

NUMERACY
SCQF Level 4
40 Hour Unit

CORE SKILLS UNIT

ASSESSMENT SUPPORT PACK

Part 1: Information for tutors

What is involved?

Numeracy at SCQF level 4 is about applying straightforward numerical skills in personal, workplace, social and educational situations which involve graphical information and calculations. The focus of the Unit is on transferable numeracy skills:

- ◆ numerical calculations
- ◆ measuring
- ◆ understanding graphs, tables, charts and diagrams
- ◆ producing graphs, tables, charts and diagrams

The Unit is designed for delivery in schools, colleges, workplaces, community and other learning environments.

At this level, learners have to use numerical skills, read straightforward scales, interpret graphical forms and communicate straightforward information graphically in everyday contexts.

Learner motivation can be maximised by making the numeracy activities as relevant as possible to the learner's likely uses for numeracy. The activities should be drawn from the learner's personal, workplace, social or educational situation. Additionally, integration of the numeracy activities with those of other SQA qualifications being undertaken should be explored. For example, when a learner is undertaking other National Qualifications, motivation for numeracy can be increased if the activities are related to these National Qualifications and the learner can see the direct relevance of the numeracy. If you do decide to adopt this approach, separate records of assessment decisions must be kept for this Unit and evidence for this Unit should be clearly accessible.

Assessment and evidence

Learners at this level should work with straightforward measuring instruments, graphical information and numbers in familiar situations.

You should try to identify naturally-occurring opportunities for assessment where possible. For learners who are also working towards vocational Units or subject specific Units, opportunities for assessment of graphical or numerical skills could arise while completing tasks which provide evidence for both the vocational/subject specific Unit and this Unit. Some of the exemplars in this pack could be used or contextualised for this purpose.

Assessment is likely to be by one or more of:

- ◆ written tasks
- ◆ oral questioning
- ◆ observation

Assessment of the Unit should be based as far as possible on the everyday activities of the learner. You can find guidance on suitable assessment activities in Part 2 of this pack.

When you are assessing by observation, it is essential to keep a detailed checklist. When you are assessing by oral questioning, you must keep a copy of the questions asked and the answers given.

All items of evidence must be signed and dated by you.

Part 3 of this pack supplies exemplar forms which you can use to record successful completion of each of the Unit tasks. You can sign and date these as the learner achieves each task to keep a record of the learner's progress.

Planning

You should work out where opportunities for meeting the standard are likely to arise. Where possible this should be built into the assessment process. You should discuss this assessment process with the learners so that they are quite clear about what is expected from them.

Guidance on the Unit

What learners need to know or be able to do

The Unit states that on completion the learners will know how to:

- ◆ use notation for the following: whole numbers, decimals, percentages, fractions and ratios
- ◆ decide which calculations need to be carried out and in what order to solve numerical problems (eg add, then multiply)
- ◆ carry out calculations involving the following: whole numbers, decimals, percentages, fractions and ratios
- ◆ round answers to a specified number of decimal places (eg 2.465 is 2.47 to two decimal places)
- ◆ read and use a scale on an instrument (eg a ruler, metre stick, thermometer) or on a graph to make measurements to the nearest marked un-numbered division.
- ◆ extract and interpret information from at least ONE of the following, a table, a chart, a graph, or a diagram
- ◆ select one appropriate graphical form and use it to communicate information

You can break the Unit down into three areas:

- ◆ numerical calculations
- ◆ measuring
- ◆ extracting and communicating graphical information

These three areas are explained individually below and additional information from the Unit is included.

Numerical Calculations

Learners must be able to recognise and use common notation of whole numbers, decimals, percentages, fractions and ratios. Examples need only be as complex as: 153, 1.875, 35%, $\frac{5}{8}$ 2:3 and 5:2.

When giving the result of a calculation, they should be able to express the answer to a given degree of accuracy, such as rounding to a specified number of decimal places.

Calculations will consist of a combination of the basic arithmetic operations. The particular combination may not be obvious without taking time to inspect the problem. The learners should be guided to think clearly about which operations are required and the order of carrying them out. Situations requiring two to four operations are appropriate.

It may be that you wish to use a formula in a calculation. The learners should be able to deal with a simple formula expressed in symbols.

It is not appropriate to deliver the numeracy skills abstractly. You are encouraged to make all the learning as relevant to the learner's personal situation as possible

You should note the following general points from the Unit. The learners:

- ◆ can carry out the calculations mentally, in writing, using a calculator or using another electronic device eg a computer
- ◆ are allowed to give exact or approximate answers as appropriate
- ◆ are encouraged to check their answers, although evidence of this checking is not required

Regarding the final point, you should get the learners to think of ways to make a simple check on their numeracy calculations. It is not strictly part of the assessment but it is good learning and teaching practice to ensure that the learners have some confidence in their own calculations. This can be reinforced during feedback sessions following unsuccessful completion of assessments.

It is assumed that the learners are able to carry out the four basic arithmetic operations of addition, subtraction, multiplication and division. However, evidence of all four is not required

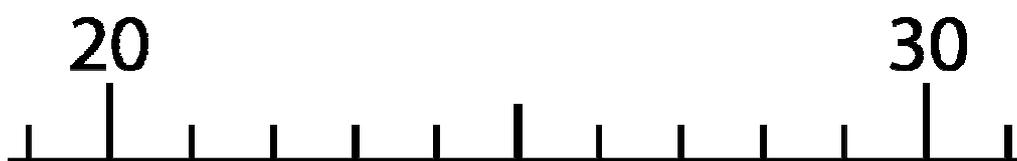
Measuring

Learners should be familiar with the units used in their measurements.

Learners may make measurements from scales on a measuring instrument or the axis of a graph.

The Unit is specific on the nature of the scale to be used. Since the learner has to make measurements to the nearest marked un-numbered division.

A suitable scale is that of a thermometer with numbered divisions marked every ten degrees as shown below. The degrees are shown by marked un-numbered divisions. Learners must be able to measure to the nearest degree.



You will need to show the learners how to measure to the nearest division using the convention that if the reading appears exactly half way between two divisions, the higher value is used.

It is important to note that this Unit is based on using instruments with analogue scales. Digital readouts are not acceptable.

Extracting and communicating graphical information

At SCQF level 4, learners are required to make a choice of graphical form (table, graph, chart and diagram) to represent the information. The learners should understand how to create the graphical forms and know the appropriate applications for each.

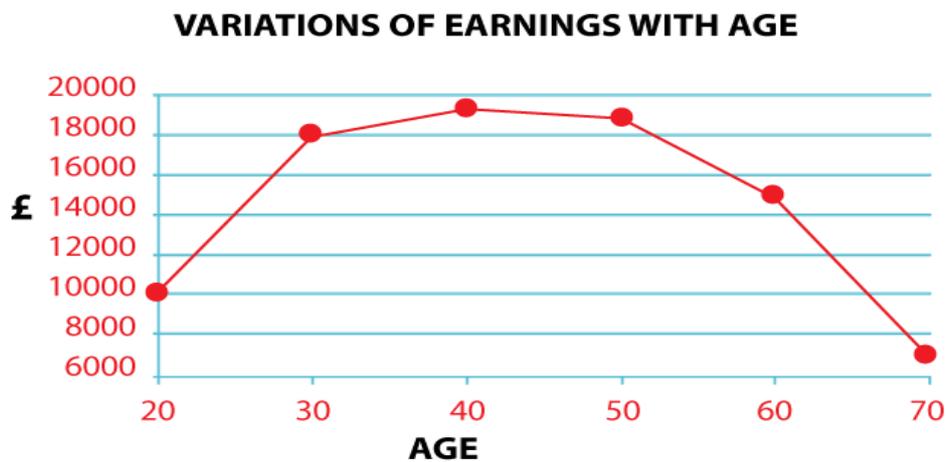
Learners can create or complete the graphical forms by hand or using computer software, so long as they understand the underlying concepts. You may want to check this by questioning them.

When extracting information from graphical forms, they are also expected to interpret it. This is likely to be achieved when the learners have to read more than one value and then have to make an observation or further calculation.

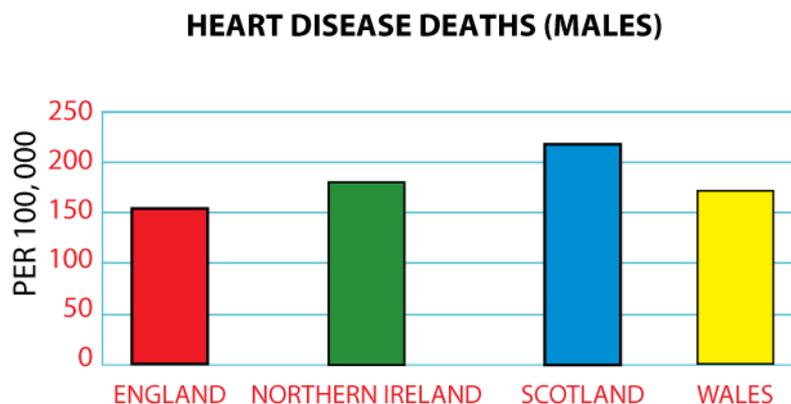
Tables are a general-purpose method of displaying numerical information graphically. There is a clear relationship between the columns. For SCQF level 4, tables are restricted to three or four columns. The example below, illustrating the variation in room prices for a hotel throughout the year, is made up of four columns.

Hotel Prices by room and time of year			
Period	Single room	Twin room	Family room
1st Jan — 31st Mar	£40	£60	£70
1st Apr — 15th Jun	£50	£75	£85
16th Jun — 30th Sep	£60	£90	£100
1st Oct — 31st Dec	£55	£80	£90

Line graphs are used, strictly speaking, to show continuously varying information. However, sometimes, they are used to display discrete but ordered information. This type of graph is often used to show trends and thus the X axis is usually a time axis. It is important to place markers on the graph line showing the data points. Also the learners must understand that it is only valid to extract information at these data points and not in between. The example below illustrates the way in which average income varies with age.

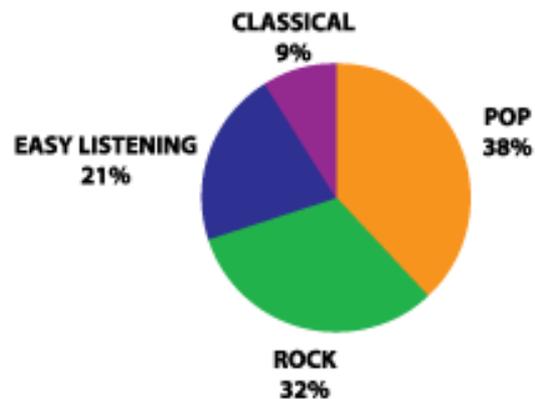


Bar charts are used to give a snap shot comparison of values. These are usually values of different but related quantities. The example below compares death from heart disease in males in the four nations of the UK.



Pie charts are very useful at showing the proportions making up a whole. A good indication that a pie chart can be used is if the information to be presented is in the form of percentages adding up to 100%. The example below shows the proportions of CDs sold by music genre.

CD SALES BY MUSIC TYPE



Diagrams are best used to show information which consists of spatial relationships or physically connected items. An example would be a layout plan of a living room where three-dimensional shapes are represented in two dimensions. Other possibilities are maps or circuit diagrams.

Gathering evidence

It may be appropriate for you to gather written evidence produced by the learners while carrying out the practical activities. However, written evidence is not essential for this Unit and is inappropriate if it disadvantages the learners. You may wish instead to observe the learner carrying out a task and question them on completion. This requires you to create and complete record sheets comprising a checklist, questions asked and learner responses.

From the learner's point of view, it is very useful to be provided with a means of keeping all the work relevant to this Unit together. You can help here by creating and providing the learner with a workbook which includes all the evidence gathering items. An alternative is to provide worksheets which can be made into a paper-based or e-portfolio.

If you have chosen to integrate the numeracy work with that of other Units being undertaken by the learner, it may be possible to assess the numeracy as part of a larger single activity. In this case you must keep separate records for this Unit.

The Unit requires learners to carry out numeracy tasks which involve:

using numbers, carrying out calculations and drawing conclusions from their answers

- ◆ making measurements with instruments with scales
- ◆ extracting and conveying information using tables, graphs, charts or diagrams

This may be achieved in many ways. Some typical activities might be:

calculating the space required to store a number of standard sized boxes in a storeroom

- ◆ calculating the ratio of males to females, within a particular income bracket, from local council statistics
- ◆ forecasting the cost of electricity for next year, based on bills from last year, and budgeting monthly amounts to cover this
- ◆ pricing a holiday using tables from a travel brochure, according to date of departure, hotel chosen and length of stay

- ◆ measuring ingredients by volume for a recipe
- ◆ using graphs to show the results of a survey which the learner has carried out.

It is possible that you could create a single activity which would provide evidence for the whole Unit. If this is not the case, or you do not think it to be appropriate for your learners, the assessment could be split into two tasks. These would be:

- ◆ Task 1: Using Number
- ◆ Task 2: Graphical information

Part 2: Assessment Guidance

You can use the information given in this section in several ways:

- ◆ to help identify the type and amount of evidence which the learner needs to produce
- ◆ to help identify the level of complexity in evidence required for the Core Skill at this level
- ◆ to help you to create an assessment task related to the learner's own situation

You can use the following information to create task sheets to be used with the learners in assessment sessions. The task sheet will contain the assessment items and you can leave appropriate space for the learners to insert their responses.

Learners must complete both of the tasks.

Task 1 must cover numerical calculations and measuring. Successful completion should be noted on the checklist. Task 1 task sheet can be given to the learners for completion. Three questions must be successfully completed.

Task 2 must cover extracting and conveying information using graphical forms. Successful completion should be noted on the checklist. Task 2 task sheet should be given to the learners for completion.

Task 1: Using Number

This task must cover the Unit requirements to:

- ◆ decide which calculations need to be carried out and in what order to solve numerical problems (eg add, then multiply)
- ◆ carry out calculations involving the following: whole numbers, decimals, percentages, fractions and ratios
- ◆ round answers to a specified number of decimal places (eg 2.465 is 2.47 to two decimal places)
- ◆ read and use a scale on an instrument (eg a ruler, metre stick, thermometer) or on a graph to make measurements to the nearest marked un-numbered division.

This task consists of two parts. One dealing with each of:

- ◆ numerical calculation
- ◆ reading a scale

For the numerical calculation part, a minimum of three calculations is required to show consistency of performance. Each of the calculations should have around two to four steps and these may not be obvious without the learner carefully inspecting the activity.

You can create three questions which taken together will address all the above requirements. The following must be covered:

- ◆ whole numbers, decimals, percentages, fractions and ratios
- ◆ deciding on order of calculations
- ◆ rounding answers
- ◆ addition, subtraction, multiplication, division as required

The simplest way to ensure coverage is to have one question involving each of percentages, fractions and ratios. Decimal numbers and a good coverage of the four arithmetic operations are always likely to be involved if several

steps are required. Finally, one calculation can ask for a result to a set number of places.

The calculations should relate to the personal, workplace, social and educational situations of the learners. Here are some suggestions with three calculations and one measuring activity:

Personal/Social Context

- 1 Calculate foreign currency costs for a credit card transaction involving a fixed charge plus an exchange rate. This will involve decimals and the percentage cost can be asked for to a stated number of decimal places.
- 2 Calculate the total cost of a shopping trip involving multiple purchases of a number of items. Fractions can be introduced as a fractional discount (eg $\frac{1}{12}$) to be applied at the end.
- 3 A given number of residents are polled about a change in rubbish collection times in a town. Given the ratio of responses (eg for: against is 3:2), calculate how many residents are for the change.
- 4 Calculate the average room temperature by taking a thermometer reading at the same time each day for a given number of days.

Educational Context

- 1 Given the weight of a potato and the weight of water in it, calculate the percentage non-water content of the potato. Express the answer to two decimal places.
- 2 Given the population of a city and the fraction (eg $\frac{3}{8}$) of people 25 years of age or under, calculate the number of people over the age of 25.
- 3 In a titration, two liquids are mixed in a given ratio (eg 2:3) by volume. Given the volume of one, calculate the volume of the other liquid.
- 4 Make a reading of the weight of a recipe ingredient using weighing scales.

Workplace Context

- 1 Given the ratio of males to females and the average weight of each for a group of travellers, decide if they can all fly in a light aircraft where there is a passenger weight restriction.
- 2 A restaurant has been set a target seat occupancy expressed as a percentage. The number of seats in the restaurant and the number of sittings per day is given. In a particular week, a certain number of meals are served. Decide if the target has been met.
- 3 A brass rod is to be reduced in diameter. The volume of metal to be removed is given. After some time (eg 10 minutes), a given fraction of the volume has been removed. Calculate the remaining volume to be removed expressed to three decimal places.
- 4 Make a measurement of the volume of a liquid product using a measuring cylinder.

Task 2: Graphical information

This task must cover the Unit requirements to:

Extract and interpret information from at least ONE of the following:

- ◆ a table containing three or four categories of information (eg a timetable; a distance table)
- ◆ a chart (eg bar or pie chart)
- ◆ a graph (eg a line graph with a straightforward scale)
- ◆ a diagram (eg a circuit diagram; a 2-dimensional representation of 3-dimensional shapes; a map)
- ◆ Communicate information through ONE of the following:
 - ◆ a table containing three or four categories of information (eg a timetable; a distance table)
 - ◆ a chart (eg bar or pie chart)
 - ◆ a graph (eg a line graph with a straightforward scale)
 - ◆ a diagram (eg a circuit diagram; a 2-dimensional representation of 3-dimensional shapes; a map)

This task is most easily covered by two activities. One dealing with each of:

- ◆ using a graphical form
- ◆ creating a graphical form

Here are some suggestions:

Personal/Social Context

- 1 A bus timetable is given in tabular form. Interpret it to find out what variations in journey time occur at rush hour.

- 2 Given a set of results from an opinion poll on a contentious issue, create a pie chart to illustrate the variation in public opinion.

Educational Context

- 1 A bar chart showing monthly rainfall is provided. Interpret this to find the number of months where the rainfall exceeds a given value.
- 2 Environmental statistics on annual emissions due to travel are provided. Create a line graph showing the trend in CO2 emissions due to increasing travel.

Workplace Context

- 1 A table is provided which gives the cost of a package holiday for different times of the year and for three standards of accommodation. Interpret this to find the times of year and standards of accommodation available for a given maximum budget for the holiday.
- 2 A plan of an existing room layout is provided. Re-draw this to include two additional floor-standing furniture items.

Part 3: Exemplar recording documentation

This section provides sample forms which can be used by the learners and tutor to gather evidence and record assessment decisions.

If you have created task sheets, as described in Part 2, they can be used as an assessment record sheet to be completed by the learner directly or used by you to note the result of the discussions with the learner.

There is an assessment checklist for each of the tasks to be completed, signed and dated by you.

The final form is a summary checklist recording Unit progress to be completed, signed and dated by you.

Assessment checklists

Learner:

Task 1: Using number

- ◆ decide which calculations need to be carried out and in what order to solve numerical problems (eg add, then multiply)
- ◆ carry out calculations involving the following: whole numbers, decimals, percentages, fractions and ratios
- ◆ round answers to a specified number of decimal places (eg 2.465 is 2.47 to two decimal places)
- ◆ read and use a scale on an instrument (eg a ruler, metre stick, thermometer) or on a graph to make measurements to the nearest marked un-numbered division.

Activity	Achieved (tick)	Evidence	Tutor initials and date
Q1			
Q2			
Q3			
Q4			
Date of completion:		Tutor signature:	

In the evidence column, indicate how the activity meets the requirements stated.

Learner:			
Task 2: Graphical information			
<ul style="list-style-type: none"> ◆ extract and interpret information from at least ONE of the following, a table, a chart, a graph, or a diagram ◆ select ONE appropriate graphical form and use it to communicate information 			
Activity	Achieved (tick)	Evidence	Tutor initials and date
Q1			
Q2			
Date of completion:		Tutor signature:	

In the evidence column, indicate how the activity meets the requirements stated.

Summary checklist

Learner:		
Learner number:		
Centre:		
Task	Date achieved	Tutor signature
1: Using number		
2: Graphical information		

Part 4: Information for learners

As you work through this Unit, your tutor will need to gather evidence to prove that you have demonstrated all the numeracy skills.

This can be done by:

- ◆ your tutor asking you questions
- ◆ you carrying out a written task
- ◆ your tutor observing you

By the end of the Unit you must show that you can:

- ◆ use notation for the following: whole numbers, decimals, percentages, fractions and ratios
- ◆ decide which calculations need to be carried out and in what order to solve numerical problems (eg add, then multiply)
- ◆ carry out calculations involving the following: whole numbers, decimals, percentages, fractions and ratios
- ◆ round answers to a specified number of decimal places (eg 2.465 is 2.47 to two decimal places)
- ◆ read and use a scale on an instrument (eg a ruler, metre stick, thermometer) or on a graph to make measurements to the nearest marked un-numbered division.
- ◆ extract and interpret information from at least ONE of the following, a table, a chart, a graph, or a diagram
- ◆ select one appropriate graphical form and use it to communicate information

These are some of the things you might do to provide the evidence:

- ◆ calculating the space required to store a number of standard sized boxes in a storeroom
- ◆ calculating the ratio of males to females, within a particular income bracket, from local council statistics

- ◆ forecasting the cost of electricity for next year, based on bills from last year, and budgeting monthly amounts to cover this
- ◆ pricing a holiday using tables from a travel brochure, according to date of departure, hotel chosen and length of stay
- ◆ measuring ingredients by volume for a recipe
- ◆ using graphs to show the results of a survey which you have done

Learners with disabilities and/or additional support needs

The additional support needs of individual learners should be taken into account when planning learning experiences, selecting the most appropriate assessment activity and considering any reasonable steps which might be necessary to allow the learner to meet the assessment standard.

Further advice can be found in SQA's Assessment Arrangements' web pages (www.sqa.org.uk)

ADMINISTRATION INFORMATION

Credit Value

1 Credit(s) at (insert SQA Level 10) (6 SCQF credit points at SCQF Level 4)



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