CENTRES FOR EXCELLENCE IN MATHS

FE centre resource

Pearson

Mastery Scheme of Work: Functional Skills Mathematics Level 1

NOTE: This scheme of work is intended as an exemplar and should be adapted to fit with the delivery context. In particular, adjustments need to be made to allow for retrieval practice, independent learning (supported and otherwise), progress reviews, revision and exam practice.

Introduction

This Scheme of Work has been written by the colleges involved in the CfEM programme. It was written by the sector, for the sector, based on CfEM's Five Key Principles of Teaching for Mastery in FE.

The intention is to provide an exemplar that can be adapted and used by maths teachers and managers in colleges across England, who are grappling with the issues of teaching Functional Skills maths over a relatively short timeframe, to learners who are frequently disengaged by previous negative experiences of the subject.

Our scheme of work is based on a 30 GLH model – comprising 20 lessons of 1.5-hour lessons. However, the scheme can be adapted to fit other delivery models. It contains links to 16 mastery lessons written by teachers during the programme, covering most, though not all of the scheme.

Overview

Although the scheme of work and lessons relating to it have been informed by all five Key Principles of Teaching for Mastery, the structure of the scheme of work presented here has been informed by one of the key principles in particular: **prioritise curriculum coherence and connections**. In terms of structuring the scheme of work, this means:

- sequencing to enable learners to see **links between mathematical concepts**
- consistent use of **familiar representations across different topics** to enhance understanding of mathematical structure.

The scheme of work has also taken account of issues of **learner engagement and resilience** – particularly in the early part of the academic year.

Rationale

The Functional Skills curriculum is made up of a few big linked ideas and this scheme of work (SoW) has been designed to reduce students' cognitive load, supporting the demands on their working memory, whilst helping them to think deeply about the underlying mathematical concepts. This is in contrast to traditional teaching in FE maths classrooms where students are provided with isolated procedures or algorithms presented as disconnected topics that need to be remembered and cannot be readily applied to everyday life situations. A critical aim is to develop an improved number sense, and ability to apply maths flexibly in practical situations.

In sequencing this SoW, we have also reviewed different models and representations of mathematical concepts as well as the efficacy of using these mastery approaches from action research undertaken by CfEM colleges.

Our SoW commences with two lessons focusing on learner **engagement and resilience**, with the intention of addressing from the start the negative attitudes and fixed mindsets that learners frequently present. However, it is important that these key messages are reinforced regularly throughout the year. For more ideas about this, see the screencasts on engagement and resilience produced by CfEM centres and CfEM's Motivation and Engagement handbook.

The next two lessons focus on **handling data** – topics which can easily be made relevant and interesting to learners, so building on the theme of learner engagement. The second lesson, on the subject of averages, also provides an opportunity to identify any issues with basic number skills (adding, subtracting, multiplication and division).

This is followed by the core topic **proportional reasoning**, again presenting opportunities to engage with familiar contexts. For direct proportion, we have chosen a **ratio table** as the initial model alongside its graphical representation as a straight line. CfEM research has shown that ratio tables help students to organise their thinking, make sense of proportion, and achieve a greater degree of flexibility in their approaches. For more ideas about using ratio tables and other visual representations, see the screencasts on visual models and representations.

At this point, attention turns to **numerical reasoning,** with the underpinning concepts of **multiplication and division** explored in detail using **arrays and area models.** There is a particular focus on **place value**, which is used to develop understanding of **decimals**, and the processes of **rounding and estimating**. The section finishes with an extension into **squares** and **directed numbers**, and a review of the **order of operations**.

The next key representation introduced is the **bar model** which provides an invaluable way of helping learners make sense of **parts of a whole,** including fractions, decimals and percentages, and their equivalences. At this point, **probability** is also tackled – with links to these equivalences. Finally, the use of bar

models is extended further to investigate **percentage increase and decrease** and the concept of **ratio**. (Further information on bar models can also be found the screencasts on visual models and representations page.)

The final section of the scheme of work focuses on **measures, shape and space**. Initially the focus is on calculations with **time** before the focus shifts to the **properties of shape**, and the concepts of **perimeter, area and volume**.

The 20th and final lesson is left open to focus on revision and exam preparation – though this will have been addressed throughout the scheme of work with the use of past paper questions.

Lesson	Section	Lesson topic	Lesson objectives	Model or representation
1	**Engagement and resilience**	**Attitudes to maths and getting unstuck**	• Motivate, engage and develop resilience in FE maths resit learners • Get to know maths learners and recognise their previous experiences • Equip learners with strategies to progress in their maths • Promote a safe, positive learning environment in the classroom	Ratio table
2		**Mindsets, resilience and number sense**	• Categorise attitudes into fixed or growth mindsets • Recognise that progress is maximised when in the growth zone • Use ratio tables to answer proportion questions • State characteristics of mathematical resilience	
3	**Handling data 1**	**Graphs and charts**	• Gather, record and present data • Interpret different charts • Construct pie charts	Ratio table
4		**Mean and range**	• Understand how and when to calculate the mean • Understand that range is the data spread and not an average • Use appropriate checking procedures and evaluate their effectiveness at each stage	
5	**Proportional reasoning 1**	**Direct proportion**	• Identify when two quantities vary in direct proportion to one another • Understand the multiplicative relationship between two quantities (non-calculator) • Solve simple proportional problems using efficient methods with ratio tables	Ratio table
6		**Scales, maps and units**	• Convert metric units of measurement • Use a scale to find lengths • Represent a proportional situation in a ratio table	

Lesson	Section	Lesson topic	Lesson objectives	Model or representation
7	**Numerical reasoning**	**Multiplication and estimation**	• Explore, evaluate and select different representations for multiplication • Apply various methods and representations to a singular context using integers and decimals • Apply efficient mastery methods to questions in different contexts • Apply estimation, inversion and rounding in order to check accuracy of answers	Array and area model
8		**Division and estimation**	• Explore and evaluate different representations for division, identifying any potential misconceptions • Apply various division methods and representations to a context involving integers and decimals • Apply inverse operations to division problems to check accuracy of answers • Apply rounding to divisions in order to check accuracy of answers	
9		Squares, directed numbers and BIDMAS	• Calculate squares of one and two-digit numbers • Recognise and use positive and negative numbers • Follow the order of precedence of operators	Array and area model Number line
10	**Parts of wholes**	**Basic Fractions – have your cake and eat it!**	• Understand what a fraction is and be able to link this to proportion • Find a fraction of an amount	Bar model
11		**Work with equivalent fractions, decimals and percentages**	• Convert between a decimal and fraction and percentage where the denominator is a factor of 10 or 100 • Understand and use equivalences between common fractions, decimals and percentages (FDP) • Order FDP amounts by understanding place value	100 square Bar model
12	**Handling data 2**	**Probability**	• Understand the likelihood of events using a probability scale • Calculate simple probability as a fraction, decimal or percentage, including from a table • Identify and correct common misconceptions	

Lesson	Section	Lesson topic	Lesson objectives	Model or representation
13	**Proportional reasoning 2**	Using percentages: simple interest and discounts	• Calculate percentages of quantities, including simple percentage increases and decreases in multiples of 5% • Calculate simple interest in multiples of 5% on amounts of money • Calculate discounts in multiples of 5% on amounts of money	Bar model
14		**Using ratio**	• Understand how ratios correspond with real-world situations • Simplify ratios • Use ratio reasoning to solve whole-to-part and part-to-part simple problems • Use bar model representations to provide insights into solving problems • Understand the importance of using reverse calculations to check answers	
15	**Measures, shape and space**	Calculating with time	• Convert between units of time • Calculate and solve problems using units of time • Schedule events	
16		**Properties of 2D shapes**	• Name and review a range of 2D shapes • Identify lines of symmetry • Measure and categorise angles	
17		**Perimeter of rectangles and compound shapes**	• Find the missing side lengths in rectilinear and compound rectilinear shapes • Explore the concept of perimeter and calculate the perimeter of compound rectilinear shapes • Understand the concept of perimeter and use it in a range of problem-solving situations	
18		**Area of rectangles and compound shapes**	• Explore the area of squares, rectangles and compound rectilinear shapes • Understand the concepts of area and use them in a range of problem-solving situations	
19		**3D shapes and volume**	• Identify properties of common 3D shapes • Through exploration, calculate volume and surface area of common 3D shapes • Use knowledge of volume and surface area for problem solving questions	

Lesson	Section	Lesson topic	Lesson objectives	Model or representation
20	*Revision and exam preparation*			