

**Your guide to Pearson Edexcel
International Advanced Level (IAL)
Mathematics**

First teaching
September 2018



Welcome

Pearson Edexcel International Advanced Level (IAL) qualifications have been designed with the global learner in mind. They differ from A levels in that they have a flexible, modular structure, but maintain the rigorous standards of all Pearson Edexcel qualifications and are comparable to the UK A level, as confirmed by NARIC*.

Developed in consultation with the international school community, including a large number of teachers and university lecturers, these globally recognised qualifications open doors to universities worldwide, giving students the necessary skills to support progression to higher and further study.

Available in 21 popular subjects and designed to be engaging for international learners, they offer progression from International GCSEs to equip students with the knowledge and skills they need for a successful future. In 2018 we launched 8 updated subjects – Biology, Chemistry, Physics, Business, Economics, Mathematics, Further Mathematics and Pure Mathematics and also a brand new Information Technology qualification, which our schools started teaching in September 2018.

IAL qualifications are not available in the UK, the Channel Islands, the Isle of Man or in British Armed Forces schools overseas.

For further information, updates and support, visit qualifications.pearson.com/IAL

“
It’s been my dream to attend a world-renowned university. Pearson Edexcel IALs have given me a solid academic foundation for further studies.”

Fei Xue, studying Computer Science,
University College London

**UK NARIC is the designated United Kingdom National Agency for the recognition and comparison of international qualifications and skills. It performs this official function on behalf of the UK Government.*

Illustration by Lauren Rolwing



Why choose Pearson Edexcel IALs?



100% externally assessed

Learners can resit individual unit examinations.



Flexible and modular structure

The flexible modular approach takes a synoptic approach to assessment, which means learners are examined on their learning from each unit and are also able to demonstrate their knowledge and understanding across the whole subject.

Unlike a linear structure, where assessment is taken at the end of a two year course, the results from each module provide formal feedback throughout the course. This means learners can quickly grasp the standard required to reach the level they are aiming for. This understanding motivates students to improve, and builds a sense of ownership through bite-size, short-term goals.



Multiple examination opportunities

Examinations are available for many subjects in January, June and October, with all subjects offering at least two assessment opportunities as standard*. As exams are spread throughout the course, there are less high stakes assessments, enabling learners to focus their revision appropriately. Learners can resit individual unit examinations.



Accessible examination papers

At Pearson Edexcel, we develop our examination papers over a two-year period. The papers go through a rigorous world class assessment design process, which ensures that the content is relevant for international learners, and there is a clear and consistent relationship between command words, marks and skills. With logical progression of difficulty throughout and consistency in template and design, our question papers are clear and provide suitable challenge and support for students of all ability ranges.



IAS results contribute to IAL grade

International AS qualifications can be taken separately as a stand alone qualification, or used as a stage on the way to completing an International Advanced Level qualification. This provides international schools and learners with greater choice and flexibility to meet their needs and aspirations.



Recognised by universities worldwide

Fully comparable to UK reformed GCE A levels, as confirmed by NARIC, Pearson Edexcel IALs provide learners with access to the world's top universities and prestigious employment opportunities. They are recognised by leading universities across the world, including Oxford, Cambridge, Columbia, Yale, MIT, Caltech, Hong Kong / China University of Science and Technology and the National University of Singapore.



Internationally relevant content

Pearson Edexcel IAL qualifications and accompanying published resources contain international content where possible, such as topic themes, examples, case studies and photos, making content more relevant and engaging for all learners. Language is also reviewed by a specialist to ensure materials are written with EAL learners in mind, in a clear and accessible style.

**With the exception of IAL Information Technology which offers June examination only.*

Pearson Edexcel IAL in Mathematics



100% externally assessed



Exams in January, June and October

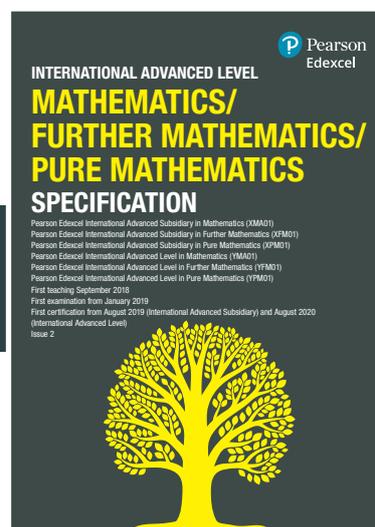
We have listened to feedback from all parts of the international school community, including a large number of teachers and universities, to ensure we develop our Mathematics qualifications to be engaging for international learners and to give them the necessary skills to support progression to higher education or further study in Mathematics.

With three different awards available, **Mathematics**, **Further Mathematics** and **Pure Mathematics**, the qualification is designed to be studied over two years, with the option of a one-year AS level course. Results of the IAS qualification can contribute to the overall IAL grade.

Key qualification features

- Unitised structure with 14 equally weighted units. Each examination timed at 1h 30m and has 75 marks available.
- Flexibility to combine units across Pure Mathematics, Further Pure Mathematics, Mechanics, Statistics and Decision Mathematics. There are 5 routes to combine units to achieve an International A Level Mathematics qualification, with additional routes for Further or Pure Mathematics..
- Three exam series per year means students can sit unit exams when they are ready.
- IAS results will continue to contribute to IAL.
- Curriculum-matched textbooks and teacher supports have been developed to support teaching and learning.

For further information and to download the specification, visit qualifications.pearson.com/ialmaths2018



Helping students make the best progress they can

Containing up to date and engaging content, the Pearson Edexcel International Advanced Level in Mathematics encourages students to take responsibility for their own learning and mathematical development.

Aims of the qualification – to enable students to develop:

- their understanding of mathematics and mathematical processes in a way that promotes confidence and fosters enjoyment
- the ability to reason logically and recognise incorrect reasoning, to generalise and to construct mathematical proofs
- their range of mathematical skills and techniques and use them in more difficult, unstructured problems
- an understanding of coherence and progression in mathematics and of how different areas of mathematics can be connected
- skills to recognise how a situation may be represented mathematically and understand the relationship between ‘real-world’ problems and standard and other mathematical models and how these can be refined and improved.

Students will use their knowledge and skills to:

- use mathematics as an effective means of communication
- read and comprehend mathematical arguments and articles concerning applications of mathematics
- acquire the skills needed to use technology such as calculators and computers effectively, recognise when such use may be inappropriate and be aware of limitations
- develop an awareness of the relevance of mathematics to other fields of study, to the world of work and to society in general
- take increasing responsibility for their own learning and the evaluation of their own mathematical development.

Your guide to assessment changes and timelines

The Core Mathematics units have been renamed Pure Mathematics and split as follows:

- Core Maths 12 content has been restructured into two units: Pure Maths 1 and Pure Maths 2 (Calculator permitted)
- Core Maths 34 content has been restructured into two units: Pure Maths 3 and Pure Maths 4 (Calculator permitted)

Decision Mathematics has been updated.

These five units have new unit codes as detailed here.

Cash-in codes remain the same.

Specification	Level	Units	Jun 2019	Oct 2019	Jan 2020	Jun 2020	Oct 2020	Jan 2021
LEGACY 2013 SPECIFICATION								
Core Maths	AS	WMA01	✓	✓	✓	✓	X	X
Core Maths	A2	WMA02	✓	✓	✓	✓	X	X
Mechanics 1	AS	WME01	✓	✓	✓	✓	✓	✓
Mechanics 2	A2	WME02	✓	✓	✓	✓	✓	✓
Mechanics 3	A2	WME03	✓	X	✓	✓	X	✓
Statistics 1	AS	WST01	✓	✓	✓	✓	✓	✓
Statistics 2	A2	WST02	✓	✓	✓	✓	✓	✓
Statistics 3	A2	WST03	✓	X	X	✓	X	✓
Further Pure Maths 1	AS	WFM01	✓	X	✓	✓	X	✓
Further Pure Maths 2	A2	WFM02	✓	X	X	✓	X	✓
Further Pure Maths 3	A2	WFM03	✓	X	X	✓	X	✓
Decision Maths 1	AS	WDM01	✓	X	✓	✓	X	X
MATHEMATICS 2018 SPECIFICATION								
Pure Maths 1	AS	WMA11	✓	✓	✓	✓	✓	✓
Pure Maths 2	AS	WMA12	✓	✓	✓	✓	✓	✓
Pure Maths 3	A2	WMA13	X	X	✓	✓	✓	✓
Pure Maths 4	A2	WMA14	X	X	X	✓	✓	✓
Decision Maths 1	AS	WDM11	✓	X	✓	✓	X	✓

Developing transferable skills valued by universities and employers

In recent years, universities and employers have highlighted the need for students and graduates to develop a range of transferable skills, often referred to as 'soft skills', to enable them to better meet the demands of undergraduate study and the world of work.

In fact, universities and employers consider transferable skills to be the largest skills gap overall.



1 in 6

employers have difficulty finding candidates with the skills they require¹



54%

of companies say that skills shortages impact their ability to serve their customers²



1 in 3

skills in a job posting is a "soft skill"¹



87%

of university professors do not think students have the research skills needed for degree-level study³

Pearson Edexcel International Advanced Levels (IALs) equip students with these embedded transferable skills sought after by universities and employers. They develop core competencies, such as problem-solving, critical thinking and verbal reasoning. Transferable skills are signposted in our IAL qualifications and published teaching and learning resource so students know the skills they are developing throughout their studies.

Prepare your learners for more than just a grade

We've provided **skills mapping and transferable skills subject definitions** documents for your subject area, so you can easily identify what skills can be developed in your day to day teaching. Find out more online by visiting your subject page and searching under the *Teaching and Learning materials* tab [qualifications.pearson.com/IAL](https://www.pearson.com/IAL)

¹ *Employability - Personal & Social Capability Framework report from Pearson, 2016.*

² *Employability report from PSB for Pearson, 2016.*

³ *Bridging the Gap: Understanding the Differing Research Expectations of First-Year Students and Professors, Meg Raven, Mount Saint Vincent University, 2016.*

Supporting you at every stage

We provide an unparalleled level of support services, tools, resources and training alongside qualifications, making teachers and students lives easier at every stage.

Your free subject support

Subject Advisors

Providing fast, reliable, expert help on a specific subject area of your choice. We aim to answer all emailed questions within 48 hours and resolve 90% of issues phoned in on the first call.

Contact support.pearson.com/uk/s/qualification-contactus

Pearson International Schools Community

Connect with other educators around the world, share ideas and resources and stay up to date with the latest subject developments by joining our international schools community at community.pearsoninternationalschools.com

At a glance: support for you at every stage

FREE resources and support	Planning and teaching	Exam preparation and assessment	Results support
Getting started guide	✓		
Training events (face-to-face, online & downloadable content)	✓		
Subject advisor support	✓	✓	✓
Community forums	✓	✓	✓
Schemes of work	✓		
Sample assessment materials	✓	✓	
Examiner reports		✓	✓
Exemplar marked responses		✓	
Past papers		✓	
examWizard		✓	
Mark schemes		✓	
ResultsPlus mock exam analysis		✓	
ResultsPlus		✓	✓
FREE access to Scripts service (ATS)			✓
Additional paid for resources			
Printed Student Books and digital ActiveBooks	✓	✓	
Online Teacher Resource Packs	✓	✓	

Offering more advanced support services and tools

Our technology capability also allows us to provide the following unique services and tools to teachers and students:



ResultsPlus provides detailed information on exam performance and a platform to view and compare student results – as individuals or as groups – across the world. It helps with planning improvements in teaching and learning. ResultsPlus Direct is a free online service that gives students a detailed breakdown and comparison of their performance in Pearson Edexcel exams, globally, to help them identify areas of improvement.



examWizard is our free exam preparation tool containing a bank of past Pearson Edexcel exam questions, mark schemes and examiners' reports for a range of subjects. It saves you time by enabling you to create your own mock exams, topic tests, homework or revision activities in minutes and links directly to associated examiner reports and mark schemes!



FREE access to Scripts Service (ATS) is an online service which allows access to view electronically marked exam papers, free of charge, providing enhanced transparency and support for teachers to evaluate a student's performance on particular questions in relation to what they have been taught.



Awarding reliability. We use ePEN, our unique, image-based marking system ensuring real time monitoring, quality control and reporting to ensure the highest quality marking and provision of data for tools such as ResultsPlus. Pearson Edexcel exam marking processes have been proven to produce the most reliable results. This demonstrates that our qualifications maintain the highest standards and can be relied upon to deliver to expectation.

“Because of ResultsPlus, students can learn about their mistakes and rectify.”

Kanagambigai, Chief Counsellor, Chemistry Lecturer, A levels Department, HELP Academy, Malaysia commenting on the ResultsPlus mocks service.

Published resources

These are brand new resources to support the updated Pearson Edexcel International Advanced Level (IAL) qualifications in Mathematics, Further Mathematics and Pure Mathematics, for first teaching from September 2018.

Student Books

- 14 books – one for each unit of the Pearson Edexcel International A Level 2018 specification.
- Each Student Book includes 3-year access to an online ActiveBook.
- Packed with hints and worked examples to help preparation for examinations.
- Lots of practice of exam-style questions and each book contains a complete practice exam paper.

Online Teacher Resource Packs

- 14 Online Teacher Resource Packs available – to accompany each Student Book.
- Available as an annual subscription.
- Range of planning, teaching and assessment resources, helping to save you time.



CHAPTER 9 CONSTANT ACCELERATION 37

9.3 Constant acceleration formulae 1

A standard set of letters is used for the motion of an object moving in a straight line with constant acceleration.

- s is the displacement.
- u is the initial velocity.
- v is the final velocity.
- a is the acceleration.
- t is the time.

You can use these letters to label a velocity–time graph representing the motion of a particle moving in a straight line accelerating from velocity u at time 0 to velocity v at time t .

Gradient of line = $\frac{v-u}{t}$
 $a = \frac{v-u}{t}$

Rearranging $v = u + at$ ①

• $v = u + at$ ①
 • $s = \left(\frac{u+v}{2}\right)t$ ②

Hint Formula ① does not involve s and formula ② does not involve a .

Links These formulae can also be derived using calculus. → Chapter 11

Example 4

A cyclist is travelling along a straight road. She accelerates at a constant rate from a velocity of 4 m s^{-1} to a velocity of 7.5 m s^{-1} in 40 seconds. Find:

- the distance she travels in these 40 seconds
- her acceleration in these 40 seconds.

Start by drawing a diagram.

Model the cyclist as a particle.

Write down the values you know and the values you need to find.

$u = 4, v = 7.5, t = 40, s = ?, a = ?$

Exam hints draw learners' attention to potential pitfalls in the exam and give practical hints about preparing for the exams, answering questions in the correct format, and checking work.

Worked examples show how to work through questions, and how to lay out calculations.

Sample page from Pearson Edexcel International A Level Mechanics 1 Student Book

PURE MATHEMATICS

Pearson Edexcel International A Level Mathematics Pure 1 Student Book	978 1 292244 79 2
Pearson Edexcel International A Level Mathematics Pure 1 Teacher Resource Pack	978 1 292244 83 9
Pearson Edexcel International A Level Mathematics Pure 2 Student Book	978 1 292244 85 3
Pearson Edexcel International A Level Mathematics Pure 2 Teacher Resource Pack	978 1 292244 90 7
Pearson Edexcel International A Level Mathematics Pure 3 Student Book	978 1 292244 92 1
Pearson Edexcel International A Level Mathematics Pure 3 Teacher Resource Pack	978 1 292244 93 8
Pearson Edexcel International A Level Mathematics Pure 4 Student Book	978 1 292245 12 6
Pearson Edexcel International A Level Mathematics Pure 4 Teacher Resource Pack	978 1 292245 13 3

FURTHER PURE MATHEMATICS

Pearson Edexcel International A Level Mathematics Further Pure 1 Student Book	978 1 292244 64 8
Pearson Edexcel International A Level Mathematics Further Pure 1 Teacher Resource Pack	978 1 292244 58 7
Pearson Edexcel International A Level Mathematics Further Pure 2 Student Book	978 1 292244 65 5
Pearson Edexcel International A Level Mathematics Further Pure 2 Teacher Resource Pack	978 1 292244 62 4
Pearson Edexcel International A Level Mathematics Further Pure 3 Student Book	978 1 292244 66 2
Pearson Edexcel International A Level Mathematics Further Pure 3 Teacher Resource Pack	978 1 292244 63 1

DECISION MATHEMATICS

Pearson Edexcel International A Level Mathematics Decision 1 Student Book	978 1 292244 56 3
Pearson Edexcel International A Level Mathematics Decision 1 Teacher Resource Pack	978 1 292244 57 0

MECHANICS

Pearson Edexcel International A Level Mathematics Mechanics 1 Student Book	978 1 292244 67 9
Pearson Edexcel International A Level Mathematics Mechanics 1 Teacher Resource Pack	978 1 292244 68 6
Pearson Edexcel International A Level Mathematics Mechanics 2 Student Book	978 1 292244 76 1
Pearson Edexcel International A Level Mathematics Mechanics 2 Teacher Resource Pack	978 1 292244 78 5
Pearson Edexcel International A Level Mathematics Mechanics 3 Student Book	978 1 292244 81 5
Pearson Edexcel International A Level Mathematics Mechanics 3 Teacher Resource Pack	978 1 292244 82 2

STATISTICS

Pearson Edexcel International A Level Mathematics Statistics 1 Student Book	978 1 292245 14 0
Pearson Edexcel International A Level Mathematics Statistics 1 Teacher Resource Pack	978 1 292245 15 7
Pearson Edexcel International A Level Mathematics Statistics 2 Student Book	978 1 292245 17 1
Pearson Edexcel International A Level Mathematics Statistics 2 Teacher Resource Pack	978 1 292245 16 4
Pearson Edexcel International A Level Mathematics Statistics 3 Student Book	978 1 292245 18 8
Pearson Edexcel International A Level Mathematics Statistics 3 Teacher Resource Pack	978 1 292245 19 5

Each chapter is **mapped to the specification** content for easy reference.

Learning Objectives at the beginning of each chapter highlight what students need to know and understand.

Prior knowledge checks ensure students have the foundations to learn. Learning Objectives at the beginning of each chapter highlight what students need to know and understand.

The **real world application** of the maths students are about to learn are highlighted at the start of each chapter.

1 ALGEBRAIC EXPRESSIONS

1.1
1.2
1.10

Learning objectives

After completing this chapter you should be able to:

- Multiply and divide integer powers → pages 2-4
- Expand a single term over brackets and collect like terms → pages 2-4
- Expand the product of two or three expressions → pages 4-6
- Factorise linear, quadratic and simple cubic expressions → pages 6-9
- Know and use the laws of indices → pages 9-11
- Simplify and use the rules of surds → pages 12-13
- Rationalise denominators → pages 13-15

Prior knowledge check

1 Simplify:
 a $4m^2n + 5mn^2 - 2m^2n + mn^2 - 3mn^2$
 b $3x^2 - 5x + 2 + 3x^2 - 7x - 12$
 ← International GCSE Mathematics

2 Write as a single power of 2:
 a $2^5 \times 2^3$ b $2^8 \div 2^2$
 c $(2^3)^2$ ← International GCSE Mathematics

3 Expand:
 a $3(x + 4)$ b $5(2 - 3x)$
 c $6(2x - 5y)$ ← International GCSE Mathematics

4 Write down the highest common factor of:
 a 24 and 16 b $6x$ and $8x^2$
 c $4xy^2$ and $3xy$ ← International GCSE Mathematics

5 Simplify:
 a $\frac{10x}{5}$ b $\frac{20x}{2}$ c $\frac{40x}{24}$
 ← International GCSE Mathematics

Computer scientists use indices to describe very large numbers. A quantum computer with 1000 qubits (quantum bits) can consider 2^{1000} values simultaneously. This is greater than the number of particles in the observable universe.

Sample page from Pearson Edexcel International AS/A Level Pure Mathematics 1 Student Book



I like the modular nature of IAL, the fact that I can choose whichever core units I want to do, whichever applied units I want to do. It's very comprehensive. It opens up many doors to many international universities.



Wang, Pearson Edexcel International Advanced Level student from Sri Lanka, studying Chemistry, Biology, Physics, and Mathematics.

About Pearson Edexcel

At the core of everything we do at Pearson is the desire to make a measurable impact on improving people's lives through learning. From primary school to secondary school, through to professional certification; our qualifications help educate millions of people worldwide.

Foundations for success

Pearson Edexcel International Advanced Level (IAL) is part of the iProgress family for ages 5 to 19, which also includes iPrimary, iLowerSecondary and International GCSE (IG). We offer more than just a qualification, with professional development training that keeps teachers up-to-date with the latest educational practices, support materials that make planning and teaching lessons easier, and student textbooks and online resources, so you'll have more time to focus on the development of your students' progress.

Progress to university

Developed by education specialists specifically for international learners, Pearson Edexcel IAL qualifications are recognised by leading universities across the world, including Oxford, Cambridge, Columbia, Yale, MIT, Caltech, Hong Kong / China University of Science and Technology and the National University of Singapore.



Find out more

To find out more about our Pearson Edexcel International A Level qualifications and to sign up to our monthly newsletter, visit our website, qualifications.pearson.com/IAL