



# 2015 A LEVEL PHYSICS LAUNCH EVENT

# Agenda

1. Our approach
2. The changes
3. Our draft specification
4. Supporting you through the changes
5. Contact information



# Our approach

## The research phase

To develop new Edexcel A levels, Pearson has involved:

- ❖ teachers
- ❖ Higher Education lecturers
- ❖ subject stakeholders
- ❖ examiners
- ❖ students

## The role of Higher Education

- ❖ Initial request from Secretary of State for HE involvement in A level reform
- ❖ Ensure that A level prepares students for undergraduate study
- ❖ Initial questionnaire across 30 universities
- ❖ Focus on (i) content, (ii) practical work, (iii) Maths within science
- ❖ “Advisory groups” (~ 8 people) worked with Pearson on content
- ❖ Ofqual submission requires evidence from these groups

## “World Class Qualifications”

- ❖ Benchmarking of our A level against similar qualifications in other countries
- ❖ Internal validity studies looked at comparability of Edexcel A levels year-on-year
- ❖ Research from other sources e.g. Ofqual’s report on International Comparisons
- ❖ Ensure A level continues to have international standing



# The changes

## Edexcel and other Awarding Bodies

Changes to:

- ❖ the linear nature of AS and A level
- ❖ the subject criteria for AS and A level
- ❖ the assessment objectives for AS and A level
- ❖ the assessment of mathematics within A level
- ❖ the assessment of practical work at A level

are common to all Awarding Bodies, for accredited specifications for use in England.



## The timeline for A level 2015

	2014	2015	2016	2017
Current specification	Summer series as normal	Summer series as normal	Final AS and A2 exams	
New specification	Specifications in centres	First teaching	First AS exams	First A level exams

## Government view – all A levels

“I believe that the primary purpose of A levels is to prepare students for degree-level study. All students should have access to qualifications that are highly respected and valued by leading universities. Current A levels do not always provide the solid foundation that students need to prepare them for degree study”.

Michael Gove, Secretary for State, January 2013

## HE view – all A levels

A levels are generally seen as 'fit for purpose' in terms of content and preparing most students for HE study, however they highlighted issues with skills that undergraduate learners lack:

- **Academic skills:** research, finding sources, essay writing and referencing.
- **Critical thinking skills:** constructing balanced arguments from evidence, assessing validity and soundness of arguments.
- **Synoptic learning skills:** making links across different topics, analysis, solving more complex problems.
- Some students lack the required skills in academic **English and Maths**, i.e. reading, numeracy and literacy and oral skills are not at the right standard for undergraduate study.

# The Smith Report

## Summer 2013

- ❖ Review of stakeholder evidence across Awarding Bodies
- ❖ Smith report recommends level of change needed

## Autumn 2013

- ❖ Public consultation on the changes needed
- ❖ Proposed small changes to “core” subject criteria
- ❖ Proposed a weighting for assessing maths within science

## Spring 2014

- ❖ Final subject criteria published

## Subject criteria for GCE 2015

- ❖ generic statements showing content for A level (and AS)
- ❖ this content must be in ALL accredited specifications
- ❖ the subject criteria make up 60% of A level (and AS)
- ❖ the remaining 40% is at the discretion of each Awarding Body; and can be additional breadth or depth
- ❖ some statements revised, or moved between AS and A level
- ❖ Overall, low level of change in content of subject criteria

## Changes to the subject criteria

Very few changes to the subject content, but:

- ❖ “How Science Works” statements remain in introduction, but not referred to in assessment objectives
- ❖ AS content remains a sub-set of the A level content
- ❖ Requirement for proportion of marks to be assigned to assessing maths within each science
- ❖ Assessment objectives re-worded and given new weightings

## The role of AS level

- ❖ AS level becomes a “stand alone” qualification
- ❖ Revised AS level is the same standard as current AS
- ❖ AS can be the same content as the first year of A Level i.e. AS is co-teachable with A level
- ❖ Students can still take AS level then go on to A level
- ❖ If students take AS level examinations, these marks DO NOT form part of overall A Level grade
- ❖ The A level grade is awarded for performance on A level papers only – these papers will integrate AS material

## Revised assessment criteria

		A level	AS level
<b>AO1</b>	Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures	30 – 35%	35 – 40%
<b>AO2</b>	Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: in a theoretical context in a practical context when handling qualitative data when handling quantitative data	40 – 45%	40 – 45%
<b>AO3</b>	Analyse, interpret and evaluate scientific information, ideas & evidence, including in relation to issues, to: make judgements and reach conclusions develop and refine practical design and procedures	25 – 30%	20 – 25%





# Our draft specification



# Features of Edexcel specifications

- ❖ clearly organised specifications
- ❖ revised content to assist progression to further study or to the workplace
- ❖ support and guidance for developing practical and mathematical skills
- ❖ high quality assessments designed to deliver greater consistency
- ❖ support for planning, delivery, and tracking student progress



## General introduction

- ❖ specifications still arranged into AS and A level material
- ❖ topics clearly marked
- ❖ Core Practicals embedded into specifications
- ❖ “command words” used differ from those on exams:  
KNOW                                      UNDERSTAND    BE ABLE TO
- ❖ appendices show practical and mathematical requirements



# A Level Physics

- ❖ small changes to the criteria  
e.g. momentum (in one dimension) moves to AS
- ❖ some additions to the specification  
e.g. increased optics at AS
- ❖ non-core topics such as astrophysics retained
- ❖ 40% of marks allocated to mathematical skills
- ❖ single specification – can be taught as a concept course, or context using SHAP materials

# Physics

- ❖ The topics are broadly unchanged from current A level

AS level	A level
Mechanics	Further mechanics
Electric circuits	Fields
Materials	Nuclear and particle physics
Waves and the particle nature of light	Thermodynamics and space
	Nuclear radiation
	Oscillations



## Physics – using Salters-Horners

- ❖ SHAP approach provides a context-led course
- ❖ real-life contexts developed in partnership with schools, universities and industry
- ❖ centres may like to use the SHAP approach for some topics, and a concept approach for others
- ❖ topics retain same titles as currently, but some movement of material to improve storylines
- ❖ fully-supported by resources for this approach



# Getting to know the draft specification

## ACTIVITY 1

**Review the content of the draft specification**

**What changes can you see to the content?**

**What has moved between AS and A level?**

**Do the new command words help show what you need to teach?**



# Our draft specification - assessing practical skills





## Practical assessment at A level

- ❖ Revised A levels will not contain any “coursework” or project activities which count towards the A level grade.

Two assessed aspects of practical assessment:

- ❖ aspects of practical work to be assessed in written examinations
- ❖ practical competency to be assessed separately, by teachers



# Practical work in the draft specification

To keep practical work at the heart of the specification, Awarding Bodies and the regulator have agreed to:

- ❖ add a number of key practical techniques to subject criteria
- ❖ include a minimum of 12 “core” practicals in all specifications
- ❖ have some consistency in the proportion of marks in written examinations which cover the assessment of practical work



## What will core practicals be like?

- ❖ minimum of 12 activities
- ❖ embedded into draft specification
- ❖ covering the techniques listed
- ❖ differ between Awarding Bodies
- ❖ split between first and second year
- ❖ “tried and tested”
- ❖ mostly take place in a single lesson

# Practical techniques in Physics

## ACTIVITY 2

**Review the 12 practical techniques and the core practicals for your subject.**

**Can you see how the core practicals cover the techniques?**

**Which techniques may need further work beyond the core practicals?**

# Practical assessment in written papers

Questions on AS and A level papers must assess practical skills in these areas:

- ❖ **Independent thinking**
- ❖ **Use and application of scientific methods and practices**
- ❖ **Numeracy and the application of mathematical concepts in a practical context**
- ❖ **Instruments and equipment**

Questions may be asked in the context of core practicals, or applied to other practical scenarios.



# The practical competency measure

Confirmed by Ofqual:

- ❖ only available at A level
- ❖ involves on-going assessment by teachers
- ❖ reported alongside A level grade, but does not affect that grade
- ❖ reported as “pass” or “not reported”



# The practical competency measure

Still under discussion:

- ❖ the nature of the evidence required to show completion of core practicals
- ❖ what will be submitted for moderation
- ❖ any other procedures e.g. visiting moderators

Final details for the assessment of practical competency will be reported after an Ofqual trial this autumn.



# Our draft specification - assessing mathematical skills





## The background

- ❖ Smith Report recommended minimum weighting for assessment of mathematical skills within science
- ❖ 10% in Biology, 20% in Chemistry, 40% in Physics
- ❖ needs to be “Level 2 or above”
- ❖ where maths above Level 2 is expected, it will need to be taught

## The skill areas

New mathematical appendices in the A level science specifications will encourage students to develop skills within the areas of:

- ❖ Arithmetic and numerical computation
- ❖ Handling data
- ❖ Algebra
- ❖ Graphs
- ❖ Geometry and trigonometry

## Exemplifying the skills

For each skill, the mathematics appendix will give some examples of where this skill could be encountered.

e.g.

C.2.2	Change the subject of an equation, including non-linear equations	Candidates may be tested on their ability to: •rearrange $E = mc^2$ to make $m$ the subject
C.3.3	Understand that $y = mx + c$ represents a linear relationship	Candidates may be tested on their ability to: •rearrange and compare $v = u + at$ with $y = mx + c$ for velocity-time graph in constant acceleration problems

# Mathematical requirements

## ACTIVITY 3

**Review the contents of the mathematical appendix  
(Appendix 6)**

**Are there any aspects of mathematical  
coverage that differ from what you  
currently do?**



# Our draft specification - assessment model and SAMs



## Feature of Edexcel SAMs

- ❖ mixture of question types
- ❖ questions ramped in difficulty through the paper
- ❖ consistent demand profile of question from year to year
- ❖ at AS, two papers covering different topics
- ❖ At A level, Paper 1 and 2 are also topic-based
- ❖ Paper 3 will assess across the whole subject, and have a practical focus

# Physics

## ❖ Proposed AS examination model

Paper 1	Paper 2
1h 30 mins, 80 marks	1h 30 mins, 80 marks
50% of AS	50% of AS
Covers Topics 1 & 2 and includes questions on core practicals	Covers Topics 3 & 4 and includes questions on core practicals

# Physics

## ❖ Proposed A level examination model

Paper 1	Paper 2	Paper 3
1h 45mins 90 marks	1h 45mins 90 marks	2h 30mins 120 marks
Topics 5, 6 & 7 (plus AS Topics 1 & 2)	Topics 8 - 12 (plus AS Topics 3 & 4)	All topics – half the paper is practical
30% of A level	30% of A level	40% of A level



# Specimen assessment materials

## ACTIVITY 4

**Review the contents of the draft specimen papers.**

**How is AS material examined in the A level papers?**

**Which questions assess mathematics and practical skills?**



# Supporting you through the changes

# Supporting you through the changes

- ❖ Planning and delivery
- ❖ Teaching and learning
- ❖ Understanding the standard
- ❖ Tracking progress
- ❖ Training from Pearson
- ❖ Personal support

# Planning and delivery

We will provide you with:

- ❖ Getting Started Guide
- ❖ Mapping to current GCEs
- ❖ Schemes of work
- ❖ Guides to choosing concept-led or context-led teaching routes for Salters-Horners / Physics

# Teaching and learning

Preparing for changes may require a fresh approach to teaching and learning.

- ❖ Our free resources will focus on how to help learners develop deeper understanding and overcome potential barriers to learning
- ❖ Materials are drawn from tried-and-tested pedagogies that are underpinned by an evidence base, so we know they work.
- ❖ Our CPD programme will focus on aspects of the teaching where you have said you need more support.



# Teaching and learning

## Developing Investigative skills

- ❖ Teacher guide
- ❖ Student support materials
- ❖ CPD

## Mathematics in Science

- ❖ Teacher guide
- ❖ Student support materials



## Understanding the standard

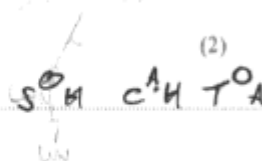
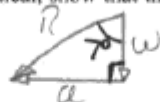
To help you understand the standard of the new A Level, we will provide:

- ❖ Additional set of assessment materials alongside our accredited SAMs (Sample Assessment Materials)
- ❖ Exemplar student work, with examiner commentaries, derived from our trialling with centres
- ❖ Mark schemes that have been researched and trialled

## Understanding the standard

Enhanced Examiner Reports, as in present specification, to highlight common areas of student misunderstanding

(iii) When the string is at  $7^\circ$  to the vertical, show that the acceleration of the car is about  $1 \text{ m s}^{-2}$ .



$$\sin 7 = \frac{a}{R}$$

$$a = R \sin 7 = 10 \sin 7 = 1.22 \text{ m s}^{-2}$$



**ResultsPlus**  
Examiner Comments

The candidate has drawn a triangle from which to base their trig using both forces and acceleration. They then use a value of  $g = 10$ . No correct answer could be obtained from this working.



**ResultsPlus**  
Examiner Tip

As the tension and the mass had not been given, you had to resolve both vertically and horizontally to cancel out the unknown quantities:

$$T \sin \theta = ma$$

$$T \cos \theta = mg$$

Dividing one by the other will give  $\tan \theta = a/g$  so a can now be calculated as  $g$  and  $\theta$  are known.



## Tracking progress



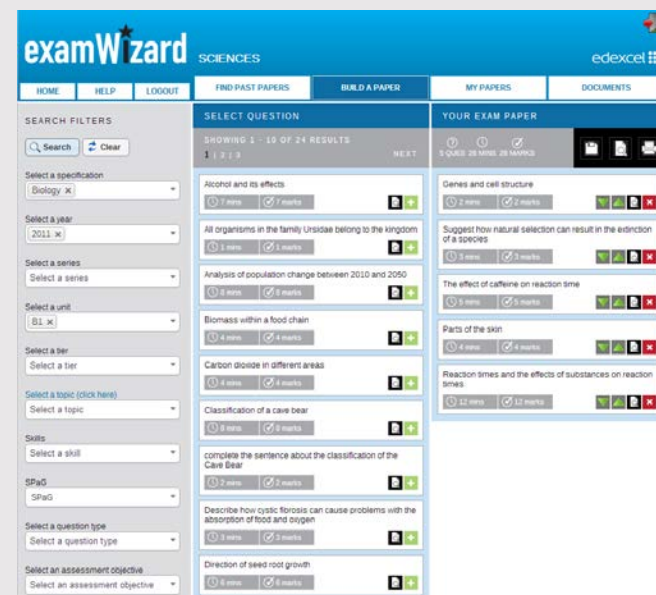
**ResultsPlus**

- ❖ Our new qualification will have an additional set of papers prior to first teaching, for you to use as a mock exam or earlier in the course.
- ❖ ResultsPlus provides the most detailed analysis available of your students' exam performance. It can help you to identify topics and skills where students could benefit from further learning.
- ❖ Mock Analysis provides analysis of past exam papers which can be set as mock exams.

[www.edexcel.com/resultsplus](http://www.edexcel.com/resultsplus)

## Tracking progress

- ❖ Allows you to create your own tests online using FREE past paper questions.
- ❖ Contains a huge bank of past Edexcel exam questions and support materials to help you create your own mock exams, topic tests, homework or revision activities.
- ❖ Helps you search for past papers, mark schemes and examiners' reports.

The screenshot shows the examWizard interface for Sciences. It features a navigation bar with 'HOME', 'HELP', 'LOGOUT', 'FIND PAST PAPERS', 'BUILD A PAPER', 'MY PAPERS', and 'DOCUMENTS'. The main content area is divided into three sections: 'SEARCH FILTERS', 'SELECT QUESTION', and 'YOUR EXAM PAPER'. The 'SEARCH FILTERS' section includes dropdown menus for 'Select a specification' (Biology), 'Select a year' (2011), 'Select a series', 'Select a unit' (BI), 'Select a tier', 'Select a topic (click here)', 'Skills', 'SQAQ', 'Select a question type', and 'Select an assessment objective'. The 'SELECT QUESTION' section displays a list of questions with their respective topics, marks, and time limits. The 'YOUR EXAM PAPER' section shows a preview of the selected questions and their marks.

[www.examwizard.co.uk](http://www.examwizard.co.uk)

## Training from Pearson

Events in a timely manner to help you prepare to teach the new specification:

- ❖ Getting ready to teach events in early 2015.
- ❖ Professional development events with a focus on developing expertise to support good teaching and learning.



[www.edexcel.com/training](http://www.edexcel.com/training)



## Personal support

- ❖ Stephen Nugus – Science Subject Advisor
- ❖ Curriculum and centre support from our local Curriculum Development Managers and Curriculum Support Consultants
- ❖ Local network events
- ❖ Science Team Updates – email support giving regular news, past papers, information on training...

[scienceteamupdates@pearson.com](mailto:scienceteamupdates@pearson.com)



# Contact information

## Contact information

- ❖ Subject Advisor email: [TeachingScience@pearson.com](mailto:TeachingScience@pearson.com)
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- ❖ Subject page link: [www.edexcel.com/Subjects/Science](http://www.edexcel.com/Subjects/Science)
  
- ❖ [www.edexcel.com/contactus](http://www.edexcel.com/contactus)
- ❖ [www.edexcel.com/ALevelSciences2015](http://www.edexcel.com/ALevelSciences2015)