

Participant pack

Module 12a: Developing functional mathematics with vocational learners

Handling data

Handouts

- HO 1: What is data?
- HO 2: Personal reflection sheet
- HO 3: Functional mathematics process skills
- HO 4: Functional skills examiners' report
- HO 5: Adult numeracy core curriculum
- HO 6: Data handling activities
- HO 7: Useful websites
- HO 8: Planning a data handling activity

HO 1: What is data?

Data is a collection of facts, such as values or measurements. It can be numbers, words, measurements, observations or even just descriptions of things. Data can be qualitative or quantitative.

- Qualitative data is descriptive information (it *describes* something)
- Quantitative data is numerical information (numbers).

For more information, visit: <http://www.mathsisfun.com/data/data.html>

And **Quantitative data** can also be discrete or continuous:

- Discrete data can only take certain values (like whole numbers)
- Continuous data can take any value (within a range)

Put simply: **discrete data** is counted, **continuous data** is measured.

For more information, visit: <http://www.mathsisfun.com/data/data-discrete-continuous.html>

How to draw a bar chart

Further information on how to draw a bar chart, using discrete data, is available on the Excellence Gateway. This information sheet shows how to display data on income and expenditure in a bar chart. The title is Hairdressing: how to construct a bar chart <http://www.excellencegateway.org.uk/node/22539>

If you would like to further develop your knowledge and understanding of data handling and statistics, you might find the following interactive websites useful:

BBC Skillswise: <http://www.bbc.co.uk/skillswise/topic-group/graphs>

BBC GCSE Bitesize: <http://www.bbc.co.uk/schools/gcsebitesize/maths/statistics/>

Centre for Innovation in Mathematics Teaching (esp. units 8, 16 and 18):
<http://www.cimt.plymouth.ac.uk/projects/mepres/book9/book9int.htm>

HO 2: Personal reflection sheet

Module 12a: Handling data

As you go through the different topics and activities during the session, make notes below regarding topics you feel confident about and those that you need to consolidate further.

Topic / activity	Reflections
Transport to work	
Introductions	
Functional maths: process skills	
Challenge of functional skills	
Data handling in vocational areas	
Creating a story	
Carousel	
Planning a data handling activity	

HO 3: Functional mathematics process skills

Functional skills qualifications in mathematics assess three interrelated process skills:

Representing – selecting the mathematics and information to model a situation	Analysing – processing and using mathematics	Interpreting – interpreting and communicating the results of the analysis
<p>Candidates recognise that a situation has aspects that can be represented using mathematics</p> <p>Candidates make an initial model of a situation using suitable forms of representation</p> <p>Candidates decide on the methods, operations and tools, including ICT, to use in a situation</p> <p>Candidates select the mathematical information to use</p>	<p>Candidates use appropriate mathematical procedures</p> <p>Candidates examine patterns and relationships</p> <p>Candidates change values and assumptions or adjust relationships to see the effects on answers in models</p> <p>Candidates find results and solutions</p>	<p>Candidates interpret results and solutions</p> <p>Candidates draw conclusions in light of situations</p> <p>Candidates consider the appropriateness and accuracy of results and conclusions</p> <p>Candidates choose appropriate language and forms of presentation to communicate results and solutions</p>

Source: Functional skills criteria for mathematics : Entry 1, Entry 2, Entry 3, level 1 and level 2 (September 2011) Ofqual/11/4953

<http://www.ofqual.gov.uk/downloads/category/68-functional-skills-subject-criteria>

HO 4: Functional skills examiner's report

FSM02 - Functional Skills Mathematics Level 2

Introduction

Most candidates attempted the majority of the questions and gave thoughtful answers to the problems set. Overall, candidates found questions most difficult when the context was unfamiliar to them, the question was open-ended or multi stage. As candidates are required to show success in problem solving in real life situations these types of questions are an essential part of functional skills papers.

Centres need to ensure that candidates are offered many opportunities to solve such problems in preparation for the tests.

Many candidates did show their working clearly and were consequently able to obtain process marks. Centres need to place emphasis on the meaning of the notepad symbol as some candidates are ignoring the key need to show **clear** working. Those candidates who provided no working or disorganised working made it very difficult to credit their efforts.

Awarding credit in multi stage problems was particularly difficult when a candidate's communication was poor.

Candidates need to understand that when dealing with questions that require them to 'explain their answer', it is important to provide both a decision and a reason for it.

Centres need to place emphasis on understanding of functional language such as 'overcharging', 'budget' and 'survey'.

Calculating with time is a functional skill which is very poorly done. Candidates need to practise adding times in many functional contexts.

Candidates should be encouraged to ask themselves whether a data collection sheet they have produced is fit for purpose.

They also need to practice choosing a suitable linear scale for a graph.

Candidates sometimes missed key elements in questions. Centres should place emphasis on highlighting, underlining or circling key information in questions to minimise the errors caused by lack of careful reading.

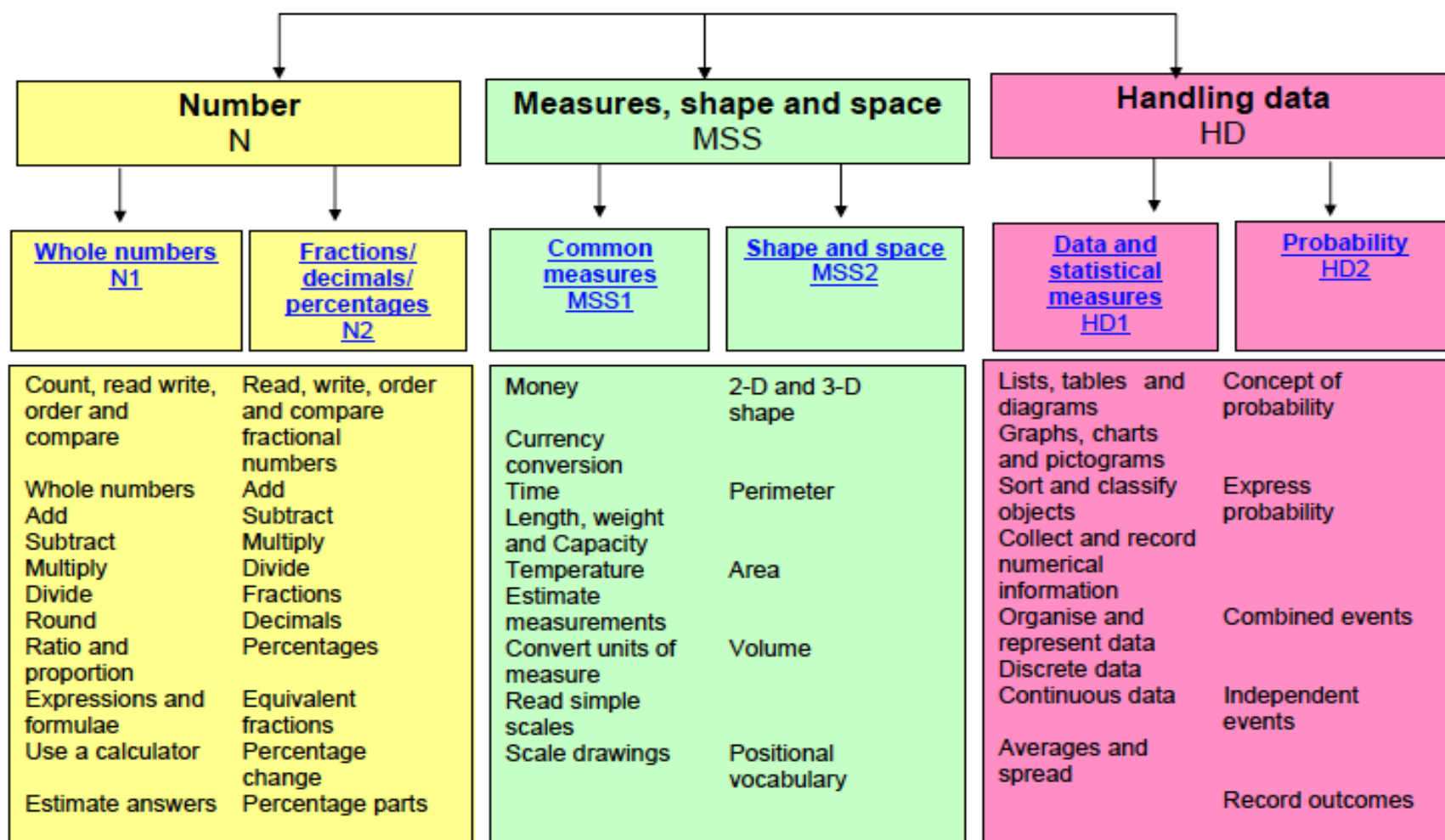
There is evidence that some candidates are not using calculators. Centres need to ensure that there is always access to a calculator during the test and, when preparing candidates for the test, encourage them to make use of a calculator.

Source:

http://www.edexcel.com/migrationdocuments/QS%20FS%20and%20Diploma/February%202011%20-%20ER/FSM02_01_pef_20110328.pdf

HO 5: Adult numeracy core curriculum

Adult Numeracy Core Curriculum



HO 6: Data handling activities

<i>Activity</i>	<i>How could this be adapted for my vocational learners?</i>	<i>How could this be adapted for different levels?</i>
A. Sampling		
B. An average exercise		
C. Using averages		

<i>Activity</i>	<i>How could this be adapted for my vocational learners?</i>	<i>How could this be adapted for different levels?</i>
D. Which is better?		
E. Labels		
F. True or false?		

<i>Activity</i>	<i>How could this be adapted for my vocational learners?</i>	<i>How could this be adapted for different levels?</i>
G. Clues		

HO 7: Useful websites

Adult numeracy core curriculum

<http://www.excellencegateway.org.uk/node/1514> New interactive online version. As well as the numeracy curriculum, there are sections on embedding, family learning and employability, links to resources and other curricula, ideas, suggestions and activities, personal space, contributions from other tutors and more.

BBC Skillswise

<http://www.bbc.co.uk/skillswise/maths>

Online and paper-based resources for adult numeracy learners.

Being Functional resources

<http://tlp.excellencegateway.org.uk/tlp/fs/fs-resources/about.php>

A range of functional skills resources, including CPD activities.

Braingames

<http://www.braingames.org.uk/>

Online interactive learning materials in a games format, including English and maths.

Excellence Gateway - nationally developed Skills for Life materials

<http://rwp.excellencegateway.org.uk>

Resources developed over the period 2001 to 2010 to support the national Skills for Life Strategy and other Skills for Life developments.

Embedded learning materials

<http://rwp.excellencegateway.org.uk/Embedded%20Learning/>

An extensive range of materials to support embedded learning (including numeracy) in over 25 vocational, community, employability and health settings.

Functional skills on the Excellence Gateway

<http://www.excellencegateway.org.uk/node/21154>

See this menu page to access the range of functional skills resources on the Excellence Gateway, including the new functional skills starter kit:

<http://www.excellencegateway.org.uk/node/20280>

Improving Learning in Mathematics

<http://tlp.excellencegateway.org.uk/teachingandlearning/downloads/default.aspx#/math>

Resources for improving teaching in mathematics, including a selection of downloadable materials. Aimed primarily at Level 2 and 3 learners.

Learning Mathematics in Context

<http://tlp.excellencegateway.org.uk/tlp/xcurricula/lmic/>

Ideas and resources to help you explore teaching and learning mathematics within vocational and other subject areas.

Mathematical Moments

<http://tlp.excellencegateway.org.uk/tlp/stem/stem-mm.html>

Each Mathematical Moment invites you to focus on a particular mathematical topic, offers you suggestions for activities you could carry out with your learners, prompts you to anticipate, and then reflects on learners' responses, and finally offers you some follow-up ideas. The topics are addressed at levels ranging from Entry to Level 3.

Move On

<http://www.move-on.org.uk/>

English and Maths resources for teachers, learners and providers, encompassing promotion, engagement and delivery. Check out Stop 4 of the Teacher Route.

National Centre for Excellence in the Teaching of Mathematics

<https://www.ncetm.org.uk/>

Resources and tools for teachers of maths and numeracy across all sectors (primary, secondary and FE). Check out the following pages. Note that you need to register before accessing these materials.

Numeracy Challenge <https://www.ncetm.org.uk/resources/13790>

Maths at Work <https://www.ncetm.org.uk/resources/11329>

FE Magazine <https://www.ncetm.org.uk/resources/14609>

Mathemapeda <https://www.ncetm.org.uk/mathemapeda/>

Thinking Through Maths (online CPD module) <https://www.ncetm.org.uk/reflective-learning/ttm>

Northern College

<http://www.northern.ac.uk/content/?id=133>

Active resources for teaching functional mathematics (Entry 3 and Level 1).

Nrich

<http://nrich.maths.org/public/index.php>

Free mathematics enrichment materials (problems, articles and games) for teachers and learners. Aimed at ages 5 to 19 years, but much is suitable for adults.

OCR support materials for Functional Skills Maths:

Level 1: <http://www.ocr.org.uk/qualifications/type/fs%5F2010/maths/l1/documents/>

Level 2: <http://www.ocr.org.uk/qualifications/type/fs%5F2010/maths/l2/documents/>

Tasks to use as teaching resources or practice assignments.

Office of Fair Trading Skilled to Go

<http://www.oft.gov.uk/about-the-oft/partnership-working/partnership-working-info/consumer-education/resources/sthome>

A teacher's toolkit of games and resources for consumer education, with literacy and numeracy embedded.

Resources to support the pilot of functional skills

<http://www.excellencegateway.org.uk/page.aspx?o=201311>

Teaching and learning functional mathematics

Skills Workshop

<http://www.skillsworkshop.org/>

Free downloadable Skills for Life and functional skills resources from this private

website.

Subtangent

<http://www.subtangent.com>

Interactive maths games and resources that can be used on line or downloaded.

Tarsia Formulator

http://www.mmlsoft.com/index.php?option=com_content&task=view&id=4&Itemid=5

Free downloadable software to help create your own mathematical jigsaws and domino activities.

HO 8: Planning a data handling activity

For this activity, you will work with a small group to plan a data handling activity that is both **purposeful** and **relevant to the vocational needs** of your learners.

In planning the activity, you should consider the 5-stage model of data handling:

1. Specify the problem

- Why do learners need to carry out this activity?
- What questions are they trying to answer?
- What problem are they trying to solve?

2. Plan

- Where will learners obtain their data?
- Will they collect primary data or use secondary data?

3. Collect data

- If *primary*: how will they collect this? What sample will they use? What questions will they ask? What types of error might there be?
- If *secondary*: what data are available? Is data in an accessible form?

4. Process and represent

- How will learners record and group the data?
- What graphs and charts are most useful to summarise the data?
- Will you tell learners which graphs and charts to choose, or allow them to decide?

5. Interpret and discuss

- How will you encourage learners to question and interpret the data?
- How will they use their findings to answer the initial questions from stage 1 (specify the problem)?

Feeding back

- Use a flipchart sheet to provide an outline of your activity, which can be displayed to the whole group.
- Prepare to provide brief feedback on:
 - The rationale for your activity
 - Any key considerations in developing the activity


PowerPoint slide notes



Support for English, maths and ESOL


Module 12a: Developing functional mathematics with vocational learners - Handling data

Transport to work



- What form of transport do you normally use to get to work?
- Group yourselves according to the transport used.
- Organise the data and use mini-whiteboards to represent it.

What are functional skills?



"Functional skills are the fundamental, applied skills in English, mathematics, and information and communication technology (ICT) which help people to gain the most from life, learning and work."

(Ofqual criteria for functional skills qualifications)

Aims for the day



- To introduce participants to the aims and demands of functional mathematics
- To provide practical ideas and activities for embedding data handling within vocational contexts

Learning outcomes



By the end of the session participants will have:

- Understood the role of process skills within functional mathematics
- Identified challenges to learners presented by functional mathematics accreditation
- Identified how data handling skills are used within their vocational area
- Experienced a variety of data handling activities and identified how they might be adapted for vocational learners
- Created a functional data handling activity, relevant to vocational learners

Process skills



Representing	Analysing	Interpreting
Making sense of situations and representing them	Processing and using mathematics	Interpreting and communicating the results of the analysis
A learner can: <ul style="list-style-type: none">• 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, inc. ICT, to use in a situation• select the mathematical information to use	A learner can: <ul style="list-style-type: none">• 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	A learner can: <ul style="list-style-type: none">• interpret results and solutions• draw conclusions in 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

Transport to work



Represent How did you make sense of the situation and represent it mathematically?

Analyse How did you use maths to find results and solutions?

Interpret How did you interpret and communicate the results of the analysis?

Contextualised or functional?



Contextualised

You need 4 screws to attach 1 shelf to a wall. How many screws do you need for 6 shelves?

Functional

You need to fit 6 shelves in an area measuring 1m x 1.5m. Explain exactly what materials you need.

Functional skills assessment



Discuss the functional skills assessment and note:

- what sorts of skills, knowledge and understanding are required
- how the assessment differs from previous numeracy assessments (e.g. key skills and adult numeracy)
- the difficulties your learners might have with the assessment

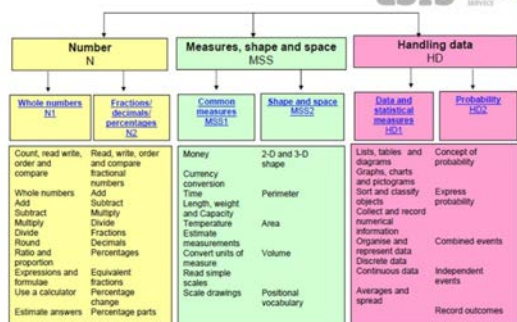
Edexcel examiners' reports



Candidates had difficulty with:

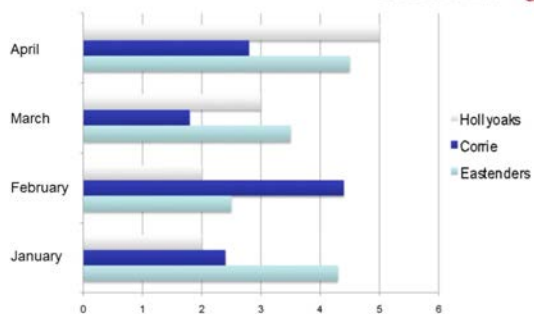
- unfamiliar contexts
- open-ended or multi stage questions
- showing working clearly
- explaining their decisions and assumptions
- understanding of functional language
- close reading and identifying key information

Adult numeracy core curriculum



What could the graph represent?

Viewing figures in millions for TV soaps 2010



Data handling carousel



- A selection of data handling activities are laid out on the tables
- Working in pairs or small group, try out and discuss the activities
- Make notes on your handout about how each might be adapted for vocational learners and different levels

Five aspects of data handling



- Specify the problem
- Plan
- Collect data
- Process and represent
- Interpret and discuss

Handling data – functionally!



Functional data handling activities should be:

- Purposeful
- Relevant
- Challenging
- Achievable

Learning outcomes



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