

# Edexcel International AS/A Level Mathematics

Welcome to  
Pearson

---

First teaching in 2018, first assessment 2019

---



# Welcome to Pearson

## Agenda

- 10:00 Introductions
- 10:10 Welcome to Pearson – getting a good start
- 10:25 Session 1 The content of the course
- 11:10 Session 2 How is the content assessed?
- 11:30 BREAK
- 11:45 Session 2 continued
- 12:45 Lunch
- 13:00 Session 3 Marking and mark schemes
- 13:45 Session 4 – Support from Pearson
- 16:00 End of training



# Welcome to Pearson

In this training, delegates will:

- identify how the qualifications are devised
- review the content of the qualification
- explore how to plan the course and/or lessons
- understand the assessment of the qualification and how to prepare students
- identify the support available from Pearson
- network and share ideas with other teachers.



# Welcome to Pearson Edexcel

Welcome to Pearson Edexcel, the world's leading learning company and the UK's largest awarding body.

We set the standard for worldwide recognised qualifications, built on the UK educational system and accepted by universities worldwide.

We have a simple mission:  
**to help make a measurable impact on improving people's lives through learning.**

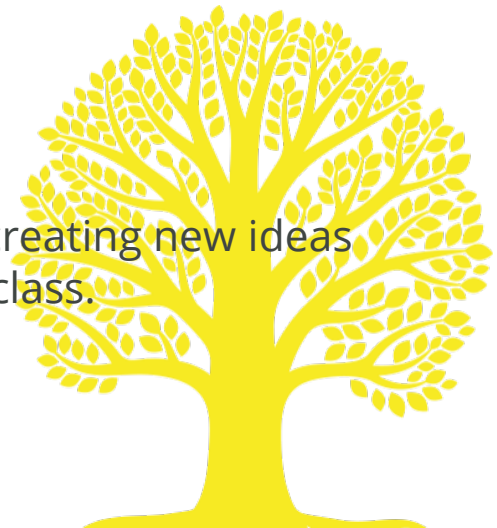
*“We judge ourselves – and invite others to judge us – not by the products that we make but by the impact on learners.”*

John Fallon,  
Chief Executive Officer,  
Pearson



# About Pearson Edexcel

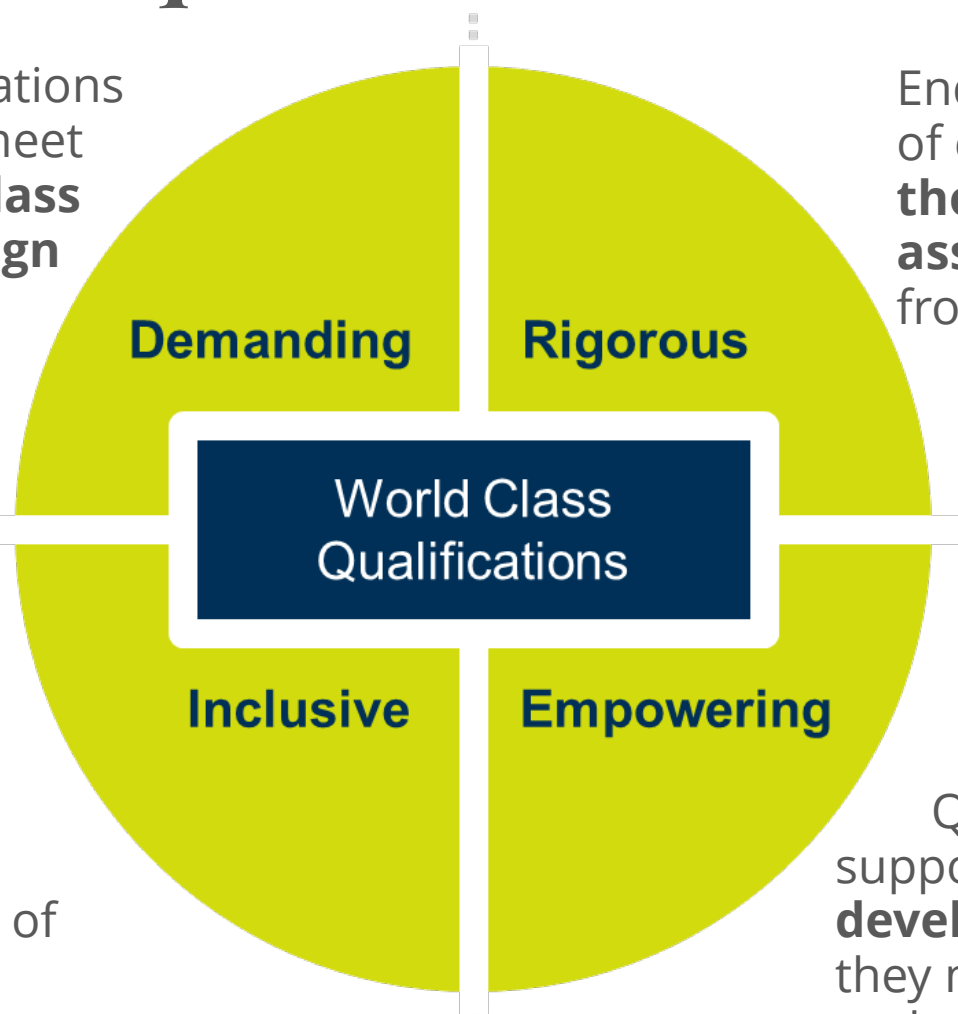
- As the UK's largest awarding organisation, we are best placed to provide qualifications that are most closely aligned to the British educational system.
- We are the most reliable awarding organisation in the UK, recognised and trusted by educators, learners and employers to provide high quality qualifications.
- By helping you to realise student potential, you can prepare and empower all your students to progress to further education, university and employment.
- Our technology capability allows us to provide you with more advanced support services, tools and resources to make life easier for school leaders, teachers and students.
- Pearson Edexcel are leading the way, challenging thinking and creating new ideas so you can be confident our qualifications will always be world-class.



# World-class qualifications

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

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



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

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

# The content of the course

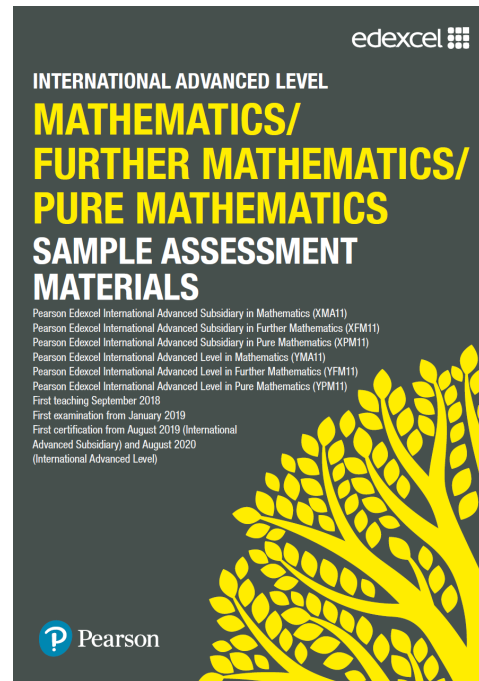
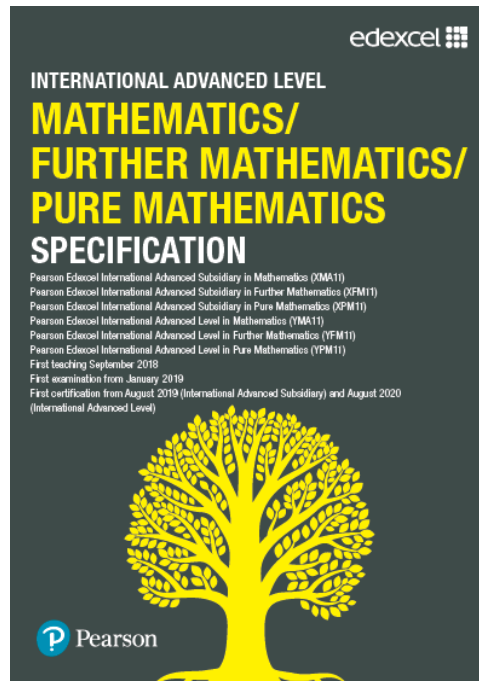


# What are specifications and SAMs?

- A specification is the main document you need to teach the course.
- It outlines the aims of the course, the content you **MUST** cover and all the information you need about assessing your students.
- A copy of this document is in your pack and on our website.
- SAMs is short for Sample Assessment Materials. This document is just as important as the specification.
- The SAMs are examples of the question papers and mark schemes and show the question types and how they will be marked by the examiners.
- We base all of our future papers and assessments on these Sample Assessment Materials.



# What are specifications and SAMs?



# What are specifications and SAMs?

- There are 3 A level courses available as part of the Mathematics family.....
- International A level mathematics
- International A level Pure Mathematics
- International A level Further Mathematics



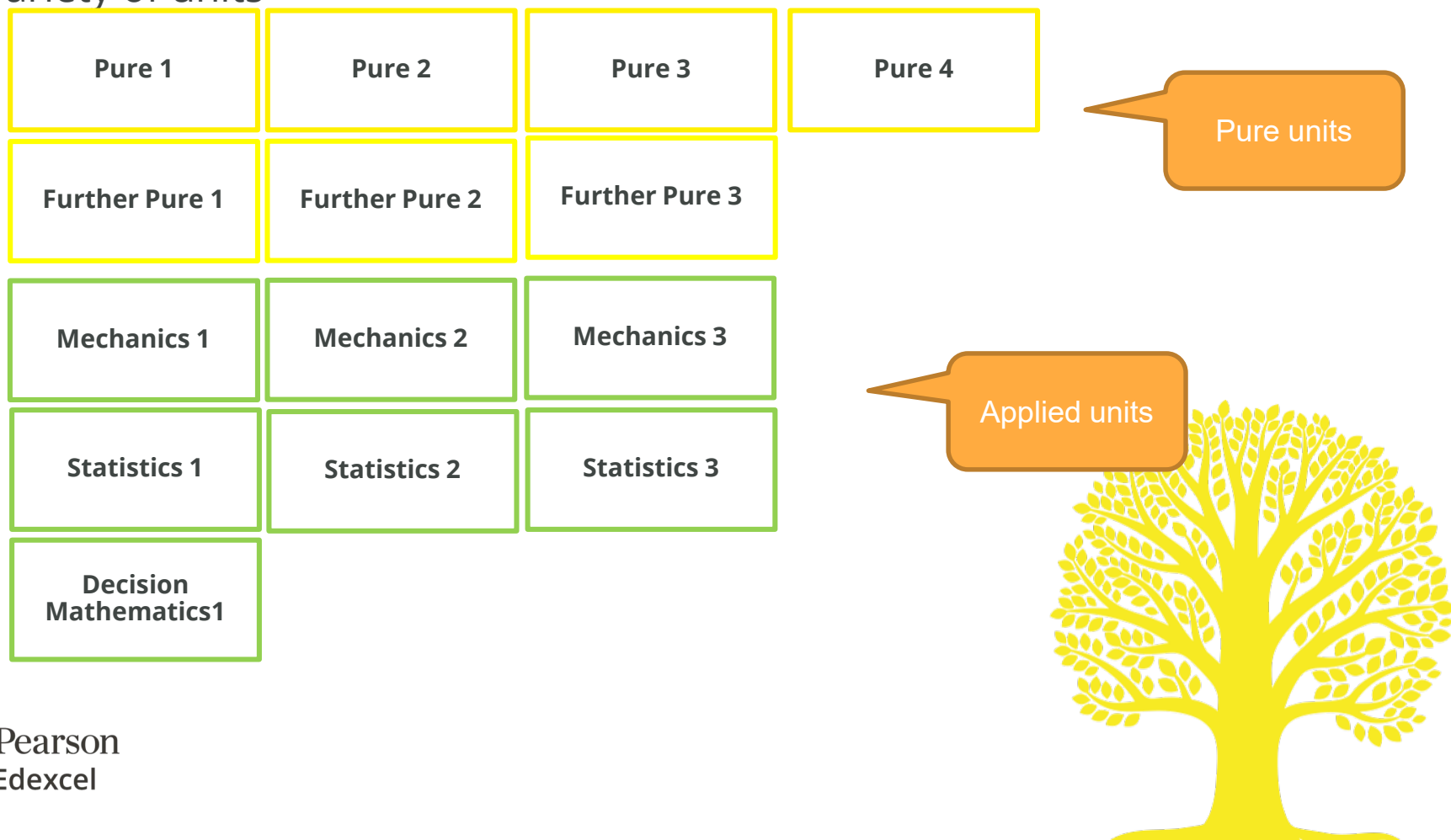
# What are specifications and SAMs?

- ..... and also three AS level courses
- International AS level mathematics
- International AS level Pure Mathematics
- International AS level Further Mathematics



# What are specifications and SAMs?

- Within each of the A levels, centres can choose from a variety of units



# What are specifications and SAMs?

Within each of the A levels, centres can choose different pathways to follow.

- Each unit is equally weighted for the final A level grade
- Each unit assumes a teaching time of 60 hours
- Each unit is assessed through a 90 minute examination
- Each examination is marked out of a total of 75



# The units for A level Mathematics

Pure 1

Pure 2

Pure 3

Pure 4

Algebra  
Calculus  
Trigonometry

and Mechanics 1 and Statistics 1 or Mechanics 1 and Decision Mathematics

or Statistics 1 and Decision Mathematics

Or

Mechanics I and II

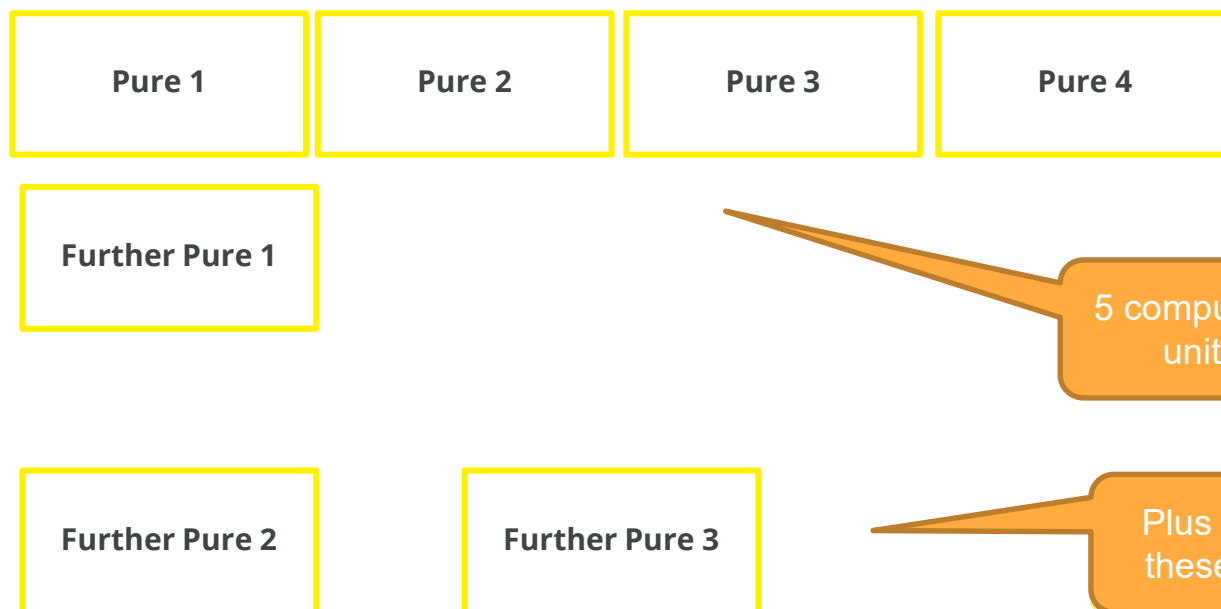
Or

Statistics 1 and II

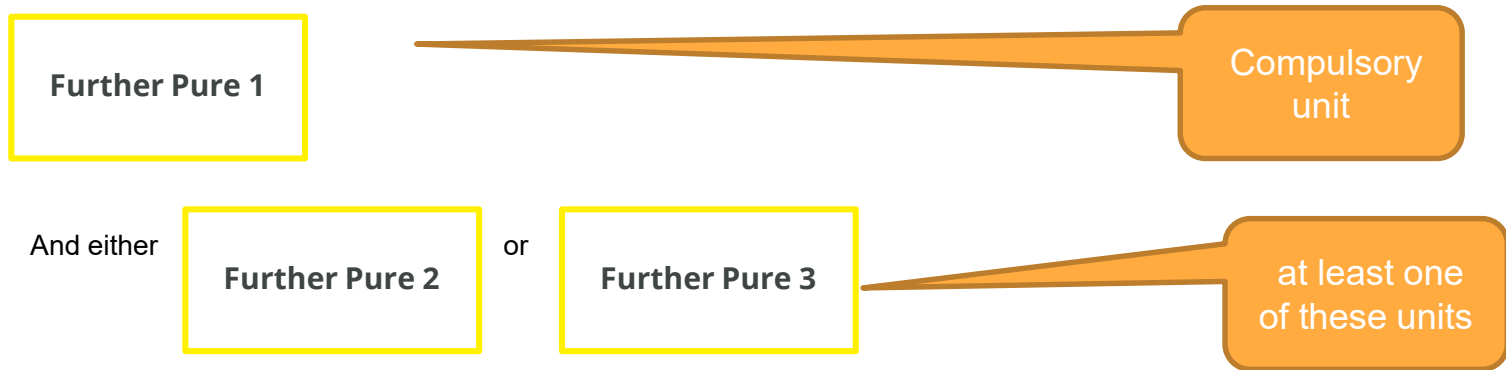
6 units in total  
for the A level



# The units for A level Further Mathematics



# The units for A level Further Mathematics



And a further 4 units from the applied units and the remaining FP unit



# The units for A level Mathematics

This consists of Pure 1, Pure 2 and one of Mechanics 1, Statistics 1, Decision Mathematics

There are similar arrangements for AS Pure mathematics and AS Further mathematics.

Full details are available on the Edexcel website and in the Specification document



# What are the details of the Specification?

- The CONTENT of each unit is given in the specification.
- This is the material the student has to learn.
- It has been carefully designed with the following properties:
  - continuity with International GCSE
  - deliverable within a normal length course of study
  - relevant as a preparation for further study at university or for work
  - comparable in depth and breadth with the UK GCE award



# What are the details of the Specification?

- Here is an extract from the Pure 1 unit

What students need to learn:		Guidance
<b>1. Algebra and functions</b>		
1.1	Laws of indices for all rational exponents.	$a^m \times a^n = a^{m+n}$ , $a^m \div a^n = a^{m-n}$ , $(a^m)^n = a^{mn}$  The equivalence of $a^{\frac{m}{n}}$ and $\sqrt[n]{a^m}$ should be known.
1.2	Use and manipulation of surds.	Students should be able to rationalise denominators.
1.3	Quadratic functions and their graphs.	
1.4	The discriminant of a quadratic function.	Need to know and to use $b^2 - 4ac > 0$ , $b^2 - 4ac = 0$ and $b^2 - 4ac < 0$
1.5	Completing the square. Solution of quadratic equations.	Solution of quadratic equations by factorisation, use of the formula, use of a calculator and completing the square.  $ax^2 + bx + c = a\left(x + \frac{b}{2a}\right)^2 + \left(c - \frac{b^2}{4a}\right)$

Content

Additional  
guidance

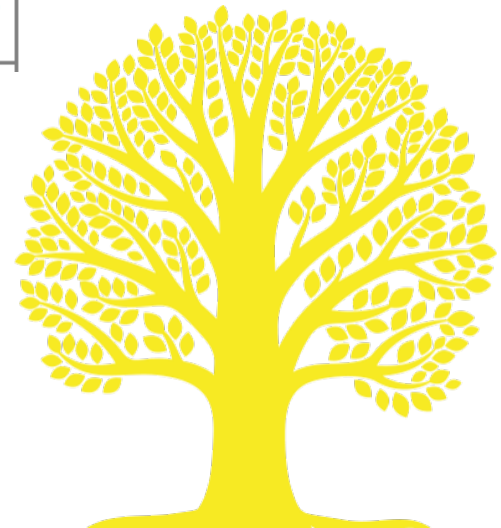


# What are the details of the Specification?

- Here is an extract from the statistics 1 unit

What students need to learn:		Guidance
<b>1. Mathematical models in probability and statistics</b>		
1.1	The basic ideas of mathematical modelling as applied in probability and statistics.	
<b>2. Representation and summary of data</b>		
2.1	Histograms, stem and leaf diagrams, box plots.	Using histograms, stem and leaf diagrams and box plots to compare distributions.  Back-to-back stem and leaf diagrams may be required.  Drawing of histograms, stem and leaf diagrams or box plots will not be the direct focus of examination questions.

Additional  
guidance



# What are the details of the Specification?

The pure units are cumulative, so that Pure 2 assumes knowledge of the Pure 1 course and so on.

Mechanics 1 assumes knowledge of Pure 1 and Pure 2 and 2-D vectors

Mechanics 2 assumes knowledge of Mechanics 1 and the four compulsory Pure units

Statistics 1 requires no explicit prior knowledge of statistics

Statistics 2 assumes knowledge of Statistics 1 and selected items from Pure 1 and Pure 2

Decision mathematics requires no explicit prior knowledge



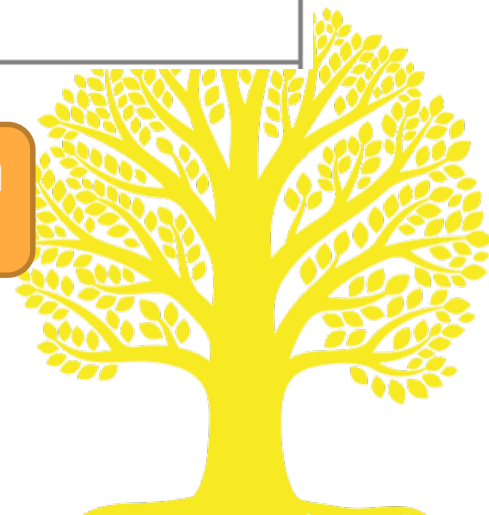
# What are the details of the Specification?

- Prior knowledge
- Pure 1 is designed as a follow on to a GCSE mathematics course, but especially the Edexcel International GCSE course (at Higher Tier)

What students need to learn:		Guidance
<b>1. Algebra and functions</b>		
1.5	Completing the square. Solution of quadratic equations.	<p>Solution of quadratic equations by factorisation, use of the formula, use of a calculator and completing the square.</p> $ax^2 + bx + c = a\left(x + \frac{b}{2a}\right)^2 + \left(c - \frac{b^2}{4a}\right)$

For example, here is an extract from the Pure 1 content

All in International GCSE



# What are the details of the Specification?

## Activity 1

Use the extract from the Edexcel International GCSE specification and the specification for Pure 1

Complete the table to summarise your findings on how much common material there is between the two.



# How is all the content assessed?



# How is all the content assessed?

- Each unit is assessed by an externally set, externally marked 90 minute examination.

There are 3 opportunities to sit most units

October

January

June

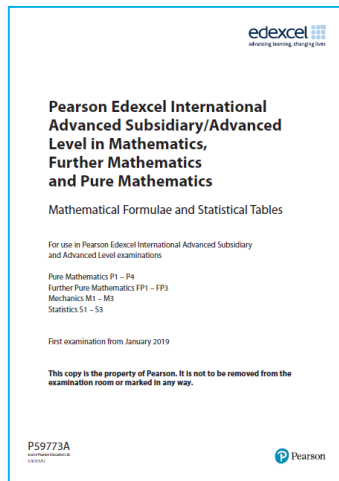
This allows  
centres to select  
what will suit their  
students

All 6 units can be taken in the same session or spread over several sessions.  
Students can resit units.



# How is all the content assessed?

- Each examination as a mixture of short and long questions with typically 10 questions to answer.
- Questions and answer spaces are in the same booklet.
- Calculators are allowed for all units.
- A formula booklet is available



However some  
formulae have to  
be learned

# How is all the content assessed?

- As this is a unitised course, the raw mark for each unit is converted to a score on the Uniform Mark Scale (UMS).
- The 6 scores are then added and the total UMS used to give the level grade for the student.

For example, if the grade A boundary for Pure 1 was 59 marks in June 2019 and for Pure 2 61 in Jan 2020 then a student getting these marks would be awarded 80 UMS for each, giving a total of 160 UMS.

These would be added to the 4 other UMS to give the total for the qualification.

<https://qualifications.pearson.com/en/support/support-topics/results-certification/understanding-marks-and-grades/converting-marks-points-and-grades.html>



# How is all the content assessed?

- The total minimum UMS required for each grade at A level is shown below.

Grade	A	B	C	D	E
UMS	480	420	360	300	240

- Totals can be easily worked out from tables on the Edexcel website



# How is all the content assessed?

- The specification is used to produce the CONTENT of questions on the examination paper for each unit.

5.2	Laws of logarithms.	<p>To include</p> $\log_a(xy) \equiv \log_a x + \log_a y,$ $\log_a\left(\frac{x}{y}\right) \equiv \log_a x - \log_a y$ $\log_a x^k \equiv k \log_a x,$ $\log_a\left(\frac{1}{x}\right) \equiv -\log_a x,$ $\log_a a = 1$ <p>where <math>a, x, y &gt; 0, a \neq 1</math>.</p>
-----	---------------------	--

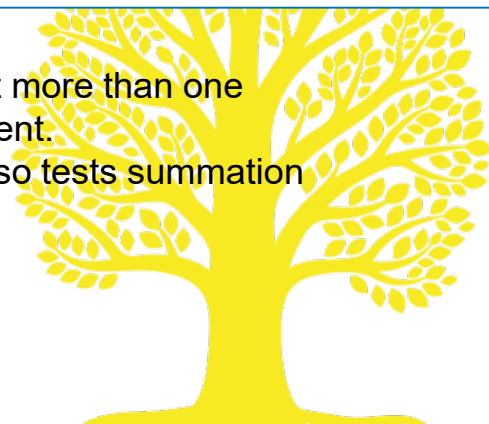
7. Given  $\log_a b = k$ , find, in simplest form in terms of  $k$ ,

(i)  $\log_a\left(\frac{\sqrt{a}}{b}\right)$

(ii)  $\frac{\log_a a^2 b}{\log_a b^3}$

(iii)  $\sum_{n=1}^{50} (k + \log_a b^n)$

A question may test more than one element of the content.  
For example, (iii) also tests summation



# How is all the content assessed?

## Activity 2

Use the content of Pure 1, sections 1.1 to 1.5 to write a question which would assess student's ability.

Write an answer to go with the question.

Is there more than one method?

How many marks would you give to the question and why?



# How is all the content assessed?

## Activity 2

Here is one idea:

Sketch the graph of  $y = x^2 + 4x + a^2$

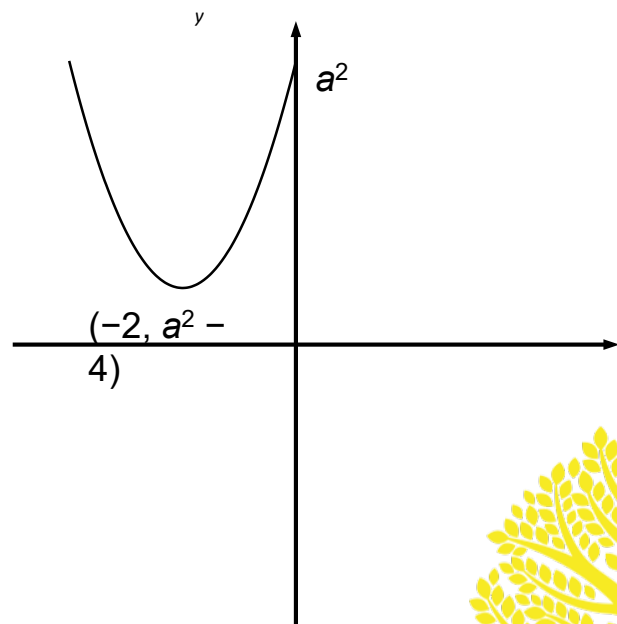
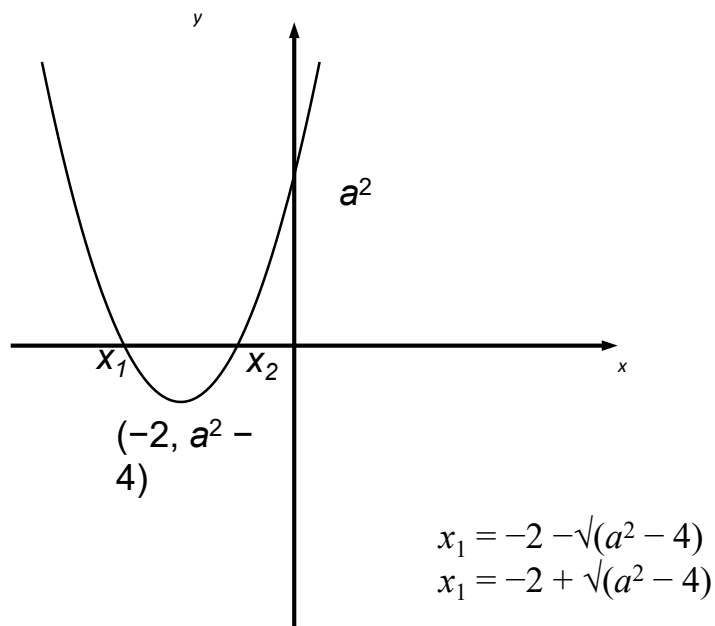
(i) In the case where  $-2 < a < 2$  (ii) In the case where  $a > 2$

On your sketches write the coordinates of the minimum point and of any point where the curve cuts an axis.



# How is all the content assessed?

- $y = x^2 + 4x + a^2 = (x + 2)^2 - 4 + a^2$



# How is all the content assessed?

- The general abilities which students should show are called the Assessment Objectives (AOs)
- These have been developed with reference to research into cognitive processes.
- In International A level mathematics these processes are summarised in 5 statements



# How is all the content assessed?

## Activity 3

What general mathematical abilities would you require from Students following an A level course in mathematics?

Write down at least three in your delegate book



# How is all the content assessed?

## **Content**

Facts

Techniques

Relationships

Models

## **Assessment Objectives**

Demonstrate knowledge of facts, techniques and relationships

Demonstrate application of facts, techniques and relationships to solve problems

Demonstrate processes to model real situations and to interpret results of calculations involving models



# How is all the content assessed?

<b>A01</b>	Recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of contexts.
<b>A02</b>	Construct rigorous mathematical arguments and proofs through use of precise statements, logical deduction and inference and by the manipulation of mathematical expressions, including the construction of extended arguments for handling substantial problems presented in unstructured form.
<b>A03</b>	Recall, select and use their knowledge of standard mathematical models to represent situations in the real world; recognise and understand given representations involving standard models; present and interpret results from such models in terms of the original situation, including discussion of the assumptions made and refinement of such models.

<b>A04</b>	Comprehend translations of common realistic contexts into mathematics; use the results of calculations to make predictions, or comment on the context; and, where appropriate, read critically and comprehend longer mathematical arguments or examples of applications.
<b>A05</b>	Use contemporary calculator technology and other permitted resources (such as formulae booklets or statistical tables) accurately and efficiently; understand when not to use such technology, and its limitations. Give answers to appropriate accuracy.

- The 5 AOs are expressed in actions



# How is all the content assessed?

- The 5 AOs are expressed in actions

**AO1**

Recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of contexts.

Example of AO1

Differentiate

$$y = 4x^2 - \frac{3}{\sqrt{x}}$$



# How is all the content assessed?

Example of AO2

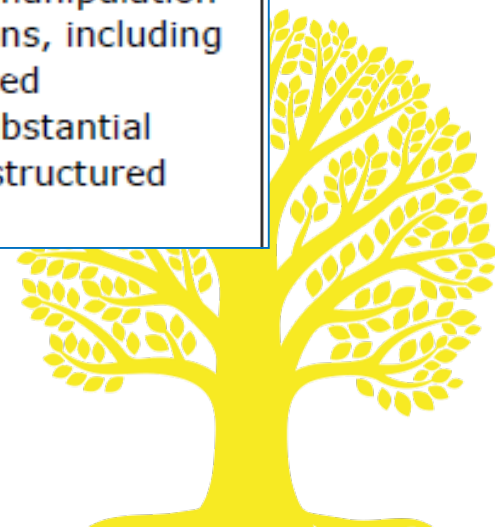
The lengths, in cm, of the two shorter sides of a right -angled triangle are  $(2 + \sqrt{2})$  and  $(2 - \sqrt{2})$

Show that the length, in cm, of the longest side is  $2\sqrt{3}$



'Show' and  
'prove' are  
generally  
linked to AO2

<b>AO2</b>	Construct rigorous mathematical arguments and proofs through use of precise statements, logical deduction and inference and by the manipulation of mathematical expressions, including the construction of extended arguments for handling substantial problems presented in unstructured form.
------------	---



# How is all the content assessed?

AO2 also refers to ... and the construction of extended arguments for handling substantial problems in unstructured form

9. The equation

$$\frac{3}{x} + 5 = -2x + c$$

where  $c$  is a constant, has no real roots.

Find the range of possible values of  $c$ .

(7)

Take a few moments to think about the steps a student would have to carry out to complete the question.



# How is all the content assessed?

- Example of AO3

The population,  $P$  millions, of a country is given by

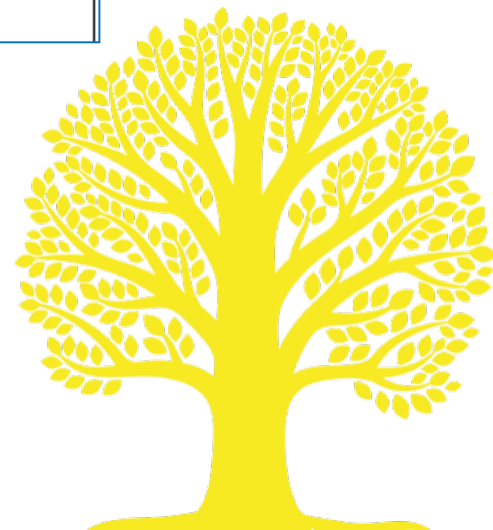
$$P = 5e^{0.4t} + 10e^{-0.8t}$$

where  $t$  is the time in years.

Write down the initial population.

**AO3**

Recall, select and use their knowledge of standard mathematical models to represent situations in the real world; recognise and understand given representations involving standard models; present and interpret results from such models in terms of the original situation, including discussion of the assumptions made and refinement of such models.



# How is all the content assessed?

Example of AO4

(a) Show that

$$\frac{\sin(2x+y) + \sin(2x-y)}{4\cos x \cos y} \equiv \sin x$$

where  $\cos x \cos y \neq 0$

(b) Hence solve the equation

$$\frac{\sin\left(2x + \frac{\pi}{3}\right) + \sin\left(2x - \frac{\pi}{3}\right)}{2\cos x} = 1$$

for values of  $x$  between 0 and  $2\pi$

**AO4**

Comprehend translations of common realistic contexts into mathematics; use the results of calculations to make predictions, or comment on the context; and, where appropriate, read critically and comprehend longer mathematical arguments or examples of applications.



# How is all the content assessed?

Example of AO5

$$I = \int_0^1 f(x) dx$$

$$\text{where } f(x) = \sqrt{1 + 2x^2}$$

**AO5**

Use contemporary calculator technology and other permitted resources (such as formulae booklets or statistical tables) accurately and efficiently; understand when not to use such technology, and its limitations. Give answers to appropriate accuracy.

Complete the column for  $x = 0.75$  giving the value of  $f(x)$  correct to 3 decimal places.

Use the trapezium rule to calculate an estimate for  $I$

$x$	0	0.25	0.5	0.75	1
$f(x)$	1	1.061	1.225		1.732



# How is all the content assessed?

Each paper in a unit should assess most of the content.

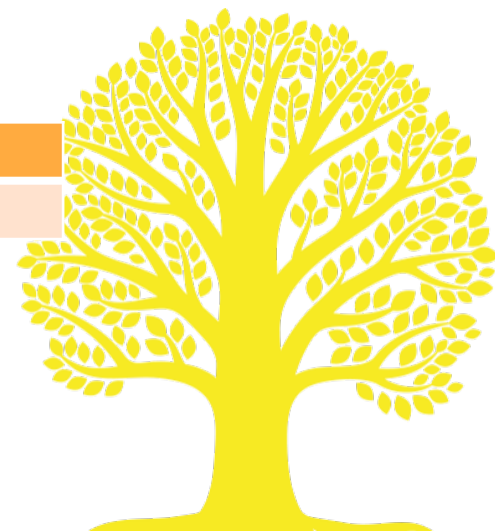
Each paper must adhere to the number of marks in the different AOs attached to the paper

For example for Pure 1

AO1	AO2	AO3	AO4	AO5
30 - 35	25 - 30	5 - 15	5 - 10	1 - 5

For example for Mechanics 1

AO1	AO2	AO3	AO4	AO5
20 - 25	25-30	15 - 20	6 - 11	4 - 9



# How is all the content assessed?

Coverage

Activity 4

Use a copy of the Specification for Pure 2 to find the coverage of the content in the Practice paper Pure 2



# How is all the content assessed?

## Coverage

Each unit examination is written with the purpose of testing most, if not all of the content areas.

Over a period of time all content areas appear on a unit examination.



# How is all the content assessed?

Note that all units assess all assessment objectives

For example, Pure 1 has at least one question which assesses AO3

5.

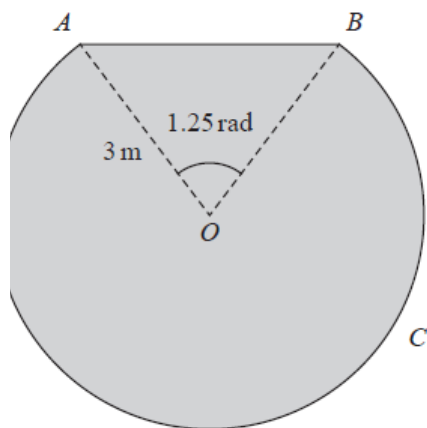


Figure 2

Figure 2 shows the plan view of a design for a garden pond.

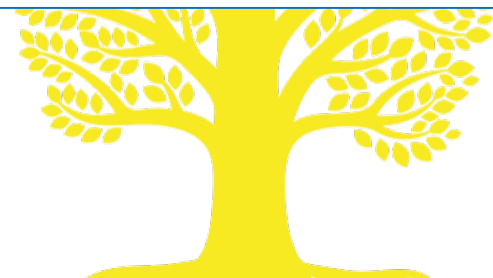
The pond consists of a sector,  $AOBCA$ , of a circle with centre  $O$ , joined to a triangle  $AOB$ .

Given  $AO = BO = 3$  m and angle  $AOB = 1.25$  radians,

(a) find the perimeter of the pond, giving your answer, in metres, to 2 decimal places. (4)

Given that there is a uniform depth of water in the pond of 1.5 m,

(b) find the volume of water in the pond, in  $\text{m}^3$ , to one decimal place. (4)



# How is all the content assessed?

For example for Pure 1 June 2019

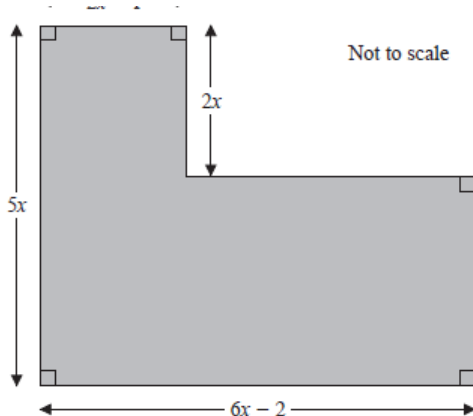


Figure 1

Figure 1 shows the plan of a garden. The marked angles are right angles.

The six edges are straight lines.

The lengths shown in the diagram are given in metres.

Given that the perimeter of the garden is greater than 29 m,

(a) show that  $x > 1.5$  m

(3)

Given also that the area of the garden is less than  $72 \text{ m}^2$ ,

(b) form and solve a quadratic inequality in  $x$ .

(5)

(c) Hence state the range of possible values of  $x$ .

(1)

Just think for a moment which AOs could be assigned to this question



# How is all the content assessed?

In fact the marks were assigned to AO2 and AO3

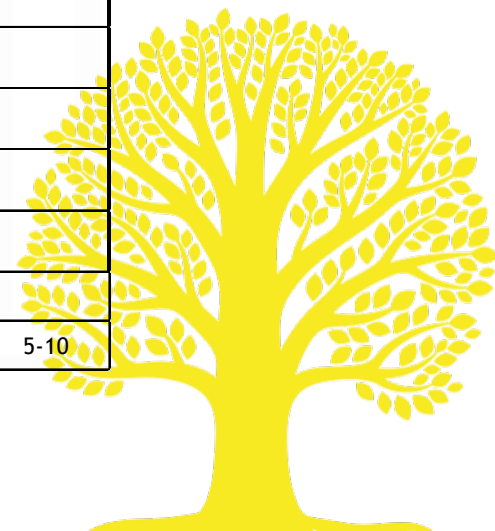
The AO2 marks came in part (a) as it is a 'show'



# How is all the content assessed?

- Constructing a full paper requires that the content sections are covered and that the sum of the marks allocated to each AO on the paper lies within the allowed totals

Q	Content	Marks	AO1	AO2	AO3	AO4	AO5
1	4.1, 4.3 Sequences	4					
2	3.1 Circles	7					
3	1.1, 1.3 Proof	4					
4	4.5 Binomial Expansion	7					
5	7.1 Differentiation problem in context	8					
6	2.1, 6.2 Factor Theorem and Trig equation	8					
7	4.2, 4.4 AP and GP problem in context	9					
8	5.2, 5.3 Laws of logarithms	9					
9	6.1, 6.2 Trig identity and equation	8					
10	7.1, 8.1, 8.2 Calculus	11					
		75					
			25-30	25-30	5-10	5-10	5-10



# How is all the content assessed?

## Activity 5

Look at the two questions together with the mark schemes for them.

Assign AO marks to each of the questions.

Q6 and Q7 from June 19 paper 1

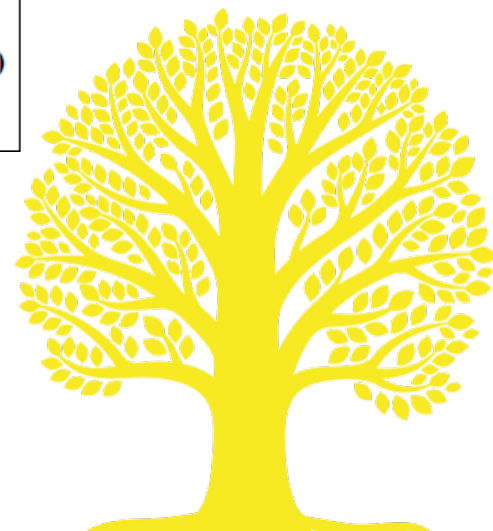


# Marking and mark schemes



# What are mark schemes?

Question Number	Scheme	Marks
<b>5.(a)</b>	$2x^3 + 3x^2 - 35x = 0 \Rightarrow x(2x^2 + 3x - 35) = 0$ $(2x - 7)(x + 5) = 0 \Rightarrow x = \dots$ $x = -5, 0, \frac{7}{2}$	M1 dM1 A1 <b>(3)</b>
<b>(b)</b>	$2(y - 5)^6 + 3(y - 5)^4 - 35(y - 5)^2 = 0$ States that $y = 5$ is a solution $(y - 5)^2 = \frac{7}{2} \Rightarrow y = \dots$ $y = 5 + \sqrt{\frac{7}{2}}$ or $y = 5 - \sqrt{\frac{7}{2}}$ or exact equivalent Both $y = 5 + \sqrt{\frac{7}{2}}$ and $y = 5 - \sqrt{\frac{7}{2}}$ or exact equivalent.	B1 M1 A1ft A1 <b>(4)</b> <b>(7 marks)</b>



# What are mark schemes?

How partial or full success is rewarded.

The marks awarded belong to 3 different types:

- M marks – marks for appropriate methods used in a correct way
- A marks – accurate answers which are conditional on correct method(s) being used
- B marks – unconditional accuracy marks

So the  
combination M0A1  
is NEVER used



# What are mark schemes?

In addition:

dM denotes a method mark which is dependent on a previous M mark

“ “ are used to denote where an incorrect answer can be used in a subsequent part and still be awarded marks (known as ‘follow through’). Usually there are conditions attached to following through.



# What are mark schemes?

Students may have access to a sophisticated calculator. Using just this may mean they do not demonstrate ability in an assessment objective.

So Edexcel mathematics exams often have instructions to show full working.

2. Answer this question showing each stage of your working.

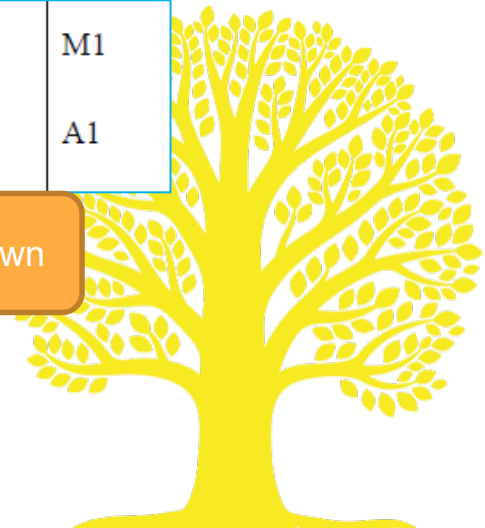
(a) Simplify  $\frac{1}{4 - 2\sqrt{2}}$

giving your answer in the form  $a + b\sqrt{2}$  where  $a$  and  $b$  are rational numbers.

(2)

2.(a)	$\frac{1}{4 - 2\sqrt{2}} = \frac{1}{4 - 2\sqrt{2}} \times \frac{4 + 2\sqrt{2}}{4 + 2\sqrt{2}}$ $= \frac{4 + 2\sqrt{2}}{16 - 8} = \frac{1}{2} + \frac{1}{4}\sqrt{2} \quad \text{oe}$	M1 A1
-------	---	----------

This step, or equivalent MUST be shown



# What are mark schemes?

## Activity 6

Suggest some other types of questions where working MUST be shown because of issues over use of a calculator.

Write these down in your delegate booklet



# What are mark schemes?

Here is a short (possibly incomplete) list:

Solution of simultaneous equations – direct function key

Solution of quadratic equations – direct function key

Solution of cubic equations – direct function key

Factorisation of cubic polynomials – via roots of cubic equations

Definite integrals – direct function key

Solution of trig equations - decimal search

Location of turning points – decimal search



# What are mark schemes?

- Mark schemes are constructed around the processes of doing a question.
- Here is question 1 from the November 2019 paper of Pure 2

1. A curve  $C$  has equation  $y = 2x^2(x - 5)$

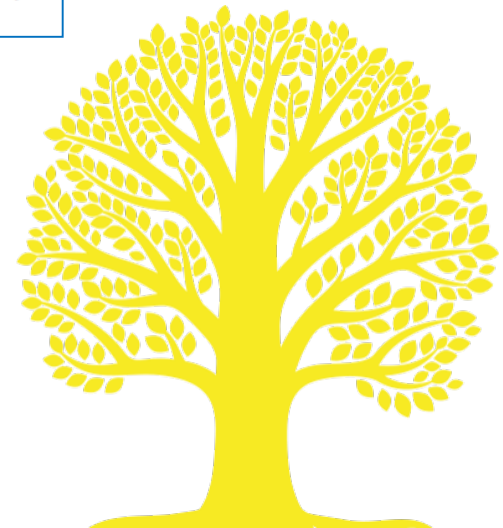
(a) Find, using calculus, the  $x$  coordinates of the stationary points of  $C$ .

(4)

(b) Hence find the values of  $x$  for which  $y$  is increasing.

(2)

Think about the processes required to do this question



# What are mark schemes?

1. A curve  $C$  has equation  $y = 2x^2(x - 5)$

(a) Find, using calculus, the  $x$  coordinates of the stationary points of  $C$ . (4)

(b) Hence find the values of  $x$  for which  $y$  is increasing. (2)

One way to do part (a) requires the following steps:

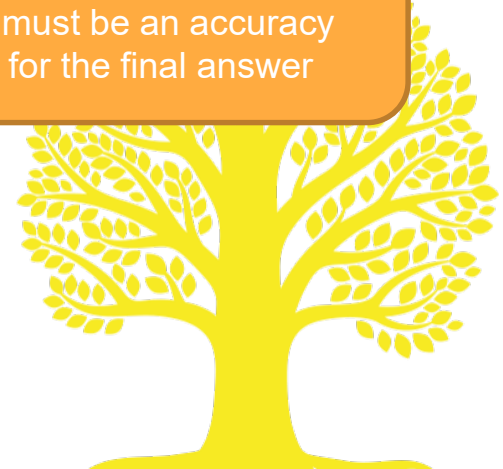
Expand the brackets

Differentiate the expanded form

Set the derivative = 0 to get an algebraic equation

Solve the algebraic equation.

The mark scheme must reflect this. There are 4 processes. There must be an accuracy mark for the final answer



# What are mark schemes?

1. A curve  $C$  has equation  $y = 2x^2(x - 5)$

(a) Find, using calculus, the  $x$  coordinates of the stationary points of  $C$ .

(4)

(b) Hence find the values of  $x$  for which  $y$  is increasing.

(2)

## Activity 7

Decide which processes should be paired to get a mark.  
Record your decision on the response sheet



# What are mark schemes?

1. A curve  $C$  has equation  $y = 2x^2(x - 5)$

(a) Find, using calculus, the  $x$  coordinates of the stationary points of  $C$ .

(4)

(b) Hence find the values of  $x$  for which  $y$  is increasing.

(2)

1 (a)	$y = 2x^2(x - 5) = 2x^3 - 10x^2$ $\frac{dy}{dx} = 6x^2 - 20x$ <p>Sets <math>\frac{dy}{dx} = 0 \Rightarrow 6x^2 - 20x = 0 \Rightarrow x = 0, \frac{10}{3}</math> oe</p>	<p>B1</p> <p>M1</p> <p>dM1 A1</p> <p>(4)</p>
-------	--	--

This method mark can only be awarded if the earlier one has been awarded



# What are mark schemes?

How does it relate to the sequence of processes shown earlier?:

1 (a)	$y = 2x^2(x - 5) = 2x^3 - 10x^2$ $\frac{dy}{dx} = 6x^2 - 20x$ <p>Sets <math>\frac{dy}{dx} = 0 \Rightarrow 6x^2 - 20x = 0 \Rightarrow x = 0, \frac{10}{3}</math> oe</p>	<p>B1</p> <p>M1</p> <p>dM1 A1</p> <p>(4)</p>
-------	--	--

Expand the brackets

B1

Differentiate the expanded form

M1

Set the derivative = 0 to get an algebraic equation

Solve the algebraic equation.

needed)

dM1 (both lines

Correct values of x

A1



# What are mark schemes?

What is needed for the M marks?

1 (a)	$y = 2x^2(x - 5) = 2x^3 - 10x^2$ $\frac{dy}{dx} = 6x^2 - 20x$ <p>Sets <math>\frac{dy}{dx} = 0 \Rightarrow 6x^2 - 20x = 0 \Rightarrow x = 0, \frac{10}{3}</math> oe</p>	<p>B1</p> <p>M1</p> <p>dM1 A1</p> <p>(4)</p>
-------	--	--

Expand the brackets

B1

Differentiate the expanded form

M1

Set the derivative = 0 to get an algebraic equation

Solve the algebraic equation.

needed)

dM1 (previous M

Correct values of x

A1



# What are mark schemes?

Part (b) obviously requires the use of the answers to part (a) and this is reflected in the mark scheme.:

One of  $x \leq "0"$  or  $x \geq "\frac{10}{3}"$ . Allow for  $x < "0"$  or  $x > "\frac{10}{3}"$ .

M1

They must have only achieved a maximum of two  $x$  coordinates in (a).

$$x \leq 0, \quad x \geq \frac{10}{3}$$

A1

Denotes that the marker must follow through the student's response

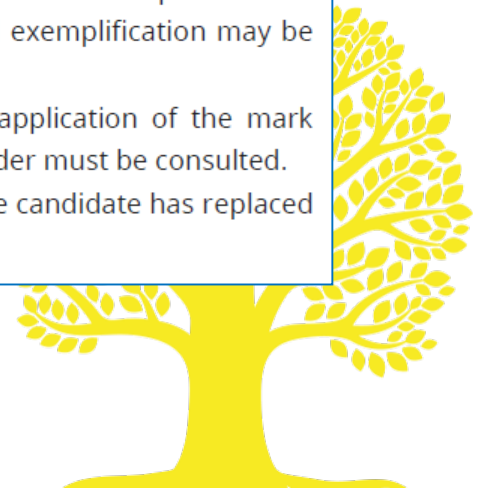


# What are mark schemes?

As well as specific marking points for each question (and additional notes for each question), Edexcel also has general marking principles.....

There is a copy in the delegate booklet

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.



# What are mark schemes?

....and additional principles for mathematics.

There is a copy in the delegate booklet

4. All A marks are 'correct answer only' (cao.), unless shown, for example, as A1 ft to indicate that previous wrong working is to be followed through. After a misread however, the subsequent A marks affected are treated as A ft, but manifestly absurd answers should never be awarded A marks.
5. For misreading which does not alter the character of a question or materially simplify it, deduct two from any A or B marks gained, in that part of the question affected. If you are using the annotation facility on ePEN, indicate this action by 'MR' in the body of the script.
6. If a candidate makes more than one attempt at any question:
  - If all but one attempt is crossed out, mark the attempt which is NOT crossed out.
  - If either all attempts are crossed out or none are crossed out, mark all the attempts and score the highest single attempt.
7. Ignore wrong working or incorrect statements following a correct answer.



# What are mark schemes?

....and also for specific, often occurring techniques

There is a copy in the delegate booklet

## Use of a formula

Where a method involves using a formula that has been learnt, the advice given in recent examiners' reports is that the formula should be quoted first.

Normal marking procedure is as follows:

**Method mark** for quoting a correct formula and attempting to use it, even if there are small mistakes in the substitution of values.

Where the formula is not quoted, the method mark can be gained by implication from correct working with values, but may be lost if there is any mistake in the working.



# What are mark schemes?

## Activity 8

### Marking

Use the mark scheme to mark to the student answers.



# What are mark schemes?

Activity 8 marking student responses

I hope you found the activity interesting.

Mark schemes are designed to cover most of the likely responses to a question.

This explains why they are long and detailed.

Experienced markers will have seen many of the techniques required in previous exams so the task of marking a full paper is not as daunting as it first appears.



# How is the content assessed?

- Producing, marking and grading exam papers.

Time	Action
-24 months	Initial draft Of QP, MS and Assessment Objective Grid (AOG) for consideration by senior examiners
-18 months	Agreed versions (3 <sup>rd</sup> draft) produced
- 15 months	Agreed version of QP typeset and sent back for checking
-12 month	Checked version of QP and MS sent to scrutineer for an independent check
-6 month	QP set up on open ready for marking; markers recruited
0 month	Live paper sat; mark scheme updated if necessary
1 month	Marking completed
2 month	Grades agreed and published ; examiner reports published

This is an approximate timescale and omits several other stages



# Support for centres



# Examiner reports

- The principal examiner (the person responsible for running the marking of the paper for a unit) writes a report on the performance of students on each question of that paper.
- The report highlights some general issues and then goes on to each question – giving quantitative information on its difficulty and then an account of what the most common errors there were.



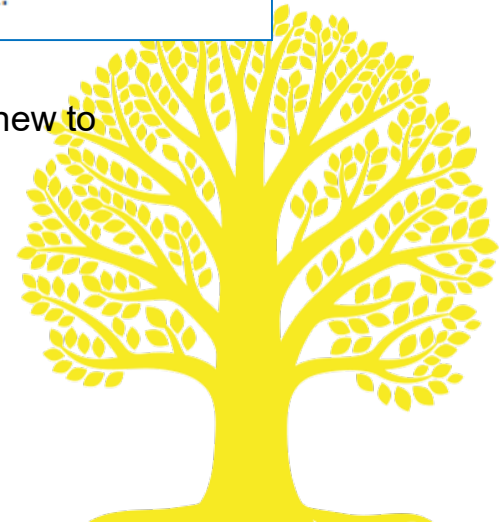
# Examiner reports

Here is an example of the general comments from Pure 1 June 2019

Points to note for future exams are

- Candidates should take care when using a calculator to find the solutions of equation especially when the questions demands that they 'show using algebra' or 'show all steps of their working'. This was true in Q2 and Q5 where a sizeable majority of candidates merely wrote down answers.
- Errors when using radians were common. This seems to be an area of weakness for a great many candidates.
- Candidates need to care when sketching graphs. There were many occurrence's when a sketch of  $\sin x$  in Q9 (b) looked linear and the one for  $\tan x$  appeared in the wrong regions.
- 'Show that' questions are always found to be more difficult. In this paper Q9(b) was poorly attempted with many candidates failing to satisfy the demand of the question.

Such general comments may be especially useful for colleagues who are new to teaching



# Examiner reports

Here is a question about which the specific comments show some of the errors students commonly make.

4. Find

$$\int \frac{4x^2 + 1}{2\sqrt{x}} dx$$

giving the answer in its simplest form.

(5)

Just take a minute to work through this question



# Examiner reports

Here is an example of specific comments from Pure 1 June 2019

## **Question 4 (Mean Mark 3.7 out of 5)**

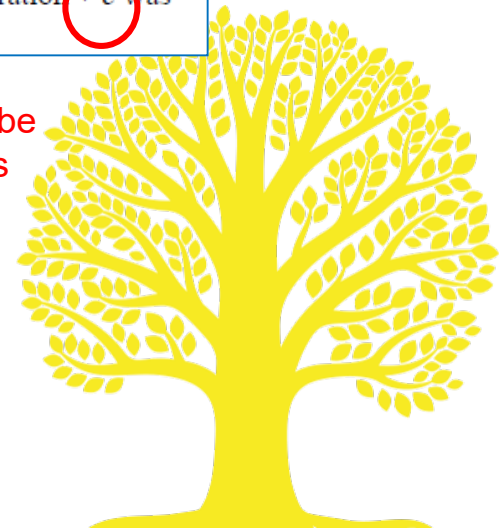
It was pleasing to note that most candidates knew that the given expression had to be written as a sum of terms before the integration was attempted. There is still a misconception, however, about how this should be carried out with many getting one of terms wrong.

Common errors included:

- $\frac{4x^2+1}{2\sqrt{x}} = 4x^{\frac{1}{2}} + \frac{1}{2}x^{-\frac{1}{2}}$
- $\frac{4x^2+1}{2\sqrt{x}} = (4x^2+1)2x^{-\frac{1}{2}} = 8x^{\frac{3}{2}} + 2x^{-\frac{1}{2}}$

Once the correct sum was formed candidates generally performed the integration correctly with only a few making fractional or sign errors. The failure to add the constant of integration  $+ c$  was also seen.

Such specific comments may be especially useful for colleagues who are new to teaching



# Examiner reports

Some common misconceptions which often appear in examiner reports :

Mishandling powers  $\frac{1}{2x} = 2x^{-1}$

Cancelling in equations instead of factorising  $x^2 = 3x$  so  $x = 3$   
 $2\sin^2 x = \sin x \cos x$  so  $2 \sin x = \cos x$

Cosine rule  $a^2 = b^2 + c^2 - 2bc \cos A$  evaluated ignoring Bidmas  
rearranged incorrectly to  $\cos A =$

Sine rule obtuse angle answer not recognised as being needed

Differentiation Confusing with integration  
 $y = x^2 + k^2$  so  $y' = 2x + 2k$   
 $y = a^x$  so  $y' = xa^{x-1}$

Integration omitting the +c especially in Diff Equations

$$\int \frac{1}{(x-a)^n} dx = \log(x-a)^n$$

Any others ?



# Guidance and support

- There is general information on the website
- Open support for centres wishing to join Edexcel mathematics
- Specific closed support for our centres
- Online events for our centres
- Face to face events for our centres (some free)
- Specific training for a centre (paid for)



# Guidance and support

There is general information on the website

<https://qualifications.pearson.com/en/qualifications/edexcel-international-advanced-levels/mathematics-2018.html>

## **Course materials**

**[Specification and sample assessments \(3\)](#)**

**[Exam materials \(18\)](#)**

**[Forms and administration \(1\)](#)**

**[Teaching and learning materials \(31\)](#)**



Use these to decide on the quality of our new  
International A Level mathematics course



# Guidance and support

Examples of actual responses

## Exemplar material



### International A Level Maths Pre-First-Assessment Exemplars

Pre-First-Assessment Exemplars for IAL Maths to demonstrate the structure of the Redeveloped Pure Maths Units

| PDF 6.2 MB | 30 Nov 2018



### International A Level in Mathematics Pure Mathematics 1 Exemplars

Post June 2019 Series

| PDF 1.9 MB | 31 Oct 2019



### International A Level in Mathematics Pure Mathematics 2 Exemplars

Post June 2019 Series

| PDF 1.8 MB | 31 Oct 2019

## Guide



### Your subject guide to International A Level Mathematics

| PDF 674.9 KB | 12 Jul 2019

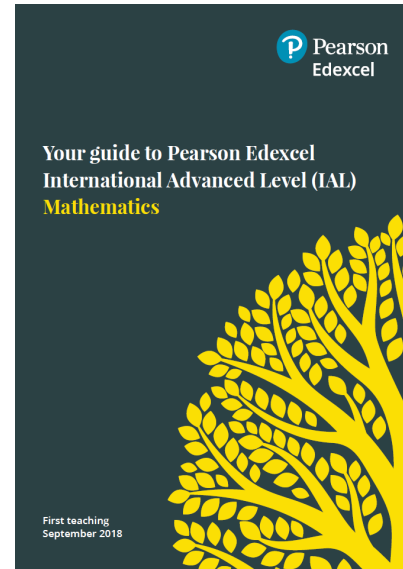


# Guidance and support

This guide tells you all you want to know about the development of the course(s)






It forms a useful introduction to IAL mathematics

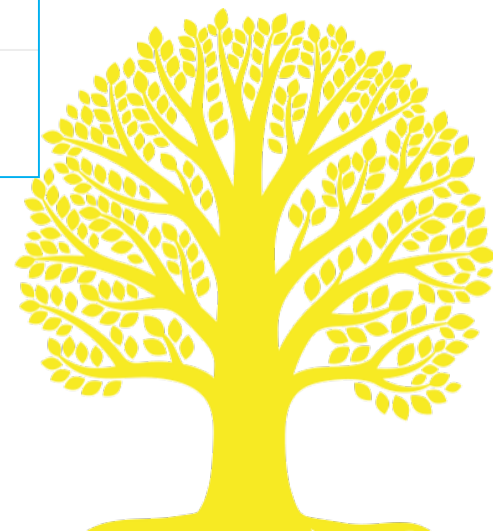
[https://qualifications.pearson.com/content/dam/pdf/International%20Advanced%20Level/General/IAL%20Maths%20Guide\\_June19\\_web.pdf](https://qualifications.pearson.com/content/dam/pdf/International%20Advanced%20Level/General/IAL%20Maths%20Guide_June19_web.pdf)



# Guidance and support

Schemes of Work  
are available for all  
units

Scheme of work	
	<a href="#">Scheme of Work Decision Mathematics 1</a> Suggested scheme of work for IAL Decision Mathematics 1   PDF 866.8 KB   18 Sep 2018
	<a href="#">Scheme of Work Further Pure Mathematics 1</a> Suggested scheme of work for IAL Further Pure Mathematics 1   PDF 1.2 MB   28 Nov 2018
	<a href="#">Scheme of Work Further Pure Mathematics 2</a> Suggested scheme of work for IAL Further Pure Mathematics 2   PDF 1.1 MB   28 Nov 2018
	<a href="#">Scheme of Work Further Pure Mathematics 3</a> Suggested scheme of work for IAL Further Pure Mathematics 3   PDF 1.2 MB   28 Nov 2018
	<a href="#">Scheme of Work Mechanics 1</a> Suggested scheme of work for IAL Mechanics 1   PDF 1.3 MB   13 Dec 2018



# Guidance and support

Each section of the SOW contains useful information

- Teaching time
- Objectives
- Prior knowledge
- Teaching points
- Opportunities for Reasoning/Problem solving
- Common misconceptions

<https://qualifications.pearson.com/content/dam/pdf/International%20Advanced%20Level/Mathematics/2018/Teaching-and-Learning-Materials/Scheme-of-Work-Pure-Maths-1.pdf>



# Guidance and support

There are also recordings and powerpoint presentations which introduce the course

## Past training content



Getting Ready to Teach Pearson Edexcel's Updated International Advanced Level Mathematics specifications for first teaching in September 2018 (XMA01 / YMA01) - Face to Face Event

| ZIP 12.2 MB | 17 Apr 2019



Getting Ready to Teach Pearson Edexcel's Updated International Advanced Level Mathematics specifications for first teaching in September 2018 (XMA01 / YMA01) - Online Event

| ZIP 9.9 MB | 11 Feb 2019



Getting Ready to Teach Pearson's new International Advanced Level Maths specifications for first teaching in September 2018

| ZIP 16.2 MB | 30 May 2018



# Guidance and support

Teaching support and training

- [Training sessions](#)
- [Results support](#)
- [Grade boundaries](#)



# Guidance and support – Training

## Training from Pearson

Live training

On-demand training


Centre-based training

About

FAQs

### Find and book



Our training hub makes it easy to find and book events. Whether you're looking for online, face-to-face, centre-based or pre-recorded sessions, we've got you covered.

Use our search-and-book tool to find live training events. If you're an Edexcel Online (EOL) customer, you can log in using your EOL account. If you're new to Pearson, you'll need to create an account. For more help, download our [step by step guide](#) .

If you're looking for training videos or courses to be delivered at your centre, visit our [pre-recorded](#) and [centre-based training](#) pages.

### Step by step guide

Want to book a training course? Download our step by step guide to securing your place.

 [Download the guide](#) 

<https://qualifications.pearson.com/en/support/training-from-pearson-uk.html>



- Free online results analysis tool for teachers
- Provides a detailed breakdown of student performance in Edexcel exams.
- Identify topics and questions where the student could benefit from further learning
- Use this knowledge to inform teaching strategies and approaches
- Provides a comparison of student performance at regional level.
- Allows centres to view their country's results compared to the total Edexcel cohort.
- Mock exams results can also be fed into the system to produce an analysis
- Schools can sign up for free ResultsPlus account in just a few quick and easy steps:



## How Result Plus works



1.  
Student  
takes exam  
on paper



2.  
Exam papers  
scanned



3.  
Examiners  
mark papers  
online



4.  
Performance  
reports  
shared



## Grade Performance

- Whole centre
- Department
- Class
- Student

## Detailed Analysis

- Performance on each question
- Comparison to Edexcel data

## Skills Maps

- Curriculum mapped
- Contextualised performance

## Comparison

- by subject
- by class
- by specification
- by centre
- by year

## Mock Analysis

- Provides insight
- Develops student learning

## Exam Documents

- Exam per
- Mark schemes
- Examiners reports



# New Access to Script (ATS) OnlinePortal

**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.**



Pearson  
Edexcel

<https://qualifications.pearson.com/en/support/Services/access-to-scripts.html>



# Guidance and support – Results

- How could you see ResultsPLus and ATS Online being used on a unitised course?
- Write down 3 points in your delegate booklet



# Guidance and support – Results

## Post results services

Reviews of marking and moderation (RoMM)

Access to scripts (ATS)

Appeals

Our Reviews of marking and moderation (RoMM) services allow you to request us to run additional checks that the grades we've issued your candidates are correct.

Clerical check (Service 1)



Review of marking of externally assessed components (Service 2)



Priority review of marking of externally assessed components (Service P2)



Review of moderation for internally assessed/externally moderated controlled assessment and coursework components (Service 3)



If a centre is concerned about the marking of a centre cohort



# Guidance and support – Results

Resources available to Edexcel centres (free)

- Schemes of Work ( described earlier)
- Maths Emporium
- examWizard



# Guidance and support – Results



---

## Maths Emporium

### Welcome to the Maths Emporium

This **free** website is intended for the use of teachers of mathematics in secondary schools, wherever you might be and regardless of what awarding body you use.

The Maths Emporium contains over 15,000 files to do with Edexcel Mathematics and all the qualifications that we offer, including past papers, mark schemes, examiner reports and grade boundaries.

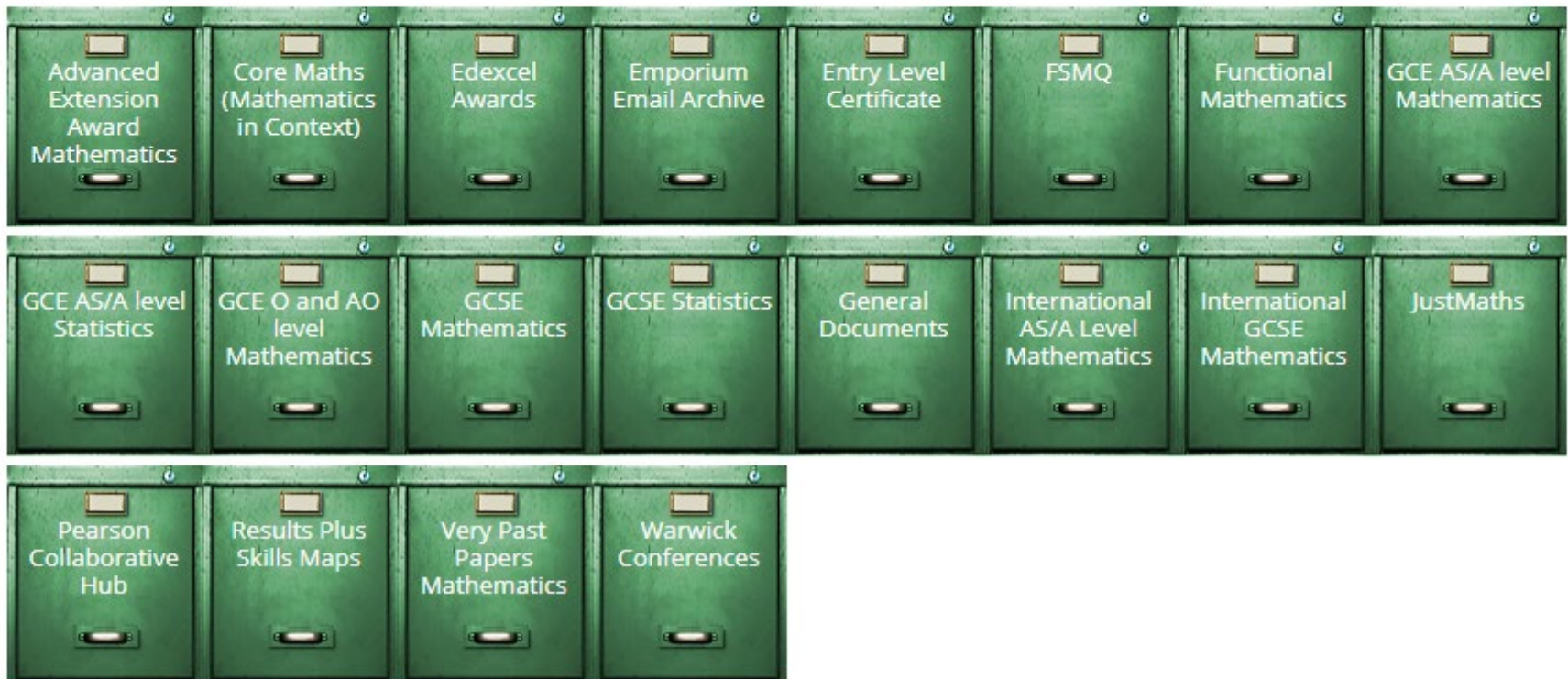
[https://www.mathsemporium.com/mathematics-emporium/?redirect\\_to=https%3A%2F%2Fwww.mathsemporium.com%2F](https://www.mathsemporium.com/mathematics-emporium/?redirect_to=https%3A%2F%2Fwww.mathsemporium.com%2F)



# Free support for Edexcel centres



## Maths Emporium



# Free support for Edexcel centres



[Maths Emporium](#) > [International AS/A Level Mathematics](#) > 02 IAL Mathematics (2018)

## Category: 02 IAL Mathematics (2018)

International AS/A Level Mathematics, for first teaching in September 2018 and first examination in January 2019. This qualification is available for centres outside the UK only.





**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.

<https://www.examwizard.co.uk/home>



## 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](#)

## Search Results

Showing 10 out of 27

### Friction and motion

8 mins 8 marks WME01/01, Jan 2018

View

Add

### Kinematics

7 mins 7 marks WME01/01, Jan 2015

Viewing

Add

### Kinematics

7 mins 7 marks WME01/01, June 2015

View

Add

### Kinematics

10 mins 10 marks WME01/01, June 2015

View

Add

### Kinematics

13 mins 13 marks WME01/01, Jan 2016

View

Add

### Kinematics

7 mins 7 marks WME01/01, Jan 2014

View

Add

Show more

Click here to name your paper...

View/Edit

Save

Total : 2 questions 22 minutes 22 marks

Remove all

Export

## Kinematics

Question

Mark Scheme

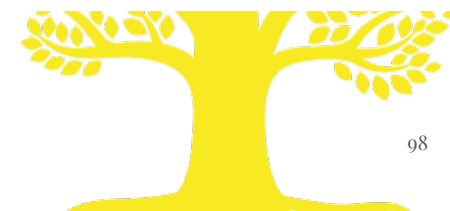
Examiner's Report

Resources

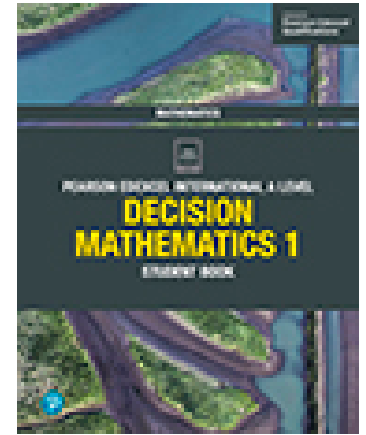
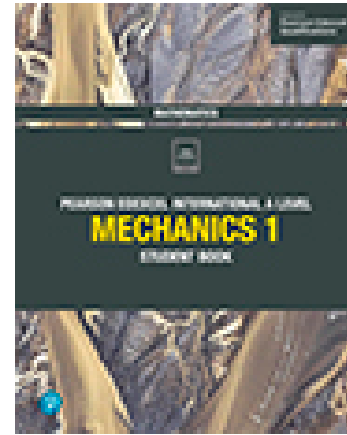
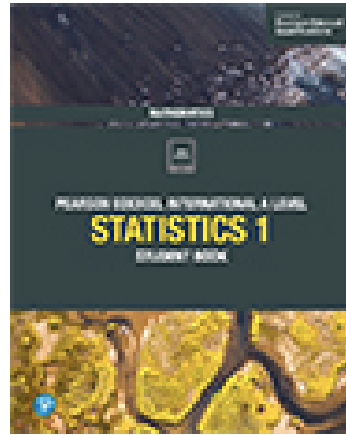
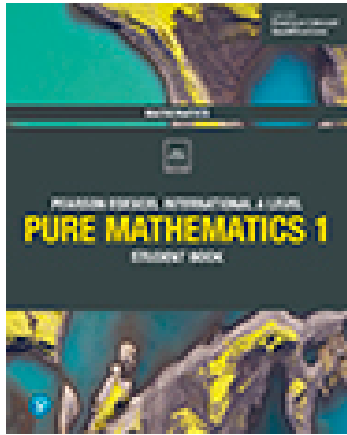
The points  $P$  and  $Q$  are at the same height  $h$  metres above horizontal ground. A small stone is dropped from rest from  $P$ . Half a second later a second small stone is thrown vertically downwards from  $Q$  with speed  $7.35 \text{ m s}^{-1}$ . Given that the stones hit the ground at the same time, find the value of  $h$ .

(7)

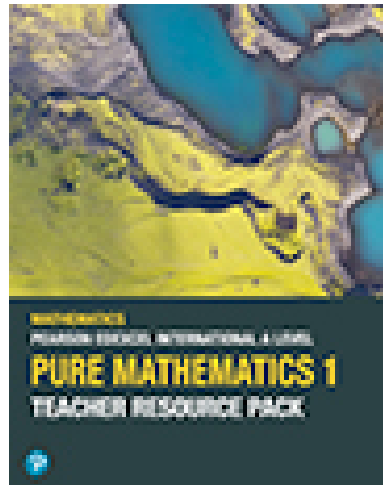
(Total for question = 7 marks)



# Paid for resources Published resources



Teacher resource packs

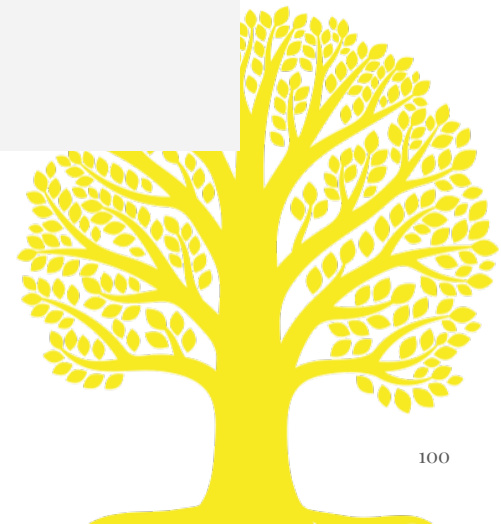


# Support for Edexcel centres (paid for)

We are committed to helping teachers deliver our Pearson Edexcel qualifications and helping students to achieve their full potential.

To do this, we aim for our qualifications to be supported by a wide range of high-quality resources, produced by a range of publishers.

However, it is not necessary to purchase endorsed resources to deliver our qualifications.



# Contact your dedicated Subject Advisor

Subject Advisor details

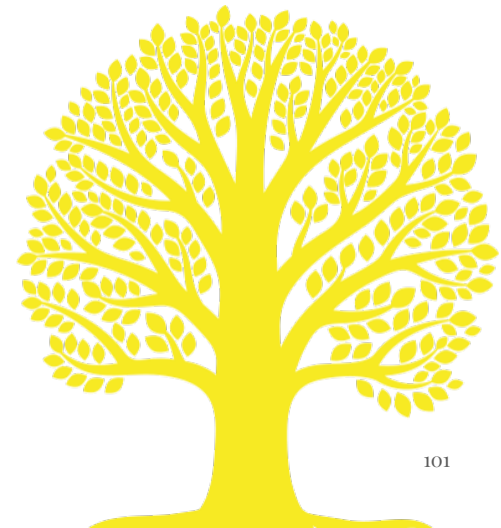
Your subject advisor is **Graham Cumming**

Phone: **+44 (0)20 7010 2174**

Twitter: **@EmporiumMaths**

Email: [Teachingmaths@pearson.com](mailto:Teachingmaths@pearson.com)

Sign up for monthly newsletters from Graham to stay on top of qualification updates, training, course materials and industry news.



# Guidance and support overview

Getting Started Guide  
& Scheme of Work

Getting Ready to  
Teach Events

Subject interpretation  
of transferable skills

Subject Advisor

Results Plus

Regional Support  
Manager

Curriculum Matched  
Publishing

Qualification Guides

Additional SAMs

Exemplar marked  
responses with  
commentaries

Examwizard

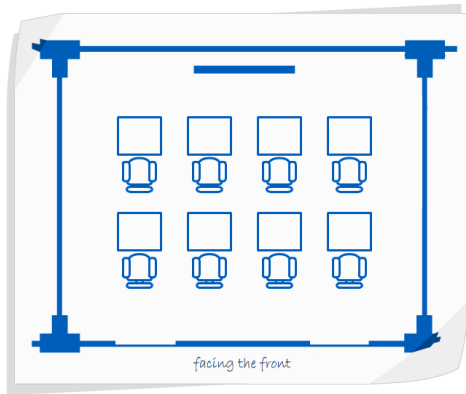
Access to Scripts

# Teaching for success

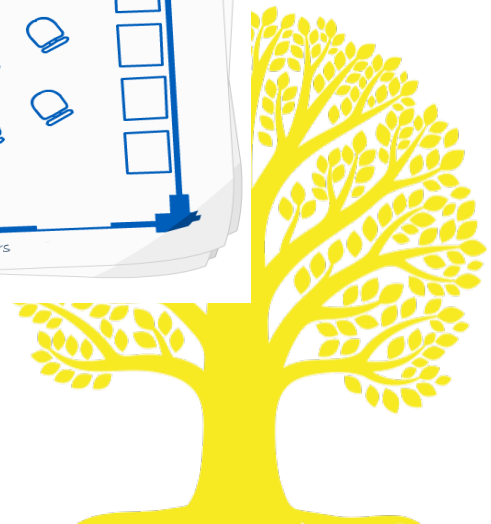
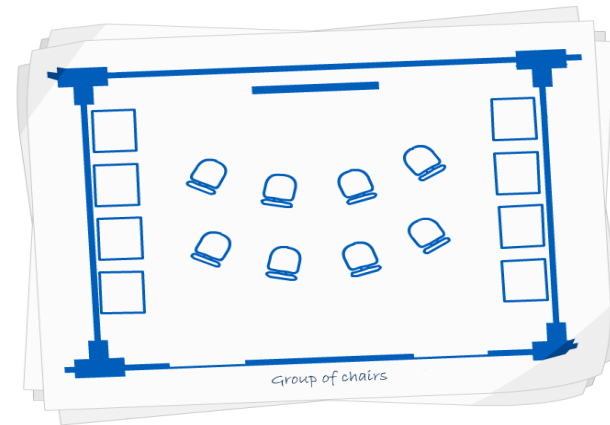
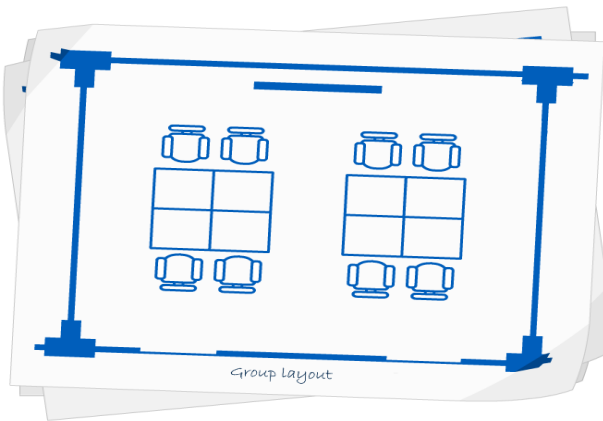
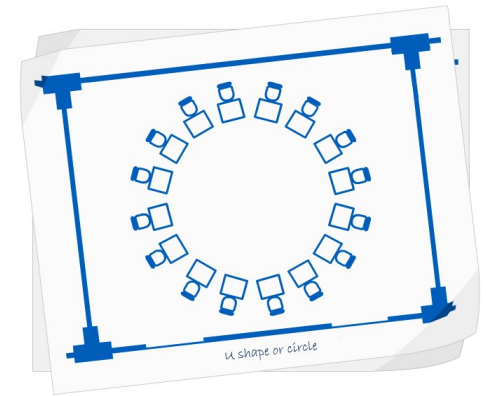
- Decide on the layout of the room
- Use lesson plans
- Use schemes of work
- Use year planners
- Decide on allowable use of calculators and formula books in lessons
- Textbooks and supplementary material
- Exam technique for IAL
- Make use of the free Edexcel support



# Teaching for success



These classroom layouts can lead to different types of interaction between students and between student and teacher.



# Teaching for success

Lesson plans:

- Learning objectives and success criteria
- Resources needed
- Content
- Timings



# Teaching for success

Schemes of work – a very useful one on the Edexcel site

Year planner - how to sequence Pure 1 and Pure 2 with the Applied course

key dates (unit exams, mock exams, reports etc)  
revision time



# Teaching for success

## Exam Preparation:

- Study the examiner reports
- At least one proper mock examination per unit marked using the mark scheme or using ResultsPLus
- Key words
- Showing working



# Learning from others



# Improving professional practice

- Edexcel online events
- Edexcel face to face events
- Local/national network groups (take advice from the Pearson area rep)
- Pearson International Schools Community
- Become an Edexcel examiner!



# Pearson International Schools **Community**

## Improving professional practice

**Connect with international teachers around the world**

- Connect with other teachers working in international schools and join groups who have shared interests, subjects or location
- Read topical news and articles and share yours
- Advertise jobs at your school or find job opportunities
- Download free resources

Sign up for events.

**Sign up today at: [community.pearsoninternationalschools.com](https://community.pearsoninternationalschools.com)**



# Please fill in your evaluation forms

**We value your  
feedback!**





# Thank you for your time

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