 9 million scripts marked annually, with exceptionally reliable results.

International GCSE Features

9-1 grading scale

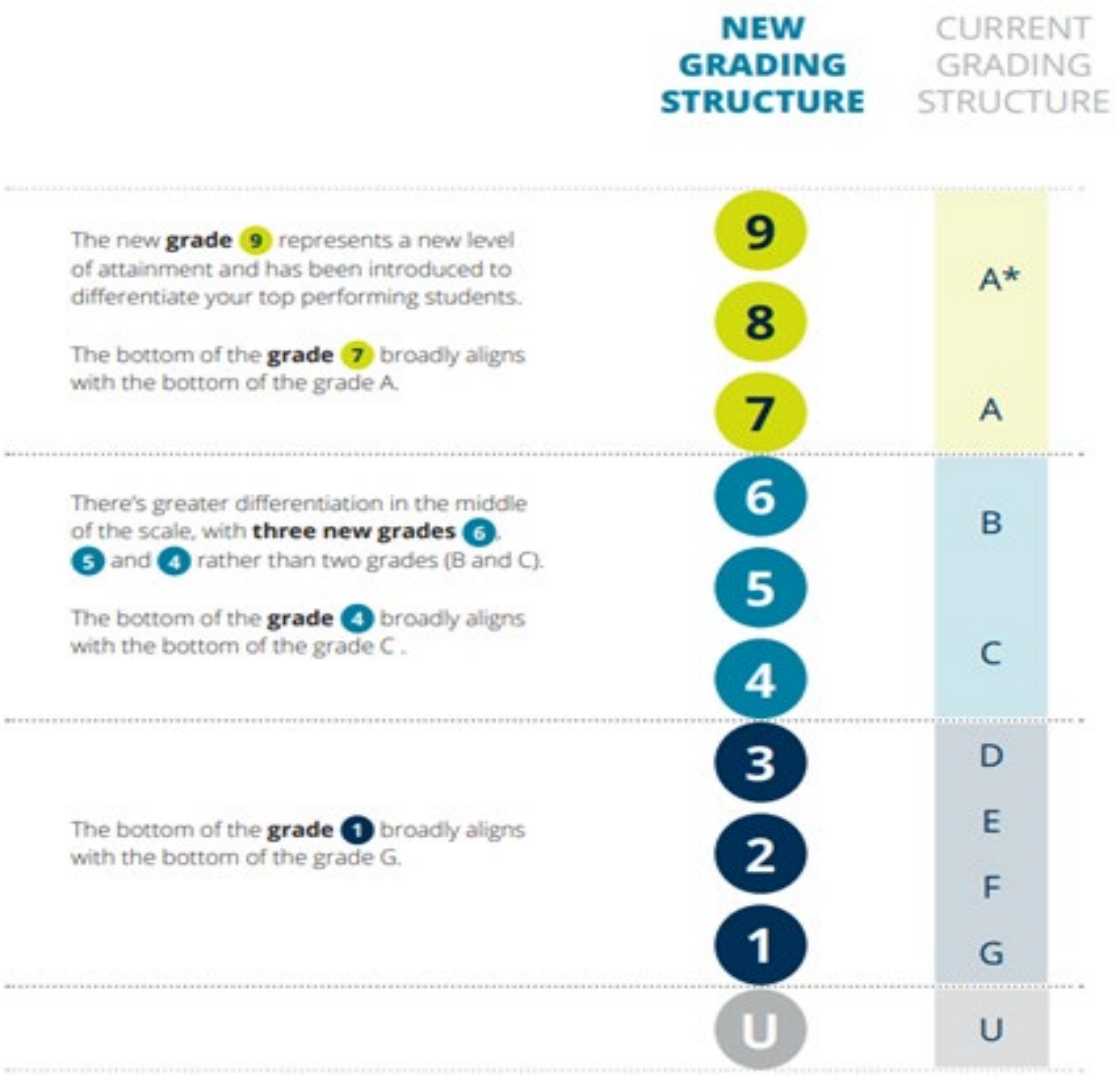
Awarding

- The grading system has changed, but our commitment to awarding grades that accurately reflect learner exam performance remains the same.
- We set new grade boundaries (minimum number of marks needed to achieve each grade) for each assessment of each qualification.

Benefits

- Greater differentiation across levels of attainment, e.g. 2 grades where the current C grade is.
- Rewards truly outstanding achievement with the grade 9.
- Provides more information about student attainment to help progression to A Level.
- Same scale for Pearson Edexcel GCSE and International GCSE allows for clear comparison with English standards, unlike old A* to G grading.

9–1 Grading Scale



World-class qualifications

All Edexcel qualifications are developed to meet Pearson's **World Class Qualification design principles**

Endorsement of educational **thought-leaders and assessment experts** from across the globe

Developed using an understanding and benchmarking of **all educational systems**

Qualifications that support young people to **develop the capabilities** they need to **progress** and prosper in their lives

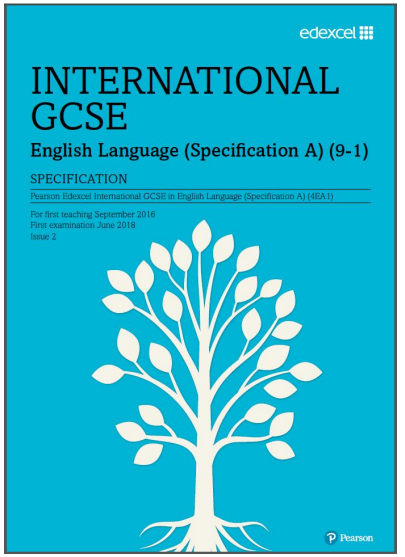
Supporting transferable skills

- Our transferable skills framework underpins the design all Pearson Edexcel international qualifications and their supporting resources across IPLS, International GCSE and International A Level.
- Ensures our assessments target the skills students' need for successful progression.
- Increasing our support where these skills **naturally** occur through the teaching, learning and assessment.
- Pearson materials and mapping will support you in identifying and developing the acquisition of these skills in students across the full curriculum.
- https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/General/Transferable-Skills-Information-Pack.pdf

New Edexcel International GCSE in Biology

Subject Features

- Reviewed and updated in light of UK GCSE changes
- Full preparation for A Level study
- Mathematical skills embedded
- Clear methods of assessment
- Transferable Skills embedded
- Practical Skills embedded
- Dedicated textbooks
- Teachingscience@Pearson.com



The Specification

Question:

- How, as teachers, do we use the specification?
- and how important is it?

Answer

- It is very important! The specification is a very detailed document that helps to guide our teaching.
- Contents include:
  - Assessment models – 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.

The Assessment Model

Key Features:

- Two examination papers – both must be taken in the same session.
- Linear examinations – there are no modules
- No separate practical exam – practical skills are assessed on the papers
- Papers have similar question styles but paper 2 has additional content
- No tiering of papers – both papers grade from 9-1

Paper 1

Biology Paper 1	*Paper code 4BI1/1B and 4SD0/1B
• Externally assessed • Availability: January and June • First assessment: June 2019	61.1% of the total International GCSE

Content summary

Assesses core content that is **not** in bold and does not have a 'B' reference. Questions may come from any topic area across the specification.

1 The nature and variety of living organisms

2 Structures and functions in living organisms

3 Reproduction and inheritance

4 Ecology and the environment

5 Use of biological resources

Assessment

- The paper is assessed through a 2-hour written examination paper set and marked by Pearson.
- The total number of marks is 110.
- A mixture of different question styles, including multiple-choice questions, short-answer questions, calculations and extended open-response questions.
- A calculator may be used in the examinations.

Paper 2

Biology Paper 2	*Paper code 4BI1/2B
• Externally assessed • Availability: January and June • First assessment: June 2019	38.9% of the total International GCSE

Content summary

Assesses **all the content**, including content that is in bold and has a 'B' reference.
Questions may come from any topic area across the specification.
Bold statements cover some sub-topics in greater depth.

1 The nature and variety of living organisms

2 Structures and functions in living organisms

3 Reproduction and inheritance

4 Ecology and the environment

5 Use of biological resources

Assessment

- The paper is assessed through a 1-hour and 15-minute written examination paper set and marked by Pearson.
- The total number of marks is 70.
- A mixture of different question styles, including multiple-choice questions, short-answer questions, calculations and extended open-response questions.
- A calculator may be used in the examinations.

Assessment summary

Paper 1	**Two hours; 110 marks**
Paper 2	**One hour and 15 minutes; 70 marks**

Both papers will contain a mixture of AO1, AO2 and AO3

The AO3 questions are likely to be in a practical context

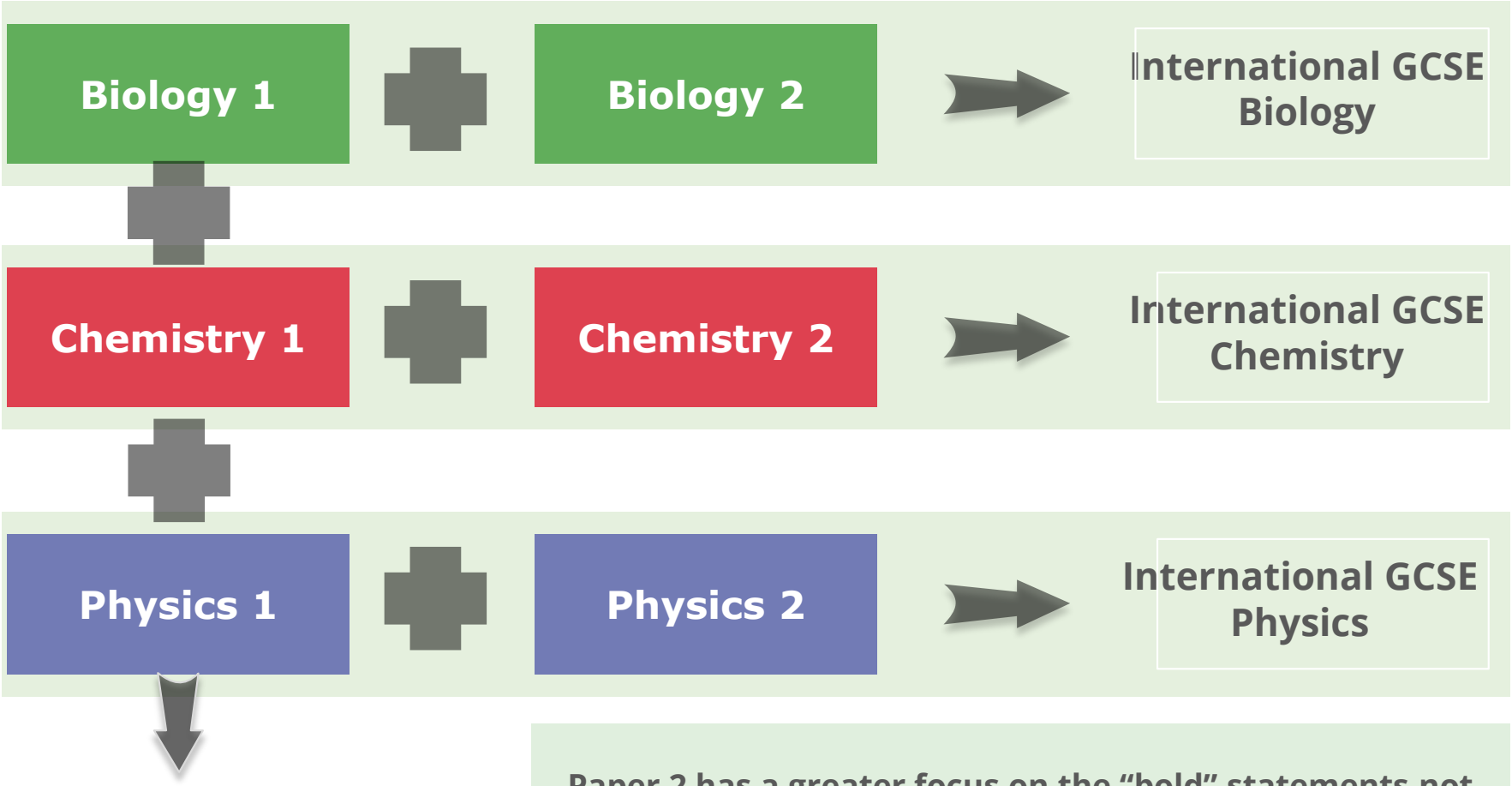
Assessment summary

There are two examination papers:

Paper 1	will **NOT** include the specification statements printed in **BOLD**
Paper 2	includes **ALL** the specification statements, including those printed in **BOLD**

Both papers have similar question types

Humans	
2.59	describe the composition of the blood: red blood cells, white blood cells, platelets and plasma
2.60	understand the role of plasma in the transport of carbon dioxide, digested food, urea, hormones and heat energy
2.61	understand how adaptations of red blood cells make them suitable for the transport of oxygen, including shape, the absence of a nucleus and the presence of haemoglobin
2.62	understand how the immune system responds to disease using white blood cells, illustrated by phagocytes ingesting pathogens and lymphocytes releasing antibodies specific to the pathogen
2.63B	**understand how vaccination results in the manufacture of memory cells, which enable future antibody production to the pathogen to occur sooner, faster and in greater quantity**
2.64B	**understand how platelets are involved in blood clotting, which prevents blood loss and the entry of micro-organisms**
2.65	describe the structure of the heart and how it functions
2.66	explain how the heart rate changes during exercise and under the influence of adrenaline
2.67	understand how factors may increase the risk of developing coronary heart disease
2.68	understand how the structure of arteries, veins and capillaries relate to their function
2.69	understand the general structure of the circulation system, including the blood vessels to and from the heart and lungs, liver and kidneys


Biology 1
Biology 2
International GCSE Biology
Chemistry 1
Chemistry 2
International GCSE Chemistry
Physics 1
Physics 2
International GCSE Physics
International GCSE Science (Double Award)
Paper 2 has a greater focus on the "bold" statements not present in Double Award

Biology qualification content summary

There continue to be five topic areas in the specification:

Nature and variety of living organisms	Structures and functions in living organisms	Reproduction and inheritance	Ecology and the environment	Use of biological resources
▪ Characteristics of living organisms ▪ Variety of living organisms	▪ Organisation ▪ Cell structure ▪ Bio molecules ▪ Movement in & out of cells ▪ Nutrition ▪ Respiration ▪ Gas exchange ▪ Transport ▪ Excretion ▪ Coordination & response	▪ Reproduction ▪ Inheritance	▪ Organisms in environment ▪ Feeding relationships ▪ Cycles within ecosystems ▪ Human influences on environment	▪ Food production ▪ Selective breeding ▪ Genetic modification ▪ Cloning

Topic 1: The nature and variety of living organisms

- Subdivided into two areas:
  (a) Characteristics of living organisms
  (b) Variety of living organisms
- Focus on classification of organisms
- Key features of living organisms and viruses are given
- Students often find fungi and protoctists difficult – key vocabulary is given. They should be familiar with key terms such as mycelium, hyphae, chitin, eukaryote and prokaryote, pathogen.
- Example organisms and viruses are given, e.g. Pneumococcus, HIV
- Only account for about 5% of marks over the papers.

Topic 2:
Structure and functions in living organisms

(a) Level of organisation
(b) Cell structure
(c) Biological molecules
(d) Movement of substances into and out of cells
(e) Nutrition
(f) Respiration
(g) Gas exchange
(h) Transport
(i) Excretion
(j) Co-ordination and response

Topic 2:
Structure and functions in living organisms

- Large section of specification.
- Biological molecules, cell biology and physiology of living organisms.
- What many pupils think of as being biology.
- Both animals and plants are considered.

Topic 3 Reproduction and inheritance

- Two sub-topics:
  (a) Reproduction
  (b) Inheritance
- Plant and animal reproduction are both considered
- Inheritance covers both classical genetics and molecular genetics (DNA structure, transcription, translation, mutations), natural selection and mutation.

Topic 4 Ecology and the environment

- Four sub-topics:
  - (a) *The organism in the environment*
  - (b) *Feeding relationships*
  - (c) *Cycles within ecosystems*
  - (d) *Human influences on the environment*

- Many students find nitrogen cycle challenging.
- Water vapour, carbon dioxide, nitrous oxide, methane and CFCs are listed as greenhouse gases

Topic 5 Use of biological resources

- Four sub-topics:

  (a) Food production

  (b) Selective breeding

  (c) Genetic modification (genetic engineering)

  (d) Cloning
- This topic has several different themes
- Lots of detail in terms of methods of cloning, use of fermenters and genetic engineering.

How do we use the specification to organise our teaching?

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Pearson

Pearson Edexcel
International GCSE Biology (2017)

How to use the Scheme of Work

This Scheme of Work (SoW) has been made available on a word document rather than PDF, allowing you to edit the document in a way that suits your teaching style and learner needs.

International GCSEs have 120 - 140 guided learning hours.

Guidance provided within the course planners, schemes of work and lesson plans are suggested approaches which can be adapted by centres to suit their particular context.

The following SoW is based on 2 hours of teaching time per week over 60 weeks and can be adjusted to how centres will use time for practical activities differently; you should edit this planner to suit your teaching approach.

The course planner, in the *Getting Started Guide,* provides a high level view of how you could approach the topics to cover the specification content across two years.

The columns in this lesson plan indicate:

- An overview of the time allocated to lessons
- Which section of the specification this lesson (or group of lessons) relates to
- The learning outcomes of those lessons.
- The activities and resources that could be used to support the teaching of this lesson
- Transferable skills support, see below for further information

Week	Content coverage	Learning outcomes	Exemplar activities	Exemplar resources	Which transferable skills are explicitly assessed through examination	Which transferable skills could also be acquired through teaching and delivery
4	**Section 2: Structures and functions in living organisms** a) Levels of organisation b) Cell structure	Students will be assessed on their ability to: **2.5B explain the importance of cell differentiation in the development of specialised cells** **2.6B understand the advantages and disadvantages of using stem cells in Medicine.**	**Activities:** • View abpi poster of stem cells. • Carry out interactive web exercise on stem cells (http://www.abpischools.org.uk/page/resource/age.cfm). • Class debate on the ethics of stem cell use. • Make an information leaflet for a doctor's surgery informing patients on the uses of stem cells.	**Websites:** • Association of the British Pharmaceutical Industry (ABPI) website provides posters, information and interactive exercises on stems cells (http://www.abpischools.org.uk/page/about.cfm) **Video clips:** • BBC DVD about stem cells and uses in medicine – Fix Me – Horizon	Personal and social responsibility Adaptability Problem solving Reasoning Interpretation Adaptive learning Adaptability Creativity	Personal and social responsibility Adaptability Intellectual interest and curiosity Perseverance Communication Collaboration Teamwork Ethics Cooperation Interpersonal skills Leadership Responsibility Assertive communication Self- presentation
5	**Section 2: Structures and functions in living organisms** c) Biological molecules	Students will be assessed on their ability to: **2.7** identify the chemical elements present in carbohydrates, proteins and lipids (fats and oils) **2.8** describe the structure of carbohydrates, proteins and lipids as large molecules made up from smaller basic units: starch and glycogen from simple sugar; protein from amino acids; lipid from fatty	**Activities:** • View models of the biological molecules to ascertain common elements. • Make paper models of large molecules from simple basic units. • Build a Carbohydrate interactive game. **Animation:** • Virtual laboratory – starch test	Edexcel International GCSE Biology Student Book: Pages 37–43 Experiment 6 – Student Book: Page 43 and pdf on ActiveBook Page 42 Edexcel International GCSE Biology Revision Guide: Page 15	Critical thinking Problem solving Analysis Reasoning Interpretation Decision making Adaptive learning Creativity Innovation Adaptability	Intellectual interest and curiosity Reasoning Interpretation Decision making Adaptive learning Initiative Self-direction Self regulation (metacognition, forethought, reflection) Communication Collaboration

Activity 1: What order should we teach the topics in?

Use the specification to decide:

- Which topics should be covered first?
- Which topics should be left to the end?
- Which topics are very 'synoptic?'
- Which topics are conceptually difficult?
- Which topics require other aspects of the specification to have been covered previously?

There is no one correct order of teaching topics!

- The published scheme of work runs in specification order.
- You can change the order to suit schools / classes / teaching styles.
- Make sure that everything is covered!
- Use topics to revisit themes – helps pupil understanding and 'deep learning'
- Use 'synoptic' topics such as fish farming to draw together all aspects of the specification

Considerations when planning a scheme of work

- ‘underpinning topics’ need covering early – cells, transport across membranes, enzymes
- Some topics are often found to be more difficult – transcription / translation and so may be better placed at the end of the course BUT there can be a risk that they are then rushed
- Some topics require knowledge from other areas of the course – gas exchange requires a knowledge of diffusion
- Some topics draw everything together – fish farming involves pollution, respiration, digestion, nitrogen cycle, energy flow……
- Seasonal availability of plants for practicals.

Consideration of topics when planning individual lessons

- Plan lessons accordingly – never assume that pupils have a full understanding of other concepts.
- Use each topic as a way of making links to other topics – this helps pupils learn and makes them feel confident.

Activity 2: Gas exchange in Humans

Which other areas of the specification does this link to?

Humans	
2.46	describe the structure of the thorax, including the ribs, intercostal muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes
2.47	understand the role of the intercostal muscles and the diaphragm in ventilation
2.48	explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries
2.49	understand the biological consequences of smoking in relation to the lungs and the circulatory system, including coronary heart disease
2.50	*practical: investigate breathing in humans, including the release of carbon dioxide and the effect of exercise*

(d)	Movement of substances into and out of cells
Students should:	
2.15	understand the processes of diffusion, osmosis and active transport by which substances move into and out of cells
2.16	understand how factors affect the rate of movement of substances into and out of cells, including the effects of surface area to volume ratio, distance, temperature and concentration gradient
2.17	*practical: investigate diffusion and osmosis using living and non-living systems*

(f)	Respiration
Students should:	
2.34	understand how the process of respiration produces ATP in living organisms
2.35	know that ATP provides energy for cells
2.36	describe the differences between aerobic and anaerobic respiration
2.37	know the word equation and the balanced chemical symbol equation for aerobic respiration in living organisms
2.38	know the word equation for anaerobic respiration in plants and in animals
2.39	*practical: investigate the evolution of carbon dioxide and heat from respiring seeds or other suitable living organisms*

(h) Transport
Students should:
2.51 understand why simple, unicellular organisms can rely on diffusion for movement of substances in and out of the cell
2.52 understand the need for a transport system in multicellular organisms
2.67 understand how factors may increase the risk of developing coronary heart disease

(g) Gas exchange
Students should:
Flowering plants
2.40B understand the role of diffusion in gas exchange
2.41B understand gas exchange (of carbon dioxide and oxygen) in relation to respiration and photosynthesis
2.42B understand how the structure of the leaf is adapted for gas exchange
2.43B describe the role of stomata in gas exchange
2.44B understand how respiration continues during the day and night, but that the net exchange of carbon dioxide and oxygen depends on the intensity of light
2.45B *practical: investigate the effect of light on net gas exchange from a leaf, using hydrogen-carbonate indicator*

How can we help students with content?

- Give clear checklists for them each time we teach a topic.
- Encourage ‘metacognition’ by getting them to evaluate their own knowledge and learning of a topic.
- After tests and exams, get them to assess their ‘weaker’ topic areas by giving them a grid to write in their marks.

Checklist for topics

Code	Topic	☺	😐	☹
7.1	know that the process of respiration releases energy in living organisms			
7.2	practical: investigate the difference between inspired and expired air for carbon dioxide concentration			
7.3	know the word equation and the balanced chemical symbol equation for aerobic respiration in living organisms			
7.4	know the word equation for anaerobic respiration			
7.5	explain the differences between aerobic and anaerobic respiration			
7.6	understand the role of ATP in energy transfer (addition and removal of a phosphate group and associated energy requirement and release)			

Test grids

- Students fill in a test grid after getting their paper back.
- The grid gives the specification references so they can check any weaker areas.
- Assessment objectives are also shown to help them self-identify where they lose marks – we will look at this later!

Test Grid

Question	Spec Ref	Max Mark	My Score	AO1	AO2	AO3
1ai	2.54	3				
1aii	2.54	2				
1b	2.57B	3				
1ci	2.57B	1				
1cii	2.60	1				
1d	2.60	3				
1e	2.58B	6				
Total		19	/ 19	/ 5	/ 5	/ 9

Assessment Objectives

Assessment Objectives

- There are three assessment objectives: AO1, AO2 and AO3
- Questions on the exam papers will focus on all three objectives.
- Very important that pupils are aware of how they will be assessed.
- Many pupils (and teachers!) only focus on content.

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

Assessment objectives and weightings

		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%

Which Assessment Objectives do your students find most challenging?

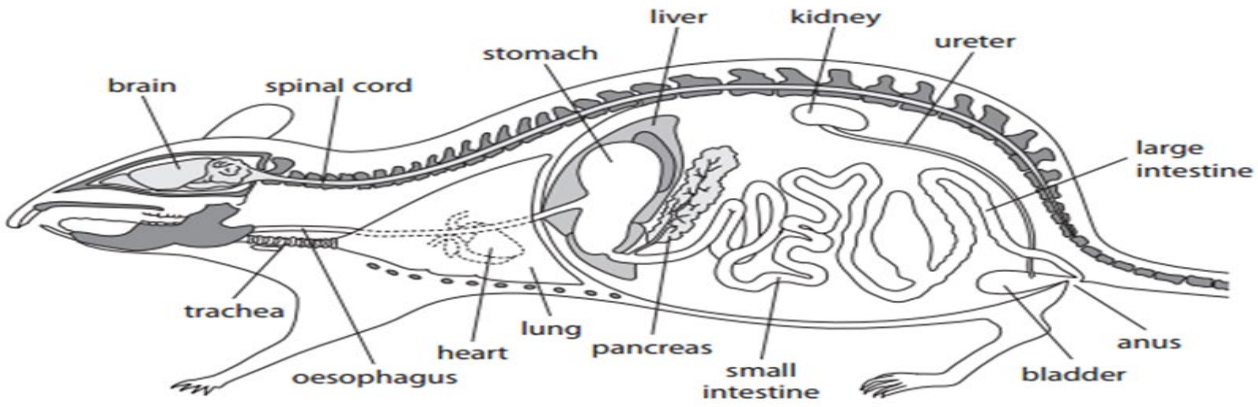
Assessment Objective 1 (AO1)

AO1 Knowledge and understanding of biology / science.

- AO1 is about understanding content.
- Conscientious students like AO1 questions – they feel confident in learning detail and depth.
- Easy to revise – repetitions, mind maps, testing with flash cards and questions.

Typical AO1 Questions

2 The diagram shows a section through a rat. Some of the rat's organs have been labelled.



(a) (i) What is meant by the term **organ**?

(1)

(ii) Name the organ labelled in the diagram that is part of the circulation system.

(1)

(iii) Name three other systems shown in the diagram.

(3)

1 .....

2 .....

3 .....

(d) The passage describes the role of enzymes involved in the genetic modification of salmon.

Complete the passage by writing a suitable word in each space.

(3)

All salmon contain a length of DNA called a ..... , which controls the production of growth hormone. Another length of DNA, from a different species of fish, is cut out using a ..... enzyme. This DNA is then joined to the salmon DNA using an enzyme called ..... .

This causes the salmon to produce growth hormone at all times.

(Total for Question 2 = 15 marks)

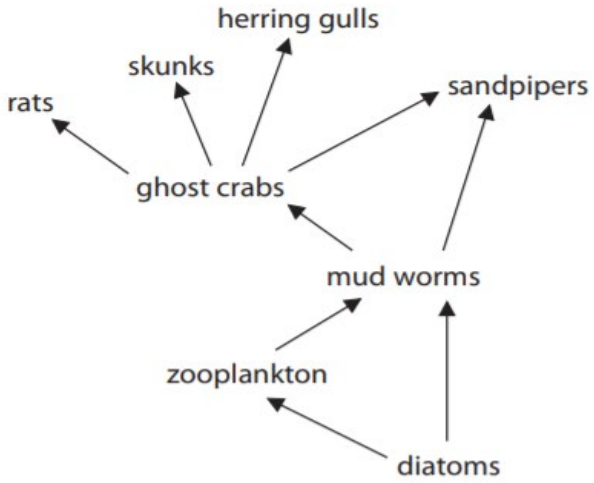
Assessment Objective 2 (AO2)

AO2 Application of knowledge and understanding, analysis and evaluation of biology.

- AO2 is about **application** of knowledge to familiar and unfamiliar contexts.
- Can require quantitative (calculations, graphs, analysis of tables with data) or qualitative analysis
- Can require higher cognitive levels – evaluate, discuss.
- Can be challenging for less confident students: 'You never taught us about birds in the winter!'
- Are often 'suggest' questions as this implies an unfamiliar context

Typical AO2 Questions

3 The diagram shows a food web.

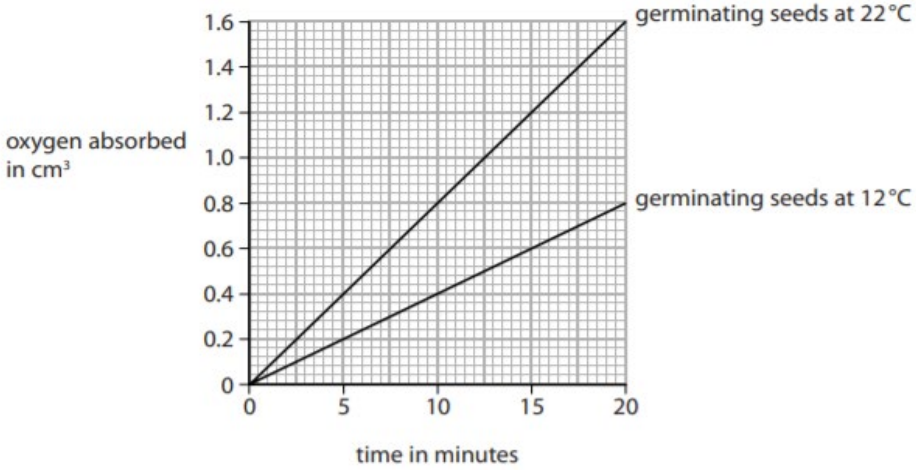


(a) Use information from the food web to complete the table.

The first one has been done for you.

number of organisms	8
number of producers	
number of primary consumers	
number of food chains	

(c) The graph shows the results of the student's investigation.



(i) Calculate the percentage increase in the rate of oxygen absorption at 22 °C compared to the rate of oxygen absorption at 12 °C.

(2)

percentage = ...

(ii) Suggest why the rate of oxygen absorption is greater at 22 °C than at 12 °C.

(2)

Assessment Objective 3 (AO3)

AO3 Experimental skills, analysis and evaluation of data and methods in biology / science / human biology

- AO3 is about experimental skills.
- Can include core practicals (but this could be classed as AO1)
- Can include general practical themes, variables, accuracy, reliability, valid planning, evaluating practical methods and data.
- Can requires higher cognitive skill command words such as evaluate and discuss
- Can require candidates to make judgements about

Typical AO3 Questions

(b) The table shows the results the student obtained from her investigation.

Colour of light	Number of gas bubbles released in one minute			
	trial 1	trial 2	trial 3	average
Red	23	26	25	
Blue	19	18	21	19
Green	12	16	6	14

(i) Complete the table by calculating the average rate of photosynthesis for red light.

(1)

.....

(ii) Explain whether the results for each colour are reliable.

(2)

.....

.....

.....

.....

.....

.....

(iii) The student is now given sugar solutions with concentrations of 1%, 5%, 10% and 20%.

Explain how the student could use these solutions to estimate the concentration of sugar in the four fruit juices.

(3)

Typical AO3 Planning questions

(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth.

You should include experimental details in your answer and write in full sentences.

(6)

Activity 3

Guess the Assessment Objectives!

- Look at the questions in the packs and identify the assessment objectives being tested.

AO1 – straight factual recall

9 Pollution can occur in the atmosphere and in rivers.

(a) Carbon monoxide can pollute the atmosphere.

Describe the effects of carbon monoxide pollution on humans.

(3)

(d) The corn becomes infected by a fungus.

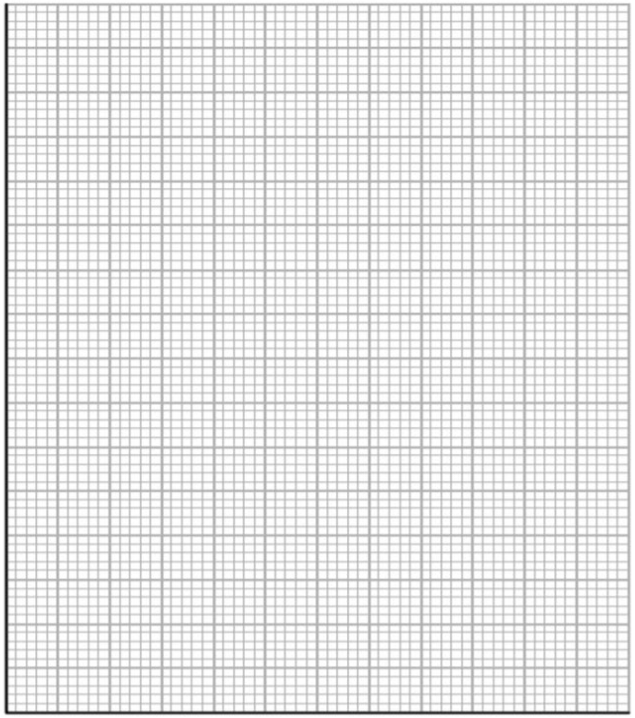
(i) Explain how this fungus feeds on the corn.

(3)

(a) Plot a line graph of this data on the grid.

Use a ruler to join the points with straight lines.

(5)



(b) What is the dependent variable in this investigation?

(1)

- ☐ **A** germination rate
- ☐ **B** number of cells
- ☐ **C** pollution level
- ☐ **D** time after germination

(c) The scientists conclude that pollution reduces the growth of shoots by affecting cell division.

(i) Name the type of cell division affected by pollution in this investigation.

(1)

(ii) To make sure their conclusion is valid, the scientists control abiotic variables while the seeds are germinating.

Discuss two abiotic variables that the scientists control.

(4)

1

2

(iii) State one biotic factor that the scientists should control.

(1)

(c) If the mineral ions are not absorbed, they are egested in the faeces.

The faeces of genetically modified (GM) farm animals contain less phosphate than the faeces of normal farm animals.

(i) Some people catch fish from rivers near farm land.

Discuss why these people might support the genetic modification of farm animals.

(4)

How to identify AOs that students need to develop

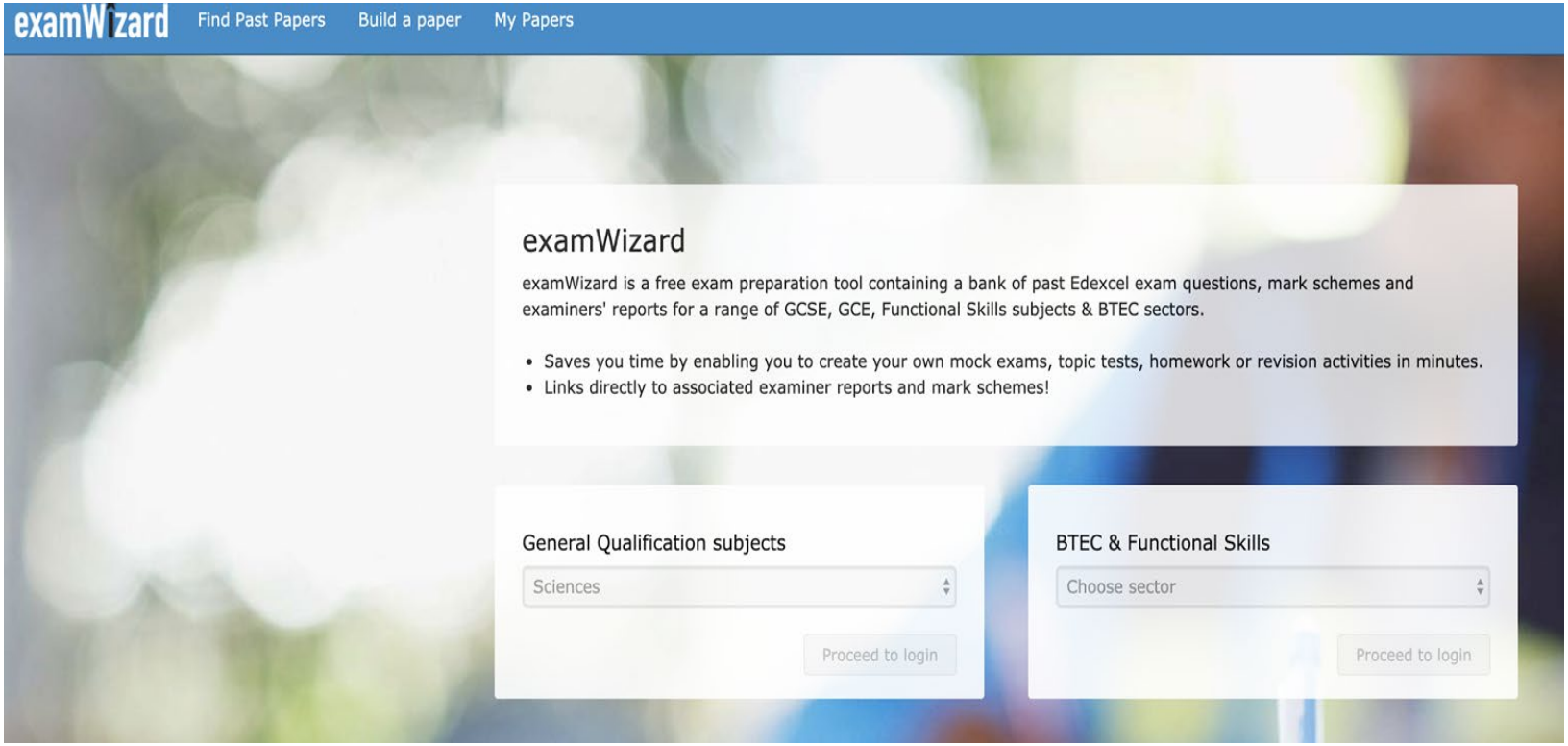
Tests – use ExamWizard to focus on topics or AOs.

Get pupils to self-identify areas for development by filling in grids about their test results.

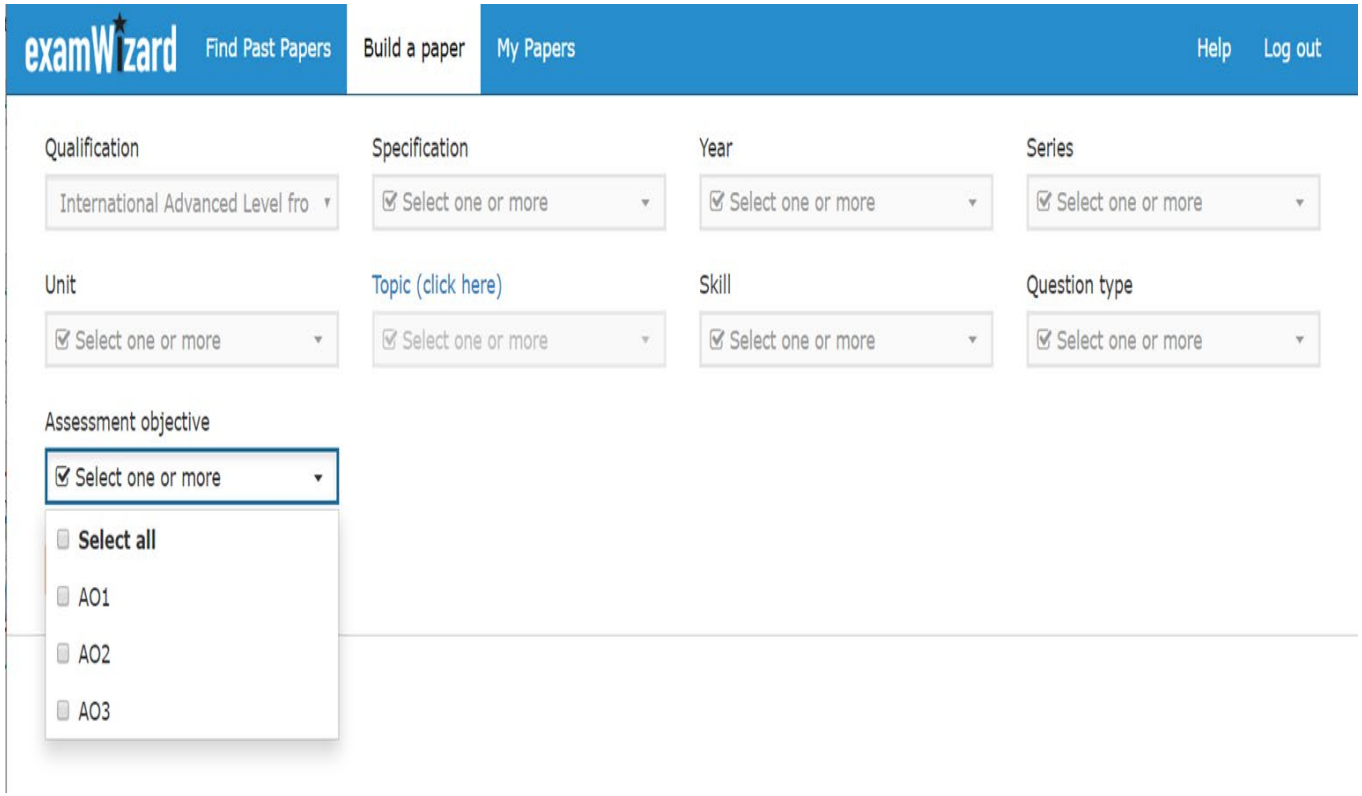
Results Plus – identify areas for development by cohort or class.

Access to Scripts – candidates / centres have free access to scripts.

ExamWizard Home page



- Tests and questions can be made to test a particular topic or AO.
- Mark schemes and examiner reports are generated automatically.



Test Grids

Test grids can be made that students fill in after receiving a marked test back.

They fill in their marks and then identify the topics and AOs that require development.

Test Grid

Question	Spec Ref	Max Mark	My Score	AO1	AO2	AO3
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1aii	2.54	2				
1b	2.57B	3				
1ci	2.57B	1				
1cii	2.60	1				
1d	2.60	3				
1e	2.58B	6				
Total		19	/ 19	/ 5	/ 5	/ 9

Delegate Activity 4 : What would this student need to focus on?

Discuss with your group what this student would need to focus on.

Test Grid

Question	Spec Ref	Max Mark	My Score	AO1	AO2	AO3
1ai	2.54	3	3	3		
1aii	2.54	2	0		0	
1b	2.57B	3	2			2
1ci	2.57B	1	1	1		
1cii	2.60	1	1	1		
1d	2.60	3	1		1	
1e	2.58B	6	2			2
Total		19	10 / 19	5 / 5	1 / 5	4 / 9

AO1: Seems fine – has learnt content well.

AO2: Only one mark out of five – application needs development

AO3: Four out of nine – suggests some development of practical skills.

Content – no clear weaker topic area although 2.58B could be need development

Test Grid

Question	Spec Ref	Max Mark	My Score	AO1	AO2	AO3
1ai	2.54	3	3	3		
1aii	2.54	2	0		0	
1b	2.57B	3	2			2
1ci	2.57B	1	1	1		
1cii	2.60	1	1	1		
1d	2.60	3	1		1	
1e	2.58B	6	2			2
Total		19	10 / 19	5 / 5	1 / 5	4 / 9

How do we develop skills for each AO?

Discuss in your groups how you could develop the skills of students for each AO.

For each, suggest what skills we need to develop and two or three methods of developing them.

- *AO1*
- *AO2*
- *AO3*

How do we develop skills for each AO?

AO1:

- Factual knowledge tests
- Revision notes / mind maps / lists
- Blank page revision – students start with a blank page and write down what they know about a particular topic. Missing facts are then looked up.
- Students teaching each other – a good way to learn is to teach someone else!

- **Vocabulary** – ALWAYS use key vocabulary (photosynthesis, digestion, emulsification, hydrolysis etc.) The more students use it, the more they become confident with using it. Less confident students are often 'too scared' to use scientific vocabulary, 'I can't use that because I am not a real science student.'

Make key vocabulary lists at start of topics and keep referring to them when teaching. NEVER assume that students know all vocabulary – ALWAYS reintroduce words when teaching each topic.

When teaching complex concepts, gradually build up a picture rather than doing everything in one go.

How do we develop skills for each AO?

AO2:

- Give students regular data analysis questions.
- Encourage them to think about contexts that are not on the specifications.
- Start developing graph skills, numerical skills and analytical skills from a young age – Year 7 ideally.
- Confidence is key to student performance.
- When evaluating encourage them to see both sides – look for data that supports and does not support.
- When writing up practicals, use scaffolding for conclusions:

  - *'Describe the patterns show by the graph, then explain the patterns using the words: respiration, oxygen, carbon dioxide production, anaerobic, aerobic.'*

- Give out data exercises as quick starter activities – these can be differentiated for different ability groups / age groups.

iG

Differentiated data analysis

'Shrews are small warm blooded mammals. Here is some data to show the rate of oxygen use by different species of shrew.'

'Discuss the rates of oxygen use by the different species of shrew.'

OR

1. Describe how the masses of the shrews changes going down the table.
2. Describe how rate of oxygen use of the shrews changes going down the table.
3. Identify the relationship between body mass and rate of oxygen use.
4. Explain how the mass of shrews will affect the surface area to volume ratio.
5. What will happen to the speed that the shrews will lose heat if their surface area to volume ratio is higher?
6. Explain the data in terms of body mass, heat loss, surface area to volume ratio and respiration rate.

Type of shrew	Body mass of shrew in g	Oxygen used in cm^3 per g per hour
Masked	2.5	10.8
Wandering	4.5	8.6
Monterey	6.5	7.2
Sonoma	11.5	5.2
Short-tailed	20.0	4.0

How do we develop skills for each AO?

AO3

- Do LOTS of practical work – you do not need to restrict them to the core practicals. A significant proportion of marks is about practical skills and understanding – it needs teaching as much as factual content.
- Start early: pupils can begin to plan practicals from a very early age and become familiar with key vocabulary such as accurate, variable, repeatability.
- There is no such thing as bad data. Even if experiments don't work, students can learn from it – 'discuss why the results didn't seem to show what was expected.'
- Put together class data to compare data. This means that students can identify anomalies, investigate ranges of results and discuss how reliable the results are.
- Don't assume that they have the maths skills from maths lessons!
- Even if you can't do a particular practical – students can still plan it or analyse data about it.

Planning practicals

When planning practicals, give lots of guidance for weaker or younger students

"The independent variable is _____"
"Two variables I need to control are _____"
Give them the hypothesis as a gap fill.

"As the light intensity _____, the rate of oxygen production by the pond weed will _____"

"Circle any anomalous values"
"Two sources of error are _____"
"To make the investigation more reliable I need to _____"

Planning practicals

For stronger students, and students who are familiar with planning, gradually reduce the scaffolding:

> "Plan an investigation into ___. Explain how you will ensure that the results are reliable and enable you to make a valid conclusion."

> "Evaluate your results and the strength of your conclusion."

If they have progressed through the years, by the time they reach International AS and A Level, they will understand how to plan, carry out and analyse.

General strategies for all Assessment Objectives

- Get students to spot Assessment Objectives on past papers.
- Get students to write their own questions and mark schemes.

Question Styles

Question Styles

- Multiple choice – can be AO1, AO2 or AO3
- Short answer – one, two or three marks. Typically describe, suggest, explain
- Longer answer / mini-essay – can be four, five or six marks. May be describe, explain, evaluate, discuss or plan.
- Experimental planning – CORMS questions
- Maths questions – calculations / graph plotting
- Comprehension – paper 2 starts with a comprehension which 'sets the scene' for synoptic questions.

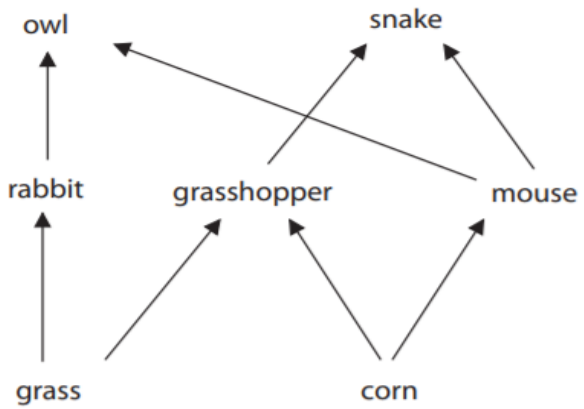
Multiple Choice Questions

- Paper 1 – up to 10
- Paper 2 – up to 5

Can be AO1, AO2 or AO3

NB: Pure recall can only be c.15% so some MCQs will be more demanding

1 The diagram shows a food web.



(a) Which of these organisms is a secondary consumer in this food web?

(1)

- ☒ **A** corn
- ☒ **B** grasshopper
- ☒ **C** mouse
- ☒ **D** owl

(ii) Which of these organisms will be hunted more often by predators when the corn is infected by a fungus?

(1)

- ☒ **A** grass
- ☒ **B** owl
- ☒ **C** rabbit
- ☒ **D** snake

Short answer questions

(ii) Describe the role of enzymes in genetic modification.

(2)

Longer Answer Questions / Mini-Essays

- Mark Schemes are 'points – based' not level based.
- Candidates should look at the mark allocations rather than number of lines.
- Candidates should focus on precise, accurate language.
- Bullet points are acceptable.
- Spelling – phonetic unless a word can be mistake for another word. For example, fotosynthesis is okay, but meitosis is not okay.

(c) If the mineral ions are not absorbed, they are egested in the faeces.

The faeces of genetically modified (GM) farm animals contain less phosphate than the faeces of normal farm animals.

(i) Some people catch fish from rivers near farm land.

Discuss why these people might support the genetic modification of farm animals.

(4)

Activity 5: Making a mark scheme and marking candidate answers

Make a points based mark scheme for this question.

Suggest five mark points – they should be clear, not overlap and be easy to apply correctly by many markers.

10 A balanced diet should include the correct proportions of each component.

(a) Two of these components are vitamins and minerals.

Describe the functions of the **other** components of a balanced diet.

(5)

Now mark the two answers in your packs.

Question Number	Answer	Additional guidance	Mark
10(a)	A description that makes reference to the following points: • carbohydrate for energy / respiration (1) • lipid / fat for energy / storage / insulation / myelin / hormones / protecting organs (1) • protein for growth / repair / (named) enzyme / hormones / antibodies / neurotransmitter (1) • water as solvent / transport / reactions / temperature regulation / prevent constipation / help egestion (1) • fibre / roughage for peristalsis / move food / prevent constipation / help egestion (1)	Allow correct named hormone for Mp2 and Mp3 Mp3 Ignore skin / nails / hair / bones Ignore prevents cancer	**5**

A: Humans need carbohydrates, proteins, water and fibre. They also need plenty of lipids for energy. Iron is important for haemoglobin and vitamin A helps vision. Vitamin C is also important for stopping scurvy and vitamin D and calcium are needed to stop rickets.

B: Starch and fats are important for energy. Too much sugar though will cause obesity. Proteins and amino acids are used for growth and repair of tissues. Fresh fruit and vegetables are important for peristalsis of the gut (they prevent constipation.)

Experimental Planning (CORMS)

- These are AO3 planning questions
- Allocated six marks
- Candidates have to plan a valid experiment in an unfamiliar context
- They are not focused on core practicals
- Plan using 'CORMS' but write the plan in an experimental context using continuous prose (although bullet points can be used)

CORMS and devising investigations

- **Change** = + and - / range of values;
  (control) Independent variable
- **Organism** = species / size / age / sex / eq;
  (biotic) Controlled variable
- **Repeat** = more than one reading / eq;
  (reliable)
- **Measure** = mass / length / units / time / eq;
  (precise/accurate) Dependent variable
- **Same** = temp. / LI / water / eq;
  (abiotic) Controlled variable

CORMS Clarification

C – change:
- be clear what is being set up

O – organism:
- stated factors, not just “same animal”
- Avoid vague terms like “size”. Refer to mass / length etc.

R – repeats:
- for reliability so must be at each value not at additional values
- idea of making it possible to take means

M - measure:
- usually two marks
- usually for a change / before and after
- measurable quantities (length, mass not just growth / size / amount)
- usually a rate so specify a sensible time (appropriate)

S - same:
- usually two variables that are relevant and would affect the results

Activity 6: Making a mark scheme and marking experimental planning questions

Write down the mark points for this International GCSE question. Come up with 7 mark points in the style of: C O R M1 M2 S1 S2

(c) Plant growth substances stimulate root growth from a cut stem.

Describe an investigation to find the best concentration of plant growth substance to stimulate root growth.

You should include experimental details in your answer and write in full sentences.

(6)

Mark Scheme

Use the mark scheme to mark the student answers.

Question Number	Answer	Additional guidance	Mark
10(c)	A description that makes reference to six of the following points: • C change / different concentrations of growth substances (1) • O same species / same plant / same type of plant/ named plant / same age / same size / eq (1) • R repeat (1) • M1 count number of roots / length of roots / measure roots with ruler / eq (1) • M2 stated time period of one day plus (1) • S1 same (control) temperature / oxygen / light / carbon dioxide (1) • S2 same compost / water / humidity / soil / mineral ions / named mineral ion / same <u>volume</u> of plant growth substance (1)	Auxin and no auxin = 0 M1 Ignore mass S2 Ignore nutrients	**6**

A. I will take several oat seedlings. I will grow them so that their roots begin to develop. I will then add a range of different auxin concentrations to each of the roots. I will repeat each concentration with three plants to make it reliable. I will put the plants into soil and see how much they grow over a constant time period. I will keep everything the same, such as the amount of nutrients in the soil.

Total - Three marks: C, O, R

B.

C: different auxin concentrations

O: same species

R: repeats

M: length of root in one week

S: oxygen, minerals, carbon dioxide

I will make a range of concentrations of auxin. I will then take plants of the same species (and same age) and place the different concentrations of auxin on the roots of each one. I will repeat this two more times so that there are three for each concentration. I will measure the lengths of the roots for all the plants. I will put the plants into soil with the same compost (same mineral ion concentrations.) I will measure the lengths of the roots one week later to see how much they have grown. I will keep the oxygen and carbon dioxide concentrations the sae.

Total - Six marks (max): C, O, R, M1, M2, S1, S2

C: Take two plants of the same species. Place the roots of one in plant hormones but not the other. The plant hormones should make the roots grow longer than the one without the hormones. This is because the plant hormones affect the speed which roots and shoots grow. The hormones used could include auxin which also affects phototropism and geotropism. I will repeat the experiment.

Total - Two marks: O, R

Maths Questions

- Can be calculations
- 10 % of marks are from calculations
- Can be graph plotting
- Graphs are typically bar charts or points joined with straight lines – the question will ask for the type of graph.

Activity 7: Plotting graphs

- Often marked as SLAAP, SLAPU or SLAPUK / eq;

- **S** scale linear and half of each axis
- **L** lines straight, between points and neat (or neat bars)
- **A** axis correct way around
- **A** axes labelled
- **P** points (or bars) plotted correctly
- **U** units correct on each axis
- **K** key if two or more lines (bars)

8 A scientist investigates the effect of exercise on breathing rate.

She measures the breathing rate in breaths per minute of two people, P and Q, every 5 minutes for 30 minutes.

This is her method.

- measure their breathing rate every 5 minutes while they exercise for 20 minutes
- measure their breathing rate every 5 minutes for a further 10 minutes while they recover from the exercise

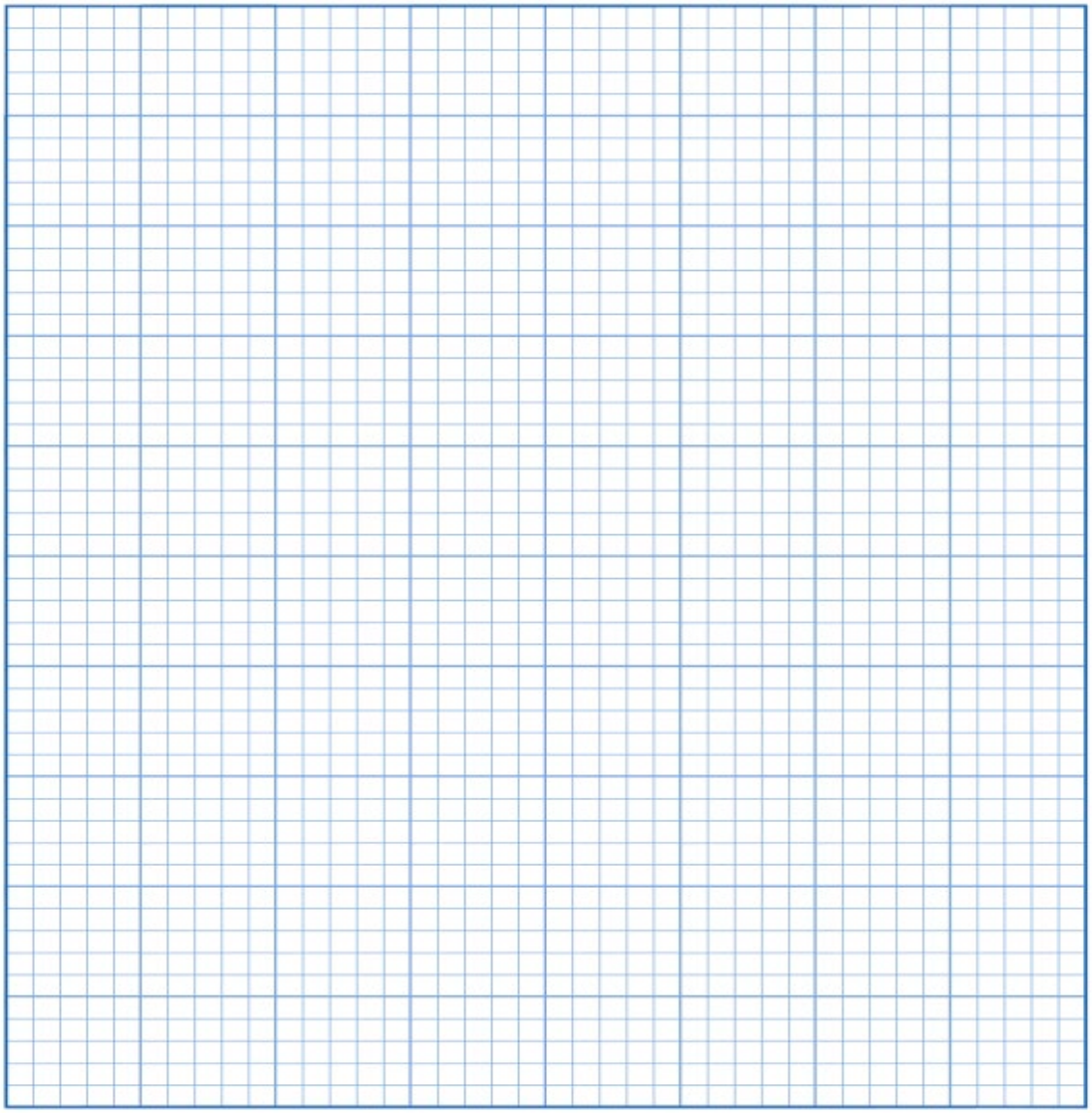
The table shows her results.

Time in minutes	Breathing rate in breaths per minute	
	Person P	Person Q
0	12	15
5	20	24
10	22	24
15	25	23
20	24	20
25	16	19
30	12	15

(a) (i) Plot a line graph of the results for person P and person Q.

Use a ruler to join your points with straight lines.

(6)



Comprehension Question

- Paper 2 starts with a comprehension question
- This is often stimulus material to ‘set the scene’
- Questions may be synoptic and draw from several areas of the specification

Command words

Command words: What they are and why they are important

- Every question should have a command word.
- It is an instruction to candidates, telling them what we want them to write.
- It is critical that candidates know what each command word means so that they can answer the question effectively.
- Many candidates do not fully understand what each command word means – 'Describe' and 'Explain' are often confused with each other.
- All our qualifications in International GCSE sciences now use a common taxonomy for command words
- These can be found in an appendix at the back of the specification
- Students can expect a range of command words across the demand range of the exam paper

Where do we find out about command words?

1. Specifications – all Pearson specifications give a glossary of command words.
2. Sample assessment material (SAMS) – these contain examples of all command words.
3. Past papers and mark schemes – these will show the command words; the mark schemes illustrate how answers should be written for each command word.

Activity 8 – what are the command words?

- List five command and give a brief definition of each.

International GCSE command words

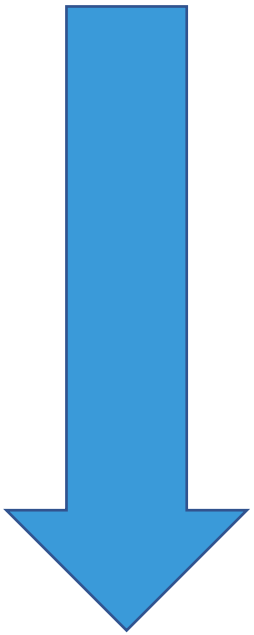
Command word	Definition
Add/Label	Requires the addition or labelling of a stimulus material given in the question, e.g. labelling a diagram or adding units to a table.
Calculate	Obtain a numerical answer, showing relevant working.
Comment on	Requires the synthesis of a number of variables from data/information 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.
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 this can be described.
Suggest	Use your knowledge to propose a solution to a problem in a novel context.

Cognitive Demand of Command Words

Some command words have different cognitive demands:

State
Describe

Compare and contrast



Increasing demand

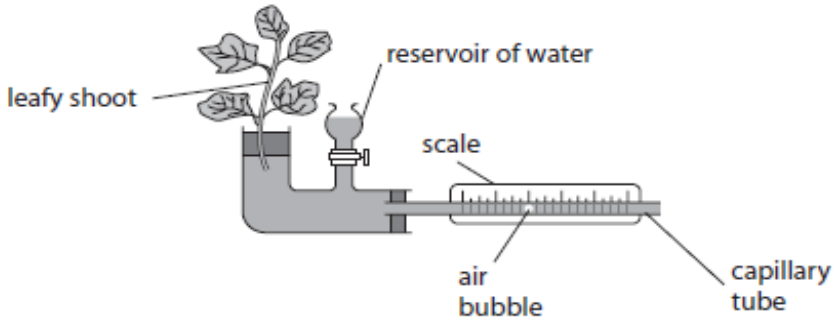
Explain

Evaluate / Discuss

Describe and explain

4 A student investigates the effect of wind on the rate of transpiration of a leafy shoot using a potometer.

The diagram shows her apparatus.



(b) The table shows the student's results.

Experiment	Rate of transpiration in mm per minute	
	still air	wind
1	0	3
2	1	4
3	1	3

Explain the difference in the rate of transpiration in wind and in still air.

(2)

Command word: Comment on

"Look at data and information and decide what it shows"

(b) Seawater is warmed if hot water from power stations is released into the sea.

A scientist investigates the effect of water temperature on the concentration of oxygen dissolved in water.

He also investigates the effect of water temperature on the oxygen used by a fish.

The table shows his results.

Water temperature in °C	Dissolved oxygen in arbitrary units	Oxygen used in cm^3 per hour
5	7.8	10
10	6.8	15
15	6.0	40
20	5.6	100
25	5.2	150
30	5.0	200
35	4.6	220

(i) The scientist concludes that hot water pollution affects the population of fish living near a power station.

Comment on this conclusion.

(5)

Question Number	Answer	Mark
2(b)(i)	An answer that makes reference to five of the following points: • reduce population (1) • increase in oxygen consumption / demand (1) • reduction in available oxygen (1) • respiration affected (1) • bacteria grow (1) • death of fish (1) • migration (1) • only one fish used so results not reliable (1)	**5**

Command words: Suggest

'Use your knowledge to propose a solution to a problem in a novel context.'

(ii) Suggest how woodlice benefit from the bacteria in their digestive system.

(2)

.....

.....

.....

.....

(iii) Suggest how the bacteria benefit from living in the gut of the woodlice.

(1)

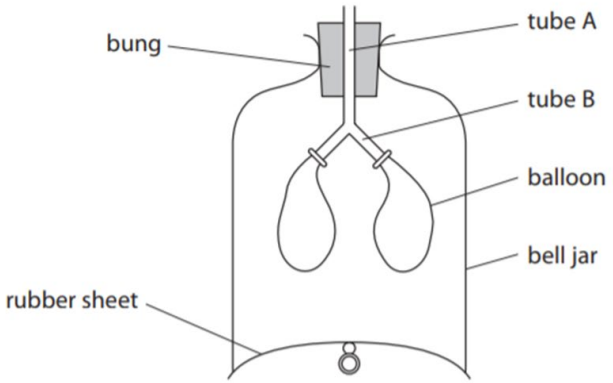
.....

.....

Command word: Evaluate

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.'

8 A teacher uses this bell jar model of the thorax to show the process of ventilation.



(b) Evaluate whether the bell jar model can completely demonstrate the process of ventilation.

(4)

Mark Scheme

Question Number	Answer	Mark
8(b)	An answer that makes reference to four of the following points: • reference to diaphragm (1) • balloons represent lungs (1) • reference to trachea / windpipe / bronchus (1) • reference to ribs / ribcage / movement of chest / ribcage / bell jar does not move (1) • reference to intercostal muscles (1)	**4**

Command word: 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.'*

(c) A student investigates the effect of genetic modification on the growth of salmon.

The student measures the mass and length of one normal salmon and one genetically modified salmon when both salmon are 18 months old.

The table shows the student's results.

Type of salmon	Mass in g	Length in cm
normal	1250	33
genetically modified	3000	61

(ii) The student concludes that his results show that genetically modified (GM) salmon are useful in providing a balanced diet.

Discuss the student's conclusion.

(6)

Question Number	Answer	Mark
2(c)(ii)	An answer that makes reference to six of the following points: • GM salmon grow more / heavier / longer / larger / more mass / grow faster / eq (1) • (more) protein provided (1) • only need protein in correct amount / only need sufficient protein / only need 50g / too much protein / excess protein / eq (1) • balanced diet also needs vitamins / carbohydrate / lipid / minerals / fibre / no idea of other **named** component in salmon (1) • one salmon used / not repeated/ should use several fish (1) • (data) not reliable / result may be anomalous (1) • no information on food supply to salmon / temperature / oxygen / pollution (1) • protein need depends on age / sex / activity / eq (1)	**6** **Mp1 Allow converse**

Activity 9: Marking exercise

Use the mark schemes to mark the candidate answers in the packs.

Practical skills

Core Practicals and General Practical Skills

Core Practicals

- All courses have a series of core practicals that candidates should complete.
- Candidates may be tested on their knowledge of these practicals.
- Questions about modified versions of the core practicals can be set.
- Core practical methods may be used in other contexts, e.g. indicator solutions, iodine test for starch.

Practical Skills and Understanding of the Scientific Method

- Students should be familiar with typical school laboratory equipment at the appropriate levels.
- Students should understand how to plan experiments that will generate valid data.
- Students should understand how to analyse and evaluate the quality of data at an appropriate level.

International GCSE Biology

Core Practicals

2.9 Investigate food samples for the presence of glucose, starch, protein and fat
2.12 Investigate how enzyme activity can be affected by changes in temperature
2.14B Investigate how enzyme activity can be affected by changes in pH
2.17 Investigate diffusion and osmosis using living and non-living systems
2.23 Investigate photosynthesis, showing the evolution of oxygen from a water plant, the production of starch and the requirements of light, carbon dioxide and chlorophyll
2.33B Investigate the energy content in a food sample
2.39 Investigate the evolution of carbon dioxide and heat from respiring seeds or other suitable living organisms
2.45B Investigate the effect of light on net gas exchange from a leaf, using hydrogencarbonate indicator
2.50 practical: investigate breathing in humans, including the release of carbon dioxide and the effect of exercise
2.58B Investigate the role of environmental factors in determining the rate of transpiration from a leafy shoot in humans, including the release of carbon dioxide and the effect of exercise
3.5 Investigate the conditions needed for seed germination
4.2 Investigate the population size of an organism in two different areas using quadrats
4.4B Investigate the distribution of organisms in their habitats and measure biodiversity using quadrat
5.6 Investigate the role of anaerobic respiration by yeast in different conditions

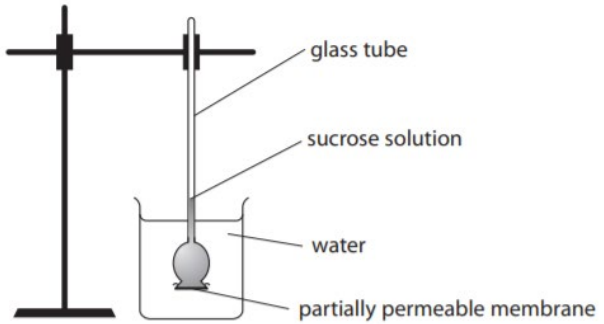
How are Core Practicals Assessed?

This is an example of a core practical from

2.17 Investigate diffusion and **osmosis** u
and **non-living systems**

It also tests general practical skills in part

4 This apparatus can be used to show osmosis.



(a) Explain what happens to the level of the sucrose solution in the glass tube.

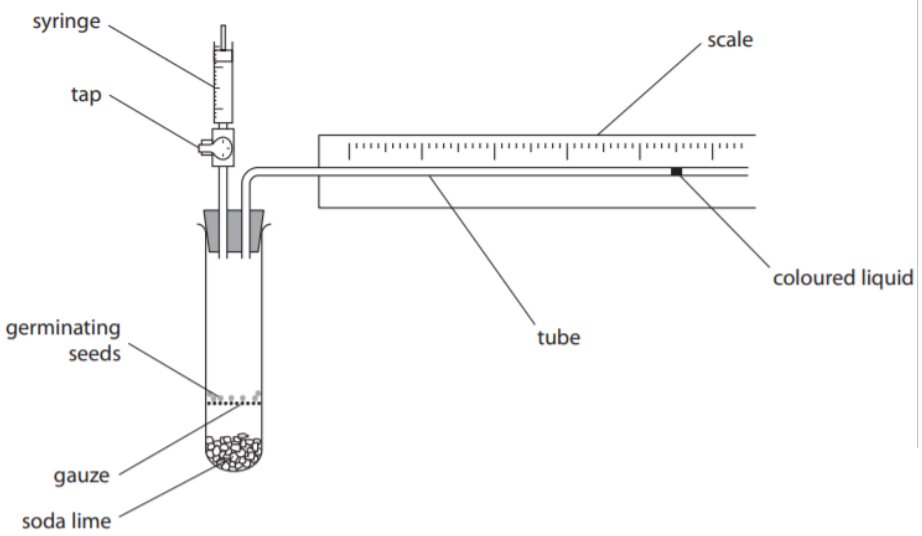
(3)

(b) Describe how this apparatus could be modified to measure the rate of osmosis at different temperatures.

(3)

(b) A student investigates the oxygen absorbed by germinating seeds at different temperatures.

The diagram shows some of the student's apparatus.



(i) Suggest why the student opens the tap after obtaining one set of results.

(2)

(ii) What is the function of the soda lime?

(1)

- ☐ **A** it absorbs carbon dioxide
- ☐ **B** it absorbs oxygen
- ☐ **C** it releases carbon dioxide
- ☐ **D** it releases oxygen

Using Core Practicals to Develop General Practical Skills

- General practical skills and understanding of the 'scientific method' are also assessed on the exam papers.
- This area is covered by **Assessment Objective 3 (AO3).**

'Experimental skills, analysis and evaluation of data and methods in biology.'

Core practicals are a useful opportunity to practise general practical skills.

They can enable students to develop planning skills, analytical skills and evaluation of practical techniques.

Some skills can be assessed on the papers in a different context, for example:

- the use of bicarbonate indicator
- the use of colorimeters
- using soda lime to remove carbon dioxide
- using a method to ensure random placements of quadrats

International GCSE Experimental Skills

Experimental skills

The best way to develop experimental skills is to embed practical investigations in teaching or theory. The development of knowledge and experimental skills can then happen together, leading to secure acquisition of both knowledge and skills.

Our practical investigations are embedded within *2: Biology content* as specification points in italics. The skills developed through these and other practicals will be assessed through written examinations.

In the assessment of experimental skills, students may be tested on their ability to:

- solve problems set in a practical context
- apply scientific knowledge and understanding in questions with a practical context
- devise and plan investigations, using scientific knowledge and understanding when selecting appropriate techniques
- demonstrate or describe appropriate experimental and investigative methods, including safe and skilful practical techniques
- make observations and measurements with appropriate precision, record these methodically and present them in appropriate ways
- identify independent, dependent and control variables
- use scientific knowledge and understanding to analyse and interpret data to draw conclusions from experimental activities that are consistent with the evidence
- communicate the findings from experimental activities, using appropriate technical language, relevant calculations and graphs
- assess the reliability of an experimental activity
- evaluate data and methods taking into account factors that affect accuracy and validity.

Summary of Practical Assessment Areas

There are three broad areas of practical assessment:

- Planning experimental work
- Implementation of experimental work
- Analysis and evaluation of data and methods.

Planning Skills

Students are expected to be able to plan investigations that will produce valid data, at both International GCSE.

The basic ideas behind a valid plan are similar at all levels.

- Identification of independent, dependent and control variables.
- Use of repeat readings.

Use CORMS to plan practicals

Analysis and Evaluation of Data and Methods

- Processing data: Explain, discuss and evaluate data from experiments. Analysis of quantitative and qualitative data. Graph plotting. Recognising trends. Calculations (rates, means, percentages.)
- Evaluating data strength: Use trend lines, identify and account for outliers / anomalies. Assess reliability (repeats) and validity (controls.)
- Evaluating method: Does the apparatus generate accurate data (close to true values.) Suggesting improvements and justifying them.

Developing student understanding of experimental work

- Practice practical planning and experimental analysis from a young age
- Introduce CORMS from a young age – scaffold it to help, e.g. you should include in your answer……
- Credit precise language.
- Think up one planning exercise per topic – quick, easy homework task.
- Evaluate class data and always consider accuracy of methods.
- Scaffold 'conclusions' at first, e.g. 'describe the results your graph shows, then explain the trend using the words……..'
- Encourage confident independent exploration by letting pupils 'have a go.'
- Practise, practise, practise……

Activity 10: Key Scientific Terminology

Term	Definition
	A value that is close to the true value
	Factors that would affect the experiment and so need to be maintained constant
	Variable that is measured as a result of changing another
	The variable that is under investigation and is changed by the experimenter.
	Results that have been repeated and show a similar pattern.
	An investigation where all the variables have been controlled and the results are reliable.
	The value that would be obtained under ideal conditions.

Term	Definition
Accurate	A value that is close to the true value
Controlled variable	Factors that would affect the experiment and so need to be maintained constant
Dependent variable	Variable that is measured as a result of changing another
Independent variable	The variable that is under investigation and is changed by the experimenter.
Reliable	Results that have been repeated and show a similar pattern.
Valid	An investigation where all the variables have been controlled and the results are reliable.
True Value	The value that would be obtained under ideal conditions.

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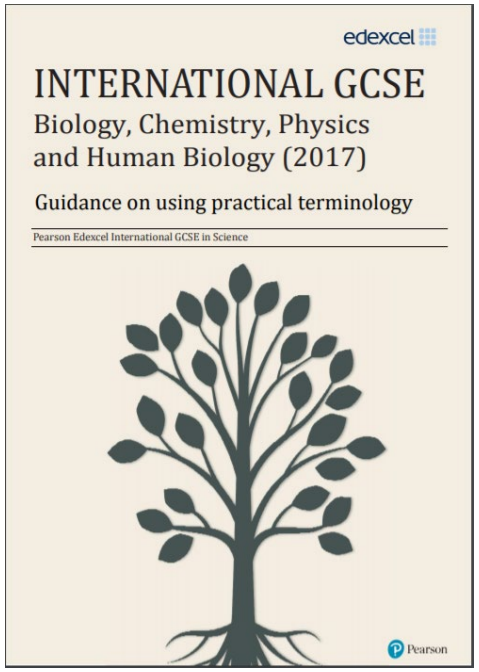
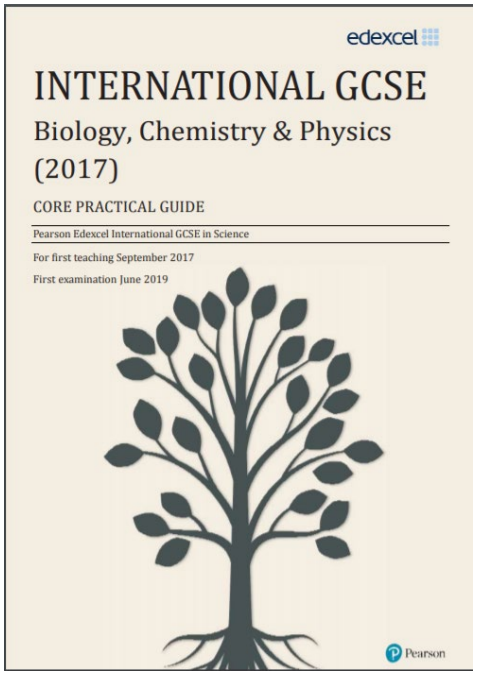




Maths Skills

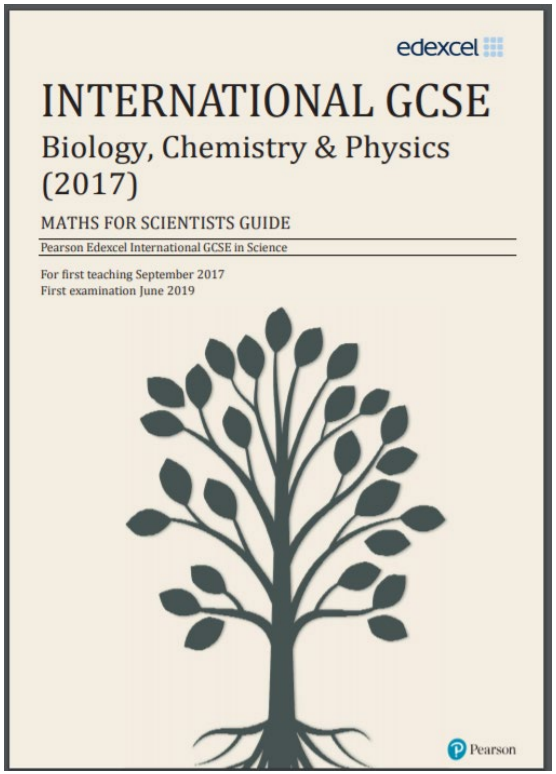
Mathematical Skills

- The development and use of relevant mathematical skills is key to progress in science subjects
- A list of mathematical skills which should be developed appears in the Appendix for each specification
- These skills will be tested in exam papers within the context of the science
- Assessment of mathematical skills will account for 10% of marks in Biology

		B	C	P
1	**Arithmetic and numerical computation**			
A	Recognise and use numbers in decimal form	✓	✓	✓
B	Recognise and use numbers in standard form	✓	✓	✓
C	Use ratios, fractions, percentages, powers and roots	✓	✓	✓
D	Make estimates of the results of simple calculations, without using a calculator	✓		✓
E	Use calculators to handle sin x and $\sin^{-1} x$, where x is expressed in degrees			✓
2	**Handling data**			
A	Use an appropriate number of significant figures	✓	✓	✓
B	Understand and find the arithmetic mean (average)	✓	✓	✓
C	Construct and interpret bar charts	✓	✓	✓
D	Construct and interpret frequency tables, diagrams and histograms	✓		✓
E	Understand the principles of sampling as applied to scientific data	✓		
F	Understand simple probability	✓	✓	✓
G	Understand the terms mode and median	✓		
H	Use a scatter diagram to identify a pattern or trend between two variables	✓	✓	✓
I	Make order of magnitude calculations	✓	✓	✓
3	**Algebra**			
A	Understand and use the symbols $<$, $>$, $\propto$, $\sim$		✓	✓
B	Change the subject of an equation	✓	✓	✓
C	Substitute numerical values into algebraic equations using appropriate units for physical quantities	✓	✓	✓
D	Solve simple algebraic equations	✓	✓	✓
4	**Graphs**			
A	Translate information between graphical and numerical form	✓	✓	✓
B	Understand that $y = mx + c$ represents a linear relationship		✓	✓
C	Plot two variables (discrete and continuous) from experimental or other data	✓	✓	✓
D	Determine the slope and intercept of a linear graph	✓	✓	✓
E	Understand, draw and use the slope of a tangent to a curve as a measure of rate of change		✓	✓
F	Understand the physical significance of area between a curve and the x-axis, and measure it by counting squares as appropriate			✓

		B	C	P
5	**Geometry and trigonometry**			
A	Use angular measures in degrees			✓
B	Visualise and represent 2D and 3D objects, including two dimensional representations of 3D objects			✓
C	Calculate areas of triangles and rectangles, surface areas and volumes of cubes	✓		✓

Mathematical Skills



Support from Pearson

Resources

We offer a range of free and paid for resources for International GCSEs. These have been designed to support teachers to improve learner outcomes

Support overview

Support for all subjects

Additional support for selected subjects

Getting Started Guide & Scheme of Work	Getting Ready to Teach Events	Subject interpretation of transferable skills
Subject Advisor	Results Plus	Regional Support Manager
Curriculum Matched Publishing	Exemplar Marked Responses	Additional SAMs
Exam Wizard	Lesson Plans	Topic booklets

examWizard

iG

- 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.

ResultsPlus

ResultsPlus is the free online results analysis tool for teachers - it provides analysis features that other similar solutions don't

- Provides a detailed breakdown of student performance in Edexcel exams.
- Helps identify topics where the student can benefit from further learning and allows this knowledge to inform teaching strategies and approaches.
- Provides a comparison of student performance at regional level.
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- Access additional video guides here:
- **ResultPlus - Individual Student Analysis**
  ResultsPlus - Cohort Analysis
  ResultsPlus - Mock Analysis
  ResultsPlus - Global Analysis

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 here.

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Other useful links

1. **Grade Boundaries**

This page shows the minimum marks needed to achieve a certain grade for all UK and international examinations. Also refer to the examiners report which is available for download with other documents.

2. **Examination Results Statistics**

Results statistics summarise the overall grade outcomes of candidates sitting Pearson Edexcel examinations.

3. **Progress to University**

Here you can find information and guidance about how to progress to universities worldwide with Pearson Edexcel qualifications.

4. **Access to scripts**

Make an informed enquiry about results (EARs) using our free access to scripts portal.

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- *transferable skills, needed for progression into higher education and employment, are signposted allowing students to understand, and engage with, the skills they're gaining*
- *a fully integrated Progression Map tool allows quick and easy formative assessment of student progress, linked to guidance on how to personalise learning solutions.*
- *reviewed by a language specialist to ensure the book is written in a clear and accessible style for students whose first language may not be English*
- *glossary of key History terminology*
- *teacher support materials available online.*

Published resources – Pearson

www.pearsonglobalschools.com/

Subject advisor details

Keep up to date

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Useful link : Please have a look at your new community

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Thank you for attending this event.
Any questions?

Please fill in your evaluation forms

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