TLM Level 3 Diploma in Scientific Modelling and Physical Systems

The Level 3 Diploma in Scientific Modelling and Physical Systems builds on key principles of inclusive, accessible education, providing a structured pathway for learners seeking to develop applied knowledge in physics, systems thinking, and scientific reasoning. Designed to support progression from Level 2 study, this qualification offers meaningful opportunities for learners to deepen their understanding of key concepts in motion, energy, forces, waves, and atomic interactions.

Each unit within the suite focuses on the real-world application of physical principles and modelling techniques, supporting both academic development and practical competence. From analysing motion and understanding forces, to exploring energy systems, field interactions, and wave phenomena, the qualification is built around a flexible structure that meets a wide range of learner needs and institutional contexts.

This qualification is suitable for post-16 learners, adult returners, and those preparing for further or higher study in fields such as engineering, applied science, renewable energy, or technical services. It supports varied learning styles and assessment approaches, incorporating coursework and applied tasks that enable learners to demonstrate both subject understanding and transferable skills in critical thinking, quantitative reasoning, and scientific communication.

The Regulated Qualifications Framework (RQF) was designed by the UK government's Qualifications and Curriculum Development Agency now replaced by Ofqual. The RQF is referenced to the European Qualifications Framework devised by the European Union

Contents

1. For those in a hurry!

1.1	TLM's assessment model is common to most of its qualifications. It is based on competence-based assessment of coursework using a portfolio of evidence and supported by a free optional cloud-based evidence management system.
1.2	Learners must demonstrate competence against the assessment criteria from their day-to-day work and the tutor assessor must verify that they are competent in relation to the general level descriptor using indicative assessment criteria. TLM's external moderator will check the judgements and the quality of the evidence and provide feedback. This process is not graded; the intention is that it is a flexible way of checking basic practical competence in the subject at the qualification's framework level.
Procedures	
1.3	The first thing to do is to arrange assessor training with TLM. TLM trains at least one assessor as Principal Assessor who must accept responsibility for standards within the Centre. The Principal Assessor can train and appoint assessors within the Centre as long as they are competent to take on the work and are willing to sign an agreement on the web site to uphold standards.
1.4	TLM will provide initial training in the pedagogical model, and using the supporting technologies to provide the evidence needed. The purpose is to get you started and then we provide on-going support to ensure you are confident and we can work as a professional partnership. We advise new Centres to do some coursework assessment early so that they can receive feedback and quickly become confident in doing routine coursework assessment. Our aim is to make this no more onerous than normal routine assessment that anyone would do as a normal part of the teaching job. This gives more time to focus on teaching and therefore to support raising attainment.

2. Introduction

The TLM Level 3 Diploma in Scientific Modelling and Physical Systems offers a progression pathway from prior study by developing advanced skills in physical principles, computational modelling, and analytical reasoning across a range of real-world contexts. Covering themes such as mechanics, thermodynamics, electromagnetism, wave behaviour, quantum phenomena, and field theory, the qualification supports learners in building both subject-specific competence and broader transferable skills.

The Level 3 Diploma in Scientific Modelling and Physical Systems in will give learners the opportunity to:

- Engage in applied learning that is relevant to real-world contexts, developing a range of experimental, modelling, and problem-solving techniques essential for academic and professional progression,
- Achieve a nationally recognised Level 3 qualification
- Strengthen personal growth and confidence through structured, meaningful tasks that encourage deeper engagement with scientific inquiry and technological innovation.

2.1 TLM Level 3 Diploma in Scientific Modelling and Physical Systems

The objective of the qualification is to equip learners with the knowledge, confidence, and transferable skills needed to support their continued personal and professional development.

Optional Units

- Unit 1 - Developing Scientific Literacy and Methods (7 credits)
- Unit 2 - Understanding Motion, Force, and Energy in Mechanical Systems (7 credits)
- Unit 3 - Understanding Electricity and Magnetism in Practical Contexts (7 credits)
- Unit 4 - Understanding Fluids, Materials, and Heat Transfer in Scientific Systems (6 credits)
- Unit 5 - Understanding Vibrations and Waves in Science and Technology (6 credits)
- Unit 6 - Exploring Atomic and Quantum Science in Modern Contexts (6 credits)
- Unit 7 - Understanding Gravitational, Electric, and Magnetic Fields (7 credits)

3. Summary of Qualification Specification

3.1 Level 3 Diploma in Scientific Modelling and Physical Systems (Annexe A)

The Level 3 Diploma in Scientific Modelling and Physical Systems builds on key principles of inclusive, accessible education, providing a structured pathway for learners seeking to develop applied knowledge in physics, systems thinking, and scientific reasoning. Designed to support progression from Level 2 study, this qualification offers meaningful opportunities for learners to deepen their understanding of key concepts in motion, energy, forces, waves, and atomic interactions.

Qualification Title: TLM Level 3 Diploma in Scientific Modelling and Physical Systems
Qualification Number: XXXXXXX
Qualification Level: Level 3
Total Credits: 46
Guided Learning Hours: 322
Total Qualification Time: 460
Assessment Methods: Coursework, E-assessment, Portfolio of Evidence

Assessment
Learners must demonstrate competence against the assessment criteria from their communication and involvement with the training materials and the trainer assessor must verify that they are competent in relation to the general level descriptor using indicative assessment criteria. TLM's external moderator will check the judgements and the quality of the evidence and provide feedback. This process is not graded; the intention is that it is a flexible way of checking basic practical competence in the subject at the qualification's framework level.

3.5 Assessment

The internally assessed, externally moderated coursework for all qualifications is pass/fail but by submitting the evidence for external moderation, feedback can be given to the tutor on areas to improve for resubmission.

Evidence must be provided against the unit assessment criteria from practical tasks related to the learners' everyday work supported by tutor observations, portfolio completed, and or activities in line with the learning materials

The way evidence is gathered is up to the assessor, the only requirement is that it clearly supports the judgements against the assessment criteria and the relevant learning outcomes.

If on formative assessment the account manager finds gaps in evidence relating to a particular candidate, they will request more evidence before approving the award or the unit certificate. Assessors must then adjust their work to ensure all their learners are providing the appropriate level and breadth of evidence.

We encourage early submission of at least some evidence so that assessors are confident from the feedback that what they are providing is sufficient. In this way we can maintain standards while supporting improved efficiency.

Centres will be subject to the TLM Centre Assessment Standards Scrutiny (CASS) and further details of this, including our centre guidance, is freely available on the TLM website in our Policy Download Centre. https://tlm.org.uk/policy-download-centre/

4. Qualification Content

Mandatory	Optional Unit Bank
None	
• **Unit 1 - Developing Scientific Literacy and Methods** • **Unit 2 - Understanding Motion, Force, and Energy in Mechanical Systems** • **Unit 3 - Understanding Electricity and Magnetism in Practical Contexts** • **Unit 4 - Understanding Fluids, Materials, and Heat Transfer in Scientific Systems** • **Unit 5 - Understanding Vibrations and Waves in Science and Technology** • **Unit 6 - Exploring Atomic and Quantum Science in Modern Contexts** • **Unit 7 - Understanding Gravitational, Electric, and Magnetic Fields**	**None**

5. Support

	Guidance and Assistance
5.1	There is further guidance for coursework assessment on the TLM web site. All centres have an assigned Account Manager who will be pleased to help at any time. Our aim is to give professional assessors, most of whom are qualified tutors, the confidence to make judgements with a minimum of bureaucracy so that they can focus their time on maintaining their professional knowledge, skills and supporting learning through effective teaching rather than "chasing paper". There is often a confusion between bureaucracy and rigour, since unnecessarily complex bureaucracy can actually detract from rigour by obscuring the importance of the outcomes.
5.2	**Web sites** - TLM provides support through cloud-based systems. Providing assessment grades and the management of certification through the Centre Management Site is mandatory and all assessors are provided with training in its use. It is simply a matter of recording learner competence against the unit criteria as the evidence is collected and claiming a certificate on behalf of the learner when a unit has been fully assessed.
5.3	The **community learning site** provides free optional facilities for learners to submit their evidence on-line, linking it to the assessment criteria across single or multiple units. The assessor can accept or reject this evidence and comment on it providing a full audit trail for evidence. Moderator/verifiers can get immediate access to this evidence and so it is potentially a lot more efficient than alternative methods. No paper, no e-mails with file attachments necessary. There are facilities for progress tracking that can be based on criteria and/or units. The system can be linked as an extension to any standards compliant VLE/e-portfolio system for centres that are already committed to a specific VLE product. Training can be provided, and free support is available from your Account Manager. The aim is to eliminate all paper-based bureaucracy, all screen-shots and referencing that draws time away from teaching.
5.4	**Telephone** and e-mail support are available to all Centres. There is a general convention of firstname.secondname@tlm.org.uk for e-mail addresses. It is usually best to e-mail your account manager in the first instance. Google hangouts can be arranged for video conferencing support.

6. Registration & Procedures

	Registration
6.1	TLM's registration model allows centres to enter learners at times convenient to them. There are no late entry fees and no additional fees should a learner fail to produce evidence at a level but can meet the criteria at a lower level. This can reduce costs to the centres when compared to other qualifications There are no fees for replacement certificates or verification of certificates because all certificates can be directly authenticated against TLM's secure database. For details of current subscription costs please contact us or refer to the web site.
	Internal standardisation
6.2	The Principal Assessor has the ultimate responsibility for consistency in assessment standards within a centre. All assessors have signed a contract agreeing to uphold standards and should therefore co-operate with the Principal Assessor and Account Manager at TLM to ensure that standards across the centre are consistent. It is advisable to send work samples to TLM early to check that evidence is at the right standard so that there is time to make any adjustments necessary to the course and learner expectations. TLM will generally check a higher quantity of work from new assessors and feedback to ensure that they are confident to make appropriate judgements over time. This reduces risk and improves efficiency in the longer term.
	Authentication
6.3	All assessors must take reasonable steps to ensure that any coursework evidence submitted by candidates is a true reflection of the candidates' competence. This is in keeping with the assessor undertaking to uphold and maintain standards in the contract with TLM.
6.4	Certificates can be authenticated directly on-line using the certificate number or by scanning the QR code on the certificate. There is no charge and it makes it more likely that certificates will be checked and that in turn improves security. Certificate forgeries are a significant problem when authentication is not simple and straightforward because convincing forgeries are easy to achieve with recent technologies and will get easier as time goes on.

7. Other Considerations

	Access arrangements and special requirements
7.1	All TLM's qualifications are intended to be accessible, as widely as possible. Please refer to the Annex for further information. Centres should contact TLM if they have any questions related to accessibility issues
	Language
7.2	The language for provision of this qualification is English only. This will only change if we have a significant demand in another language that is sufficient to cover the additional costs involved.
	Malpractice
7.3	TLM has comprehensive policies and procedures for dealing with malpractice. These are documented with links on the web site at https://tlm.org.uk/policy-download-centre/ Assessors should be familiar with these policies and make them clear to candidates. Assessors should inform their account manager if they suspect any instance of malpractice that could have a material effect on the outcome of any assessments, either for themselves or colleagues. This is part of the upholding of standards that is part of the contract with TLM.
	Equality of opportunity
7.4	TLM promotes equality of opportunity through policies and procedures. These are again documented in detail on the web site at https://tlm.org.uk/policy-download-centre/
	Resources, Support and Training
7.5	A clear goal is to enable learners to support all their IT user needs using resources freely and legally available from the internet. This is related directly to national policies for inclusion and equality of opportunity. The reality is that there is so much user dependence on proprietary applications that we can only support the transition to free and open resources through education and common sense.
7.6	TLM does not require centres to use Free and Open-Source applications but it certainly encourages them to do so. Most of the key software applications needed to support any of the assessed units are available freely from the web including office suites, graphics and sound editing. As a nation we could save hundreds of millions if not billions of pounds in software licensing fees by providing users with the skills, knowledge and confidence to migrate to free and open-source applications. You Tube, OpenClipart.org, Wikipedia and many other sites provide free content that supports learning and the number and range of such sites is increasing.

Annexe A

Level 3 Diploma in Scientific Modelling and Physical Systems - Unit assessment - coursework guidance

The **Level 3 learner** has knowledge and understanding of facts, procedures and ideas in an area of study or field of work to complete well-defined tasks and address straightforward problems. Holder can interpret relevant information and ideas. Holder is aware of a range of information that is relevant to the area of study or work. AND/OR Holder can select and use relevant cognitive and practical skills to complete well-defined, generally routine tasks and address straightforward problems. Holder can identify how effective actions have been. Holder can identify, gather and use relevant information to inform actions.	**Moderation/verification:** The assessor should keep a record of assessment judgements made for each candidate and make notes of any significant issues for any candidate. They must be prepared to enter into dialogue with their Account Manager and provide their assessment records to the Account Manager through the on-line mark book. They should be prepared to provide evidence as a basis for their judgements should it be required by the Principal Assessor or their Account Manager/external moderator. Before authorising certification, the Account Manager must be satisfied that the assessor's judgements are sound.

General Information

The Level 3 qualification has the following characteristics for learners:

- Achievement at RQF level 3 (EQF Level 4) reflects the ability to select and use relevant knowledge, ideas, skills and procedures to complete well-defined tasks and address straightforward problems. It includes taking responsibility for completing tasks and procedures and exercising autonomy and judgement subject to overall direction or guidance.
- Use understanding of facts, procedures and ideas to complete well-defined tasks and address straightforward problems. Interpret relevant information and ideas. Be aware of the types of information that are relevant to the area of study or work.
- Complete well-defined, generally routine tasks and address straightforward problems. Select and use relevant skills and procedures. Identify, gather and use relevant information to inform actions. Identify how effective actions have been.
- Take responsibility for completing tasks and procedures subject to direction or guidance as needed.

- The specification for the Level 3 award provides an outcome framework for assessment and is not intended to dictate any particular context for learning and so can be used with any age range of adults.

Requirements

- Standards must be confirmed by a trained Level 4 Assessor
- Assessors must as a minimum record assessment judgement as entries in the on-line mark book on the TLM certification site.
- It is expected that there will be routine evidence of work used for judging assessment outcomes in the candidates' records of their day-to-day work. Samples, including related plans and schemes of work should be available at the annual visit and/or by video conference.
- Different approaches to learning will be required in order to match differing needs, for example, the needs of learners will be different from the needs of those with learning disabilities.
- When the candidate demonstrates secure capability against each of the criteria in the unit, they are entitled to a certificate for passing the unit and the overall award.

Unit 1. Developing Scientific Literacy and Methods

1. Understand and apply scientific methods in practical contexts	1.1 Explain the steps of the scientific method used in applied sciences 1.2 Design a basic scientific investigation to explore a real-world problem 1.3 Analyse experimental data, evaluate results, and draw evidence-based conclusions
2. Understand scientific units, measurement scales, and conversions	2.1 Identify and convert between commonly used units of measurement in science 2.2 Use standard measurement prefixes to express quantities at different scales and convert between them 2.3 Explain different scales and units used in scientific and everyday contexts
3. Explore measurement accuracy and uncertainty	3.1 Identify sources of measurement error 3.2 Describe the difference between precision and accuracy 3.3 Explain how to Calculate uncertainty and its impact on results

Unit 2: Understanding Motion, Force, and Energy in Mechanical Systems

1. Understand motion in one, two, and three dimensions	1.1 Describe the concepts of speed, velocity, and acceleration 1.2 Describe how to compare uniform motion and accelerated motion 1.3 Explain how motion is analysed in one-, two-, and three-dimensional systems
2. Understand the forces acting on objects and their effects	2.1 Describe the concept of inertia and its role in motion 2.2 Explain how resultant forces cause acceleration using Newton's laws of motion 2.3 Describe terminal and escape velocity and explain their significance in real-world contexts 2.4 Describe the principle of conservation of momentum and apply it to collisions
3. Explore the relationship between force, work, energy, and power	3.1 Explain how forces contribute to motion and stability in mechanical systems 3.2 Describe the relationship between work and energy, including energy transfer 3.3 Identify different forms of energy storage and conversion 3.4 Calculate energy use and power consumption in practical scenarios

Unit 3: Understanding Electricity and Magnetism in Practical Contexts

1. Understand electrostatics and electrical properties of materials	1.1 Explain how electrostatic charges are produced and interact 1.2 Describe electric fields and the forces they produce 1.3 Identify materials as conductors, insulators, or semiconductors based on their electrical properties
2. Understand the generation and application of electric current	2.1 Identify sources of electric current and describe how they are used in practical systems 2.2 Describe how electricity can be transformed, stored, and used across different industries 2.3 Explain the purpose and basic function of capacitors in electrical circuits
3. Explore the relationship between electricity and magnetism	3.1 Describe the role of magnetism in generating electric current 3.2 Explain how electromagnetism is used in technologies such as motors, communication systems, and medical devices 3.3 Describe key applications of electromagnetism in modern industry and development

Unit 4: Understanding Fluids, Materials, and Heat Transfer in Scientific Systems

1. Understand the properties and applications of fluids	1.1 Describe the physical characteristics that distinguish fluids from solids and gases 1.2 Explain how fluid properties support transportation systems and industrial applications 1.3 Identify practical uses of fluid dynamics in sectors such as healthcare and engineering
2. Understand mechanical properties of materials under stress	2.1 Describe how pressure and force affect the shape and structure of materials 2.2 Explain how materials respond to stretching, compression, and deformation 2.3 Compare how different materials behave under various physical stresses
3. Understand heat, temperature, and thermal energy transfer	3.1 Describe the difference between heat and temperature 3.2 Explain how heat is transferred through conduction, convection, and radiation 3.3 Interpret the behaviour of substances as they change temperature and state 3.4 Describe the behaviour of ideal gases and their role in industry and living systems

Unit 5: Understanding Vibrations and Waves in Science and Technology

1. Understand the principles and applications of oscillations	1.1 Describe the characteristics of natural and forced oscillations 1.2 Explain the role of oscillations in communication systems and mechanical devices 1.3 Identify how oscillation principles are applied in technology, healthcare, and industrial systems
2. Understand mechanical and electromagnetic waves	2.1 Explain the properties and types of mechanical waves 2.2 Describe the nature and generation of electromagnetic waves 2.3 Identify key applications of electromagnetic waves across sectors such as communication, medicine, agriculture, and security

Unit 6: Exploring Atomic and Quantum Science in Modern Contexts

1. Understand the development of atomic and quantum theory	1.1 Describe the historical development of atomic models 1.2 Explain the key ideas of quantum theory, including Planck's hypothesis and the photoelectric effect 1.3 Describe the dual nature of matter and energy using concepts such as wave-particle duality 1.4 Identify how X-rays and electromagnetic radiation are used in medical and security applications
2. Understand nuclear structure and radioactivity	2.1 Describe the structure of atomic nuclei and the concept of nuclear stability 2.2 Explain the processes of alpha, beta, and gamma decay using nuclear equations 2.3 Describe the relationship between mass and energy in nuclear reactions 2.4 Identify the benefits and risks of ionising and non-ionising radiation in practical settings
3. Explore introductory concepts in quantum computing	3.1 Explain the difference between classical probability and quantum probability 3.2 Describe the concept of quantum states and qubits 3.3 Identify the principles of quantum measurement and sensing 3.4 Outline potential applications of quantum technologies in computing and data processing

Unit 7: Understanding Gravitational, Electric, and Magnetic Fields

1. Understand gravitational fields and forces	1.1 Describe the concept of a force field and how it applies to gravity 1.2 Explain the inverse square law for gravitational force between point masses 1.3 Identify how gravitational fields affect motion on Earth and in space
2. Understand electric fields and potentials	2.1 Describe how electric fields are formed and how they act on charges 2.2 Describe how electric fields act on charges 2.3 Explain electric potential and potential difference in a field 2.4 Describe the differences between electric and gravitational fields in terms of direction, force carriers, and field strength 2.5 Describe uniform electric fields and their practical uses
3. Understand magnetic fields and electromagnetic induction	3.1 Describe the properties and behaviour of magnetic fields 3.2 Calculate the force on a current-carrying wire and a moving charge in a magnetic field 3.3 Explain magnetic flux and electromagnetic induction 3.4 Describe how induced emf occurs using Apply Faraday's and Lenz's laws 3.5 Identify examples of electromagnetic induction in real-world applications

Accessibility Policies

TLM firmly believes that every learner should have an equal chance to excel in their studies and assessments, regardless of any disabilities they may have. To achieve this goal, TLM has developed a comprehensive and well-structured reasonable adjustment policy that is specifically tailored to cater to the needs of learners with disabilities. This policy is not only an essential aspect of TLM's commitment to inclusivity but also an integral part of creating a diverse and accessible learning environment.

The reasonable adjustment policy is designed to support learners with disabilities in various ways. It encompasses a range of accommodations, such as providing additional time for examinations, offering alternative formats for study materials, permitting the use of assistive technology, arranging for sign language interpreters, and ensuring accessible physical facilities. The implementation of these reasonable adjustments is meticulously carried out to ensure that they meet the individual needs of each learner, acknowledging the unique challenges they may face.

TLM is dedicated to making the reasonable adjustment process transparent and easily accessible for all stakeholders. Thus, the details of the policy are made readily available to all, including learners, educators, and TLM Centres. These details can be found on TLM's official website, ensuring that everyone is well-informed about the support and accommodations available to learners with disabilities.

Additionally, TLM Centres play a crucial role in facilitating this process. They are empowered to submit requests for other reasonable adjustments on behalf of learners, based on their specific requirements and circumstances.
TLM firmly believes that promoting a culture of inclusivity and understanding is fundamental to fostering an environment where learners can thrive, irrespective of their abilities or disabilities. By continuously evaluating and refining its reasonable adjustment policy, TLM ensures that it remains up to date with the best practices in the field of inclusive education.

TLM Qualifications is deeply committed to its duty as an awarding organisation to provide reasonable adjustments for learners with disabilities in accordance with the Equality Act 2010. By adhering to its comprehensive reasonable adjustment policy and collaborating closely with TLM Centres, TLM strives to create a learning landscape that supports and empowers all learners, ensuring they can reach their full potential and achieve academic success

TLM Accessibility Policy: https://tlm.org.uk/policies/general-requirements-for-regulated-qualifications/#3

TLM reasonable adjustment policy: https://tlm.org.uk/reasonable-adjustments-and-special-considerations-policy-2/

TLM reasonable adjustments request form: https://tlm.org.uk/wp-content/uploads/2022/03/TLM-RASC-form-1.docx

TLM reasonable adjustments request form: https://tlm.org.uk/wp-content/uploads/2022/03/TLM-RASC-form-1.docx