LEVEL 2

WJEC Level 2 Additional Mathematics

Approved by Qualifications Wales

Guidance for Teaching: Unit 2

Teaching from 2026
For award from 2027

This Qualifications Wales regulated qualification is not available to centres in England.

Made for Wales.
Ready for the world.

WJEC would like to thank the students and teachers of Fitzalan High School, Cardiff and Llanwern High School, Newport for their participation in the creation of these covers.

Contents

Introduction

WJEC Level 2 Additional Mathematics has been approved by Qualifications Wales and is available to all centres in Wales. It will be awarded for the first time in Summer 2027, using grades Pass, Merit or Distinction.

Aims of the Guidance for Teaching

The principal aim of the Guidance for Teaching is to support teachers in the delivery of WJEC Level 2 Additional Mathematics and to offer guidance on the requirements of the qualification and the assessment process. The Guidance for Teaching is **not intended as a comprehensive reference**, but as support for teachers to develop stimulating and exciting courses, tailored to the needs and skills of their learners. The guide offers possible classroom activities and links to useful resources (including our own, freely available digital materials and some from external sources) to provide ideas for immersive and engaging lessons.

Additional ways that WJEC can offer support:

- sample assessment materials and mark schemes
- professional learning events
- examiners' reports on each unit
- direct access to the subject officer
- free online resources
- Exam Results Analysis
- Assessment Feedback package.

Qualification Structure

WJEC Level 2 Additional Mathematics consists of six units (two mandatory, four optional). The qualification is unitised and does not contain tiering. There is no hierarchy to the order the units should be taught.

	Unit title	Type of Assessment	Weighting
Mandatory Units			
Unit 1	Algebra	Written examination	33⅓%
Unit 2	Calculus	Written examination	33⅓%
Optional Units			
Unit 3	Geometry and Trigonometry	Written examination	33⅓%
Unit 4	Statistics	Written examination	33⅓%
Unit 5	Mechanics	Written examination	33⅓%
Unit 6	Discrete and Decision Mathematics	Written examination	33⅓%

To be awarded the qualification, learners must complete **three** units:

- **two** mandatory units
- **one** optional unit.

Learners who complete fewer than three units will receive unit certification for the successful completion of each unit.

Unit 2 Summary of Assessment

Unit 2: Calculus **Written examination: 50 minutes** **33⅓% of qualification** **40 marks**
The paper will comprise a number of short and longer, both structured and unstructured, questions. A calculator will be allowed in this paper.

Overview of Unit 2

Calculus
(33⅓% of the qualification)

The purpose of this unit is to introduce and develop an understanding of new concepts relating to calculus, supporting progression to the further study of mathematics or a related discipline.

A calculator will be allowed in this paper.

In this unit, learners will develop knowledge, skills and understanding in:	
2.1	Differentiation
2.2	Integration

Unit 2 Assessment objectives and weightings

AO1	Recall and use their knowledge of the prescribed content.	23⅓%
AO2	Select and apply mathematical methods.	6⅔%
AO3	Interpret and analyse problems and use mathematical reasoning to solve them.	3⅓%

Unit 2 Teacher Guidance

2.1 Differentiation		
	Content Amplification	**Teacher Guidance**
2.1.1 Differentiating terms and expressions	Learners should be aware of: • differentiation from first principles, in order to gain a better understanding of the gradient function. Learners should be able to: • differentiate x^n and related expressions, including polynomials, for integer values of n only, that is, use of $\frac{\mathrm{d}}{\mathrm{d}x}(x^n) = nx^{n-1}$.	It is important to understand the limiting process to find the gradient of a curve at a given point, however differentiation from first principles will not be formally assessed. In questions, indices of x will be an integer, negative, zero and positive. Fractional indices are not included. Questions may include an expression as a sum of terms, such as: • find $\frac{dy}{dx}$ when $y = 3x^8 - \frac{4}{x^2} + 6x^{-5} + 7$ • find $\frac{dy}{dx}$ when $y = 5x^2 - (x+2)(x-7)$ • find the gradient function of $y = \frac{1}{2x^{-3}} + 8$ • find the gradient of the curve $y = 3x^2 + 6$ at the point (0, 6). Learners may be required to apply knowledge of perpendicular gradients. **Example question:** A straight line intersects the curve $y = x^3 - 2x - 3$ at the point (2, 1). The straight line is perpendicular to the curve at this point. Find the gradient of the straight line.

2.1.2 Second derivatives	Learners should be able to: • find second derivatives in simple cases, for example, given $y = x^3 + 3x^2 + 1$ find $\frac{\mathrm{d}^2y}{\mathrm{d}x^2}$.	Any indices of x will be integers only, negative, zero and positive. Fractional indices are not included. **Example question:** Given that $y = 5x^3 - \frac{1}{x}$,find the value of $\frac{\mathrm{d}^2x}{\mathrm{d}y^2}$ when $x = 5$.
2.1.3 Stationary points on a curve	Learners should be able to: • find the maximum and minimum points on a curve and determine their nature. Learners are not expected to consider points of inflection.	Stationary points are identified by solving $\frac{\mathrm{d}y}{\mathrm{d}x}$ = 0. Learners will be expected to clearly demonstrate the nature of these points, for example by applying knowledge of $\frac{\mathrm{d}^2x}{\mathrm{d}y^2}$.
2.1.4 Equations of tangents	Learners should be able to: • find the equation of a tangent to a curve at a given point.	Learners are expected to find the gradient of a curve at a particular point and hence find the equation of the tangent at this point.

2.2 Integration		

2.2.1
Integrating terms and expressions
	Learners should be aware of:
	• integration being the reverse process of differentiation.
	
	Learners should be able to:
	• integrate x^n and related expressions for integer values of n only, that is,
	given $\frac{dy}{dx} = x^n$ then $y = \frac{x^{n+1}}{n+1} + c\ (n \neq -1)$.
		Learners should understand the role of the constant of integration.
		
		Learners may be expected to link knowledge of differentiation to work in reverse, applying knowledge of integration and the constant of integration.
		
		Learners may be asked to find the equation of a curve given $\frac{dy}{dx}$ and further information, for example:
		• find the equation of the curve given that:
		  • (2, 43) is a point on the curve and
		  • the gradient function of the curve is $\frac{dy}{dx} = 12x^2 - 5$.

2.2.2 Evaluating definite integrals	Learners should be able to: • evaluate definite integrals, including integrands that are polynomials.	Learners will be expected to show working that includes the integration, the appropriate substitutions and the intention to subtract.
2.2.3 Calculating the area between a curve and the x-axis	Learners should be able to: • apply integration to simple areas where the curve is entirely above or below the x-axis in the given interval, where the interval could be defined by vertical lines or inequalities.	Learners should be able to interpret a negative value for a definite integral as an area below the x-axis. Questions may include additional calculated areas, such as a quadrilateral or a triangle, to find the area of a simple region. Regions may be defined by a list of inequalities.

Learning Experiences

Learners should be encouraged to consider the following learning experiences and skills to further develop their understanding, appreciation and awareness of the subject content. Information in the table below provides opportunities for teachers to integrate the learning experiences into delivery.

Learning Experience	Exemplification of Learning Experience
Work both independently and collaboratively.	The ability to work independently is crucial to all learners tracking their own progress through this specification for Unit 2. Independent work encourages learners to take ownership of their own studies, leading to a better understanding and retention of mathematical concepts. Level 2 Additional Mathematics Unit 2 is a unit in which collaborative discussion of solutions, misconceptions and approaches is hugely impactful on progress. Habits formed during Level 2 Additional Mathematics Unit 2 will ease transition to further and higher education, where self-directed and collaborative study are crucial. Both independent and collaborative learning are imperative in supporting the development of learners' mathematical fluency, conceptual understanding, logical reasoning, strategic competence and communication with symbols. Problem style questions which require multiple steps to solve are effective in promoting collaborative learning. Learners can work in groups to discuss strategies and come up with solutions together. Example: 2.1.1 Learners could work collaboratively to explore the gradients of straight lines connecting points as a limiting process to becoming a tangent.
Gain experience and appreciation of the role mathematics plays in other subjects and areas of the curriculum.	Making links and showing the usefulness of mathematics in other subject areas is an invaluable tool when adding relevance to a topic or task. Example: 2.2.3 Learners will be able to calculate exact answers to problems that may previously have only been estimated in mathematics, geography, IT or science, such as: • the area under a curve, progressing from estimating using the trapezium rule • the gradient of a tangent to a curve, progressing from drawing a tangent by eye.

Gain awareness and appreciation of some of the different careers and work-related areas that draw upon mathematics.	Learners see the relevance of mathematical concepts in various professional roles, including scientific, IT, space technology, weather forecasting and AI development where exact interpretation and readings are essential, hence preparing them for future career paths.
Access rich tasks that invoke curiosity, build resilience and require *Learners* to be resourceful.	Deeper understanding of a mathematical concept is aided through rich tasks that invoke curiosity, encouraging inquisitive learners to consider 'what would happen if...?' Example: 2.2.3 Learners could apply their skills to calculate actual acceleration, velocity or distance rather than estimating from a graph, processing to make small changes and record the impact, for example in the placement of traffic lights looking at the impact on velocities.
Undertake practical work that allows *Learners* to apply their mathematical skills inside and outside of the classroom setting.	Practical work both in and outside the classroom setting can improve engagement in mathematics lessons and provide learners with a different approach to recall previous knowledge and skills. Example: 2.1.3 Learners could apply knowledge of maxima and minima in business pricing strategies.
Encounter familiar, unfamiliar and complex problems.	Learners will encounter mathematical challenges with opportunities to learn from errors and mistakes, overcome misconceptions, and solve mathematical problems. Learners need to have the opportunity to investigate how to solve problems, discuss questions and generate their own ideas or strategies. Example: 2.1.3 Learners could check solutions to problems requiring the equation of a tangent using graphing software to verify realistic answers.

Opportunities for embedding elements of the Curriculum for Wales

Curriculum for Wales Strands	
Cross-curricular Skills – Literacy	
	There are many opportunities to include Literacy in Level 2 Additional Mathematics. These opportunities are important to Learners because: • listening skills can help learners progress and can be developed when teachers explain methods, as learners need to listen carefully to understand and effectively grasp explanations. Learners also benefit through listening to their peers' ideas and arguments. • Reading skills have an impact on learner achievement. Learners need to be able to read and interpret questions, scan questions for key information, and deduce the best approach to answering a question. • Learners being able to verbally present their thoughts, strategies, reasoning and justifications to peers and teachers using subject specific language, aids the development of understanding and eradicates misconceptions. When learners work together to solve problems and share strategies they learn from each other. • Writing skills are important because learners need to be able to solve problems and provide written steps to evidence how they reached the solution. Below are some examples of how Literacy can be embedded into teaching and learning:

Listening	***Specification Reference*** 2.1.1	***Amplification*** Differentiating terms and expressions	***Example*** Listening to an explanation of the limiting process as lines are drawn joining two points and showing that as these points get closer and closer together, eventually they are indistinguishable as a line segment and become a tangent.
Reading	***Specification Reference*** 2.1.2	***Amplification*** Second derivatives	***Example*** Understanding notation that $\frac{\mathrm{d}^2y}{\mathrm{d}x^2}$ means $\frac{d}{dx}(\frac{dy}{dx})$.
Speaking	***Specification Reference*** 2.1.1	***Amplification*** Differentiating terms and expressions	***Example*** Verbalising the rule aids recall of facts in order to answer questions, involving both positive and negative integers.
Writing	***Specification Reference*** 2.1.4	***Amplification*** Equations of tangents	***Example*** To write the stages of the problem in order to gather the parts of workings to form an equation.

<table>
<tr><th colspan="4">Cross-curricular Skills – Numeracy</th></tr>
<tr><td></td><td colspan="3">There are many opportunities to include Numeracy in Level 2 Additional Mathematics. These opportunities are important to Learners because:

• learners will practice and develop skills from GCSE Mathematics and Numeracy to gain an insight into the fascinating world of understanding the exact nature of calculus

• the qualification naturally brings together number skills, including working with indices and interpretation of graphical concepts including rate of change, area, geometry and position.

Below are some examples of how Numeracy can be embedded into teaching and learning:</td></tr>
<tr><td>Developing Mathematical Proficiency</td><td>Specification Reference

2.2.3</td><td>Amplification

Calculating the area between a curve and the x-axis</td><td>Example

Link to problems at GCSE Mathematics and Numeracy that require the estimation of an area under a curve to solve a problem, for example the passing position of two trains travelling in opposite directions.</td></tr>
</table>

Understanding the number system helps us to represent and compare relationships between numbers and quantities	***Specification Reference*** 2.2.2	***Amplification*** Evaluating definite integrals	***Example*** Substitution and subtraction of terms, such as in the evaluation of a definite integral.
Learning about geometry helps us understand shape, space and position and learning about measurement helps us quantify in the real world	***Specification Reference*** 2.1.4	***Amplification*** Equations of tangents	***Example*** Link to problems in GCSE Mathematics and Numeracy that require the estimation of a rate of change, or gradient of a curve to solve a problem, such as calculating the acceleration of a cyclist downhill.

<table>
<tr><th colspan="4">Integral Skills</th></tr>
<tr><td>Critical Thinking and Problem Solving</td><td colspan="3">There are many opportunities to include Critical Thinking and Problem Solving in Level 2 Additional Mathematics. These opportunities are important to Learners because:

• Critical Thinking and Problem Solving are developed and enhanced through teaching and learning and can be achieved by offering opportunities for learners to engage in logical reasoning and justifications.
• Learners have opportunities to investigate how to solve problems through applying new concepts, discussions and questioning to generate strategies. Learners have to think critically about the methods they choose to solve problems.

Below are some examples of how Critical Thinking and Problem Solving can be embedded into teaching and learning:</td></tr>
<tr><td></td><td>Specification Reference

2.2.3</td><td>Amplification

Calculating the area between a curve and the x-axis</td><td>Example

Interpret inequalities to identify a region, and decide upon values to substitution and the parts to subtract.</td></tr>
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<tr><td rowspan="2">Planning and Organisation</td><td colspan="3">There are many opportunities to include Planning and Organisation in Level 2 Additional Mathematics. These opportunities are important to Learners because:

• Planning and Organisation are essential skills that can be developed through the teaching and learning. These skills enable learners to approach problems systematically. By integrating opportunities for planning and organisation into lessons, teachers can help learners become more independent and efficient.
• Encouraging learners to break down problems into steps and plan their approach before solving will develop their planning and organisational skills. When tackling a complex question, learners can first write down a plan outlining the steps they will take or methods they will apply, and the order in which they will proceed. This builds on their ability to organise their thoughts and systematically work through problems. Learners need to know how to organise their work clearly, showing all steps of their calculations or reasoning to avoid careless mistakes.

Below is an example of how Planning and Organisation can be embedded into teaching and learning:</td></tr>
<tr><td>Specification Reference

2.1.2</td><td>Amplification

Second derivatives</td><td>Example

A problem involving reverse working, by applying rules of integration remembering to include the constant of integration.</td></tr>
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<tr><td rowspan="2">Personal Effectiveness</td><td colspan="3">There are many opportunities to include Personal Effectiveness in Level 2 Additional Mathematics. These opportunities are important to Learners because:

• Key personal and social skills such as independence, emotional intelligence, discussion, debate, learning through mistakes and identifying areas for improvement can be cultivated when studying Level 2 Additional Mathematics Unit 2.
• These skills can be developed through thoughtful teaching and learning strategies, such as problem-solving activities, growth mindset tasks that emphasise the importance of effort, persistence and learning through mistakes, learner error analysis, pair and group work, discussions, learner led feedback and self-evaluation.

Below is an example of how Personal Effectiveness can be embedded into teaching and learning:</td></tr>
<tr><td>Specification Reference

2.1.3</td><td>Amplification

Stationary points on a curve</td><td>Example

Use graphical software or calculations to check outcomes.</td></tr>
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Glossary for Unit 2

Term	Definition
Gradient function	This is another way of saying $\frac{dy}{dx}$, for example, the gradient function of $y = ax^2 + bx + c$ is $\frac{dy}{dx} = 2ax + b$
Indefinite integration	This is an integral that does not have any upper or lower limits, as found in a definite integral
Constant of integration	The constant of integration, often written as '+c', is a constant term added to a result of an indefinite integration