

# PEARSON EDEXCEL INTERNATIONAL GCSE (9-1) **Biology, Chemistry & Physics**

GETTING READY TO TEACH

Event code: 4SS0 – 19IF02

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First teaching in 2017, first assessment in 2019.

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# Welcome to today's event

- ❖ Introduction to your trainer: Damian Riddle
- ❖ Housekeeping
- ❖ What's in your pack?
- ❖ How today's training is structured

# Agenda

10.00 – 10.15	Introductions and getting started
10.15 – 11.30	Session 1: Getting Ready for delivery
11.30 – 11.45	BREAK
11.45 – 13.00	Session 2: Getting Ready for practical
13.00 – 14.00	LUNCH
14.00 – 15.15	Session 3: Getting Ready for assessment
15.15 – 15.30	Session 4: Support
15.30 – 16.00	Plenary, final questions and feedback

# Getting to know you

- ❖ Who are you, and which school do you teach at?
- ❖ Do you teach Biology, Chemistry or Physics?
- ❖ Are you new to Edexcel International GCSE or did you teacher the previous specification?

# What do you want to find out today?

- ❖ Please ask lots of questions!
- ❖ Your chance to find out more
- ❖ Make contacts with teachers at other schools too!

# Getting Ready for delivery

**Pearson Edexcel International GCSE**

**Biology, Chemistry and Physics**

# Why Edexcel International GCSE?

- ❖ Developed with input from teachers across the world
- ❖ Suitable for all students: Single Award to separate sciences
- ❖ Engaging content, with progression in mind
- ❖ Clear, accessible question papers available January and June
- ❖ Practical and mathematical skills developed
- ❖ Support from Pearson

# Our suite of International GCSEs

Our suite of 9 – 1 qualifications in Science include the following:

Subject	June (from June 2019)	January (from January 2020)
Biology	✓	✓
Chemistry	✓	✓
Physics	✓	✓
Science (Double Award)	✓	✓
Science (Single Award)	✓	x
Human Biology	✓	✓



# Key features of the 2017 specifications

- ❖ Subject content revised in line with content of other 14 – 16 curricula, including GCSE in the UK
- ❖ Fairer content split between Double Award and separate sciences
- ❖ Practical skills assessed through questions in exam papers
- ❖ Introduction of new qualification - Science (Single Award)
- ❖ Graded using new 9 – 1 system
- ❖ Support by published resources and free support

# Biology content summary

There are five topic areas in the specification:

## Nature and variety of living organisms

- Characteristics of living organisms
- Variety of living organisms

## Structures and functions in living organisms

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

## Reproduction and inheritance

- Reproduction
- Inheritance

## Ecology and the environment

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

## Use of biological resources

- Food production
- Selective breeding
- Genetic modification
- Cloning

# Chemistry content summary

There are now 4 sections in the specification instead of 5

## Principles of Chemistry

- States of matter
- Elements, compounds and mixtures
- Atomic structure
- Periodic Table
- Equations and calculations
- Bonding
- Electrolysis

## Inorganic Chemistry

- Groups 1 & 7
- Reactivity series
- Gases in the atmosphere
- Extraction & uses of metals
- Acids, alkalis & titrations
- Salt preparation
- Chemical tests

## Physical Chemistry

- Energetics
- Rates of reaction
- Reversible reactions and equilibria

## Organic Chemistry

- Introduction
- Crude oil
- Alkanes
- Alkenes
- Alcohols
- Carboxylic acids
- Esters
- Polymers

# Physics content summary

There are now 8 topic areas in the specification:

**Forces and  
motion**

**Electricity**

**Waves**

**Energy  
resources and  
energy  
transfers**

**Solids, liquids  
and gases**

**Magnetism and  
electro-  
magnetism**

**Radioactivity  
and particles**

**Astrophysics**

# Comparison to Cambridge IGCSE

- ❖ The content is broadly similar: although some differences occur  
e.g. CIE Physics has no Astronomy content  
Edexcel International Biology does not include mechanical digestion and the structure of teeth
- ❖ Schools who are switching from CIE can look at our schemes of work for detail on the content required
- ❖ The assessment of the two specifications are different  
e.g. Edexcel International has practical questions throughout,  
rather than in a separate paper  
CIE has a separate multiple choice paper

# Reading the specification

<b>(b) Group 7 (halogens) – chlorine, bromine and iodine</b>	
<b>Students should:</b>	
2.5	know the colours, physical states (at room temperature) and trends in physical properties of these elements
2.6	use knowledge of trends in Group 7 to predict the properties of other halogens
2.7	understand how displacement reactions involving halogens and halides provide evidence for the trend in reactivity in Group 7
<b>2.8C</b>	<b>explain the trend in reactivity in Group 7 in terms of electronic configurations</b>

- ❖ “Bold” statements in separate science only (Paper 2)
- ❖ Command words in the specifications give a guide to depth of teaching

# Science (Double Award)

Features of Science (Double Award):

- Students take Paper 1 in Biology, Chemistry and Physics
- Students achieve two grades, based on performance across all three papers: these two grades may not be the same
- Students may still progress to A level
- Significant changes to the content of Double Award compared to previous specification

# Science (Single Award)

This new qualification has:

- Half the content of the Double Award specification
- Short exam in each science which does not overlap with Double Award or Biology / Chemistry /Physics
- Students achieve a single grade, based on performance across all three papers
- Not designed for science progression



# Combinations of subjects

- ❖ Double Award candidates take the same Paper 1 as candidates sitting Biology, Chemistry and Physics as separate sciences
- ❖ Double Award cannot be taken in the same exam series as Biology or Chemistry or Physics
- ❖ Single Award exams contain different questions to those in the Double Award or separate science papers
- ❖ Single Award can therefore be taken in the same exam series as Biology or Chemistry or Physics or Science (Double Award)

# Planning your teaching

- ❖ Mapping documents available to show:
  - How content matches the previous specification
  - How content matches the Cambridge specification
  - How the Single and Double Award content fits with the separate science
- ❖ Schemes of work divide the content and provide additional guidance and resources

# ACTIVITY 1 – organising your teaching

## DISCUSSION

- ❖ Two years / three years
- ❖ How many hours per week?
- ❖ One teacher for everything / one teacher per science
- ❖ Regular practical / mostly theory
- ❖ Theoretical / application

# Progression

- ❖ The Edexcel International GCSE is part of our wider set of specifications for students
- ❖ These start with the Lower Secondary Curriculum
- ❖ International GCSE gives excellent preparation for progression to International A level, or to GCE A level or IB

# Skills for progression

- ❖ Learning of facts is of limited use
  - Knowledge marks up 40% of questions at International GCSE and only around one-third at A level
  - Factual content changes at each stage of learning
- ❖ Progression comes from developing skills
- ❖ Learning styles important: passive learning vs active learning

# Teaching skills, not knowledge

Version 1	Version 2
<p>When we eat, enzymes in saliva breakdown starch to simpler carbohydrates , like maltose. We chew our food to break it up into smaller pieces. This makes it easier to swallow but also makes the reaction with enzymes faster because of the higher surface area.</p> <p>Saliva also makes our food wet – this helps as well swallow. The food travels down the oesophagus by peristalsis.</p>	<p>Imagine you're eating a cheese sandwich. What types of food molecules are there in the sandwich?</p> <p>There's an enzyme called amylase in saliva. It breaks down starch to maltose. What would make this process happen faster? How are humans adapted to make this happen?</p> <p>For your homework, I'm going to ask you to plan an experiment you could do to show that surface area</p>

## ACTIVITY 2 – Skills for progression

**What skills do you think are important in your subject?**

**Discuss with colleagues on your tables and consider:**

- What are the top 3 skills for progression in your subject?**
- Does this vary across the three sciences?**

# The 9–1 grading scale

- ❖ Designed to show that the new GCSEs are different to the previous ones
- ❖ Matching in outcomes expected between Grade 7 and Grade A; and between Grade 4 and Grade C
- ❖ New Grade 9 above the current A\*
- ❖ Number of Grade 9s awarded depends on the number of Grade 7s



# The 9–1 grading scale

“Grade 9 is not the same as A\*; it’s a new grade, designed to recognise the very highest performing students.”

*Ofqual*

New grading structure	Current grading structure
9	A*
8	
7	
6	B
5	
4	C
3	
2	D
1	
U	U

GOOD PASS (DfE)

5 and above = top of C and above

AWARDING

4 and above = bottom of C and above

# Grade 9

- ❖ Originally intended to fixed: “the top 20% of those scoring Grade 7”
- ❖ Method of awarding Grade 9 has been changed, to be fairer on students
- ❖ New method of working out Grade 9 will be:

$$\begin{array}{l} \text{proportion of Grade 7} \\ \text{students eligible} \\ \text{for Grade 9} \end{array} = \frac{(\% \text{ of students who achieved Grade 7})}{2} + 7\%$$

# Comparing 9-1 and A\* - G

## 2018: A\* - G

	A*	A* - A	A* - C	A* - F
Biology	35.6%	53.9%	78.6%	90.6%
Chemistry	38.5%	55.8%	81.7%	92.9%
Physics	37.2%	54.7%	78.5%	91.9%

## 2019: 9 – 1

	Gd 9	Gd 9 – 8	Gd 9 – 7	Gd 9 – 4	Gd 9 - 1
Biology	18.6%	37.7%	53.6%	79.2%	94.0%
Chemistry	23.0%	43.3%	59.0%	80.6%	95.9%
Physics	22.3%	42.4%	59.3%	79.8%	94.2%

# **Morning break**

**Please be ready to start again  
in 20 minutes!**

# Getting Ready for practical

**Pearson Edexcel International GCSE**

**Biology, Chemistry and Physics**

# The importance of practical work

- ❖ It is often said that Sciences are “practically based”
- ❖ This is true – but practical work is not just about students gaining skills in manipulation
- ❖ All sciences are also investigative
- ❖ It is the ability to investigate that opens up science to students – and also helps them with application
- ❖ Integration of practical work: exams reflect teaching

# Practicals in the specification

- ❖ Specifications contain a number of suggested practicals
- ❖ Further suggestions for practicals appear in an Appendix
- ❖ The suggested practicals would form a basis for practical work, on which schools would be encouraged to build
- ❖ Questions on exam papers test practical skills, rather than recall of specific techniques – so may be in the context of any practical activity

# Core Practicals

- ❖ Each specification contains 12 – 14 practical activities embedded in the specification content
- ❖ These have been chosen to give students experience of key techniques and apparatus
- ❖ They are also designed to be accessible from the point of view of apparatus
- ❖ Students should be familiar with the core practicals, but will get tested on a wider range of practicals in exams



# Developing practical skills

Students should be familiar with a range of laboratory apparatus and its use, including the reading of scales.

1

Students should be able to plan an experiment and control variables, to collect and record data in a table, and to plot appropriate graphs with lines of best fit.

2

Students should be able to process and analyse data, to identify and account for anomalies, to evaluate data and methods, and to justify a conclusion.

3

The specification will include guidance on the use of terminology within practical and experimental work.

4

# ACTIVITY 3 – Practical terminology

Define each of these terms



validity



precision



anomaly



accuracy



reliability

# Practical terminology in exams

- ❖ Exams often phrase questions to avoid using terms because of lack of shared understanding

- ❖ Context: is the question about method / apparatus or data?

- ❖ In general:

VALIDITY – about controlling variables

RELIABILITY – about repeating to find and remove anomalies

PRECISION – about the use of apparatus

ACCURACY – the hard one! All the above can affect accuracy...

# Looking at the SAMs

ACCURACY, PRECISION, RELIABILITY, VALIDITY

- ❖ Physics: did not appear in any questions
- ❖ Chemistry: one question uses “validity”  
one mark scheme uses “accuracy”
- ❖ Biology: one MCQ uses “reliability”  
one longer question uses “validity”

(b) The data shows the mean maximum lung volume at each age.

(i) Which of the following would improve the reliability of these mean values?

(1)

- ☐ **A** using a larger range of ages
- ☐ **B** measuring more people at each age
- ☐ **C** measuring lung volume in  $\text{cm}^3$
- ☐ **D** measuring lung volumes in other mammals

(c) A student wants to compare the transpiration rate of two weed species.

Describe how the student could measure the rate of water loss in order to make a valid comparison.

(5)

He repeats the method using the same amount, in moles, of different metals.

(a) To make the experiment valid, he starts with the copper(II) sulfate solution and the added metal at the same temperature.

State **two** other variables that must be controlled if the experiment is to be valid.

(2)

(a) A teacher advises the student to use a  $50 \text{ cm}^3$  burette instead of the  $10 \text{ cm}^3$  measuring cylinder.

Suggest **two** reasons why it would be better to use a burette instead of a measuring cylinder to add the acid in this experiment.

(2)

# Practical support guide

- ❖ Available on the website
- ❖ An introduction to each practical activity
- ❖ Description of the practical, with some useful hints and tips
- ❖ Questions to use with students to test their understanding as they do the experiment in the lab
- ❖ A past paper question, where relevant, to use as a homework activity

# ACTIVITY 4 – using the Practical Guide

**Your pack contains an example of the Practical Guide for one of the Core Practicals.**

**What questions would you ask as the students did this practical?**

**How do these questions:**

- help students understand the practical?**
- prepare students for exam questions?**

# Practical skills in examinations

**Students may be tested on their ability to:**

Describe and plan experiments

Draw conclusions which are consistent with the evidence, using scientific knowledge and understanding

Describe safe and appropriate practical techniques

Communicate findings from experimental activities using appropriate vocabulary, calculations and graphs

Analyse and interpret data from experimental activities

Evaluate data and methods



# CORMS and devising investigations

- **Change**      with and without OR range of values  
(independent variable)
- **Organism**      e.g. species / size / age / sex....  
(controlled variable: biotic)
- **Repeat**      more than one reading
- **Measure**      what is measured, and when?  
(dependent variable)
- **Same**      any two factors  
(controlled variable: abiotic)

# CORMS questions in 2019

## Paper 1

(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)

## Paper 1B

11 The diagram shows an insect called a wasp.

Wasps kill their prey by injecting a poison called venom through a small tube called a stinger.

Some scientists believe that the smell of venom attracts other wasps.

Design an investigation to find out if the smell of venom attracts other wasps.

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



(6)

# Does CORMS work for other sciences?

- ❖ Biology questions are set in very general situations
- ❖ In Chemistry and Physics, questions tend to be in a familiar situation
- ❖ Chemistry and Physics questions tend, therefore, to require more specific experimental details e.g. apparatus used, measurements taken
- ❖ It is always worth addressing validity and reliability!

# Graphs

- ❖ Guidance is given in the document “Guidance on using practical terminology”
- ❖ Students are advised to draw graphs in pencil
- ❖ Draw graphs as larger as possible on the grid – but without using a complicated scale!
- ❖ Exam questions give guidance on the type of trend line to draw: a straight line or a curve
- ❖ Biology questions usually ask for points to be joined

# ACTIVITY 5 – example questions

**Your pack contains two example questions testing practical skills.**

**Discuss possible mark schemes for these questions.**

**How can you prepare students to answer this type of question in the exam?**

# Mathematical skills

- ❖ 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, 20% in Chemistry and 30% in Physics
- ❖ See SAMs for an example, but note that maths questions have always been asked in previous papers so should not be a surprise

# Getting Ready for assessment

**Pearson Edexcel International GCSE**

**Biology, Chemistry and Physics**

# Summary of assessment

100% external assessment – with no coursework

Linear assessment – all exams take in the same exam session

Questions using maths skills  
(10% in Bio  
20% in Chem  
30% in Physics)

Mixture of question types – all marked with ‘points-based’ mark schemes

Single tier of entry (untiered)

Each paper will have some longer questions  
(4 – 6 marks)



# Assessment summary

## Paper 1

**Two hours; 110 marks**  
will **NOT** include the specification statements  
printed in **BOLD**

## Paper 2

**One hour and 15 minutes; 70 marks**  
includes **ALL** the specification statements,  
including those in **BOLD**

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

The AO3 questions  
are likely to be in a  
practical context

Both papers have similar question types

# Assessment objectives

## AO1

Knowledge and understanding of biology / chemistry / physics

**40%**  
**of total marks**  
**(was 45-50%)**

## AO2

Application of knowledge and understanding, analysis and evaluation of biology / chemistry / physics

**40%**  
**of total marks**  
**(was 27.5-32.5%)**

## AO3

Experimental skills, analysis and evaluation of data and methods in biology / chemistry / physics

**20%**  
**of total marks**  
**(was 20-25%)**

# How has assessment changed?

- ❖ Paper 1 has 10 fewer marks; and Paper 2 has 10 more marks
- ❖ Paper 2 carries more “weight” – the bold statements will be tested more than currently
- ❖ There is more emphasis on skills, understanding and application (AO2) and less on recall (AO1)
- ❖ Longer questions in all three sciences; and multiple-choice in all three sciences

# AO2 questions

(c) Some people have problems with their breathing system.

They struggle to breathe and can become breathless.

These people may use inhalers to reduce their symptoms.

The inhalers deliver drugs called bronchodilators into their lungs.

The photograph shows a person using an inhaler.



(Source: © Ljupco Smokovski/Shutterstock)

(i) Suggest how bronchodilators help these people to breathe.

(2)

❖ “Sir, you never taught us anything about inhalers!”

❖ Students need to deal with contexts and apply their knowledge

## ACTIVITY 6 – AO2 questions

**Your pack contains two questions involving AO2 from this summer's exams.**

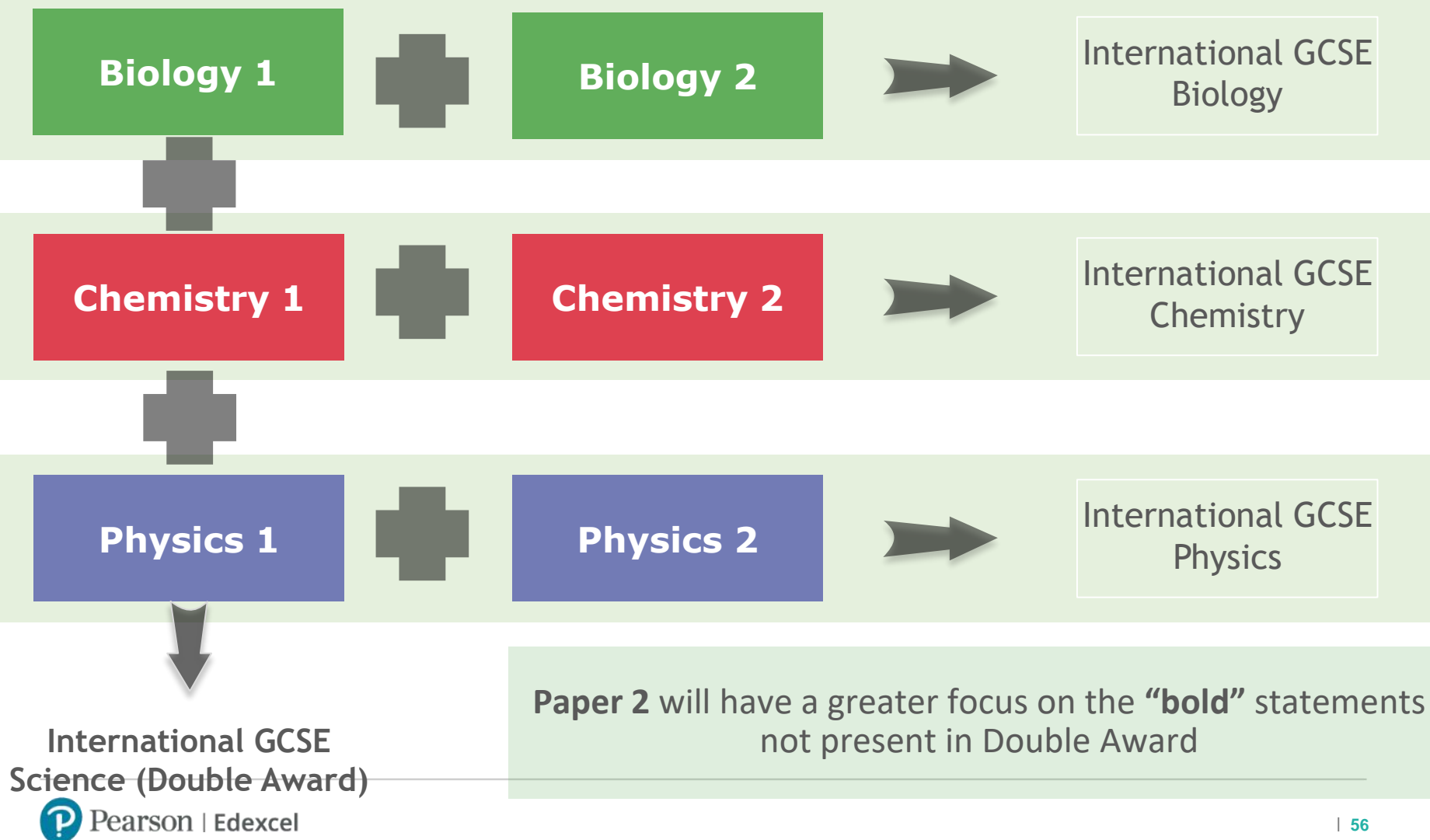
**How would your students read these questions?**

**What can you do to help students access this type of question?**

# Preparing students for AO2

- ❖ Teaching approaches: facts vs principles
- ❖ Questioning styles: closed vs open
- ❖ Homework activities: formative vs summative
- ❖ Exam preparation

# Structure of papers



# Exam question guide

The question style is similar to that of the existing International GCSE:

A small number of multiple choice questions

Short answer responses, usually worth 1 – 3 marks

Longer answer questions, up to 6 marks

All questions are **compulsory** and may cover **practical** situations as well as **areas** of theory



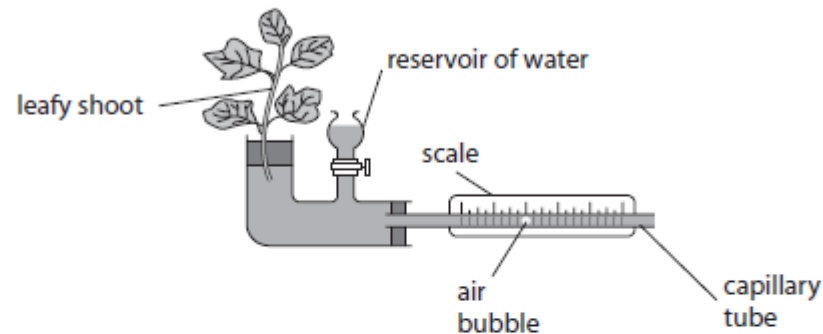
# Command words

- ❖ All our qualifications in science now use a common taxonomy for command words
- ❖ These can be found in an Appendix at the back of the specification
- ❖ Students can still expect a range of command words across the demand range of the exam paper

# Describe and explain #1

- 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

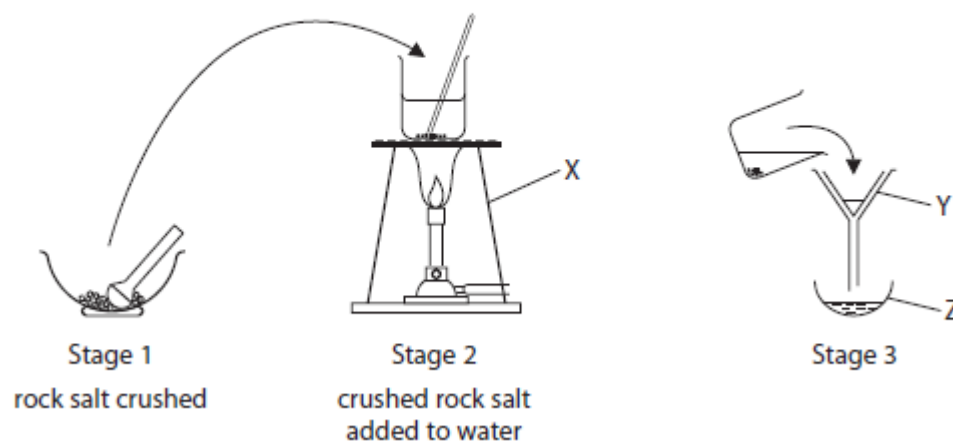
Explain the difference in the rate of transpiration in wind and in still air.

(2)

# Describe and explain #2

2 Rock salt is a mixture of the soluble salt, sodium chloride, and some insoluble impurities.

The diagram shows the first three stages of a method used to obtain pure sodium chloride from rock salt.



How do you get  
2 marks here?

(c) (i) Explain what happens to the impurities in stage 3.

(2)

(iii) Describe a chemical test used to distinguish between unsaturated and saturated hydrocarbons.

(3)

How much detail  
is needed here?

test .....

results .....

# New command words: Compare

*“Give similarities and differences between several things, not just one”*

(c) The table gives some data on two main sequence stars, X and Y.

	Star X	Star Y	The Sun
mass compared to the Sun	0.7	15	1

Compare the evolutionary paths for Star X and Star Y.

(4)

# New command words: Comment on

*“Look at data and information and decide what it shows”*

(e) The molecular formula of compound **S** is  $\text{C}_4\text{H}_8$

Student X states that compound **S** is an alkane.

Student Y states that compound **S** is an alkene.

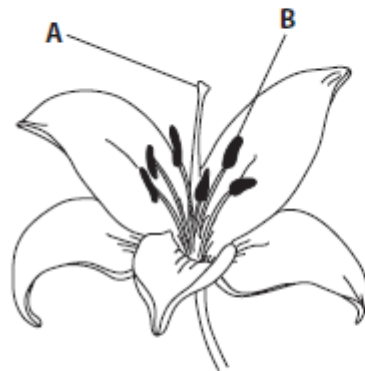
Comment on each of the student's statements.

(4)

# New command words: Identify

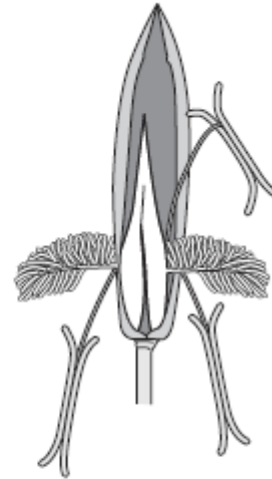
*“Choose key details from information in the question”*

8 The diagrams show two flowers from different species.



magnification  $\times 0.5$

**Flower 1**



magnification  $\times 10$

**Flower 2**

(b) Identify the method of pollination used by each flower.

Include features shown on the diagram to support your answer.

(4)

# Some subject specific issues

## BIOLOGY

- comprehension exercise in Paper 2

## PHYSICS

- formulae which students need to remember are marked in the specification as “know and use...”
- other formulae are just “use...” and will be provided in the question paper
- different formulae are provided for Paper 1 and Paper 2

# Support

**Pearson Edexcel International GCSE**

**Biology, Chemistry and Physics**



# What's on the website?



## International GCSEs and Edexcel Certificates Chemistry (2017)

[Specification](#)[Course materials](#)[Published resources](#)[News](#)

### Find course materials

[Specification and sample assessments \(3\)](#)[Exam materials \(8\)](#)[Teaching and learning materials \(18\)](#)

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Find your Document

[Assessment guidance](#)

# Teaching and learning materials

In this section of the website you will find:

- Getting started guides
- Mapping document and schemes of work
- Guides for practical and mathematical skills
- Exemplars
- Topic Guides
- Past training materials

# Teaching and learning support overview

Getting Started Guide  
& Scheme of Work

Subject interpretation  
of transferable skills

Subject Advisor

Results Plus &  
ExamWizard

Regional Support  
Teams

Curriculum Matched  
Publishing

Access to Scripts



**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.
- Allows you to view your school's performance against other Pearson Edexcel schools in your country. You can also find student results analysis from their previous Pearson Edexcel school.
- Mock exams results can also be fed into the system to produce an analysis.
- [ResultsPlus Direct](#) gives your students access to their final grades and performance breakdown, wherever they are.
- Sign up for free ResultsPlus account in just a few quick and easy steps [here](#).
- Access additional video guides here:
  - [ResultPlus - Individual Student Analysis](#)
  - [ResultsPlus - Cohort Analysis](#)
  - [ResultsPlus - Mock Analysis](#)
  - [ResultsPlus - Global Analysis](#)



**examWizard is a free tool for teachers containing a bank of past paper questions to help create their own bespoke mock exams and tests to focus on particular topic areas as needed:**

- Use existing mark schemes for accurate marking
- Use existing examiner report for insight
- Use the results to understand where students need more support, informing teaching strategies.

**Unlike other similar question banks, ExamWizard is:**

- Available free to all Edexcel centres
- Updated with latest questions faster, following the exam series
- One stop shop for assessment material with access to whole past papers and examiner reports as well as the ability to construct bespoke ones easily with content tagged to specific attributes.

# New 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](#).**



# Further examination feedback

- ❖ Look out for our pre-recorded feedback sessions for International GCSE
- ❖ These provide feedback directly from the Principal Examiner on the summer's exams
- ❖ Examiner reports are also provided on each subject website, along with question papers & mark schemes

# Contact your Subject Advisor

Your Science Subject Advisor team can be contacted through our website

<https://qualifications.pearson.com/en/contact-us/teachers.html>

Phone: **+44 (0)330 058 9493**

Twitter: [\*\*@PearsonSciences\*\*](#)



# Thank you

Find out more about us at:  
<http://qualifications.pearson.com>