NUMERACY
Using Number: Calculation
SCQF Level 3
20 Hour Unit (F3GK 09)

CORE SKILLS UNIT
ASSESSMENT SUPPORT PACK

Part 1: Information for tutors

What is involved?

This Unit is one of a group of three:

♦ Using Number: Calculation (20-hour Unit)

♦ Using Number: Measuring (10-hour Unit)

♦ Using Graphical Information (10-hour Unit)

Together these deliver the complete Numeracy Core Skill at SCQF level 3.

Using Number: Calculation is about applying simple numerical skills in everyday personal, workplace, social, and educational situations that involve calculations. The focus of the Unit is on transferable numeracy skills. It is designed for delivery in schools, colleges, workplaces, community, and other learning environments.

Everyday situations might involve money, time, length, weight, area, volume, or temperature.

The learner will be expected to work with familiar tasks that involve only a small number of obvious steps.

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 consist of an appropriate mix from personal, workplace, social, and educational examples. In addition, integration of the numeracy activities with those of other SQA Units being undertaken should be explored. For example, when a learner is undertaking vocational Units, motivation for numeracy can

be increased if the activities are related to the vocational Unit and the learner can see the direct relevance of the numeracy.

Assessment and evidence

Learners at SCQF level 3 will need support and may carry out their calculations mentally or in writing. The numeracy activities they carry out may require exact or approximate answers. You should show the learners how to check their answers and encourage them to do it routinely. However, for achievement of the Unit, evidence of this checking is not required.

The numerical activities should be familiar to the learner and only involve a small number of steps.

The learners:

♦ may carry out the calculations mentally, in writing, using a calculator, or using another electronic device, eg a computer

♦ must give correct answers

♦ should check their answers, although evidence of this checking is not required

You should try to identify naturally occurring opportunities for assessment when possible. For learners who are also working towards vocational or subject-specific Units, opportunities for assessment of number skills could arise while completing tasks that 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.

The assessment process is likely to involve one or more of:

♦ written tasks

♦ oral questioning

♦ observation

When assessing by observation, you must keep a detailed checklist. Similarly if you use oral questioning, you must keep a record of both the questions and the learner responses. All evidence, whether produced by the learner or a record made by yourself, must be retained, signed, and dated by you.

Planning

You should work out where opportunities for meeting the standards 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 learners will:

- use notation for each of the following — whole numbers (eg 5), simple decimals (eg 2.45), simple percentages (eg 30%), simple fractions (eg 2/3), simple ratios (eg 1:3, 5:1)

- carry out all of the following — addition, subtraction, multiplication, division

- carry out simple calculations involving either whole number percentages (eg 30%) OR simple fractions (eg 2/5)

- decide which calculations need to be carried out and in what order (eg add, then multiply)

- draw conclusions from the results of their calculation

Notation

Learners should be able to read and understand the notation for:

- whole numbers

- simple decimals

- simple percentages

- simple fractions

- simple ratios

They should be able to convert between values written in words and numerical notation such as:

- four-fifths = 4/5

- five per cent = 5%

- a ratio of one to three = 1:3

Decimals should be to no more than two places, eg 1.25, and percentages should be whole numbers.

Very large and very small numbers are not dealt with in this Unit. This can be taken care of if you choose the correct units for the learners' activities. For example the value 2,500,000 watts could be expressed as 2.5 megawatts. Similarly £1,500,000 may be expressed as 1.5 million pounds.

Basic operations

The learners should be familiar with the four basic arithmetic operations of addition, subtraction, multiplication, and division using whole numbers, eg calculations such as:

23 + 45 =

91 – 22 =

12 × 15 =

78 ÷15 =

The answers for division may not be whole numbers but the calculation should not lead to an answer of more than two decimal places.

Combining operations

The basic operations can be combined to allow the learners to tackle more complex calculations. When two or three operations have to be carried out, the learners should decide which operations are required and then think out the order of the operations.

The activity could be the straightforward combination of two operations, such as:

A group of friends consists of six men and five women. They go out for a meal together at an 'eat all you want for £5' restaurant. What is the total bill for the meals?

The addition of the six men and five women is followed by the multiplication by five pounds to get the answer.

A combined activity can involve a fraction, such as:

The price of a DVD usually costing £8 has been reduced by two-fifths in a sale. What is the saving?

For the learner the two-fifths contains an initial division followed by a subsequent multiplication of the original cost. The two steps of the calculation could also be done in reverse order.

Application to problems

Although you may feel that it is necessary to deliver some of the fundamental parts of the material for this numeracy Unit abstractly, it is vital to make all the learning materials as relevant to the learners as possible. Only by making the activities address a particular part of the learners' everyday personal, workplace, social, or educational situation can you maximise motivation.

You are encouraged to relate even the simplest calculation to the learners' experiences so the result that they will produce is not an abstract number but the solution to a relevant problem. Therefore, the learners are drawing a conclusion at the end of the activity.

In some contexts you may need to provide and explain simple formulae to the learners to allow them to complete the activity. If so, you should give the formula in words and it is not necessary to use algebraic notation.

An example is: You can work out the *floor area of a rectangular room by multiplying the length of the room by its width.*

Other than specific workplace activities, the areas of time and money yield countless opportunities for activities. These should be familiar concepts to your learners and basing some of the numeracy activities on these two areas may be of particular help in the personal development of some learners.

Gathering evidence

For verification purposes it is only necessary to retain evidence for each activity stated in the Unit. Learners must meet all of the requirements of the Unit (ie 100% achievement) but they do not have to do so as part of one exercise. Evidence can be collected where it occurs naturally in exercises performed in different contexts or it can be generated through one or more set assessment(s).

Where a tutor collects naturally occurring evidence for the Numeracy Core Skill, they must satisfy themselves that the learner is capable of fulfilling each of the activities stated in the Unit consistently. However, it will only be necessary for the tutor to retain one piece of evidence for each activity.

If a tutor opts to collect evidence through one or more set assessment(s) covering the activities stated in the Unit and a learner is successful in some but not all of the activities, that learner would only need to be reassessed in the activities they did not achieve.

Where a tutor collects evidence through one or more set assessment(s), it would normally be expected that considerable learning and teaching will have taken place prior to the learner undertaking the set assessment(s). As part of the learning and teaching, learners should have successfully completed tasks and exercises of a similar level to those they will tackle in each set assessment, on at least one occasion. In other words, learners will normally have shown in class activities that they are capable of working at the required level before they are deemed ready for each set assessment.

It may be appropriate for you to gather written evidence produced by the learner carrying out practical exercises. However, written evidence is not essential for this Unit and is inappropriate if it disadvantages the learner. 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 that includes all the evidence-gathering items. An alternative is to provide worksheets that can be made into a portfolio 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.

Evidence for this Unit may be gathered in a variety of ways. Some typical activities might be:

- calculating the number of extra staff required for a 20% increase in staffing if a firm employs 200 people

- deciding how many adults are required to take a group of 20 six-year-old children on an outing, if current guidance recommends a child:adult ratio of 5:1

- deciding the appropriate time to leave the house for work, based on the expected journey time of 35 minutes and a required arrival time of 8.30 am

- working out the cost of 3/4 of a kilo of potatoes, when the price per kilo is £1.60.

It may be possible to create a single activity that would provide evidence for the whole Unit. If this is not possible, or you do not think it would be appropriate for your learners, the Unit assessment could be split into smaller tasks. For example, an approach you might use is to have one activity covering numerical notation and simple numerical calculation. This will also cover the four arithmetic operations.

A second activity could then be used to gather evidence for multiple operations and drawing conclusions from results. The second activity would need to be of a more problem-solving nature and would involve the learner deciding on the order of the operations

Disabled learners and/or those with additional support needs

The additional support needs of individual learners should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

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 that the learner needs to produce

♦ to help identify the level of complexity in evidence required for this Core Skill at this level

♦ to help you 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.

The guidance given in the rest of this section is based on the example of a centre that chooses to develop two tasks to cover the assessment of this Unit. In the following pages examples are given of the type of calculations and questions that could be set by the centre as part of the tasks.

Exemplar assessment

Task 1: Work with basic numerical notation and carry out numerical calculations

1   Each year, the amount of sunshine days that a summer holiday destination has is two hundred and fifty. Write that down as a number in the box provided.

2   The proportion of people in a questionnaire who say they enjoy New Year celebrations was fifty five percent. Write that down as a numerical expression in the box provided.

3   The ratio of soft- to hard-centred sweets in a chocolate box is one to four. Write that down as a numerical expression in the box provided.

4   The fraction of food left over after a party is one-quarter. Write that down as a numerical expression in the box provided.

5   A length of a wooden beam in metres is six point nine. Write that down as a number in the box provided.

6   Sam records a television programme of 17 minutes and then one of 39 minutes on one DVD. What is the total recording time?

7 Wendy gets paid £260 for her work but has to give up £50 of that in tax. How much is she left with?

8 Alex runs 50 kilometres per week for fitness training. If he does this for 20 weeks, how far has he run in total?

9 Sandy has to run 450 kilometres over 9 weeks for his fitness training. How far must he run each week?

10 A shopper spends £100 and gets a discount of £15 back. What is the percentage saving?

11 Jim wins a prize of £300. He decides to give one-quarter of it to his friend Ted. How much does Ted get?

Task 2: Decide which calculations need to be carried out and in what order and draw conclusions from the results produced

1   Rob attends the gym and has to exercise for 40 minutes. After a while he looks at the clock and realises that he is only one-quarter of the way through his routine. How many minutes has he still to go?

2   Jan power-walks for a total of six hours each week. One week she has walked for 1 hour and 15 minutes on Monday and 1 hour and 45 minutes on Wednesday. She will be free to walk only on Friday and Sunday for the rest of the week. How long must she walk on Friday and Sunday if she does the same time on each of these days?

3   A soap dispenser holds 1500 ml of liquid soap. Each press of the dispenser uses 5 ml of soap. On average it is pressed 50 times each day. How many days will a full dispenser last?

4   A large bottle of ketchup normally costs 60 pence. A special offer bottle contains 25% extra and costs 70 pence. Is the special offer bottle really a bargain?

5   To find a person's body mass index (BMI) you need their height in metres and their weight in kilograms.

    The formula for BMI is: multiply the height by itself and divide the result into the person's weight.

    Calculate the BMI of Don, who has a height of 2.0 m and weighs 80 kg.

Notes for assessment

The learner must successfully complete both tasks to achieve the Unit.

The worked out questions here are not presented as model answers but have the purpose of illustrating the way in which the questions satisfy the requirements of the Unit.

Task 1

This task covers working with basic numerical notation and carrying out simple addition, subtraction, multiplication, and division.

1 250 — whole number notation

2 55% — simple percentage notation

3 1:4 — simple ratio notation

4 1/4 — simple fraction notation

5 6.9 — simple decimal notation

6 17 + 39 = 56 minutes — addition

7 £260 – £50 = £210 — subtraction

8 50 × 20 = 1000 km — multiplication

9 450 ÷ 9 = 50 km — division

10 100 × 15 ÷100 = 15% — calculation of simple percentage

11 1 × £300 ÷ 4 = £75 — use of simple fraction

Task 2

This task comprises five questions. These decide which calculations need to be carried out and in what order, and draw conclusions from the results produced. There is unavoidable overlap with much of Task 1. If Task 2 were extended to include the notation aspects of the Unit, then it would cover the whole Unit and Task 1 would not be required.

Question 2 involves manipulating hours and minutes. It is only applicable if the time concepts have been explicitly covered in the learning material.

Although all these questions require the learner to draw a simple conclusion, question 4 demands an explicit example of this in the form of a decision.

1   This involves division and subtraction in that order. It uses a simple fraction.

$1 \times 40 \div 4 = 10$

$40 - 10 = 30$ minutes.

2   This involves addition, subtraction, and division in that order.

1 h 15 m + 1 h 45 m = 3 h 0 m

6 h – 3 h 0 m = 3 h 0 m

3 h 0 m ÷ 2 = 1 h 30 m = one hour and thirty minutes on each day.

3   This involves multiplication and division in that order.

one day's soap is 50 × 5 ml = 250 ml

$1500 \div 250 = 6$ days.

4   This involves multiplication, division, addition, and implied subtraction in that order. It uses a simple percentage. A conclusion is drawn at the end.

cost of 25% of normal bottle = 25 × 60 ÷100 = 15 pence

cost of special bottle at normal price = 60 + 15 = 75 pence

75p is 5p dearer than 70p for special offer

The special offer is a bargain.

5   This involves the solution of a problem expressed as a formula in words. The calculation is multiplication followed by division.

multiply the height by itself 2 × 2 = 4

divide $80 \div 4 = 20$

BMI = 20

Part 3: Exemplar recording documentation

This section provides example forms that can be used by the learner and the tutor to gather evidence and record assessment decisions. The first form, the record sheet, is an example of a form for the learner to complete when being assessed for Task 2. Alternatively, it can be completed by the tutor to record oral responses. For Task 1, a separate record is not required as the exemplar sheet itself is to be completed by the learner.

The checklists are for completion by the tutor, recording assessment and Unit progress. In the first checklist, under the heading 'Activity' the tutor should insert the requirement that is being assessed, eg simple fraction, notation or addition, subtraction, and division.

Record sheet

Task 2: Decide which calculations need to be carried out and in what order and draw conclusions from the results produced

1   Rob attends the gym and has to exercise for 40 minutes. After a while he looks at the clock and realises that he is only one-quarter of the way through his routine. How many minutes has he still to go?

Answer:

2   Jan power-walks for a total of 6 hours each week. One week she has walked for 1 hour and 15 minutes on Monday and 1 hour and 45 minutes on Wednesday. She will be free to walk only on Friday and Sunday for the rest of the week. How long must she walk on Friday and Sunday if she does the same time on each of these days.

Answer:

3   A soap dispenser holds 1500 ml of liquid soap. Each press of the dispenser uses 5 ml of soap. On average it is pressed 50 times each day. How many days will a full dispenser last?

Answer:

4   A large bottle of ketchup normally costs 60 pence. A special offer bottle contains 25% extra and costs 70 pence. Is the special offer bottle really a bargain?

Answer:

5   To find a person's body mass index (BMI) you need their height in metres and their weight in kilograms.

The formula for BMI is: multiply the height by itself and divide the result into the person's weight.

Calculate the BMI of Don, who has a height of 2.0 m and weighs 80 kg.

Answer:

Tutor comments:

Tutor signature:.. Date:........................

Assessment checklist

Learner:		
Task 1: Work with basic numerical notation and carry out numerical calculations		

Activity	Evidence	Tutor comment/Date
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

Task 2: Decide which calculations need to be carried out and in what order, and draw conclusions from the results produced		

Activity	Evidence	Tutor comment/Date
1		
2		
3		
4		
5		
Tutor signature:		**Date:**

Summary checklist

Task	Date achieved	Tutor signature
Learner:		
Learner number:		
Centre:		
Task 1: Work with basic numerical notation and carry out numerical calculations		
Task 2: Decide which calculations need to be carried out and in what order and draw conclusions from the results produced		

ADMINISTRATIVE INFORMATION

Core Skills

This Unit is part of a suite of three Units that when completed give automatic certification of the Core Skill of Numeracy at SCQF level 3. The other Units in this suite are:

Using Number: Measuring at SCQF level 3

Using Graphical Information at SCQF level 3

Credit value

3 SCQF credit points (0.5 SQA credits) at SCQF level 3

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