

# Specification

## Essential Skills Wales

### Edexcel Levels 1-4 Essential Skills Wales in Application of Number

January 2011

Issue 2

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This specification is Issue 2. We will inform centres of any changes to this issue. The latest issue can be found on the Edexcel website: [www.edexcel.com](http://www.edexcel.com)

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Publications code: FC025966

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# Qualification titles covered by this specification

**Edexcel Level 1 Essential Skills Wales in Application of Number**

**Edexcel Level 2 Essential Skills Wales in Application of Number**

**Edexcel Level 3 Essential Skills Wales in Application of Number**

**Edexcel Level 4 Essential Skills Wales in Application of Number**

These qualifications have been developed in line with the Welsh Assembly Government (WAG) and accredited by DCELLS and are eligible for public funding. The Qualifications Accreditation Number (QAN) should be used by centres when they wish to seek public funding for their learners. The QANs for the qualifications in this publication are:

Edexcel Level 1 Essential Skills Wales in Application of Number	500/7643/7
Edexcel Level 2 Essential Skills Wales in Application of Number	500/7639/5
Edexcel Level 3 Essential Skills Wales in Application of Number	500/7638/3
Edexcel Level 4 Essential Skills Wales in Application of Number	500/7641/3

The qualification title is as it will appear on learners' certificates. Learners need to be made aware of this when they are recruited by the centre and registered with Edexcel. Providing this happens, centres are able to describe the programme of study leading to the award of the qualification in different ways to suit the medium and the target audience.

## **Additional Edexcel Essential Skills Wales qualifications available**

Edexcel Entry Level Essential Skills Wales in Application of Number

Edexcel Entry Level Essential Skills Wales in Communication

Edexcel Entry Level Essential Skills Wales in ICT

Edexcel Levels 1-4 Essential Skills Wales in Communication

Edexcel Levels 1-4 Essential Skills Wales in ICT

For specifications and further information on the above qualifications please visit our website at [www.edexcel.com](http://www.edexcel.com).

# Introduction

This document contains the required outcomes, content and associated guidance for the Edexcel Levels 1-4 Essential Skills Wales in Application of Number. It contains further details of the assessment and quality assurance of these qualifications and includes advice about Edexcel's policy regarding access to its qualifications.

Essential Skills Wales (ESW) qualifications are designed to meet a range of different needs. They:

- aim to improve the skills of young people and adults, and to rationalise the qualifications available
- bring together the current key and basic skills into a single suite of skills standards and qualifications, suitable for all learners, both young and adult, and across all contexts
- provide a better guarantee of the skills young people need to participate and progress in education, training and employment
- develop and secure the broader range of aptitudes, attitudes and behaviours that will enable learners to make positive contributions to the communities in which they live and work.

The Essential Skills Wales suite of qualifications consists of three individual skill areas, with standards/qualifications available at each level within these skills:

- Application of Number
- Communication
- Information and Communication Technology (ICT).

The new suite of skills qualifications will replace the current Key Skills in Application of Number, Communication and ICT and the Basic Skills of Adult Literacy, Adult Numeracy and Skills for Life ICT from September 2010 in Wales.

# Structure of the qualifications

## Edexcel Levels 1-4 Essential Skills Wales in Application of Number

Each level within the Essential Skills Wales in Application of Number is made up of three components:

- understanding numerical data
- carrying out calculations
- interpreting results and presenting findings.

**To achieve the qualification at each level, learners must demonstrate that they have met the minimum standard for each component area.**

The aim of the Application of Number standards is to encourage learners to develop and demonstrate their skills in using number to tackle a task, activity or problem by collecting and interpreting information involving numbers, carrying out calculations, interpreting results and presenting findings. The standards are mostly concerned with developing and recognising learners' abilities to select and apply numerical, graphical and related mathematical skills in ways that are appropriate to their particular context. However, they can also be used to help individuals make connections with less familiar contexts and develop their ability to progress to higher levels of competence.

Techniques such as being able to measure and read scales, carry out specific calculations, or draw a particular type of diagram, are essential, but so too are the skills of interpretation (for example of information from tables, graphs or charts), selecting appropriate methods to process data, describing what findings show, and taking account of purpose and audience when presenting results (whether on paper, on screen, or to a live audience). The techniques and skills of application contribute both to understanding a task, activity or problem and to deciding on the best course of action. The standards are designed to recognise learners' progression in terms of both underpinning techniques and of the skills of application.

Progression through the levels is demonstrated by increasing ability to manage the whole process:

Understand and tackle a problem → Collect and interpret data → Carry out calculations → Check results Interpret results → Present findings → Reflect/review.

Each skill level incorporates and builds on the previous levels. Details of all the levels are provided to show the inter-relationship and the differentiation between the levels.

It is important to note that, where the wording of a standard is identical at different levels, the progression is inherent in another aspect of the standard. For example, the requirement to 'check that your results make sense' appears at all levels from Entry level 1 to Level 3. The progression is inherent in the fact that the complexity and detail of the results to be checked will be more demanding at each level.

**At the three Entry levels** learners are required to use number skills in familiar and accessible contexts. The number skills demanded by the situation or problem are clear and straightforward. Guidance and direction are provided by a tutor, teacher or trainer.

**At Level 1** learners are required to handle simple numerical and graphical information and apply techniques in the context of short activities. Calculations will usually involve only one or two steps. Much of the numerical content will be concerned with whole numbers and the use of decimals in everyday contexts (for example in using money or taking measurements), and the use of common units of measurement.

At this level, learners must cover all three of N1.1, N1.2 and N1.3, but are not required to combine them in a single task or activity. Evidence for each of these components may be presented separately.

**At Level 2** learners are required to demonstrate and evidence their use of number skills in the context of at least one activity that covers all three of N2.1, N2.2 and N2.3. Such an activity will give them more scope to make decisions on how to identify and find the information they need, what calculations to use, and how best to present their findings. Calculations will involve two or more steps and a more demanding range of techniques and understanding. Learners must know how to work with numbers of any size, including addition and subtraction of fractions, calculations involving area and volumes, ratio, unit conversions, percentages and scaling, as well as the use of formulae and graphs.

**At Level 3** there is an increase in the complexity of activities and techniques needed to tackle the problem or task and in the independence required of the learner. Learners are required to be responsible for planning and carrying through their use of number in the context of one or more activities that cover all three of N3.1, N3.2 and N3.3, including handling data from a relatively large data set. Compared with Level 2, calculations will involve several steps and rearranging formulae. Learners must justify their approaches and methods, in addition to presenting, justifying and evaluating their findings. As at Level 2, at least one piece of work must show evidence of the whole process described above.

**At Level 4** the focus of the standard is on learners developing and applying their number skills to their work, study or other activities over an extended period of time (for example about three months) with substantial independence. The extended timeframe is to ensure that there are sufficient opportunities for the work to develop, as well as for learners to monitor and critically reflect on their progress and the effectiveness of their number skills, so that they can adapt their strategy in response to new demands and feedback from others.

Learners need to show that they can:

- plan their use of number skills strategically
- apply these skills effectively and for a purpose over time
- monitor and review their work, including the development of their skills
- reflect critically on their progress.

# Qualification format

Each qualification level has a standard format which is designed to provide clear guidance on the requirements of the qualification for learners, tutors, assessors and those responsible for monitoring national standards.

Each qualification is set out in the following way.

## *Qualification level*

This is the level of study of the qualification as determined by DCELLS.

## *Credit value*

This is the volume of learning achievement through completion of the qualification as determined by DCELLS.

## *Guided learning hours*

Guided learning hours is 'a notional measure of the substance of a qualification'. It includes an estimate of time that might be allocated to direct teaching, instruction and assessment, together with other structured learning time such as directed assignments or supported individual study. It excludes learner-initiated private study. Centres are advised to consider this definition when planning the programme of study associated with this specification.

## *About this qualification*

This states explicitly what skills a learner will develop through completing the qualification. It provides amplification of the evidence requirements for the qualification level.

## *Skills components*

These expand the skills a learner needs to develop to achieve the qualification, as set out in the *About this qualification* section. These are taken directly from the ESW qualification standards and provide the skills statement in the first column that the learner needs to provide evidence of, the skills needed to be able to provide this evidence in the second column and the form the evidence must take in the third column.

## *Guidance*

This supports the requirements of the skills components for the qualification. It provides explanations of some of the requirements of the standards that may be useful when learners are developing skills for the qualification and producing evidence for their portfolios.

# Assessment

## General principles

Assessment must be targeted at a specific level. It must provide a reliable measure of proficiency at the level by providing significant evidence of success against the requirements of the ESW standards at the specified level.

The level of an ESW qualification is determined by four factors:

- the learners's familiarity with the context, task or activity
- the complexity of the situation and the task or activity
- the degree of independence shown by the learner in deciding which skills they will use and how they will apply them to suit different tasks and activities
- the range and complexity of the techniques and skills the learner uses in completing the task or activity.

These four factors interrelate so that, to some extent, relatively low demand in one factor may be compensated by relatively high demand in another. However, the skills are demonstrated through performance so the key determinant of the overall level is the learner's ability to select, use and apply their skills when carrying out a task or activity.

Evidence of a learner's skills must:

- be set in realistic and interesting contexts and scenarios that are relevant to the learner
- require learners to tackle a purposeful task or tasks that are relevant to the contexts/scenarios
- require the application of knowledge, skills and understanding for the purpose of the task/s
- assess process skills and the outcome of their application.

Assessments must comply in full with the Evidence Requirements of the ESW standards, including Amplification of Evidence Requirements and Mandatory Definitions, at the relevant level. They must not include any additional requirements.

Learners must submit a portfolio of evidence for assessment to demonstrate competence for all skills. Learners must adhere to the Evidence Requirements detailed in this specification.

The assessment for the Edexcel Levels 1-4 Essential Skills Wales in Application of Number is criterion referenced, based on the achievement of specified skills.

The overall grading for the Edexcel Levels 1-4 Essential Skills Wales in Application of Number is a pass, based upon the successful completion of all skills.

The Edexcel Levels 1-4 Essential Skills Wales in Application of Number are internally assessed and internally verified. Centre processes will be quality assured by Edexcel.

## Accreditation of Prior Learning (APL)

Edexcel encourages centres to recognise learners' previous achievements and experience through APL. Learners may have evidence that has been generated during previous study or in their previous or current employment or whilst undertaking voluntary work that relates to one or more of the units in the qualification. Assessors should assess this evidence against the national standards in the specifications in the normal way. As with all evidence, assessors should be satisfied about the authenticity and currency of the material when considering whether or not the outcomes of the unit have been met.

Full guidance about Edexcel's policy on APL is provided on our website: [www.edexcel.com](http://www.edexcel.com).

## Quality assurance of centres

Details of quality assurance procedures are set out in the *Edexcel Quality Assurance Handbook* published annually.

Edexcel's qualification specifications clearly set out the standard to be achieved by each learner in order to achieve the award of the qualification. Edexcel operates a quality assurance process, which is designed to ensure that these standards are maintained by all assessors and verifiers.

For the purposes of quality assurance all individual qualifications are considered as a whole. Centres delivering these qualifications must be committed to ensuring the quality of the qualifications they deliver, through effective standardisation of assessors and verification of assessor decisions. Centre quality assurance and assessment is monitored and guaranteed by Edexcel.

The Edexcel quality assurance processes will involve:

- centre approval for those centres not already recognised as a centre for Edexcel qualifications
- centre risk assessment by Edexcel of overarching processes and quality standards (this would usually be via self-assessment, but will include visits on occasions)
- programmed sampling of internal verification and assessor decisions.

Centres are required to declare their commitment to ensuring quality and appropriate assessment opportunities for learners that lead to valid and accurate assessment outcomes. In addition, centres will commit to undertaking defined training and online standardisation activities. Centres already holding Edexcel approval are able to gain qualification approval online. New centres must complete a centre approval application.

The key principles of quality assurance are that:

- a centre delivering Edexcel programmes must be an approved centre and must have approval for the programmes or groups of programmes that it is operating
- the centre agrees as part of gaining approval to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; it must abide by these conditions throughout the period of delivery
- Edexcel makes available to approved centres a range of materials and opportunities intended to exemplify the processes required for effective assessment and examples of effective standards. Approved centres must use the materials and services to ensure that all staff delivering Edexcel qualifications keep up to date with the guidance on assessment
- an approved centre must follow agreed protocols for standardisation of assessors and verifiers; planning, monitoring and recording of assessment processes; and for dealing with special circumstances, appeals and malpractice.

## **Approval**

Centres must be approved with Edexcel to offer Essential Skills Wales. Centres should complete an approvals form via [www.edexcel.com](http://www.edexcel.com) or email [approvals@edexcel.com](mailto:approvals@edexcel.com).

Where centres are approved to offer Edexcel Apprenticeships they will be automatically approved to offer Essential Skills Wales.

The approval contract is a formal commitment by the head or principal of a centre to meet all the requirements of the specification and linked codes or regulations. Sanctions and tariffs will be applied if centres do not comply with the contract. This could ultimately result in the suspension of certification or withdrawal of approval.

## Programme design and delivery

Centres are free to offer the qualifications using any mode of delivery that meets the needs of their learners. This may be through traditional classroom teaching, open learning, distance learning or a combination of these. Whatever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specifications and to subject specialists where applicable.

Staff delivering programmes and conducting the assessments should be fully familiar with current practice and standards. Centres will need to meet any specialist resource requirements when they seek approval from Edexcel.

## Access and recruitment

Edexcel's policy regarding access to its qualifications is that:

- the qualifications should be available to everyone who is capable of reaching the required standards
- the qualifications should be free from any barriers that restrict access and progression
- there should be equal opportunities for all wishing to access the qualifications.

Centres are required to recruit learners to the qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualification and that the qualification will meet their needs. Centres should take appropriate steps to assess each applicant's potential and make a professional judgement about their ability to complete the programme of study successfully and achieve the qualification. This assessment will need to take account of the support available to learners within the centre during their programme of study and any specific support that might be necessary to allow learners to access the assessment for the qualification. Centres should also show regard for Edexcel's policy on learners with particular requirements.

### Restrictions on learner entry

There are no restrictions on entry.

## Access arrangements and special considerations

Edexcel's policy on access arrangements and special considerations aims to enhance access to the qualifications for learners with disabilities and other difficulties (as defined by the Disability Discrimination Act 1995 and the amendments to the Act) without compromising the assessment of skills, knowledge, understanding or competence.

Learners with particular disabilities may be unable to show that they are competent by providing all their evidence in the form specified. For these learners, reasonable adjustments to the evidence requirements may be allowed in appropriate circumstances. In some cases, exemptions may be permissible. Such arrangements must be agreed in advance with Edexcel.

Further details are given in Edexcel's policy *Access Arrangements and Special Considerations for BTEC and Edexcel NVQ Qualifications* which is on the Edexcel website ([www.edexcel.com](http://www.edexcel.com)). This document will apply to Essentials Skills Wales qualifications. This policy replaces the previous Edexcel policy (*Assessment of Vocationally Related Qualification: Regulations and Guidance Relating to Learners with Special Requirements, 2002*) concerning learners with particular requirements.

# Professional development and training

Edexcel supports UK and international customers with training related to Edexcel qualifications, including ESW. This support is available through a choice of training options offered in our published training directory or through customised training at your centre.

The support we offer focuses on a range of issues including:

- planning for the delivery of a new programme
- planning for assessment and grading
- developing effective assignments
- building your team and teamwork skills
- developing student-centred learning and teaching approaches
- building in effective and efficient quality assurance systems.

The national programme of training we offer can be viewed on our website ([www.edexcel.com/training](http://www.edexcel.com/training)). You can request customised training through the website or by contacting one of our advisers in the Training from Edexcel team via Customer Services to discuss your training needs.

Our customer service numbers are:

<b>BTEC and NVQ</b>	<b>0844 576 0026</b>	<b>(ESW queries should be directed here)</b>
GCSE	0844 576 0027	
GCE	0844 576 0025	
The Diploma	0844 576 0028	
DIDA and other qualifications	0844 576 0031	

Calls may be recorded for training purposes.

The training we provide:

- is active – ideas are developed and applied
- is designed to be supportive and thought provoking
- builds on best practice.

## Further information

Edexcel produces regular policy statements on Edexcel qualifications and accompanying procedures. Please check our website for current information.

For further information please call Customer Services on 0844 576 0026 (calls may be recorded for training purposes) or visit our website at [www.edexcel.com](http://www.edexcel.com).



# **Application of Number: evidence requirements**



# Level 1 Essential Skills Wales in Application of Number

Level:	1
Credit value:	6
Guided learning hours:	60

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## About this qualification

This is about demonstrating your skills in:

- understanding numerical data (N1.1)
- carrying out calculations (N1.2)
- interpreting results and presenting findings (N1.3)

in order to tackle problems or tasks that you meet in education, training, work and social roles.

## Amplification of evidence requirements

### Notes

- 1 Each level of the skill incorporates and builds on the previous levels. So, for example, in N1.2.2, the requirement to 'recall multiplication facts to 10 x 10 and make connections with division facts' builds on 'recall addition and subtraction facts to 20' (Entry Level 3).
- 2 The subject matter and resources will be straightforward, (ie those that you often meet in the context in which you are working or studying). The content will be put across in a direct way so that you can easily identify the information you need to tackle problems or tasks.
- 3 You must provide evidence of your Application of Number skills, as they are specified in the first column of the component grid. Your evidence must be in the form described in the third column ('Evidence requirements'). In order to provide this evidence, you will need to have the skills that are listed in the second column.
- 4 The guidance included within the qualification supports the requirements of the three columns of the component areas and is intended to advise and help you and your teacher/tutor/trainer in your work. It provides explanations of some of the requirements of the standards that may be useful when you are developing the skill of Application of Number at Level 1 and producing evidence of your work. It is not a mandatory part of the standards.

- 5 Many learners when producing evidence have found that it is both more interesting and more effective to complete a task or activity that covers all three components (N1.1, N1.2 and N1.3) as a continuous process. However, this is not a requirement.
- 6 The Mandatory Definitions (*Appendix A*) give the exact meaning of certain words in the document. You must always refer to them when you are developing your skills, gathering evidence, and preparing for assessment.
- 7 Witness statements must not be the only form of evidence that you provide. When you provide a witness statement, it must be supported by other evidence.

## **Evidence**

At Level 1, you will be assessed via a portfolio of evidence. The term ‘evidence’ is used in this document to refer to the work you produce for final assessment.

You must:

- understand and tackle a problem or task
- obtain and interpret data
- carry out calculations
- check results
- interpret results
- present findings.

All your calculations should ideally be set in a purposeful context although standalone exercises are acceptable.

There must be evidence that all your work has been assessed and authenticated, for example there must be records/notes, written by a competent assessor, confirming that your work is your own and that it has achieved the required standard.

## **Skill requirements**

In order to achieve this qualification, the evidence that you present for assessment needs to demonstrate that you can meet all of the skills requirements of the qualification for each of the component areas. A piece of work submitted could give assessment evidence for more than one skill.

## Component: N1.1 Understand numerical data

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N1.1.1</b> Understand and describe at least one given practical problem or task that involves a range of numerical data and information.</p>	<ul style="list-style-type: none"> <li>• check with an appropriate person that you understand the problem or task...</li> </ul>	<p>Evidence must show that the learner has understood and described the given problem or task.</p> <p>Evidence must normally be in the form of notes produced by the learner (by hand or electronically).</p>
<p><b>N1.1.2</b> Agree with an appropriate person how you will tackle it.</p>	<ul style="list-style-type: none"> <li>• ...and agree how you will tackle it.</li> </ul>	<p>Evidence must show that the learner has contributed to deciding how the task will be tackled.</p> <p>Evidence must normally be in the form of notes produced by the learner (by hand or electronically).</p>
<p><b>N1.1.3</b> Obtain relevant numerical data and information from at least two sources to meet the purpose of your task. Your sources must include at least one of a table, a chart, a graph, or a diagram.</p>	<ul style="list-style-type: none"> <li>• read, understand and extract information from tables, diagrams, charts and simple graphs</li> <li>• read and understand numbers presented in different ways, including large numbers in figures or words, simple fractions, decimals, percentages, ratios and negative numbers</li> <li>• collect and record data from accurate observations</li> <li>• read scales on familiar measuring equipment using everyday units</li> <li>• use scales on diagrams to find and interpret information</li> <li>• use shape and space to record measurements and make observations.</li> </ul>	<p>Evidence must show that the learner is clear about how the data/information they obtain meets their purpose.</p> <p>Evidence must include data/information obtained from at least two different sources. At least one source must include a table, chart, graph or diagram.</p> <p>Evidence must include:</p> <ul style="list-style-type: none"> <li>• copies of source material</li> <li>• details of the site/s of observation/measurement</li> <li>• records of data/information obtained.</li> </ul>

## Component: N1.2 Carry out calculations

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N1.2.1</b></p> <p>Use appropriate methods to get the results you need and describe the methods you have used.</p>	<ul style="list-style-type: none"> <li>identify and use methods and calculations that are suitable for your task.</li> </ul>	<p>Evidence must show that the learner can identify and describe the methods and calculations that are suitable for getting the results they need.</p> <p>Evidence of describing methods must normally be in the form of notes produced by the learner (by hand or electronically).</p>
<p><b>N1.2.2</b></p> <p>Use the data and information you have obtained to carry out calculations relevant to your task to do with:</p> <p>a) amounts or sizes</p> <p>b) scales or proportion</p> <p>c) handling statistics.</p>	<ul style="list-style-type: none"> <li>work to the levels of accuracy you have been given</li> <li>add and subtract, with whole numbers and simple decimals with and without a calculator</li> <li>multiply and divide a simple decimal by a whole number with and without a calculator</li> <li>recall multiplication facts to 10 x 10 and make connections with division facts</li> <li>understand and find simple fractions and percentages</li> <li>recognise equivalencies between common fractions, percentages and decimals, and use these to find proportions of whole numbers</li> <li>add, subtract, multiply, divide and record sums of money</li> <li>read, measure and record time in common date and time formats</li> </ul>	<p>Evidence must show that the learner:</p> <ul style="list-style-type: none"> <li>has used data and information from N1.1</li> <li>is clear about the purpose and relevance of their calculations.</li> </ul> <p>Evidence for the second bullet may be in the form of <b>either</b> notes or a witness statement.</p> <p>Evidence must include calculations (at least one from each category) relating to:</p> <ul style="list-style-type: none"> <li>amounts or sizes</li> <li>scales or proportion</li> <li>handling statistics.</li> <li>and must show how the learner has checked their methods and calculations.</li> </ul>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N1.2.2 continued</b></p>	<ul style="list-style-type: none"> <li>• choose and use appropriate units and instruments to estimate, read, measure and compare length, weight, capacity, time and temperature</li> <li>• calculate within a system by <ul style="list-style-type: none"> <li>- adding and subtracting common units of measure</li> <li>- converting units of measure in the system</li> </ul> </li> <li>• work out different properties of a variety of shapes, including perimeters, areas and volumes</li> <li>• draw 2D shapes in different orientations using grids</li> <li>• use ratios and proportion</li> <li>• use probability to show (using fractions, decimals and percentages) that some events are more likely to occur than others</li> <li>• find the average (mean) of up to 10 items</li> <li>• find the range for up to 10 items</li> <li>• calculate efficiently using whole numbers, fractions, and decimals</li> <li>• use different ways of checking your methods and calculations</li> <li>• identify and correct any errors</li> <li>• check that your results make sense.</li> </ul>	<p>Evidence must show how the results make sense in relation to the purpose of the task. This evidence must normally be in the form of notes produced by the learner (by hand or electronically).</p>

## Component: N1.3 Interpret results and present findings

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N1.3.1</b></p> <p>Present your findings using charts, graphs or diagrams.</p>	<ul style="list-style-type: none"> <li>• interpret the results of your calculations</li> <li>• show how your results relate to your problem or task</li> <li>• identify and describe more than one appropriate way to present your findings to a familiar given audience, including using charts or diagrams</li> <li>• using the correct units, use appropriate ways to present your findings, including a chart or graph, and a diagram</li> <li>• label your work correctly.</li> </ul>	<p>Evidence must show that the learner can:</p> <ul style="list-style-type: none"> <li>• choose how to present their findings using two appropriate ways (ie chart and diagram or graph and diagram)</li> <li>• present their findings correctly.</li> </ul> <p>Whether or not ICT is used to produce graphics, evidence must show that the learner has checked their accuracy and can explain them fully. Evidence of this understanding may be in the form of a witness statement.</p>
<p><b>N1.3.2</b></p> <p>Describe what your results tell you and explain how they meet the purpose of your task.</p>	<ul style="list-style-type: none"> <li>• describe what your results tell you and explain how they meet the purpose of your task.</li> </ul>	<p>Evidence must show that the learner can:</p> <ul style="list-style-type: none"> <li>• describe the results of their calculations</li> <li>• explain how they relate to the purpose of the task.</li> </ul> <p>Evidence must normally be in the form of written (by hand or electronically) notes produced by the learner.</p>

## Guidance for Application of Number Level 1

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This guidance supports the requirements set out in the three columns of the component areas and is intended to advise and help you and your teacher/tutor/trainer in your work. It explains some of the requirements of the standards that may be useful when you are developing the skill of Application of Number at Level 1 and producing evidence of your work. It is not a mandatory part of the standards.

### N1.1.1

#### Check

You must be able to show that you understand the problem or task that you have been given, for example by repeating it in your own words and/or asking for more detail.

### N1.1.2

#### Agree

You must be able to discuss and agree with an appropriate person how to tackle a problem or task, ie you will make the decision jointly with a teacher, tutor or supervisor.

### N1.1.3

#### Read, understand, extract

You must know how to obtain information from:

- tables, such as a timetable or price list
- charts, such as a pictogram, pie chart or bar chart (for example to identify the number of items sold on a given day, the sales for a week, or the day with the most sales)
- single line graphs (for example to identify the temperature at given times of day, or the time of day when the temperature was highest or lowest)
- diagrams, such as a simple map, workshop drawing or plan using a scale such as  $10 \text{ mm} = 1 \text{ m}$ .

## **Read and understand numbers**

You must know how to deal with numbers presented in different ways, for example write down spoken numbers such as 'one thousand and fifty', or 'three fifths', recognise decimal fractions, know that one third is a bit more than 30 per cent or 0.3.

## **Collect, record**

You must know how to read numbers from scales on familiar measuring equipment, for example from a thermometer, tape measure, or measuring jug, and how to make accurate observations, for example when carrying out stock checks, using everyday units for example minutes, millimetres, litres, grammes, degrees.

You must record measurements and observations accurately and in a way that is fit for the purpose of your task.

## **N1.2.1**

### **Identify methods and calculations**

You must know how to select the method and calculation you need for a task, for example 'I must multiply these numbers' or 'I must divide by 100'.

### **Describe**

You must be able to make notes of or talk through your methods and what you did to achieve your purpose.

## N1.2.2

### Carry out calculations

Application of Number requires you to show that you can carry out a number of different types of calculations (amounts or sizes; scales or proportion; handling statistics). 'Amounts or sizes' is a single category. 'Scales or proportion' is another single category. From each of these categories, you must present at least one example as evidence.

You must be able to carry out calculations both with and without a calculator.

#### a) amounts or sizes

You must know how to:

- carry out calculations using:
  - simple decimals - in the context of everyday tasks such as dealing with money, or measuring using metric units, for example how to multiply and divide decimals by 10, 100, 1000, with and without a calculator
  - simple fractions and percentages - how to find parts, such as  $\frac{2}{3}$  or  $\frac{3}{4}$ , of whole number amounts or measurements, and find percentages, including how to work out increases in amounts (for example a 10 per cent rise in cost) and decreases in amounts (for example a 20 per cent discount)
  - areas and volumes - for example how to find a rectangular area in  $\text{m}^2$  or the volume of a box in  $\text{cm}^3$
- convert within a system, for example convert 70 minutes to 1 hour 10 minutes, 0.36 metres to 360 mm, 0.6 hours to 36 minutes.

#### b) scales or proportion

You must know how to use simple scales on diagrams to work out actual measurements.

- When working with proportions, you must know how to increase and reduce whole-number amounts using ratio and direct proportion, for example scale up amounts of food for three times the number of people or put items in two piles, one with twice as many items as the other.

#### c) handling statistics

You must know how to calculate the range and the mean of a group of up to 10 numbers.

### **Levels of accuracy**

You must know how to work to levels of accuracy given by a teacher, tutor or trainer, such as the nearest 10p or nearest hundredth, and to round results.

### **Check calculations**

You must always check the accuracy of your calculations. This is often a mental process and you do not have to produce evidence every time you do it. Where there is a series of calculations of the same type, you must record evidence of how you have checked at least the first few of each type. For the remainder, accurate results must confirm that you have checked effectively. You must be aware of the importance of checking your results and be familiar with different methods of carrying out checks.

### **Check that results make sense**

While a calculation may be accurate, it may not 'make sense' or be fit for purpose in relation to the problem or task that you have tackled. You must check this.

## **N1.3.1**

### **Choose, use, present**

You must be able to identify more than one way to present your findings, and to choose for yourself which is/are the most suitable for your purpose, for example when to present discrete data in a bar chart, or draw a diagram such as a plan of a room or piece of equipment. This does not mean that you have to present the same finding in two different ways, but that, in your work as a whole, you must use two different ways of presenting your findings.

## **N1.3.2**

### **Describe and explain**

You must know how to describe what the results of your calculations show in relation to the problem you have tackled (for example show that the results of your calculations suggest that a proposed solution will not work).

# Level 2 Essential Skills Wales in Application of Number

Level:	2
Credit value:	6
Guided learning hours:	60

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## About this qualification

This is about demonstrating your skills in:

- understanding numerical data (N2.1)
- carrying out calculations (N2.2)
- interpreting results and presenting findings (N2.3)

in order to tackle problems or tasks that you meet in education, training, work and social roles.

## Amplification of evidence requirements

### Notes

- 1 Each level of the skill incorporates and builds on the previous levels. So, for example, when carrying out calculations at Level 2, you need to know how to 'recognise equivalencies between common fractions, percentages and decimals, and use these to find proportions of whole numbers', which is a requirement at Level 1.
- 2 The subject matter and resources will be more complex than at Level 1 and you must show more independence in tackling problems and tasks. You must explain your methods and your findings and how they meet the purpose of your task and are appropriate for your audience.
- 3 You must provide evidence of your Application of Number skills, as they are specified in the first column of the component grid. Your evidence must be in the form described in the third column ('Evidence requirements'). In order to provide this evidence, you will need to have the skills that are listed in the second column.
- 4 The guidance included within the qualification supports the requirements of the three columns of the component areas and is intended to advise and help you and your teacher/tutor/trainer in your work. It provides explanations of some of the requirements of the standards that may be useful when you are developing the skill of Application of Number at Level 2 and producing evidence of your work. It is not a mandatory part of the standards.

- 5 Many learners when producing evidence have found that it is both more interesting and more effective to complete a task or activity that covers all three components (N2.1, N2.2 and N2.3) as a continuous process. However, this is not a requirement.
- 6 The Mandatory Definitions (*Annexe A*) give the exact meaning of certain words in the document. You must always refer to them when you are developing your skills, gathering evidence, and preparing for assessment.
- 7 Witness statements must not be the only form of evidence that you provide. When you provide a witness statement, it must be supported by other evidence.

## Evidence

At Level 2, you will be assessed via a portfolio of evidence. The term ‘evidence’ is used in this document to refer to the work you produce for final assessment.

You must demonstrate understanding of the whole process:

- understand and tackle a problem
- collect and interpret data
- carry out calculations
- check results
- interpret results
- present findings
- reflect/review.

You must therefore carry out at least one activity that shows your skills in all three components (N2.1, N2.2, N2.3).

If you need to carry out additional activities to meet all the requirements of N2.2 (a, b, c, d), each activity must include tasks for:

**either**

- N2.1 and N2.2

or

- N2.2 and N2.3

but you need to meet only the missing requirement/s.

There must be evidence that all your work has been assessed and authenticated, for example there must be records/notes, written by a competent assessor, confirming that your work is your own and that it has achieved the required standard.

## Skill requirements

In order to achieve this qualification, the evidence that you present for assessment needs to demonstrate that you can meet all of the skills requirements of the qualification for each of the component areas. A piece of work submitted could give assessment evidence for more than one skill.

## Component: N2.1 Understand numerical data

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N2.1.1</b> Help to identify and describe at least one practical problem or task that involves a range of numerical data and information.</p>	<ul style="list-style-type: none"> <li>work with an appropriate person to help you identify and describe the problem or task...</li> </ul>	<p>Evidence must show that the learner has played an active part in identifying and describing the problem or task about which they have been briefed or which they have chosen.</p> <p>Evidence must be in the form of notes produced by the learner (by hand or electronically).</p>
<p><b>N2.1.2</b> Confirm with an appropriate person how you plan to tackle it.</p>	<ul style="list-style-type: none"> <li>...and confirm how you will tackle it.</li> </ul>	<p>Evidence of planning must include:</p> <ul style="list-style-type: none"> <li>details of how the learner intends to obtain relevant data and information</li> <li>a clear sequence of tasks showing how they intend to use this information.</li> </ul> <p>Evidence must be in the form of notes produced by the learner (by hand or electronically).</p>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N2.1.3</b> Collect relevant numerical data and information from a range of sources to meet the purpose of your task. Your sources must include at least <b>two</b> of a table, a chart, a graph or a diagram.</p>	<ul style="list-style-type: none"> <li>• read, understand and extract information from tables, diagrams, charts, and simple graphs</li> <li>• read and understand numbers presented in different ways</li> <li>• collect and record data from making accurate observations</li> <li>• read scales on a range of equipment to given levels of accuracy</li> <li>• use shape and space to record relevant measurements and make accurate observations</li> <li>• estimate amounts and proportions</li> <li>• understand compound measures.</li> </ul>	<p>Evidence must show that the learner is clear about how the data/information they obtain meets their purpose. Evidence must include data/information collected from at least three sources. At least one source must require the learner to collect and record data/information. Evidence must include:</p> <ul style="list-style-type: none"> <li>• copies of source material</li> <li>• details of the site/s of observation/measurement</li> <li>• records of data and information obtained.</li> </ul>

## Component: N2.2 Carry out calculations

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N2.2.1</b></p> <p>Use appropriate methods to get the results you need and explain the methods you have used.</p>	<ul style="list-style-type: none"> <li>• identify and use methods and calculations that are appropriate for your task, including grouping data when this is appropriate.</li> </ul>	<p>Evidence must show that the learner can:</p> <p>identify, use and explain appropriate methods for getting the results they need.</p> <p>Evidence must be in the form of notes produced by the learner (by hand or electronically).</p>
<p><b>N2.2.2</b></p> <p>Use the data and information you have obtained to carry out calculations relevant to your task to do with:</p> <ul style="list-style-type: none"> <li>• amounts or sizes</li> <li>• scales or proportion</li> <li>• handling statistics</li> <li>• using formulae.</li> </ul>	<ul style="list-style-type: none"> <li>• show clearly your methods of carrying out calculations and give the levels of accuracy of your results</li> <li>• carry out calculations involving two or more steps, with numbers of any size with and without a calculator</li> <li>• use mental arithmetic involving whole numbers and simple fractions</li> <li>• work with and convert between fractions, decimals and percentages</li> <li>• calculate with sums of money and convert between currencies</li> <li>• calculate, measure and record time in different formats</li> </ul>	<p>Evidence must show that the learner:</p> <ul style="list-style-type: none"> <li>• has used data and information from N2.2.1</li> <li>• is clear about the purpose and relevance of their calculations.</li> </ul> <p>Overall, evidence of calculations must include at least one example from each category:</p> <ol style="list-style-type: none"> <li>a) amounts or sizes</li> <li>b) scales or proportion</li> <li>c) handling statistics</li> <li>d) using formulae</li> </ol> <p>and must show how the learner has checked their methods and calculations.</p>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N2.2.2 continued</b></p>	<ul style="list-style-type: none"> <li>• estimate, measure and compare length, weight, capacity and temperature using metric and, where appropriate, imperial units</li> <li>• calculate within a system and between systems using conversion tables and scales, and approximate conversion factors</li> <li>• recognise and use common 2D representations of 3D objects</li> <li>• solve problems involving 2D shapes and parallel lines</li> <li>• work out actual dimensions from scale drawings</li> <li>• use proportion and calculate using ratios where appropriate</li> <li>• identify the range of possible outcomes of combined events through probability and record the information using diagrams and tables</li> <li>• compare sets of data of an appropriate size, using percentages, mean/median/mode</li> <li>• use range to describe the spread within sets of data</li> <li>• understand and use given formulae</li> </ul>	<p>Category (c) must include a comparison of data sets.</p> <p>Evidence must show and explain methods and give levels of accuracy.</p> <p>Evidence must include records of how the learner has checked:</p> <ul style="list-style-type: none"> <li>• their methods and calculations</li> <li>• that the results make sense in relation to the purpose of the task.</li> </ul> <p>Evidence must be in the form of written notes produced by the learner (by hand or electronically).</p>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N2.2.2 <i>continued</i></b></p>	<ul style="list-style-type: none"> <li>• calculate efficiently using whole numbers, fractions, decimals and percentages</li> <li>• check your methods and calculations</li> <li>• identify and correct any errors</li> <li>• check that your results make sense.</li> </ul>	

## Component: N2.3 Interpret results and present findings

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N2.3.1</b> Select two different ways to present your results, using charts or graphs, and tables or diagrams appropriate to your audience.</p>	<ul style="list-style-type: none"> <li>understand what the results of your calculations mean in the context of your problem or task</li> <li>identify and describe appropriate ways to present your findings to two different audiences, including numerical, graphical and written formats.</li> </ul>	<p>Evidence must show that the learner can</p> <ul style="list-style-type: none"> <li>choose how to present their results, using two appropriate ways (ie charts and/or graphs, and tables and/or diagrams)</li> <li>explain why these ways are appropriate to their audience.</li> </ul> <p>Evidence must be in the form of written notes produced by the learner (by hand or electronically).</p>
<p><b>N2.3.2</b> Present and explain your methods and findings and explain how they meet the purpose of your task and are appropriate to your audience.</p>	<ul style="list-style-type: none"> <li>construct tables, charts and graphs, and label with titles, scales, axes and keys appropriate to your purpose and audience</li> <li>use more than one way to present your findings, including numerical, graphical and written formats</li> <li>describe your methods, highlight the main points of your findings, and explain how they meet your purpose.</li> </ul>	<p>Evidence must show that the learner can present their methods and findings effectively explain the methods they have used describe and explain what the results of their calculations mean in relation to the problem/task they have tackled, emphasising the key points.</p> <p>Evidence must be in the form of written notes produced by the learner (by hand or electronically).</p> <p>Whether or not ICT is used to produce graphics, evidence must show that the learner has checked their accuracy and can explain them fully. Evidence of this understanding may be in the form of a witness statement.</p>

## Guidance for Application of Number Level 2

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This guidance supports the requirements set out in the three columns of the component areas and is intended to advise and help you and your teacher/tutor/trainer in your work. It explains some of the requirements of the standards that may be useful when you are developing the skill of Application of Number at Level 2 and producing evidence of your work. It is not a mandatory part of the standards.

### N2.1.1

#### Help to identify

While your teacher/tutor/trainer is likely to give you the outline of a problem or task, you must take part in discussions to help clarify and describe it in detail.

If you choose to tackle a problem of your own, rather than one given by your teacher/tutor/trainer, you must take their advice about whether your chosen problem is appropriate.

### N2.1.2

#### Confirm with an appropriate person

It is your responsibility to think about how you will tackle the problem but you must check with your tutor/teacher/trainer that your plan is a good one.

### N2.1.3

#### Collect, record

You must know how to use suitable equipment for making accurate measurements and observations, as well as how to interpret a variety of numerical, written and graphical material, including tables and charts, in order to decide about their relevance to the purpose of your activity. You must record measurements and observations accurately and in a way that is fit for the purpose of your task.

#### Sources

Sources can include graphical and/or written material (for example reference books and journals; organisations that collate their own statistical information; the internet; and newspapers) and/or direct measurements or observations, depending on the context in which you are working. This material must include at least two of: a table, a chart, a simple graph, or a diagram. You must be able to read scales, such as 1:2500 on a map.

## **Compound measures**

You must know how to interpret compound measures, for example those presented as 'something per something' such as milligrammes per 100 millilitres, pressure in psi, or miles per hour.

### **N2.2.1**

#### **Identify and use methods**

You must consider a range of possible methods (for example look up formulae, or information relating to similar tasks or problems), weigh up the pros and cons of alternatives, and choose methods that are appropriate for your purpose and circumstances.

#### **Understand and use given formulae**

You must know how to use formulae that you are given by, for example, substituting values. You do not have to create or rearrange formulae.

### **N2.2.2**

#### **Carry out calculations**

Application of Number requires you to show that you can carry out a number of different types of calculations (amounts or sizes; scales or proportion; handling statistics; using formulae).

'Amounts or sizes' is a single category. 'Scales or proportion' is another single category. From each of these categories, you must present at least one example as evidence.

You must be able to carry out calculations both with and without a calculator.

You must show that you can carry out calculations involving two or more steps when working with:

- a) amounts or sizes, for example when solving problems that involve converting between fractions, decimals and percentages, different currencies or systems of measurement; evaluating one number as a fraction or percentage of another; working out volumes and areas of composite shapes
- b) scales or proportion, for example when enlarging shapes by using a positive whole number scale factor, calculating ratios such as sharing £60 in the ratio 3:5

- c) statistics, for example when finding the mean, median and mode (for example from charts showing two weeks' sales results), and using them to compare two sets of data; finding the range and using it to describe the spread within sets of data
- d) formulae, for example when using given formulae expressed in words, as rules (for example 'length in cm / 2.54=length in inches'), as well as those using symbols (for example  $c / 2.54=l$ ).

### **Levels of accuracy**

You must decide what levels of accuracy to work to (for example 'nearest whole number', 'nearest pound', 'one place of decimals') and state what they are.

### **Sets of data**

The data sets you work with must be of a size that is appropriate to your task/activity and its purpose. They must be large enough to enable you to make meaningful calculations of mean and/or median and/or mode, and to make meaningful comparisons.

### **Check calculations**

You must always check the accuracy of your calculations. This is often a mental process and you do not have to produce evidence every time you do it. Where there is a series of calculations of the same type, you must record evidence of checking at least the first few of each type. For the remainder, accurate results must confirm that you have checked effectively. You must be aware of the importance of checking your results and your methods and be familiar with different methods of carrying out checks.

### **Check that results make sense**

While your results may be based on accurate calculations, they may not 'make sense' or be fit for purpose in relation to the problem or task that you have tackled. You must check this.

## **N2.3.1**

### **Select ways to present**

You must be able to identify, describe and consider different ways to present your results (for example graphs, chart, tables, diagrams) to at least two different audiences. You must choose and use the two ways (ie charts and/or graphs, and tables and/or diagrams) that are most appropriate to your actual audience, and explain your choice. Evidence that you have considered different ways and that explains your choice must be in the form of notes, written by hand or electronically.

## **N2.3.2**

### **Present, describe and explain**

You must be able to describe your methods and explain how they meet your purpose.

### **Highlight main points**

You must present your findings in ways that make it easy for your audience to identify the main points.

# Level 3 Essential Skills Wales in Application of Number

Level:	3
Credit value:	6
Guided learning hours:	60

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## About this qualification

This is about demonstrating your skills in:

- understanding numerical data (N3.1)
- carrying out calculations (N3.2)
- interpreting results and presenting findings (N3.3)

to tackle problems or tasks that you meet in education, training, work and social roles.

## Amplification of evidence requirements

### Notes

- 1 Each level of the skill incorporates and builds on the previous levels. So, for example, in N3.2, the requirement to 'estimate, measure and compare dimensions and quantities' includes choosing and using appropriate units and instruments to measure length, weight, capacity, time and temperature, using standard and non-standard units, all of which are included at lower levels.
- 2 The subject matter and resources will be more complex than at Level 2 and you must show independence in tackling problems and tasks. You must explain and justify your methods and your conclusions.
- 3 You must provide evidence of your Application of Number skills, as they are specified in the first column of the component grid. Your evidence must be in the form described in the third column ('Evidence requirements'). In order to provide this evidence, you will need to have the skills that are listed in the second column.
- 4 The guidance within the qualification supports the requirements of the three columns of the component areas and is intended to advise and help you and your teacher/tutor/trainer in your work. It provides explanations of some of the requirements of the standards that may be useful when you are developing the skill of Application of Number at Level 3 and producing evidence of your work. It is not a mandatory part of the standards.

- 5 Many learners when producing evidence have found that it is both more interesting and more effective to complete a task or activity that covers all three components (N3.1, N3.2 and N3.3) as a continuous process. However, this is not a requirement.
- 6 The Mandatory Definitions (*Appendix A*) give the exact meaning of certain words in the document. You must always refer to them when you are developing your skills, gathering evidence, and preparing for assessment.
- 7 Witness statements must not be the only form of evidence that you provide. When you provide a witness statement, it must be supported by other evidence.

## Evidence

At Level 3, you will be assessed via a portfolio of evidence. The term ‘evidence’ is used in this document to refer to the work you produce for final assessment.

You must demonstrate understanding of the whole process:

- understand and tackle a problem
- collect and interpret data
- carry out calculations
- check results
- interpret results
- present findings
- reflect/review.

You must therefore carry out at least one activity that shows your skills in all three components (N3.1, N3.2, N3.3).

If you need to carry out additional activities to meet all the requirements of N3.2 (a, b, c, d), each activity must include tasks for:

**either**

- N3.1 and N3.2

**or**

- N3.2 and N3.3

but you need to meet only the missing requirement/s.

There must be evidence that all your work has been assessed and authenticated, for example there must be records/notes, written by a competent assessor, confirming that your work is your own and that it has achieved the required standard.

## Skill requirements

In order to achieve this qualification, the evidence that you present for assessment needs to demonstrate that you can meet all of the skills requirements of the qualification for each of the component areas. A piece of work submitted could give assessment evidence for more than one skill.

### Component: N3.1 Understand numerical data

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N3.1.1</b> Identify, analyse and accurately describe at least one practical problem or task that involves a range of numerical data and information.</p>	<ul style="list-style-type: none"> <li>• identify, analyse and accurately describe the problem or task and its sub-problems.</li> </ul>	<p>Evidence must show that the learner has independently identified, analysed and described the problem or task about which they have been briefed or which they have chosen.</p> <p>Evidence must be in the form of notes produced by the learner (by hand or electronically).</p>
<p><b>N3.1.2</b> Plan how you will tackle it.</p>	<ul style="list-style-type: none"> <li>• plan how you will tackle the problem by breaking it down into a series of tasks</li> <li>• plan how you will obtain the data and information you need.</li> </ul>	<p>Evidence of planning must include:</p> <ul style="list-style-type: none"> <li>• details of how the learner intends to obtain relevant data and information</li> <li>• a clear sequence of tasks showing how they intend to use this information.</li> </ul> <p>Evidence must be in the form of notes produced by the learner (by hand or electronically).</p>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N3.1.3</b> Collect relevant numerical data and information from a range of sources to meet the purpose of your task. Your sources must include at least <b>two</b> of a table, a chart, a graph or a diagram, of which at least one must be complex, and a large data set.</p>	<ul style="list-style-type: none"> <li>• read, understand and extract information from tables, diagrams, charts and graphs</li> <li>• collect, obtain, read, understand, select and record relevant data and information from different sources, including at least one data set of a size appropriate to a planned activity, and use this to meet the purpose of the activity</li> <li>• make accurate and reliable observations over time and use suitable equipment to measure in a variety of appropriate units</li> <li>• group data into classes of width appropriate to the data</li> <li>• use estimation to help you plan, multiplying and dividing numbers of any size</li> <li>• read and understand ways of writing very large and very small numbers</li> <li>• understand compound measures.</li> </ul>	<p>Evidence must include data/information collected from at least three sources, one of which must be an appropriate data set.</p> <p>Evidence must show that the learner can:</p> <ul style="list-style-type: none"> <li>• collect relevant data and information</li> <li>• group the data appropriately</li> <li>• explain how the data and information meet their purpose</li> <li>• explain how they used the data.</li> </ul> <p>Evidence must include:</p> <ul style="list-style-type: none"> <li>• copies of source material</li> <li>• details of the site/s of observation/measurement</li> <li>• records of data and information obtained.</li> </ul>

## Component: N3.2 Carry out calculations

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N3.2.1</b> Choose and use appropriate methods to get the results you need and justify the methods you have used.</p>	<ul style="list-style-type: none"> <li>identify and design methods that are appropriate for your task and justify your choice.</li> </ul>	<p>Evidence must show that the learner can:</p> <ul style="list-style-type: none"> <li>independently choose and use appropriate methods for getting the results they need</li> <li>explain why these methods are appropriate.</li> </ul> <p>Evidence must be in the form of notes produced by the learner (by hand or electronically).</p>
<p><b>N3.2.2</b> Use the data and information you have obtained to carry out calculations relevant to your task to do with:</p> <ul style="list-style-type: none"> <li>a) amounts or sizes</li> <li>b) scales or proportion</li> <li>c) handling statistics</li> <li>d) using formulae.</li> </ul>	<ul style="list-style-type: none"> <li>carry out calculations clearly showing your methods</li> <li>justify the levels of accuracy you have worked to</li> <li>carry out multi-stage calculations with numbers of any size</li> <li>use powers and roots</li> <li>use compound measures</li> <li>use mental arithmetic involving numbers, simple fractions, and percentages</li> <li>work out missing angles and sides in right-angled triangles from known sides and angles</li> </ul>	<p>Evidence must show that the learner:</p> <ul style="list-style-type: none"> <li>has used data and information from N3.2.1</li> <li>has used their grouped data</li> <li>is clear about the purpose and relevance of their calculations.</li> </ul>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N3.2.2 continued</b></p>	<ul style="list-style-type: none"> <li>• calculate with sums of money in different currencies</li> <li>• calculate, measure, record and compare time in different formats</li> <li>• estimate, measure and compare dimensions and quantities using metric and, where appropriate, imperial units, and check the accuracy of estimates</li> <li>• calculate within and between systems and make accurate comparisons</li> <li>• draw 2D representations of simple 3D objects</li> <li>• solve problems involving irregular 2D shapes</li> <li>• work out actual dimensions from scale drawings and scale quantities up and down</li> <li>• work out proportional change</li> <li>• compare distributions, using measures of average and range, and estimate mean, median and range of grouped data</li> </ul>	<p>Overall, evidence of calculations must include at least one example from each category:</p> <ul style="list-style-type: none"> <li>a) amounts or sizes</li> <li>b) scales or proportion</li> <li>c) handling statistics</li> <li>d) using formulae</li> </ul> <p>and must show how the learner has checked their methods and calculations.</p> <p>Evidence must show methods and levels of accuracy, with justifications.</p> <p>Evidence must include records of how the learner has checked:</p> <ul style="list-style-type: none"> <li>• their methods and calculations</li> <li>• that the results make sense in relation to the purpose of the task.</li> </ul> <p>Evidence must be in the form of written notes produced by the learner (by hand or electronically).</p>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
N3.2.2 <i>continued</i>	<ul style="list-style-type: none"> <li>• rearrange and use formulae, equations and expressions</li> <li>• make multi-step calculations efficiently</li> <li>• use checking procedures to identify and correct errors in methods, calculations and results</li> <li>• check that your results make sense.</li> </ul>	

### Component: N3.3 Interpret results and present findings

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N3.3.1</b> Select and justify two different ways to present your results, using charts or graphs, and tables or diagrams appropriate to your audience.</p>	<ul style="list-style-type: none"> <li>• understand what the results of your calculations mean in the context of your problem or task</li> <li>• select and use appropriate methods to present and illustrate your findings, showing trends and making comparisons, including numerical, graphical and written formats</li> <li>• justify your choice of methods of presentation.</li> </ul>	<p>Evidence must show that the learner can</p> <ul style="list-style-type: none"> <li>• choose how to present their results using two appropriate ways (for example charts and/or graphs, and tables and/or diagrams)</li> <li>• explain and justify why these ways are appropriate to their audience.</li> </ul> <p>Evidence must be in the form of written notes produced by the learner (by hand or electronically).</p>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N3.3.2</b></p> <p>Present and explain your methods and findings and justify how they meet the purpose of your task and are appropriate to your audience.</p>	<ul style="list-style-type: none"> <li>• construct and label tables, charts, graphs and diagrams using accepted conventions</li> <li>• describe and justify your choice of methods</li> <li>• describe what your results tell you</li> <li>• draw appropriate conclusions based on your findings, including how possible sources of error might have affected your results</li> <li>• explain how far your results meet your purpose</li> <li>• respond constructively to feedback.</li> </ul>	<p>Evidence must show that the learner can</p> <ul style="list-style-type: none"> <li>• present their methods and findings effectively</li> <li>• explain and justify the methods they have used</li> <li>• describe and explain what the results of their calculations mean in relation to the problem/task they have tackled.</li> </ul> <p>Evidence must be in the form of written notes produced by the learner (by hand or electronically).</p> <p>Whether or not ICT is used to produce graphics, evidence must show that the learner has checked their accuracy and can explain them fully. Evidence of this understanding may be in the form of a witness statement.</p> <p>Evidence must show that the learner has received feedback and has responded constructively.</p>

## Guidance for Application of Number Level 3

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The guidance below supports the requirements of the three columns of the component areas and is intended to advise and help you and your teacher/tutor/trainer in your work. It provides explanations of some of the requirements of the standards that may be useful when you are developing the skill of Application of Number at Level 3 and producing evidence of your work. It is not a mandatory part of the standards.

### N3.1.1

#### Problem

At this level, problems must include sub-problems. The techniques you need to tackle the problem must be relatively sophisticated (for example interrelated multi-stage calculations rather than those that require two or more separate steps), and must require you to consider carefully the nature and sequence of tasks when you are planning how to obtain and use information to meet your purpose. Problems must offer different possible approaches which you must evaluate to decide how best to tackle the problem.

If you choose to tackle a problem of your own, rather than one given by your teacher/tutor/trainer, you must take their advice about whether your chosen problem is appropriate.

### N3.1.2

#### Plan

You need to know to break down an activity into a series of interrelated tasks, and identify the problems to be tackled. It may not be immediately clear what these problems are, and you may need to extend your knowledge of methods and approaches. You will need to take time to specify the problem, formulate questions in terms of the data you need, plan how you will obtain this information and what you are going to do (for example methods you will use for organising data, such as tabulating and grouping, types of calculations, how you will take account of variability or bias) to meet the purpose of your activity.

### **N3.1.3**

#### **Collect, record**

You must know how to select and use suitable equipment for making accurate measurements and observations, as well as how to interpret a variety of numerical, written and graphical material, including complex tables and charts, (ie those that present very detailed information relating to a large data set), in order to decide about their relevance to the purpose of your activity. You must record measurements and observations accurately and in a way that is fit for the purpose of your task.

#### **Sources**

Sources can include graphical and/or written material (for example reference books and journals; organisations that collate their own statistical information; the internet; and newspapers) and/or direct measurements or observations, depending on the context in which you are working. This material must include at least two of: a table, a chart, a graph, or a diagram. You must be able to deal with scales, such as 1:1250 (as on large-scale maps), graphs with several graph lines on the same axes (for example power outputs compared with speed for different temperatures, weights against heights for a range of body mass indexes).

#### **Data set**

The 'large data set' must be of a size appropriate to your activity, sufficiently complex to be challenging to interpret, and large enough to enable you to carry out statistical calculations relating to grouped data. Where you compare two sets of data, one set must have been obtained by you, while the other set may have been given to you. A set of about 50 items is likely to be appropriate at this level but, if opportunities arise in your normal work to manipulate slightly smaller sets of data for a worthwhile purpose, you should not reject these in favour of larger data sets that are less relevant to your activity. It is essential that there is a relevant and realistic need to group the data.

You may produce a large data set by sampling or drawing from a larger set of secondary data.

#### **Compound measures**

You must know how to interpret compound measures, for example those presented as 'something per something' such as milligrammes per 100 millilitres, or pressure in psi, or miles per litre/gallon.

## N3.2.1

### Identify and design methods

You must consider a range of possible methods (for example look up formulae, information relating to similar tasks or problems), weigh up the pros and cons of alternatives, possibly adapt or originate new methods, and be able to justify your choice in relation to its suitability for your purpose and circumstances.

## N3.2.2

### Carry out multi-stage calculations

Application of Number requires you to show that you can carry out a number of different types of calculations (amounts or sizes; scales or proportion; handling statistics; using formulae). 'Amounts or sizes' is a single category. 'Scales or proportion' is another single category. From each of these categories, you must present at least one example as evidence.

You must show that you can carry out multi-stage calculations, ie where the results from one stage are used to provide some of the data for the next stage, for example finding the mean time taken by shoppers at checkouts, and using the results, together with data about the number of shoppers in the supermarket, to calculate the number of checkout assistants required at different times of the day (this differs from Level 2 in that each stage might include calculations involving two or more steps, for example adding and dividing to find the mean).

You must be able to carry out calculations both with and without a calculator.

Examples of calculations in each category:

- a) **amounts or sizes**  
Using powers and roots, such as 'square', 'cube' and 'square root', 106, 10-3; finding missing angles and sides, such as when working out the space implications for ramps at different slopes, when it is quicker to use calculations than scale drawings
- b) **scales or proportion**  
Knowing that, if land measurements on a plan are doubled, the area of land is four times as much, or, if three dimensions of an object are trebled, its volume or weight becomes 27 times as much
- c) **handling statistics**  
Using several methods (visual, such as frequency charts, histograms or cumulative frequency graphs; numerical, such as calculations of mean, median and interquartile range) to compare distributions of grouped data
- d) **using formulae**  
Solving simultaneous linear equations with two variables, using formulae with letters and rearranging them so as to change the subject (output) of a formula, such as making  $w$  or  $h$  the subject rather than  $b$  in  $b=hW^2$  as well as finding the value of  $W$  given the values of  $h$  and  $b$ .

### **Levels of accuracy**

You must decide what levels of accuracy to work to (for example ‘nearest whole number’, ‘nearest pound’, ‘one place of decimals’) and be able to justify your choice.

### **Multi-stage**

Where you use the results from one stage to provide data for calculations at the next stage, the stages can involve calculations from any of the four categories.

### **Use checking procedures**

You must always check the accuracy of your calculations. This is often a mental process and you do not have to produce evidence every time you do it. Where there is a series of calculations of the same type, you must record evidence of checking at least the first few of each type. For the remainder, accurate results should confirm that you have checked effectively. You must be aware of the importance of checking your results and your methods and be familiar with different methods of carrying out checks.

### **Check that results make sense**

While your results may be based on accurate calculations, they may not ‘make sense’ or be fit for purpose in relation to the problem or task that you have tackled. You must check this.

## **N3.3.1**

### **Select and justify**

You must be able to identify, describe and consider different ways to present your results (for example graphs, chart, tables, diagrams) to at least two different audiences. You must choose and use the two ways (ie charts and/or graphs, **and** tables and/or diagrams) that are most appropriate to your actual audience, to the nature of the data you want to present, and to the features you want to highlight. You must be able to give reasons that justify your choice.

Evidence that you have considered different ways and that explains your choice must be in the form of notes, written by hand or electronically.

### **N3.3.2**

#### **Describe and justify**

You must be able to describe your methods and justify them in relation to the problem you have tackled.

#### **Draw appropriate conclusions**

At this level, not only must you support your conclusions with evidence, but you must also assess the accuracy and dependability of the results, taking into account approximations in calculations and possible inaccuracies in the original information.

#### **Respond constructively**

You must be able to respond constructively to feedback, whether it is positive or negative, for example by being assertive rather than aggressive or dismissive.

# Level 4 Essential Skills Wales in Application of Number

Level:	4
Credit value:	6
Guided learning hours:	60

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## About this qualification

This is about demonstrating your skills in:

- developing a strategy for using number skills (N4.1)
- monitoring your progress and adapting your strategy as necessary (N4.2)
- presenting the outcomes of your work (N4.3)
- evaluating your overall strategy (N4.3).

## Amplification of evidence requirements

### Notes

- 1 Each level of the skill incorporates and builds on the previous levels. You must therefore ensure that you are familiar with all the requirements of Application of Number Level 3 which, in turn, incorporates the requirements of the lower levels.
- 2 You must provide evidence of your Application of Number skills, as they are specified in the first column of the component grid. Your evidence must be in the form described in the third column ('Evidence requirements'). In order to provide this evidence, you will need to have the skills that are listed in the second column.
- 3 The guidance within the qualification supports the requirements of the three columns of the component areas and is intended to advise and help you and your teacher/tutor/trainer in your work. It provides explanations of some of the requirements of the standards that may be useful when you are developing the skill of Application of Number at Level 4 and producing evidence of your work. It is not a mandatory part of the standards.
- 4 The Mandatory Definitions (*Annexe A*) give the exact meaning of certain words in the document. You must always refer to them when you are developing your skills, gathering evidence, and preparing for assessment.
- 5 Witness statements may be used to support written evidence (for example of a discussion) but must not be the only form of evidence that you provide.

## **Evidence**

At Level 4, you will be assessed via a portfolio of evidence. The term ‘evidence’ is used in this document to refer to the work you produce for final assessment.

You must produce evidence of meeting the requirements of N4.1, N4.2 and N4.3 in the context of one activity.

Documents used in evidence may be hand-written, typed or word-processed.

There must be evidence that all your work has been assessed and authenticated, for example there must be records/notes, written by a competent assessor, confirming that your work is your own and that it has achieved the required standard.

## **Skill requirements**

In order to achieve this qualification, the evidence that you present for assessment needs to demonstrate that you can meet all of the skills requirements of the qualification for each of the component areas. A piece of work submitted could give assessment evidence for more than one skill.

## Component: N4.1 Developing a strategy

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N4.1.1</b> Develop a strategy for using number skills over an extended period of time.</p>	<ul style="list-style-type: none"> <li>• establish opportunities to use number skills</li> <li>• clearly identify the outcomes you hope to achieve</li> <li>• plan your use of number skills over an extended period of time</li> <li>• make a reasoned choice of methods for achieving the quality of outcomes required, including:               <ul style="list-style-type: none"> <li>- formulating hypotheses, using models and other techniques to explore them</li> <li>- establishing methods for testing hypotheses</li> </ul> </li> <li>• identify relevant sources of information, including people and reference material, and research the information you need.</li> </ul>	<p>Evidence may be presented in a variety of ways, both written and oral. It may include entries in a personal development plan or progress file, or a project proposal.</p> <p>Evidence must include:</p> <ul style="list-style-type: none"> <li>• reasons for the choice of methods.</li> <li>• annotated references of sources used for researching information.</li> </ul>

## Component: N4.2 Monitoring progress

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N4.2.1</b> Monitor your progress and adapt your strategy, as necessary, to achieve the quality of outcomes required in work involving:</p> <ul style="list-style-type: none"> <li>• deductive and inferential reasoning</li> <li>• algebraic modelling.</li> </ul>	<ul style="list-style-type: none"> <li>• evaluate information from different sources, developing alternative lines of enquiry where appropriate</li> <li>• carry out calculations to appropriate levels of accuracy, drawing on a range of numerical, graphical and other mathematical techniques involved in:               <ul style="list-style-type: none"> <li>- making measurements or observations, including use of compound units</li> <li>- reading and interpreting scale drawings, graphs, complex tables and charts</li> <li>- organising and classifying data</li> <li>- making inferences from sets of data</li> <li>- using numerical, graphical and algebraic methods to develop models</li> <li>- using ideas of proportion, variation and scaling, including inverse proportion and other non-linear variation</li> <li>- working with expressions, formulae and equations, including powers and roots</li> </ul> </li> </ul>	<p>Evidence of monitoring progress and adapting strategy may be through:</p> <ul style="list-style-type: none"> <li>• written records of the learner's reflections on the progress of the work and of feedback obtained</li> </ul> <p>and/or</p> <ul style="list-style-type: none"> <li>• written notes of discussions with appropriate persons, supported by witness statements.</li> </ul> <p>Evidence must describe choices made, reasons for these, and judgments of their effectiveness.</p> <p>Evidence must include:</p> <ul style="list-style-type: none"> <li>• notes of planning</li> <li>• at least one draft, with evidence of checking</li> <li>• full references for all sources used.</li> </ul>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N4.2.1 <i>continued</i></b></p>	<ul style="list-style-type: none"> <li>- working with probability</li> <li>- making deductions in algebraic and spatial reasoning and applying these to your work</li> <li>• monitor and critically reflect on your use of number skills including:               <ul style="list-style-type: none"> <li>- obtaining feedback from others</li> <li>- noting choices made and judging their effectiveness</li> </ul> </li> <li>• adapt your strategy as necessary to overcome difficulties and produce the quality of outcomes required.</li> </ul>	

## Component: N4.3 Presenting outcomes and evaluating strategy

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<p><b>N4.3.1</b> Present the outcomes of your work.</p>	<ul style="list-style-type: none"> <li>• interpret results and identify the main findings from your work, including evidence to support your conclusions</li> <li>• present information effectively, selecting appropriate methods to illustrate findings, including charts, graphs and diagrams</li> <li>• explain results in relation to your work and hypotheses.</li> </ul>	<p>Evidence may be presented in written format, or in an oral presentation, or in a combination of these.</p> <p>If any part of the evidence is presented orally: evidence must include the learner’s preparatory notes for the presentation</p> <ul style="list-style-type: none"> <li>• there must be additional evidence which may be in the form of:               <ul style="list-style-type: none"> <li>- audio/visual clips of the presentation and/or</li> <li>- witness statements</li> </ul> </li> <li>• brief notes may be used as a prompt, but the learner must not read these out.</li> </ul> <p>Assessors must look for:</p> <ul style="list-style-type: none"> <li>• clarity of expression</li> <li>• appropriate use of vocabulary</li> </ul>

You must provide evidence that you can:	In order to show that you are competent, you need to know how to:	Evidence requirements
<b>N4.3.1</b> <i>continued</i>		<ul style="list-style-type: none"> <li>• the use of a variety of verbal, visual and other techniques</li> <li>• evidence that the presentation is well structured, with examples that are relevant to the audience</li> <li>• evidence that the audience has responded appropriately.</li> </ul>
<b>N4.3.2</b> Evaluate the effectiveness of your strategy, and identify ways to further develop your number skills.	<ul style="list-style-type: none"> <li>• evaluate the effectiveness of your strategy, identifying factors that had an impact on the outcomes</li> <li>• identify ways to further develop your number skills.</li> </ul>	Evidence must be written but may be supported by a recorded discussion with an appropriate person.

## Guidance for Application of Number Level 4

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The guidance below supports the requirements of the three columns of the component areas and is intended to advise and help you and your teacher/tutor/trainer in your work. It provides explanations of some of the requirements of the standards that may be useful when you are developing the skill of Application of Number at Level 4 and producing evidence of your work. It is not a mandatory part of the standards.

### **N4.1.1**

#### **Establish opportunities to use number skills**

You must spend some time researching and exploring work activities in order to identify where and how you can use number skills. Your activities must involve obtaining numerical information from different sources and working on data (for example in measuring environmental changes or making financial forecasts).

#### **Identify the outcomes**

An intended outcome is a statement of what you want or need to achieve (for example a better financial management system). You may need to negotiate these outcomes with other people who are involved in the work. You must identify and write down outcomes that are specific, so you will be able to tell if they have been achieved. This will help later when you are monitoring and evaluating your work.

#### **Plan your use of number skills**

You must take stock of the skills you will need to achieve your intended outcomes, and plan your use of number skills so you can make the most of your work activities. You need to be able to identify opportunities and constraints (for example your own expertise, resources, work patterns, health and safety issues, and social and ethical concerns). You must set realistic targets and deadlines over the coming months.

#### **Make a reasoned choice of methods**

You must know how to select methods that are valid and effective for exploring and testing hypotheses (for example to test whether or not the number of accidents at work indicates a breach of health and safety protocols). You must know how to use a mathematical model to represent an existing situation, select methods of collecting and recording data for the purpose of refining the model, and use statistical techniques for testing the possible consequences of changed circumstances.

### **Identify relevant sources of information**

You must check a range of different sources, including people who may be able to support you in developing your skills and completing the work. You may need to arrange access to specialist training, online resources, a library, or specialist publications. You must know how to use appropriate referencing and filing systems, and keep records of the sources you use.

## **N4.2.1**

### **Evaluate information**

You must develop a 'critical eye' for assessing the quality and reliability of information from different sources, taking into account commercial, political, academic or personal interests that may influence content and presentation. You must know how to check, for example, the sufficiency of sample size and how to detect possible bias in the selection of samples. You must check facts, research other sources, and ask additional questions.

### **Carry out calculations**

You need to know how to choose levels of accuracy appropriate to the task. When working with approximate numbers, or rounding to significant figures, you must be able to evaluate the scale of any accumulating errors and their effect on the overall results of calculations.

### **Monitor and critically reflect**

You must know how to track, record, reflect on and evaluate your progress (the use of ICT may be helpful). You must identify reliable sources of feedback and use feedback constructively to help you monitor your performance and make decisions (for example on whether to adapt your overall strategy).

### **N4.3.1**

#### **Interpret results and identify the main findings**

You must interpret the results of your calculations, identify the key features of a set of data, and use the data as a basis for drawing appropriate conclusions.

#### **Present information effectively**

You must know how to express relationships, patterns, trends and possible consequences in words, graphs, diagrams, rates, tables and/or formulae so as to clarify complex situations, and use appropriate terms to describe relationships and trends (for example linear, exponential). You must know how to select appropriate levels of accuracy for presenting data and how to choose appropriate styles, scales and axes for statistical and other diagrams, and appropriate class intervals for grouped data. Charts, diagrams and graphs must be labelled correctly.

#### **Explain results**

You must show that you understand how the information or data relates to your original hypothesis and give reasons, supported by evidence, to justify your results.

### **N4.3.2**

#### **Evaluate the effectiveness of your strategy**

You must be able to identify how your decisions, level of precision, and the resources and people involved in your work, have influenced how you have tackled the activity and its outcomes. You must also take into account the effect of your own strengths and weaknesses in application of number.

#### **Identify ways to further develop your application of number skills**

You must reflect on your overall level of application of number skills and suggest areas where you need to improve, based on the experience you have gained in this activity. You must be able to identify opportunities that are available to you (for example for training, for changing working practices, or for tackling new kinds of tasks). You must discuss with a line manager, colleague or mentor how you might improve working methods, take advantage of new opportunities, and further develop your skills.

# Annexe A - Application of Number Mandatory Definitions

*The focus of this Mandatory Definitions document is on the terms and concepts that are particularly relevant to the Application of Number standards. It includes some but not all of the specialist mathematical terms that appear in the standards.*

## **accuracy**

- In relation to observation and measurement, means ‘exact and correct’.
- In relation to description, means ‘without mistakes’.
- In calculations, the requirements for level of accuracy vary between the levels and must be appropriate to context.

Evidence of checking for accuracy is required at all levels. Where there is a series of calculations of the same type, evidence of checking at least the first few of each type should be recorded for assessment purposes. For the remainder, accurate results should confirm that effective checking has taken place.

## **activity**

An activity includes a number of related tasks where the results of one task affect the carrying out of another. See also ‘task’.

## **agree**

Discuss and agree with an appropriate person how to tackle a problem or task, ie the decision is made jointly with a teacher, tutor or supervisor.

## **analyse**

Break down into components or essential features; examine in detail.

## **appropriate**

Suitable for intended task, context, audience, etc. The use of ‘appropriate’ in the standards recognises that different contexts require different treatments.

## **approximate/ly/ion**

Refers to an estimate, result or check that is not exact but is close enough to be useful in a practical context.

## **assessor**

The person who is competent/trained and responsible for judging a learner’s performance against the standards at the appropriate level.

**audience**

The audience is the people addressed by a text, document or speaker. The term includes readers, listeners, film/TV audiences and users of information technology.

**authentic (evidence)**

Evidence that has been produced by the learner with no more help, support or guidance than is permitted at the relevant level.

**authenticate**

To confirm that a learner's evidence is authentic.

**average**

Sometimes used synonymously with 'arithmetic mean'. Measures of average include mean, median and mode.

**bar chart/bar graph**

A form of representation of discrete data. Frequencies are represented by bars of equal width where the lengths are proportional to the frequencies. The bars may be presented vertically or horizontally.

**capacity**

Volume (ie a measure in three-dimensional space) applied to liquids, materials that can be poured, or containers. Units include cubic centimetres ( $\text{cm}^3$ ), cubic metres ( $\text{m}^3$ ).

**chart**

For the purpose of the Application of Number skill, it is not necessary to distinguish between 'chart' and 'graph'. Both can be regarded as a representation of the relationship between variables such as categories and frequency data, or x and y coordinates. Examples include: pie chart, bar chart, histogram, pictogram, frequency polygon, frequency diagram, single or multiple line graph, scatter graph with or without line of best fit.

Where used as evidence, charts/graphs may be produced using ICT but must always be correctly drawn and labelled.

**check**

- With appropriate person: run through the problem or task for understanding, accuracy and sense, perhaps repeating in own words and/or asking questions to clarify.
- Calculations/results: use checking methods (for example inverse calculation, checking for sense, using alternative method) to identify and correct mistakes.

**collect**

The term 'collect' is used at Levels 2 and 3 to indicate that the learner must show more initiative and independence than is required when obtaining data at previous levels. See also 'obtain'.

**combined events**

A set of independent events with a single outcome. An independent event does not influence a subsequent event, for example one throw of a die does not influence a second throw. Two throws of a die is a combined event with 36 possible outcomes ( $6 \times 6$ ). The probability of throwing two sixes is  $1/36$ .

**common**

Used to describe units, instruments, measures, date formats, etc that are widely used in everyday life in non-specialist contexts.

**complex**

A complex table/chart/graph/diagram must show a variety of interrelated data.

**compound measures**

Compound measures measure several different aspects of a complex concept, for example time and distance to calculate speed.

**confirm**

The task or problem is given by the tutor, teacher or trainer. It is the learner's responsibility to ensure and demonstrate that they fully understand it.

**continuous**

See 'data'.

**correct (verb)**

Put right a mistake.

**correct (adjective)**

Of labels: appropriate and accurate.

**data**

Quantitative information consisting of counts or measurements.

- **discrete data**  
data resulting from a count of separate items or events, for example number of people, where the variable can take only one of a finite set of values.
- **continuous data**  
data that can take any of an infinite number of values between whole numbers (for example length, capacity or temperature) and so cannot be measured completely accurately. Continuous data may be represented by a line graph or histogram.

Singular: datum.

**data set**

A data set may be collected by the learner (ie primary data) or it may be sampled or drawn from a larger set of secondary data.

**describe**

Unless otherwise specified, learners may describe their task, methods, data, results etc in written or spoken form, or a combination of these.

**diagram**

Any graphical method of representation other than a chart or graph. A diagram should include a scale where this is appropriate for purpose. Examples include: scale drawing, plan or workshop drawing, circuit drawing, 3D representation, flow chart, critical path or network diagram, and organisation chart. See also 'chart'.

**discrete**

See 'data'.

**distribution**

In recording data, the way in which values in the set of observations are arranged.

**effective/ly**

Carry out a task in a way that produces the desired result. It is possible to be effective but inefficient.

**efficiently**

Carry out a calculation using an appropriate number of steps or operations. For example, at Entry 3, this might mean multiplying rather than repeated addition. When using electronic aids, it is efficient to use available operations and functions, for example memory and constant functions on a calculator, or to use the 'sum' formula in a spreadsheet for a range of cells, rather than adding up individual cells.

**electronic aid**

A tool for calculating, for example a calculator, spreadsheet.

**estimate**

To arrive at an approximate answer by calculating with suitable approximations for numbers or, in measurement, by drawing on previous experience.

**evaluate (an expression)**

To work out the value of an expression by substituting numbers for variables.

**event**

Used in probability to describe the outcome of an action or happening.

**everyday**

Describes numbers, measures, units, instruments, etc that fall within the daily experience of most people in non-specialist contexts.

**evidence**

At all levels, learners have to produce a portfolio of evidence to demonstrate that they have the skills required to satisfy the requirements of the standards. Evidence can include written material, computer printouts, artefacts, audio and/or video recordings, and witness statements/testimony. See also 'portfolio' and 'witness statement'.

**explain**

Give a clear and detailed account or description, including of cause and effect where appropriate. Tends to involve words such as 'so', 'therefore', 'as a result', 'because'. Unless otherwise specified, learners may explain their problem/task, methods, data, results, etc in written or spoken form, or a combination of these.

**expression**

A mathematical statement involving variables written in words or symbols and using operators, for example length x width,  $a \times b$  (or  $ab$ ).

**extended** (period of time)

An extended period of time is likely to be at least three months.

**familiar**

Describes contexts, situations, numbers, measures, instruments, audiences, etc of which the learner has some prior knowledge or experience.

**formula**

Any identity, general rule or mathematical law.

Plural: formulae.

**frequency table**

A table for a set of observations showing how frequently each event or quantity occurs.

**given**

Refers to a task, activity, problem or information that is provided to the learner by the tutor, teacher or trainer, rather than the learner having to find, identify or choose it for themselves.

**graph**

See 'chart'.

**graphics/al**

Graphical material and graphical formats include graphs, charts, diagrams and other ways of visually representing quantitative information.

**grouped data**

Observed data arising from counts and grouped into non-overlapping intervals, for example number of people in different age-groups with intervals 0-9, 10-19, 20-29, 30-39, 40-49, etc.

**image**

Includes models, plans, sketches, diagrams, pictures, graphs and charts. Whatever form the image takes, it must be fit for purpose and must aid understanding of the material being presented.

A 'simple image' might be a picture, sketch or diagram that shows simple information and requires very little if any mathematical interpretation.

**independence/-t/-ly**

Making choices or decisions without consulting a tutor, teacher or trainer in the first instance, though perhaps asking advice or seeking confirmation later. Includes being able to recognise when it is appropriate to ask for advice or seek confirmation.

**information**

In the standards, used together with 'data' to indicate that relevant information may not be in the form of numbers, counts or measurements. See 'data'.

**interpret**

Explain the meaning of, for example, symbols, information, results.

**inverse operations**

Operations that, when they are combined, leave the entity on which they operate unchanged, for example addition and subtraction are inverse operations (for example  $5 + 6 - 6 = 5$ ); multiplication and division are inverse operations (for example  $(6 \times 10)/10 = 6$ ).

**justify**

Explain why the methods used or choices made are appropriate to the task or activity.

**level of accuracy**

See 'accuracy'.

**line graph**

A diagram showing a relationship between two variables.

**mean**

A type of average. The arithmetic mean is the sum of quantities divided by the number of them, for example the arithmetic mean of 5, 6, 14, 15 and 45 is  $(5 + 6 + 14 + 15 + 45) / 5 = 17$ .

**median**

A type of average. The median is the middle number or value when all are arranged in ascending order, for example the median of 5, 6, 14, 15 and 44 is 14. Where there is an even number of values, the arithmetic mean of the two middle values is calculated, for example the median of 5, 6, 7, 8, 14 and 44 is  $(7 + 8) / 2 = 7.5$ .

**mode**

A measure of average - the most frequently occurring value in a set of data.

**multi-stage/multi-step (calculation)**

Where one calculation is used as the basis or starting-point for the next.

**notes**

Notes that are submitted as evidence need not be in continuous prose, and grammar, spelling and punctuation do not have to be perfect, but they must be legible and meaning must be clear. They include completion of a pro forma, where this is appropriate. Where appropriate, notes may be supplemented by a witness statement.

**number bond**

A pair of numbers with a particular total, for example number bonds to ten, all pairs of numbers with the total 10.

**obtain**

Indicates that only limited independence is required when the learner is finding sources of data and information. See also 'collect'.

**pictogram**

A form of representation of data. Suitable pictures/symbols/icons are used to represent objects. For large numbers, one symbol may represent a number of objects and a part symbol then represents a rough proportion of the number.

**pie chart**

A form of representation of data. A circle is divided into sectors. The frequency or amount of each quantity is proportional to the angle at the centre of the circle.

### **portfolio**

A portfolio is a file, folder or other means of storing and presenting the evidence that the learner is submitting for final/summative assessment. It may include a variety of types of evidence, for example written, video, audio, artefact, and may be in hard copy, e-based (often referred to as an e-portfolio), or a combination of these.

### **positional vocabulary**

Words that indicate relative position, for example right, left, above, below.

### **present (verb)**

Unless otherwise specified in the standards, learners may present the results of their work in written or spoken form, or a combination of these.

### **probability**

The likelihood of an event happening. Probability is expressed on a scale from 0 to 1. Where an event cannot happen, its probability is 0; where it is certain, its probability is 1. The probability of scoring 1 with a fair die is  $1/6$ .

### **problem**

A problem exists when there is a need to bridge a gap between a current situation and a desired situation. The problem may be a 'do-it' problem, which involves planning to achieve a desired result in the future, or a 'fix-it' problem, where the present situation is undesirable and needs to be put right.

- **sub-problem**

At Level 3 and Level 4, a problem must be sufficiently complex that the learner has to identify its sub-problems and tackle each one as a separate task if the overall problem is to be solved.

### **property**

Any attribute, for example a property of a square is that all its sides are equal.

### **proportion**

Includes percentage, fraction, decimal, ratio.

### **purpose**

Evidence must be generated in the context of a task or activity that satisfies some purpose in the learner's work or leisure. Evidence that is collected simply to satisfy the requirements of the learner's portfolio is not purposeful and does not meet the assessment requirement.

**quadrilateral**

A polygon with four sides and four interior angles.

**range**

- Refers to three or more methods, sources, options, etc
- A measure of spread in statistics. The difference between the greatest and the least in a set of numerical data.

**ratio**

A comparison of quantities of the same kind, written a:b, for example a mixture made up of two ingredients in the ratio 3:1 is 3 parts of the first ingredient to 1 part of the second; the first ingredient makes up  $\frac{3}{4}$  of the total mixture, the second makes up  $\frac{1}{4}$  of the total.

**read**

In the context of Application of Number, the term 'read' refers to obtaining meaning from symbols, numbers, diagrams, graphs, etc. It may not require the ability to read continuous text, though this is more likely to be necessary at Level 2 and Level 3.

**recording document**

Any document, log, diary, etc that is used to keep a record of the actions, steps or stages completed in carrying out a task or activity. The document may be a pro forma provided by a tutor, teacher or trainer or may be created by the learner but it must be fit for purpose.

**round (verb)**

To express a number or measurement to a required degree of accuracy, for example 537 rounded to the nearest 10 is 540.

**scale**

The ratio between the size of something real and the size of a representation of it.

**select**

Choose, using criteria appropriate to task.

**sequence**

A succession of terms formed according to a rule. There is a definite relation between one term and the next and between each term and its position in the sequence, for example 1, 4, 9, 16, 25, etc.

**simple**

Describes data, information, diagrams, charts, graphs, images etc that make limited demands on the learner, for example small whole numbers, numbers that are easy to work with (for example multiples of 2, 5, 10, 100), uncomplicated representations of limited amounts of data.

**sources**

May be primary (ie created/collected by the learner) or secondary, for example sourced from other people, printed material, electronic material, the internet, broadcasts etc. The range and complexity of sources will increase as the level of demand of a problem or task increases through the levels.

**standard unit**

Units that are agreed throughout a community, for example the metre is a standard unit of length. Non-standard units are, therefore, those that are not widely agreed, for example pace, cupful.

**step**

A purposeful action taken in the context of carrying out a task.

**straightforward**

Describes information, subjects and materials that learners often meet in their work, studies or other activities. See also 'simple'.

**sub-problem**

See 'problem'.

**substitute**

To assign a value to a variable.

**symbol**

- Letter, numeral, figure or other mark that represents a number, an operation or another mathematical idea, for example V (Roman symbol for five); > (is greater than).
- A design or motif, for example on a notice or piece of equipment, that informs the 'reader' of content or meaning, for example the symbol for radio-activity, the symbol for high-voltage electricity.

**system (of measure)**

An agreed system of measure in which units are defined and in a fixed relationship to each other, for example metric, imperial.

**table**

An orderly arrangement of information, numbers or letters, usually in rows and columns.

**tackle**

Emphasises that, at this first stage, the learner is confirming or planning their approach to the problem or task, and that this approach will not necessarily solve it.

**tally (make)**

Marks to represent objects counted.

**task**

A task is purposeful and complete in itself. It may involve more than one step. See also 'activity'.

**tolerance**

Variation in measurement that is acceptable in the context.

**valid**

Valid evidence is evidence that gives a true picture of the work of the learner and is directly relevant to the required standard.

**volume**

A measure in three-dimensional space, measured in cubes, for example cubic centimetres ( $\text{cm}^3$ ), cubic metres ( $\text{m}^3$ ).

**weight**

The force with which a body is attracted towards the earth's centre. In non-scientific contexts, often used synonymously with mass (though technically different). Metric units of weight include kilogrammes (kg) and grammes (g).

## **witness statement**

A statement (sometimes called ‘witness testimony’) that confirms that the learner has demonstrated the skills in question (for example describing the methods they have used) at the required standard. The statement must be signed by a competent person, ie a person who was present when the learner demonstrated their competence and who is, in the opinion of the assessor, capable of making a reliable, fair and unbiased judgment in relation to the required standard.

Where used, a witness statement should include the date, the name, signature and contact details of the witness, and details of the context in which the observation took place. There must also be a very short note of the witness’s role, for example workplace supervisor, geography teacher, youth group leader.

The assessor must confirm the authenticity and the validity of a witness statement; they may need to confirm with the witness that the statement is genuine and to check that the witness understands the requirements of the standard.

A witness statement must not be the sole form of evidence that a learner has achieved the standard.

Publication code FC025966 January 2011

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