**Qualifications and
Curriculum Authority**

Functional skills standards: mathematics

Contents

Introduction

The term 'functional' should be considered in the broad sense of providing learners with the skills and abilities they need to take an active and responsible role in their communities, in their everyday life, workplace and in educational settings. Functional mathematics requires learners to be able to use mathematics in ways that make them effective and involved as citizens, able to operate confidently in life and to work in a wide range of contexts.

The aim of the mathematics standards is to encourage people to demonstrate their mathematical skills in a range of contexts and for various purposes. They are essentially concerned with developing and recognising the ability of learners to apply and transfer skills in ways that are appropriate to their situation.

They are written to be sufficiently flexible to be interpreted in a variety of contexts, for example, in school and workplace settings, and by a range of users. They provide the framework for assessment, rather than the detail, and as such need to be relatively context-free.

Functional skills: mathematics

For mathematics to be useful, learners must have the skills and confidence to apply, combine and adapt their mathematical knowledge to new situations in their life and work. They need the capacity to identify and understand the role that mathematics plays in the world and use mathematics in ways that enable them to function as effective citizens and benefit them in life and work.

The **standards** are structured in two sections: process skills and levels (entry 1 to level 2)

Functional mathematics: process skills

Fundamental to individuals being able to use mathematics effectively in life and work is their ability to understand and make sense of mathematical information, to use and process that information, to interpret and analyse the results of their activity and to present this to others. These process skills form the basis of the functional skills standards for mathematics and apply at all levels.

These are the underpinning skills that are needed to be functional in mathematics. Developing these skills will provide the tools that learners will need in order to tackle situations involving mathematics in life and work. Process skills enable learners to:

- understand a situation

- choose an approach to tackle the problem

- formulate a model using mathematics

- use mathematics to provide answers

- interpret and check the results

- evaluate the model and approach

- explain the analysis and results

- apply and adapt this experience in other situations as they arise.

The key attributes of these process skills are presented below and should provide the framework for the delivery, development and assessment of functional mathematics.

Representing	Analysing	Interpreting
Making sense of situations and representing them	Processing and using the mathematics	Interpreting and communicating the results of the analysis
A learner can:	A learner can:	A learner can:
- recognise that a situation has aspects that can be represented using mathematics - make an initial model of a situation using suitable forms of representation - decide on the methods, operations and tools, including ICT, to use in a situation - select the mathematical information to use	- use appropriate mathematical procedures - examine patterns and relationships - change values and assumptions or adjust relationships to see the effects on answers in the model - find results and solutions	- interpret results and solutions - draw conclusions in the light of the situation - consider the appropriateness and accuracy of the results and conclusions - choose appropriate language and forms of presentation to communicate results and conclusions

Functional mathematics: level differentiation

This section identifies the level at which a learner would be expected to apply the process skills and includes an indication of the performance, knowledge and scope required at each level. Levels relate to the complexity of a situation, the difficulty and range of mathematical techniques required to make sense of it, and the analysis and communication of findings. At each level, these build on and subsume the skills identified at the level(s) below. Levels are differentiated by the following:

- **Complexity**. Real-world situations, as they arise, are often quite complex. Identifying the separate areas of knowledge needed to tackle a situation, the steps needed to solve the problem and the accessibility of the problem itself (routine or non-routine) determine the level of complexity.

- **Familiarity**. This reflects the extent to which a problem or situation requires an individual to transfer skills and understanding developed in other contexts to relate and apply these to make sense of a new situation. In 'transferring' skills and understanding, the individual may need to adapt or extend these in order to tackle the problem effectively.

- **Technical demand**. This reflects the range of knowledge, skills and techniques that an individual is required to draw on in order to tackle a problem. These are defined in various ways, for example, in the national curriculum levels. This may vary from a simple calculation to a thorough analysis of a practical situation.

- **Independence**. This relates to the level of autonomy that learners apply to tackling a problem at each stage. It is closely related to a learner's ability to apply problem solving skills so that at higher levels he or she can demonstrate the ability to select and apply mathematical skills independently.

Entry level

The context is very familiar and accessible to the learner. The mathematics demanded by the situation or problem are simple, clear and routine. The techniques and procedures required would be specific to the situation or problem. Guidance and direction are provided.

Level 1

The context may be less familiar than at entry level but is accessible to the learner. The mathematics demanded are clear but with some non-routine aspects to the situation or problem. Methods and procedures may require selection and an organised approach. Models would need to be selected and adapted. Guidance is provided but autonomous decisions are required to find solutions.

Level 2

In some respects, the context is unfamiliar to the learner and the situation or problem would need to be identified. The mathematics demanded may not be obvious in all situations and there will be non-routine aspects to the situation or problem. Methods may involve several steps and require identification of underlying mathematical structures and ways of describing them. Guidance may be provided but choices are independently made and evaluated.

Entry 1

The standard at entry 1 is underpinned by the process skills of representing (making sense of situations and representing them), analysing (processing and using the mathematics) and interpreting (interpreting and communicating the results of analysis).

Performance	Coverage/range
	Content and skills are equivalent to national curriculum mathematics level 1 and the adult numeracy standards at entry 1
Learners can: • understand simple mathematical information in familiar and accessible contexts and situations • use given methods and standard models to obtain answers to simple given practical problems that are clear and routine • generate results that make sense to a specified task • describe solutions to simple given practical problems in familiar contexts and situations	Learners can: • understand and use numbers up to 10 • use everyday language to describe the properties of size and measure including length, width, height and weight, and make simple comparisons • use everyday language to describe position • recognise and select coins and notes • recognise and name common 2D and 3D shapes • sort and classify objects using a single criterion • show an awareness of uncertainty

Entry 2

The standard at entry 2 is underpinned by the process skills of representing (making sense of situations and representing them), analysing (processing and using the mathematics) and interpreting (interpreting and communicating the results of analysis).

Performance	Coverage/range
	Content and skills are equivalent to national curriculum mathematics levels 1–2 and the adult numeracy standards at entry 2
Learners can: • understand simple practical problems in familiar and accessible contexts and situations • use basic mathematics to obtain answers to simple given practical problems that are clear and routine • generate results to a given level of accuracy • use given checking procedures • describe and explain solutions to simple given practical problems in familiar contexts and situations	Learners can: • understand and use whole numbers to 100 and count reliably up to 20 items • understand and use addition/subtraction in practical situations • understand and use multiplication in practical situations, where necessary using repeated addition to calculate • complete calculations using whole numbers • understand and use halves and quarters and find halves and quarters of small numbers of items • recognise and use familiar measures including time and money • recognise sequences of numbers including odd and even numbers • read simple scales to the nearest labelled division • use properties of simple 2D and 3D shapes • extract information from simple lists • record results

Entry 3

The standard at entry 3 is underpinned by the process skills of representing (making sense of situations and representing them), analysing (processing and using the mathematics) and interpreting (interpreting and communicating the results of analysis).

Performance	Coverage/range
	Content and skills are equivalent to national curriculum mathematics levels 1–3 and the adult numeracy standards at entry 3
Learners can • understand practical problems in familiar and accessible contexts and situations • begin to develop own strategies for solving simple problems • select and apply mathematics to obtain answers to simple given practical problems that are clear and routine • interpret and communicate solutions to practical problems in familiar contexts and situations • use simple checking procedures	Learners can: • understand and use whole numbers to 1,000 • complete written calculations with two-digit numbers • add and subtract using three-digit numbers • solve whole number problems involving multiplication and division • use mental recall of multiplication tables 2, 3, 4, 5 and 10 • round to the nearest 10 or 100 • understand and use simple fractions • understand decimals to two decimal places in practical contexts • recognise and describe number patterns • understand, estimate, measure and compare length, capacity, weight and temperature • complete simple mental calculations involving money and measures • recognise, name and draw simple 2D and 3D shapes • use metric and imperial units in everyday situations • extract and use information from lists, tables, simple charts and simple graphs and make comparisons of this information • check accuracy of calculations and results • present findings to make sense to others

Level 1

The standard at level 1 is underpinned by the process skills of representing (making sense of situations and representing them), analysing (processing and using the mathematics) and interpreting (interpreting and communicating the results of analysis).

Performance	Coverage/range
	Content and skills are equivalent to national curriculum mathematics levels 1–4, the adult numeracy standards and the application of number key skill, level 1
Learners can: • understand practical problems in familiar and unfamiliar contexts and situations, some of which are non-routine • identify and obtain necessary information to tackle the problem • select and apply mathematics in an organised way to find solutions to practical problems for different purposes • use appropriate checking procedures at each stage • interpret and communicate solutions to practical problems, drawing simple conclusions and giving explanations	Learners can: • understand and use whole numbers and recognise negative numbers in practical contexts • add, subtract, multiply and divide whole numbers using a range of mental methods • multiply and divide whole numbers by 10 and 100 using mental arithmetic • understand and use equivalences between common fractions, decimals and percentages • add and subtract decimals up to two decimal places • solve simple problems involving ratio, where one number is a multiple of the other • use simple formulae expressed in words for one- or two-step operations • solve problems requiring calculation, with common measures including money, time, length, weight, capacity and temperature • convert units of measure in the same system • work out areas, perimeters and volumes in practical situations • construct models and draw shapes measuring and drawing angles and identifying line symmetry • extract and interpret information from tables, diagrams, charts and graphs • collect and record discrete data and organise and represent information in different ways • find mean and range • use probability to show that some events are more likely to occur than others • understand outcomes, check calculations and explain results

Level 2

The standard at level 2 is underpinned by the process skills of representing (making sense of situations and representing them), analysing (processing and using the mathematics) and interpreting (interpreting and communicating the results of analysis).

Performance	Coverage/range
	Content and skills are equivalent to national curriculum mathematics levels 1–6, the adult numeracy standards and application of number key skill, level 2
Learners can • understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations • identify the situation or problem and the mathematical methods needed to tackle it • select and apply a range of mathematics to find solutions • use appropriate checking procedures and evaluate their effectiveness at each stage • interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations • draw conclusions and provide mathematical justifications	Learners can: • understand and use positive and negative numbers of any size in practical contexts • carry out calculations with numbers of any size in practical contexts • understand, use and calculate ratio and proportion, including problems involving scale • understand and use equivalences between fractions, decimals and percentages • add and subtract fractions, add, subtract, multiply and divide decimals to a given number of decimal places • understand and use simple equations and simple formulae involving one- or two-step operations • recognise and use 2D representations of 3D objects • find area, perimeter and volume of common shapes • use, convert and calculate using metric and, where appropriate, imperial measures • collect and represent discrete and continuous data, using ICT where appropriate • use and interpret for discrete and continuous data, using ICT where appropriate, statistical measures, tables and diagrams • use statistical methods to investigate situations • use a numerical scale from 0 to 1 to express and compare probabilities