

Core Skills Framework: an introduction

Numeracy

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Introduction

Core Skills enable people to put their knowledge and understanding into action flexibly, adapting them to new situations. Core Skills apply to a wide range of contexts in education and training, in life, and in work. They underpin and promote the development of learning and study skills, and provide a foundation for lifelong learning and personal development.

The importance of Core Skills is now widely recognised in employment and education. Lifelong learning which builds on people's Core Skills is essential if individuals are to meet their personal needs and the needs of society. In the workplace, employees at every level are increasingly expected to take responsibility for the quality of the products and services they produce or provide. Individuals who can analyse and solve problems, communicate well, use information technology, and work with others effectively, are well-equipped to assume the active, flexible and responsible roles which modern workplaces need.

A wide variety of skills and qualities are developed and used in education and training, in work and in life. Some of these are 'core' to personal development and performance.

First, there are skills for **tackling issues and problems**. These skills include being able to:

- ◆ think critically
- ◆ analyse situations and suggest courses of action
- ◆ plan and organise work and carry it through to completion
- ◆ reflect on what has been done and to draw conclusions for the future

Second, there are skills that are vital in enabling individuals to function effectively. **Communication**, both orally and in writing, is essential for clarifying your own thoughts, for relating to others, and for learning and working. The **numerical skills** involved in processing, interpreting and communicating information can help you to understand, predict and solve many types of problem. Skills in **using information technology** are increasingly useful for obtaining and analysing information, for organising your ideas, and for communicating and working with others. And being able to **work with others** means having skills that help you to co-operate with others in learning and working situations to identify and achieve your shared goals.

The Core Skills

Each Core Skill, and its components, can be assessed at each of five levels (Access 2, Access 3, Intermediate 1, Intermediate 2 and Higher — SCQF levels 2 – 6). This is a brief description of each component and the range activities that its assessment will involve at the different levels.

Communication

Communication skills underpin almost all personal, social, learning and working activity. They are essential in clarifying your thoughts, in interacting and conversing effectively with others, in expressing thoughts and in conveying information, feelings and opinions.

Oral Communication

This component involves the ability to produce and respond to oral communication for a range of purposes and audiences. Essentially, it means being able to take part in discussions and make presentations, interacting with your audience as appropriate. Attainment levels range from:

- ◆ conveying basic information and opinions through short, informal communications on familiar topics
- to:
- ◆ presenting and analysing complex information and issues through more sustained discussions or presentations on complex topics

Written Communication

This component involves the ability to produce and respond to written communication for a range of purposes and audiences. Attainment levels range from:

- ◆ dealing with brief communications expressing a few basic ideas or pieces of information about familiar topics
- to:
- ◆ dealing with communications which analyse and explore complex information and issues

Numeracy

To cope with the demands of everyday life, including work and study, people need to be comfortable with numbers and with graphs, symbols, diagrams and calculators. The skills needed for this are essentially those of interpreting, processing and communicating quantifiable and spatial information.

Using Graphical Information

This component involves the ability to use a range of graphical skills to interpret and communicate quantifiable information. Attainment levels range from:

- ◆ working in familiar contexts with simple specified tables and graphs

to:

- ◆ working in more abstract contexts and with more complex graphical information which may require some analysis, and where decisions have to be made on effective ways to communicate the information

Using Number

This component involves the ability to apply a range of numerical and other relevant mathematical and statistical skills. Attainment levels range from:

- ◆ working confidently with basic numbers in everyday contexts

to:

- ◆ working confidently with more complex numerical concepts and techniques in more abstract contexts

Information Technology

Information Technology is concerned with the electronic collection, organisation, analysis, presentation and communication of information. It encompasses all media types and formats as well as all relevant tools. The Core Skill focuses on the ability to use information technology to process information in a variety of ways which will be useful in work and in the home. It is not about developing IT specialists who will act as first-line support for others or install specialist systems.

Using Information Technology

This component involves the ability to use an IT system to support a range of information-processing activities. Attainment levels range from:

- ◆ accessing the basic facilities of a computer system to perform simple processing of familiar data and to select information from a local database

to:

- ◆ making effective, responsible and secure use of a computer system, using software in a context requiring some analysis and design and retrieving information from a range of sources

Problem Solving

The three components of this skill are stages in the process of tackling issues and problems in personal, social, vocational and occupational contexts. They are often used sequentially, and repeatedly, in a single context. Each skill can also be a major focus of activity on its own.

Critical Thinking

This component involves using analysis and reasoning to make decisions and to create or suggest ideas, courses of action and strategies. Attainment levels range from:

- ◆ working in situations which involve a few, easily-identified factors set in familiar contexts

to:

- ◆ working in more complex situations which require a greater degree of analysis before approaches can be devised

Planning and Organising

This component involves the ability to plan a task, taking account of available resources, and to manage the task to completion. Attainment levels range from:

- ◆ creating plans involving a small number of steps and using familiar resources

to:

- ◆ efficient management of a more complex plan, which may include a review of strategy and a degree of research in identifying the resources to be used

Reviewing and Evaluating

This component involves the ability to reflect on and review the process of tackling issues and problems, to evaluate the Outcomes, and to identify where alternative strategies might have been used. Attainment levels range from:

- ◆ identifying some strengths and weaknesses in a strategy

to:

- ◆ identifying and gathering evaluation evidence, evaluating strategies, and making appropriate recommendations

Working with Others

The inclusion of Working with Others as a Core Skill emphasises its importance in co-operative learning and working situations.

Working with Others

This component involves the ability to work with others to plan, agree and take responsibility for tasks, to support co-operative working in appropriate ways, and to review the effectiveness of one's own contribution. Attainment levels range from:

- ◆ taking allocated responsibility for tasks, seeking or providing information from/to others as required and reviewing one's own contribution

to:

- ◆ analysing tasks and negotiating goals, roles and responsibilities, anticipating and responding to needs of others and evaluating the effectiveness of one's own contribution

Core Skills certification

Since 1999, candidates for a range of SQA qualifications have been able to show what they have achieved in Core Skills. Virtually all Standard Grade candidates should now get a Core Skills profile which will be reviewed each time they achieve a new SQA qualification. There is no need for candidates to achieve all Core Skills, or to complete a Group Award. Their profile will report their Core Skills achievements by component — so Core Skills certification is available to those who do not complete a whole Core Skill. With increasing emphasis being placed on Core Skills in education (including higher education), training and employment, it is important that candidates are given the opportunity to be credited for what they can do.

Candidates can achieve Core Skills through:

- ◆ any Unit or Course which has been audited against the Core Skills framework and validated as fully covering one or more Core Skills component
- ◆ named Core Skills Units

In the former case, certification will be automatic. Neither the centre nor the candidate will need to enter for the Core Skills component — the entry on the Core Skills profile will be generated automatically by SQA when the candidate achieves the relevant Unit or Course.

Named Core Skills Units are available for use by schools, colleges, higher education institutions, training providers, and in the workplace.

All candidates undertaking a Scottish Group Award will have to achieve specified levels of attainment in Core Skills.

Purpose of this document

The remainder of this document provides detailed technical specifications for each Core Skill for use by those designing and auditing Units, Courses, assessment programmes and Group Awards, and by staff of the Scottish Qualifications Authority.

General skill

Apply very simple numerical skills in familiar everyday contexts.

Specific skills

- ◆ recognise and use some basic numerical notation
- ◆ decide on one numerical operation to be carried out
- ◆ carry out very simple numerical calculations

Further information on the general skill

Familiar everyday contexts might involve money, time, length, weight, temperature. The context will involve obvious, given variables which are familiar to the candidate.

Calculations may be carried out mentally, in writing or by calculator. Candidates should check answers in relation to context but evidence of checking is not required.

Further information on the specific skills

The candidate must:

- ◆ use notations for two of the following: whole numbers, simple decimals, simple fractions
- ◆ carry out all of the following calculations — addition, subtraction, simple multiplication and simple division of whole numbers.

Tasks could include:

- ◆ working out very simple financial transactions
- ◆ adding numbers in a group
- ◆ dividing portions of food

General skill

Apply simple numerical skills in everyday contexts.

Specific skills

- ◆ work with basic numerical notation
- ◆ decide on the numerical operations to be carried out
- ◆ carry out simple numerical calculations

Further information on the general skill

Contexts might involve money, time, length, weight, area, volume, or temperature. Tasks will be familiar and involve only a small number of obvious variables.

Calculations may be carried out mentally, in writing or by calculator. Candidates may give exact or approximate answers as appropriate. Candidates should check answers, although evidence of checking is not required.

Further information on the specific skills

The candidate must:

- use notations for all of the following: whole numbers, decimals, percentages, fractions, simple ratios (eg 1:3, 5:1)
- decide which operations are to be carried out (eg add and multiply) and the order in which to carry them out. At this level, candidates must show that they can carry out calculations involving two operations.
- carry out all of the following calculations — addition, subtraction, multiplication, division
- carry out calculations involving one of the following: whole number percentages, unitary fractions (eg $\frac{3}{4}$), simple formulae in words

Examples of tasks might include:

- ◆ calculating a floor area
- ◆ calculating the effect of a 10% pay rise
- ◆ calculating total working hours needed for a task
- ◆ expressing the pattern of tables and chairs in a room in a formula such as ‘Number of seats is the number of tables plus two’

General skill

Apply a range of straightforward numerical skills in everyday contexts.

Specific skills

- ◆ work confidently with basic numerical notation
- ◆ decide on the numerical operations to be carried out
- ◆ carry out straightforward calculations

Further information on the general skill

Contexts might involve money, time (including the 24 hour clock), length, weight, area, volume, or temperature.

Calculations may be carried out mentally, in writing or by calculator. It is assumed that candidates will be able to add, subtract, multiply and divide but evidence of all of the basic operations is not required. Candidates will round answers to a given degree of accuracy (eg to two decimal places or three significant figures). Candidates should check answers, although evidence of checking is not required.

Further information on the specific skills

The candidate must:

- ◆ use notations for all of the following: whole numbers, decimals, percentages, fractions, simple ratios (eg 1:3, 5:1)
- ◆ decide which operations are to be carried out (eg add and multiply) and the order in which to carry them out. At this level, candidates must show that they can carry out calculations involving three operations
- ◆ carry out calculations with whole numbers and decimals
- ◆ carry out calculations involving two of the following: percentages, fractions, simple ratios, simple formulae in symbols

Examples of tasks might include:

- ◆ calculating the volume required to store a defined weight of a product
- ◆ calculating the ratio of male to female in a group
- ◆ mileage calculations for travel expenses
- ◆ using a formula such as $f=ma$

General skill

Apply a wide range of numerical skills in everyday and generalised contexts.

Specific skills

- ◆ work confidently with a numerical concept
- ◆ decide on the numerical operations to be carried out
- ◆ carry out complex calculations or a number of sustained calculations

Further information on the general skill

Tasks may be set in unfamiliar contexts where the relevant facts and their importance need to be clarified or in more familiar contexts where a general or theoretical approach is needed.

Calculations may be carried out mentally, in writing or by calculator. It is assumed that candidates will be able to add, subtract, multiply and divide whole numbers and decimals, and to work with fractions, percentages and ratios as appropriate, but evidence of all of these is not required. Candidates will round answers to an appropriate degree of accuracy (eg to two decimal places or three significant figures). Candidates should check answers, although evidence of checking is not required.

Further information on the specific skills

The candidate must:

- ◆ solve problems involving one numerical or statistical concept (eg negative numbers, quantitative and qualitative data, discrete and continuous data, numbers represented by symbols, or a statistical concept such as range)
- ◆ decide which operations are to be carried out and the order in which to carry them out. At this level, candidates must show that they can carry out calculations involving four operations
- ◆ carry out a number of sustained calculations or at least one complex calculation (eg a calculation involving scientific indices, or a complex statistical calculation such as calculating standard deviation)

Examples of tasks might include:

- ◆ calculating annual profit and loss from monthly returns
- ◆ in an engineering context, dealing with an example involving the relationships between work done, force and distance
- ◆ using a number line or working with sub-zero temperatures

General skill

Apply in combination a wide range of numerical, statistical and other mathematical skills to process complex information in generalised contexts.

Specific skills

- ◆ work confidently with a numerical or statistical concept
- ◆ decide on the steps and operations to be carried out
- ◆ carry out a number of sustained, complex calculations

Further information on the general skill

Tasks may involve unfamiliar contexts where the relevant facts and their importance need to be clarified. Generalised contexts include situations where the candidate has to deal with problems in a more general way, or at a more theoretical level, eg by creating a model of a situation.

Calculations may be carried out mentally, in writing or by calculator. It is assumed that candidates will be able to add, subtract, multiply, divide whole numbers and decimals, and to work with fractions, percentages and ratios as appropriate but evidence of all of these is not required. Candidates will round answers to an appropriate degree of accuracy (eg to two decimal places or three significant figures). Candidates should check answers, although evidence of checking is not required.

Further information on the specific skill

The candidate must:

- ◆ solve problems involving one numerical or statistical concept (eg relationships in symbolic form, negative numbers, quantitative and qualitative data, discrete and continuous data, numbers represented by symbols, or statistical concepts such as standard deviation or confidence limits)
- ◆ decide which steps are to be carried out and the order in which to carry them out. At this level, candidates must show that they can carry out calculations involving five steps. Some of these steps might involve more than one numerical operation.
- ◆ carry out sustained, complex calculations (eg use of formulae in symbolic form, calculations using indices (scientific notation), calculation of standard deviation, manipulation of symbols, addition/subtraction/multiplication/division of fractions)

Examples of tasks might include:

- ◆ calculations involving complex financial data
- ◆ in an engineering context, calculating relationships between kinetic energy, mass and speed
- ◆ using a number line or working with sub-zero temperatures
- ◆ distinguishing between quantitative and qualitative data in surveys

General skill

Read and use very simple graphical information in familiar everyday contexts.

Specific skills

- ◆ read and use a very simple scale
- ◆ identify information in very simple tables
- ◆ identify information in very simple diagrams
- ◆ communicate information in very simple tables and diagrams with support

Further information on the general skill

Familiar everyday contexts might involve calendars, work timetables or schedules or transport timetables — the candidate should be able to work in such contexts with support.

Tables and diagrams should be designed for the candidate to complete with support as required.

Further information on the specific skills

The candidate must:

- ◆ read and use a very simple scale, on which every division is numbered
- ◆ use a familiar measuring instrument to measure to the nearest marked number *or* use the scale on a graph to determine quantities to the nearest marked number
- ◆ identify information from a very simple table containing one category of information
- ◆ identify information from a very simple diagram (eg a diagram of very simple 2D shapes such as squares or rectangles, a very simple diagram of furniture in a room or a very simple map)
- ◆ communicate information by inserting information to complete partially completed tables and diagrams

Examples of tasks might be:

- ◆ measuring with a ruler, metre stick or tape measure
- ◆ weighing ingredients with household scales
- ◆ taking the temperature of a room with a thermometer
- ◆ finding bus departure times from a table showing one destination
- ◆ finding the price of components from a table showing prices for different sizes of one item
- ◆ identifying local places on a street plan

General skill

Interpret and communicate simple graphical information in everyday contexts.

Specific skills

- ◆ read and use a simple scale
- ◆ extract information from three of the following: simple tables, graphs, charts or diagrams
- ◆ communicate information in simple tables, graphs, charts or diagrams as appropriate

Further information on the general skill

Timetables or schedules, catalogue or brochure tables, or distance/time graphs would provide suitable contexts.

Tables, graphs, charts and diagrams should be selected and designed for the candidate to complete. In the case of a graph involving a scale, the scale should be given. Communication in simple diagrams should only involve two dimensional shapes.

Further information on the specific skills

The candidate must:

- ◆ read and use a simple scale on which the unnumbered divisions are clear (eg a scale with 0 and 10 labelled and five subdivisions)
- ◆ use the scale on a measuring instrument to measure to the nearest marked number *or* use the scale on a graph to determine quantities to the nearest marked number
- ◆ extract information from three of the following:
 - a simple table containing two categories of information
 - a simple chart, (eg a bar or pie chart)
 - a simple graph (eg a line graph with a simple scale)
 - a simple diagram (eg a diagram of a 2D shape, a 2D representation of a familiar 3D shape, nets of cube and cuboid, a simple map)
- ◆ communicate information by inserting information to complete partially completed tables, graphs, charts or diagrams

Examples of tasks might be:

- ◆ measuring with a ruler, metre stick or tape measure
- ◆ calculating the cost of postage from a table showing the cost of posting packages of different weights by first or second class
- ◆ specifying a popular destination from a simple chart
- ◆ drawing a simple map
- ◆ completing a fuel consumption chart for cars

General skill

Interpret and communicate straightforward graphical information in everyday contexts.

Specific skills

- ◆ read and use a straightforward scale
- ◆ extract information from straightforward tables, graphs, charts or diagrams
- ◆ communicate information in straightforward tables, graphs, charts or diagrams as appropriate

Further information on the general skill

Work timetables or schedules, transport timetables or distance/time graphs would provide suitable contexts. It is assumed that the candidate will be familiar with the range of common forms of tables, graphs, charts and diagrams in everyday use, but evidence of each of these is not required.

The form in which the candidate will communicate information should be specified for the candidate.

Further information on the specific skills

The candidate must:

- ◆ read and use a straightforward scale with all main divisions numbered and requiring a minimal amount of interpolation.
- ◆ use a measuring instrument to measure to the nearest marked division *or* use the scale on a graph to determine qualities to the nearest marked division.
- ◆ interpret information from at least one of the following:
 - a table containing three or four categories of information
 - a chart (eg a bar or pie chart)
 - a graph (eg a line graph) with a straightforward scale
 - a straightforward diagram eg simple circuit diagram, food web, a 2D representation of 3D shapes, a map)
- ◆ communicate information in tables, graphs, charts or diagrams

Examples of tasks might be:

- ◆ measuring ingredients by volume
- ◆ making recommendations by pricing a business trip using a table showing prices according to the date of departure, hotel chosen, length of stay
- ◆ interpreting a distance/time line graph to explain that when the line is horizontal the vehicle is at rest
- ◆ producing a simple circuit diagram or map

General skill

Interpret and communicate graphical information in everyday and generalised contexts.

Specific skills

- ◆ interpret information from tables, graphs, charts or diagrams
- ◆ select an appropriate form of tables, graphs, charts or diagrams and communicate information in that form

Further information on the general skill

The candidate should interpret information which has either been presented as a number of related, straightforward forms or in one complex form. Interpreting information must go beyond simply extracting information and includes, where appropriate, interpolation and extrapolation.

The candidate will be familiar with a range of common graphical forms, and must choose an appropriate form in which to convey information.

Further information on the specific skills

The candidate must:

- ◆ interpret information presented in a complex graphical form (eg qualitative graphs; graphs where part of the axis has been omitted; histograms; stem and leaf chart; graphs showing concepts/relationship such as cumulative frequency or complex variables)
- or:
- ◆ interpret information from a series of straightforward, interconnected tables, graphs, charts or diagrams
 - ◆ communicate information in an appropriate form using tables, graphs, charts or diagrams

Examples of tasks might be:

- ◆ estimating future consumable needs from a project time plan
- ◆ calculating acceleration from a velocity/time graph
- ◆ calculating the number in a specific age group from a population pyramid
- ◆ producing a histogram showing customer breakdown by age, gender and income bracket

General skill

Apply a wide range of graphical skills to interpret and present complex information in generalised contexts.

Specific skills

- ◆ analyse and interpret complex graphical information
- ◆ select an appropriate form of table, graph, chart, diagram or qualitative form and communicate information in that form

Further information on the general skill

The candidate should analyse and interpret information which has been presented in complex graphical forms (eg statistical data in graphical format).

The candidate will be familiar with a range of common graphical forms, and must choose an appropriate form in which to convey information. The form may be qualitative (eg a graph with no scales on the axes showing a relationship or trend).

Further information on the specific skills

The candidate must:

- ◆ identify significant features in complex graphical information (eg patterns, discontinuities, rates of change, turning values, relationships between variables) and interpret these in relation to the underlying variables
- ◆ communicate information in an appropriate form (eg table, line graph, bar chart, pie chart, stem and leaf chart, histogram, diagram or qualitative form such as a graph with no scale on the axes)

Examples of tasks might be:

- ◆ using socio-economic information from a census to estimate market potential for a product
- ◆ interpreting data on share prices from stock exchange results
- ◆ reading weather maps
- ◆ producing a series of charts to demonstrate staff turnover rates for different levels of staff