

Pearson Edexcel
**International GCSE
Science**

Presenter





Session agenda

- Welcome and introductions
- Assessment objectives
- Question styles
- Taxonomy (command words)
- Support from Pearson
- Finish



Aims and objectives

- Understand the Assessment objectives for the qualification.
- Understand the question types for the qualification.
- Understand the mark schemes for the qualification.
- Practise using the mark schemes using exemplar student work.
- Learn about the support provided by Pearson around assessment and exemplars.



Getting to know you

- How long have you been teaching this specification?
- Were your students entered for the last examination series?
- What is the single most important thing you hope to take away from the session?



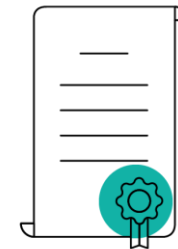
Welcome to Pearson

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**.



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

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.

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%

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

Which assessment objectives do your students find most challenging?



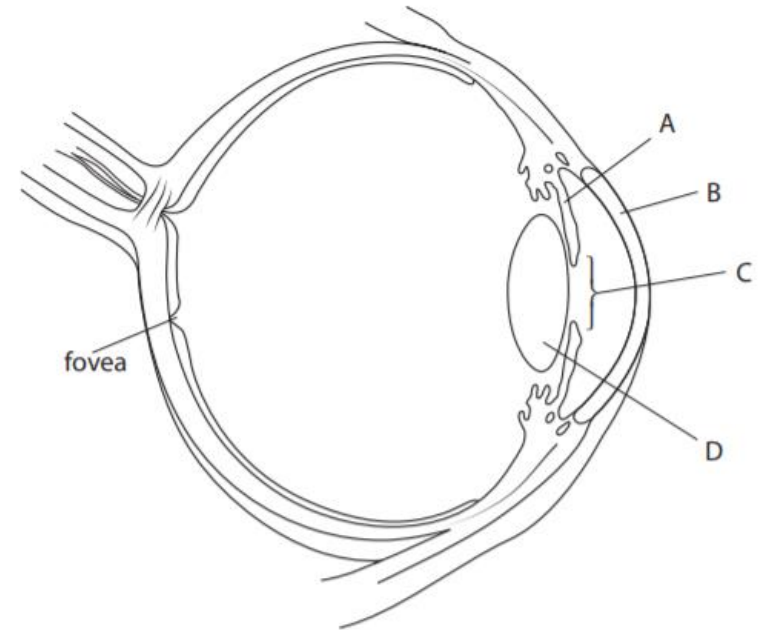
Assessment objective 1 (AO1)

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

8 The diagram shows a section through the human eye.



(a) Name the structures labelled A, B, C and D.


(4)

A

B

C

D



(b) When a person looks directly at an object, light is focused on the fovea of the retina.

(i) A person is reading a book and then looks at a distant object.

Explain the changes that occur in the structures of the eye that allow light from the distant object to be focused on the fovea.

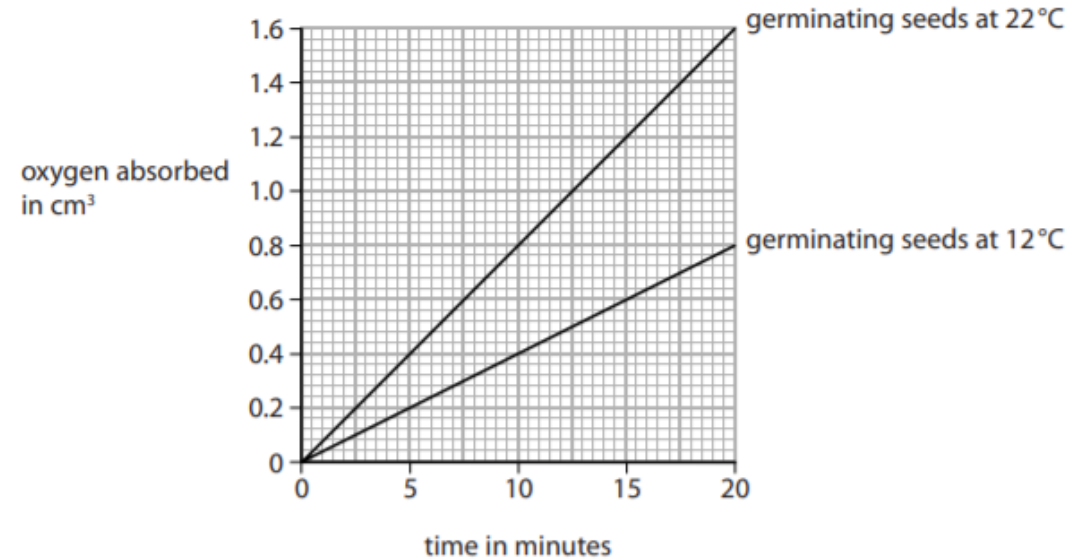
(4)

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.

(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)



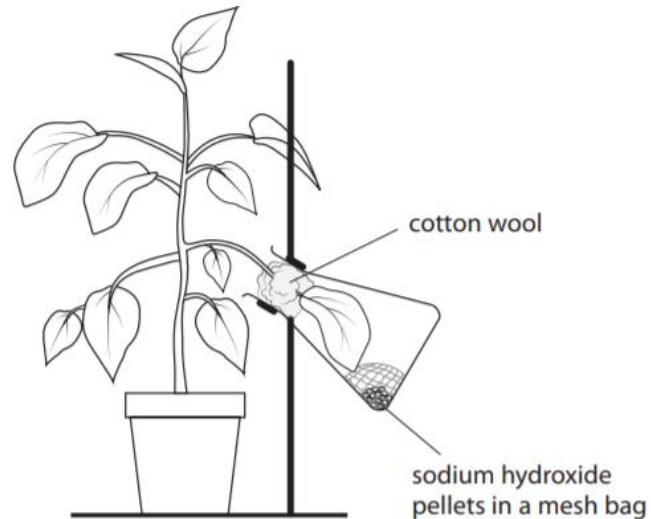
Assessment objective 3 (AO3)

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.

Typical AO3 questions

(b) A student uses this apparatus to investigate the need for carbon dioxide in photosynthesis.



(i) Explain how the student could use this apparatus to show that carbon dioxide is needed for photosynthesis.

(4)

(ii) The student is told that, after keeping the leaf in the flask for a day, he should cut the leaf into small shapes for testing.

Suggest why this is a good idea.

(2)

Typical AO3 planning questions

(b) The breakdown of dead plant material by microorganisms is affected by many factors.

Design an investigation to determine the temperature at which plant material is broken down most effectively.

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

(6)



Activity 1

What assessment objective is this question?

(d) The stomach is an organ found in the alimentary canal.

Describe the role of the stomach.

(3)

(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)


.....



(d) The corn becomes infected by a fungus.

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

(3)



(ii) Forty per cent of the energy in the producers transfers to decomposers.

Only twenty per cent of the energy in the primary consumers transfers to decomposers.

Explain this difference in energy transfer.

(3)



How to identify AOs that students need to develop

- Tests – use Exam Wizard 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

[Find Past Papers](#)[Build a paper](#)[My Papers](#)

examWizard

examWizard is a free exam preparation tool containing a bank of past Edexcel exam questions, mark schemes and examiners' reports for a range of GCSE, GCE, Functional Skills subjects & BTEC sectors.

- Saves you time by enabling you to create your own mock exams, topic tests, homework or revision activities in minutes.
- Links directly to associated examiner reports and mark schemes!

General Qualification subjects

Sciences

Proceed to login

BTEC & Functional Skills

Choose sector

Proceed to login

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

The screenshot shows the 'examWizard' interface with the 'Build a paper' tab selected. The interface includes a navigation bar with 'Find Past Papers', 'Build a paper', and 'My Papers' tabs, along with 'Help' and 'Log out' links. Below the navigation bar, there are several filter sections:

- Qualification:** A dropdown menu showing 'International Advanced Level fro'.
- Specification:** A dropdown menu with a checked checkbox and the text 'Select one or more'.
- Year:** A dropdown menu with a checked checkbox and the text 'Select one or more'.
- Series:** A dropdown menu with a checked checkbox and the text 'Select one or more'.
- Unit:** A dropdown menu with a checked checkbox and the text 'Select one or more'.
- Topic (click here):** A dropdown menu with a checked checkbox and the text 'Select one or more'.
- Skill:** A dropdown menu with a checked checkbox and the text 'Select one or more'.
- Question type:** A dropdown menu with a checked checkbox and the text 'Select one or more'.
- Assessment objective:** A dropdown menu with a checked checkbox and the text 'Select one or more'. This menu is open, showing a list of options: 'Select all', 'AO1', 'AO2', and 'AO3'.

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
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

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 shown 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.

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 students 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 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.

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.



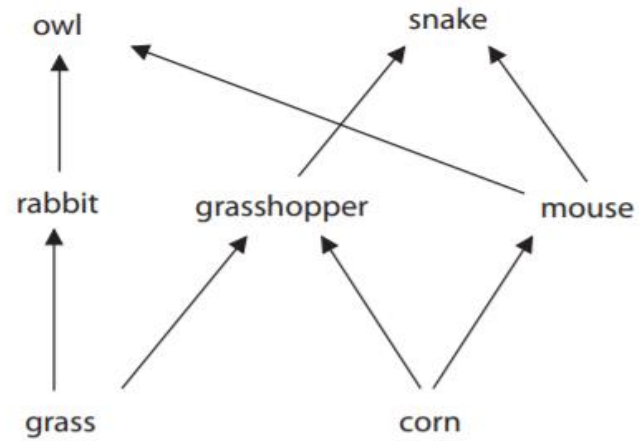
Multiple choice questions

- 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

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)

- 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.

Now mark the two answers in your packs.

Question Number	Answer	Additional guidance	Mark
10(a)	<p>A description that makes reference to the following points:</p> <ul style="list-style-type: none"> • <u>carbohydrate</u> for energy / respiration (1) • lipid / fat for energy / storage / insulation / myelin / hormones / protecting organs (1) • protein for <u>growth</u> / <u>repair</u> / (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) 	<p>Allow correct named hormone for Mp2 and Mp3</p> <p>Mp3 Ignore skin / nails / hair / bones</p> <p>Ignore prevents cancer</p>	5

Activity 2

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.)

Mark these answers and enter your mark in the poll.



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 3: Marking experimental 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)

Mark scheme


Question Number	Answer	Additional guidance	Mark
10(c)	<p>A description that makes reference to six of the following points:</p> <ul style="list-style-type: none"> • 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) 	<p>Auxin and no auxin = 0</p> <p>M1 Ignore mass</p> <p>S2 Ignore nutrients</p>	6

Use the mark scheme to mark the student answers.

Activity 3: Marking experimental planning questions


- 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.*

How many marks would this answer score?



B. 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 same.

How many marks would this answer score?



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.

How many marks would this answer score?



Plotting graphs

- Often marked as SLAAP, SLAPU or SLAPUK:
- S scale linear and half of each axis
- L lines straight, between points, and neat (or neat bars)
- A axis correct way round
- A axes labelled
- P points (or bars) plotted correctly
- U units correct on each axis
- K key if two or more lines (bars).

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.

(c) The table shows the number of deaths in 2014 caused by bacteria that are resistant to antibiotics.

The table also shows the predicted number of deaths in 2050 caused by resistant bacteria.

Year	Number of deaths $\times 10^6$
2014	0.7
2050	10.0

(i) Calculate the percentage increase in the predicted number of deaths in 2050 compared with the number of deaths in 2014.

(2)

percentage increase =

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

Temperature in °C	Number of bubbles per minute
20	2
25	6
30	8
35	10
40	14
45	20
50	no data
55	2

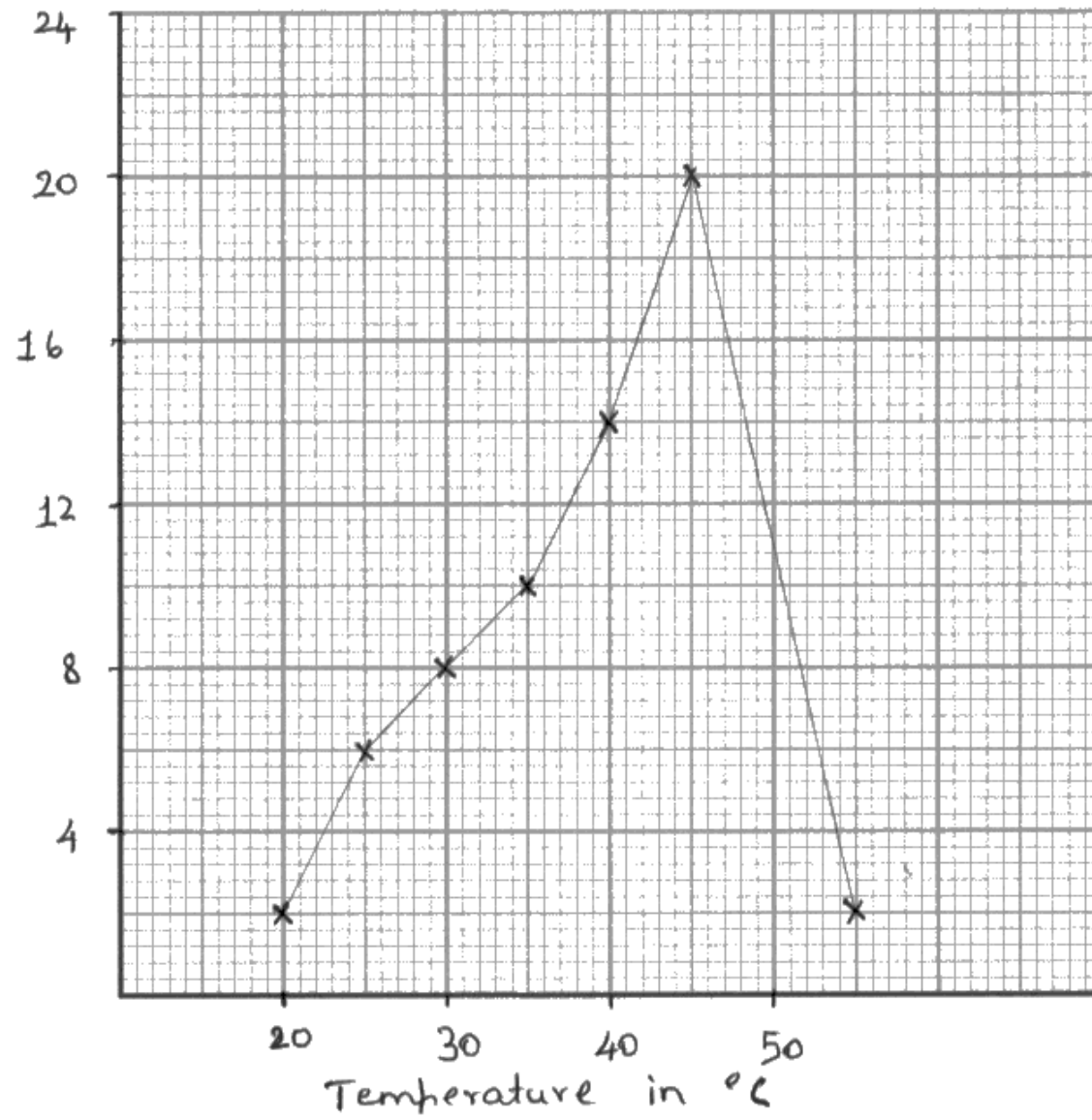
(i) Plot a graph to show these results.

Join the points with straight lines.

(5)

Question Number	Answer	additional guidance	Mark
5(b)(i)	<p>An answer that <u>makes reference</u> to the following points:</p> <p>S scale linear and half the axes (1)</p> <p>L lines straight and through each point (1)</p> <p>A1 axes correct way (1)</p> <p>A2 axes labelled <u>temperature in $^{\circ}\text{C}$ and bubbles per min(ute)</u> (1)</p> <p>P points plotted accurately (1)</p>	<p>bar charts / extrapolations: no L mark</p> <p>no P mark if data plotted for 50</p>	5 exp

Number of bubbles per minute





Comprehension questions

- 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.

Show the paper 2B comprehension as a pdf if possible. Mention that candidates should read them and that they set the scene for the questions.

Taxonomy (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.

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	<ul style="list-style-type: none"> 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.

Cognitive demand of command words

Some command words have different cognitive demands:

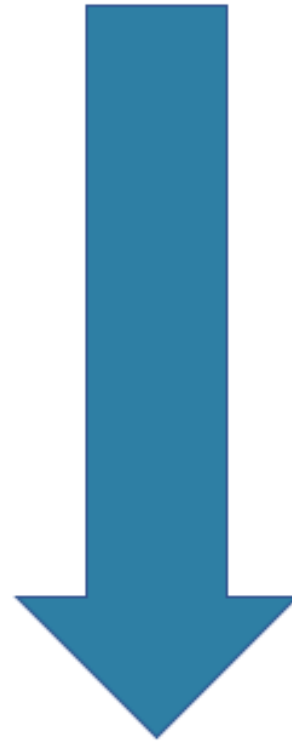
State

Describe

Compare and contrast

Explain

Evaluate / Discuss

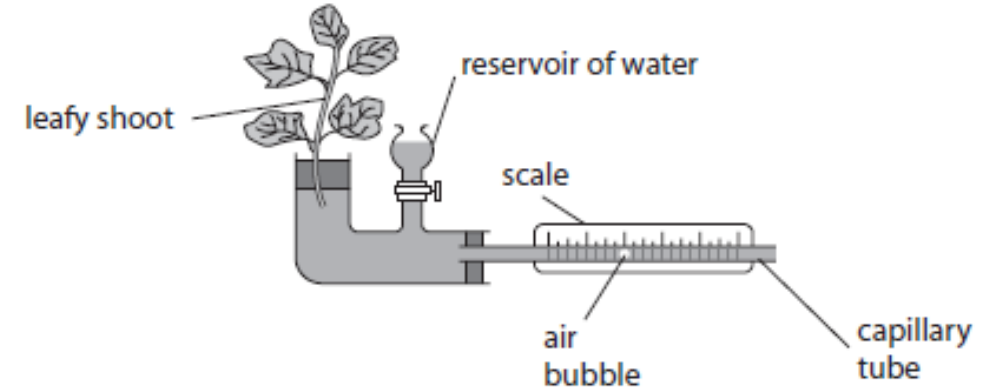


Increasing demand

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 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.

Question Number	Answer	Mark
2(b)(i)	<p>An answer that <u>makes reference</u> to five of the following points:</p> <ul style="list-style-type: none"> • 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)

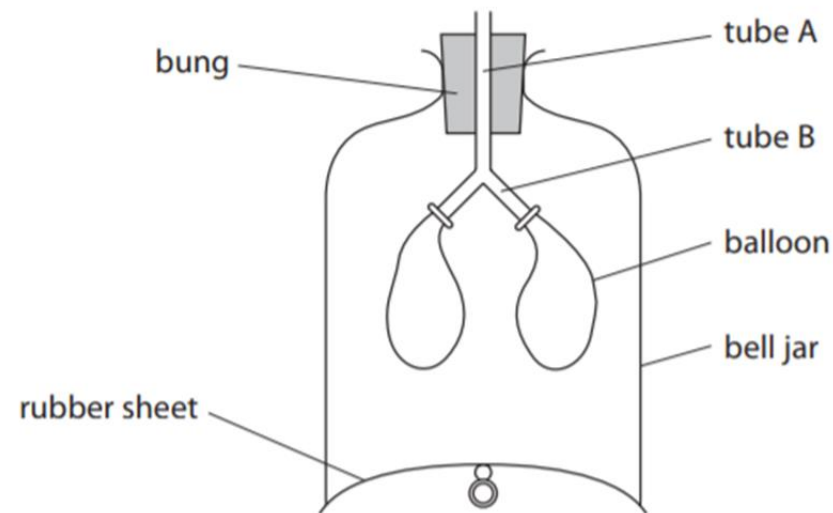
(iii) Suggest how the bacteria benefit from living in the gut of the woodlice.

(1)

Command word: Evaluate

'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)	<p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none">• 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 <u>intercostal</u> 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.

Question Number	Answer	Mark
2(c)(ii)	<p>An answer that makes reference to six of the following points:</p> <ul style="list-style-type: none"> • 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) 	<p>6</p> <p>Mp1 Allow converse</p>

Activity 4: Marking scripts

2.

(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)

Question Number	Answer	Additional guidance	Mark
4(c)(i)	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • fewer plants / fewer algae / less eutrophication (1) • (more) light and (more) photosynthesis (1) • (less) <u>decomposition</u> / <u>decomposed</u> / <u>decomposers</u> (1) • (more) oxygen / not anoxic / less BOD (1) • respiration (ONCE) (1) • (catch) more fish / fewer fish killed / better catch / fish survive / fish do not suffocate / eq (1) 	Allow converse for all Mps	4

Activity 3

(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)

If there is less phosphate passing into the river, there will be less eutrophication. This means less algae will grow. Algae would block light and so many algae would die - this would give decomposer bacteria food. The decomposer bacteria would respire and use up oxygen. This means there would be less oxygen for fish which would die. This means that less phosphate = more fish = more money!

How many marks would this answer score?

(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.

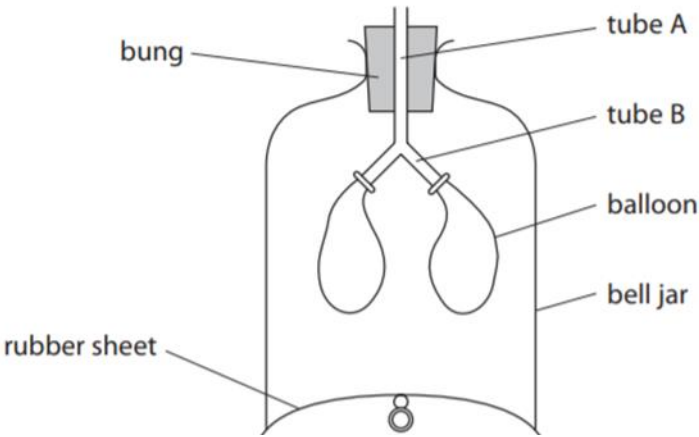
Discuss why these people might support the genetic modification of farm animals.

(4)

Less phosphate = less algal blooms. (Phosphate is a fertilizer). The phosphate would also bioaccumulate and pass up the food chain. Phosphates are also linked to pollution such as acid rain and global warming. If less algae grows, there will be more fish for the fishermen so that they will make more money. (The algae would poison the fish).

How many marks would this answer score?

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)

Question Number	Answer	Mark
8(b)	<p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none">• 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 <u>intercostal</u> muscles (1)	4

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

(4)

The bell jar is a good model because it shows how the lungs move in and out. It doesn't have alveoli so can't show gas exchange. There are no chest muscles on it. The balloons are like the lungs and the glass tubes are like bronchioles.

How many marks would this answer score?

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

(4)

The bell jar is a very good model for ventilation.

Good things about it:

- balloons are like lungs
- balloons can change size.
- it has a trachea that splits into two bronchi.
- the sheet is a diaphragm that moves up & down.

Bad things:

- glass jar won't move.
- ribs are not there.
- no intercostal muscles
- lungs don't fill jar.

Overall: I think it is a good model. ~~as the~~

How many marks would this answer score?



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Science




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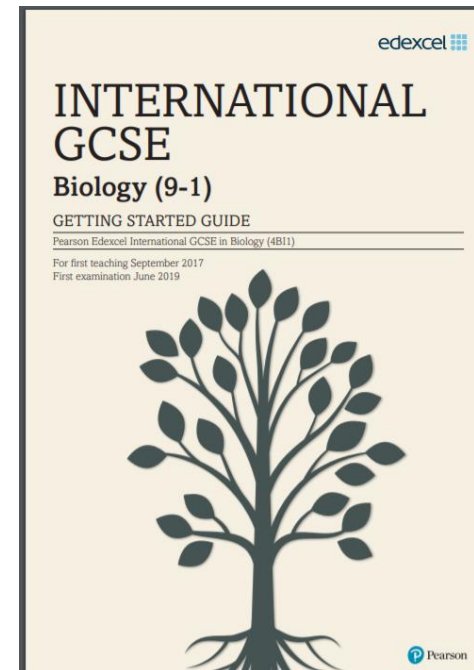
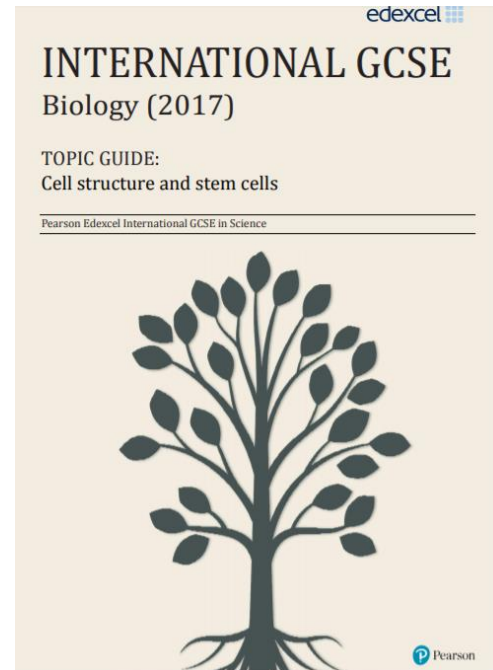
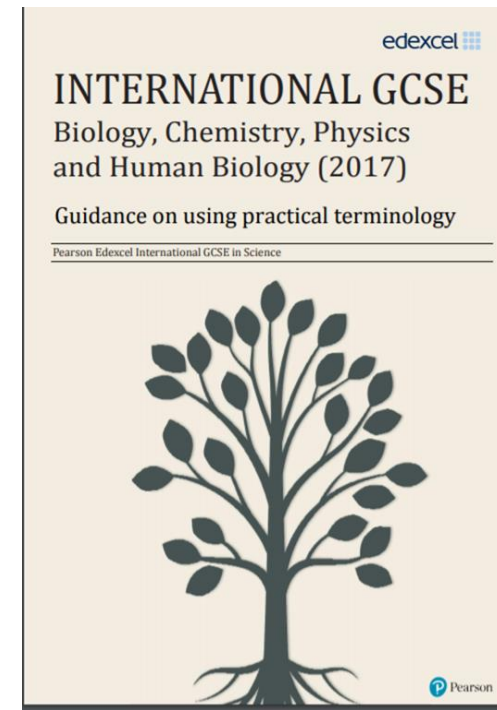
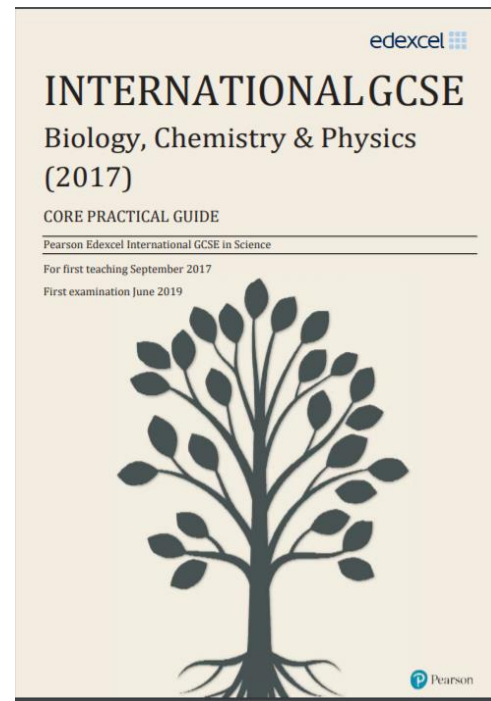
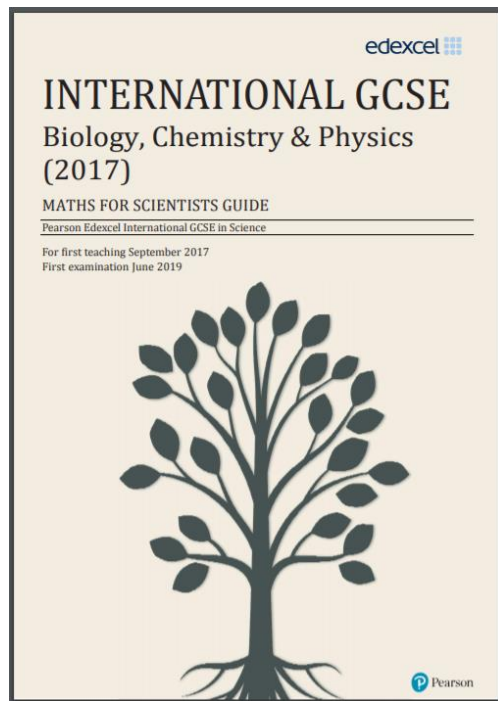
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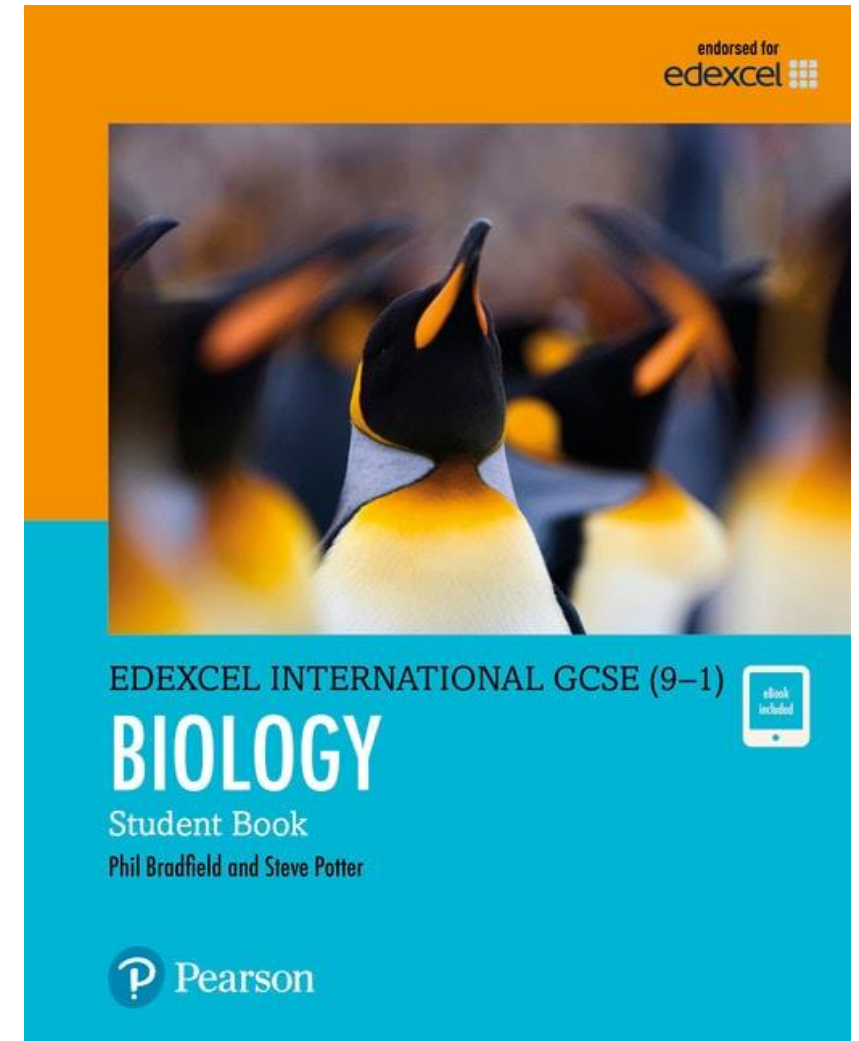
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