CENTRES FOR EXCELLENCE IN MATHS

FE centre resource

Pearson

Lesson plan

Multiplication and estimation

1. Lesson objectives

- 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.

2. GCSE curriculum

N2 apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals.

3. Lesson plan

This is an overview of the lesson. More notes can be found in the notes in the lesson slides.

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Introduction	Share objectives with learners	2	Share objectives and emphasise the exploration and application.	Slide 1
Discuss 1	Hook: Discussion about why we need multiplication	8	Vocabulary and method check: introduce the topic and get learners thinking about vocabulary and methods they currently use.	Slides 2–6 Mini-whiteboards
Explore 1	Place value activities Knowledge identification/development of understanding behind the methods	10	Demonstrate how multiplication of a 3-digit number by single and double-digit numbers is considered by decomposition of the numbers using place value cards. Learners are encouraged to think about different ways of multiplication, including standard algorithms, from the point of view of place value. The sequence arrives at the conclusion that a more efficient written method is needed i.e. an algorithm but the place value is important to understanding why the algorithm works.	Slides 7-10 Handout 1 Place value cards Mini whiteboards

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Discuss 2	Talking numbers Developing and encouraging number sense	5	Learners are asked to complete multiplication questions using mental methods of multiplication, and in particular what it means to multiply by powers of 10. Misconceptions of adding a zero are addressed.	Slide 11
Explore 2	Arrays as a way of representing multiplication	10	What is multiplication? Learners are asked to consider multiplication as an array, and multiplication as a more efficient methods than successive addition. Optional handout 2 is available for Learners to investigate how an array can be translated into a ratio table as a methos of multiplication.	Slides 12–14 Handout 2 Arrays and ratio table task
Explore 3	Area model and its use in decomposing to facilitate multiplication	10	The array model (discrete modelling) is now developed into an area model (continuous quantity modelling) to represent questions that involve decimal numbers. The area model is used to demonstrate how decimals can be decomposed by place value to facilitate multiplication.	Slides 15-16

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Explore 4	Rounding and estimation checks	15	Tutors leads a discussion to consolidate understanding of rounding rules, followed by discussion about appropriate levels of accuracy and clarify the difference between rounding to a significant figure versus rounding to a particular place value. An example is then presented on how to use rounding in multiplication to predict sensible answers. In activity 1 learners randomly select place value cards and create two pairs of two-digit numbers, then round and predict the answers prior to checking with the calculator to confirm that the place value of both answers agree. The activity is repeated with decimals included.	Slides 17–21
Practice 1	Practice multiplication questions	15	Learners are asked to complete a set of multiplication calculations, constructed using procedural variation – firstly with integers, then including decimals. Learners are encouraged to see connections between the different calculations, and explore how answers questions can be derived from previous calculations without starting over. Learners are encouraged to use rounding to check their answers. Next, learners are provided with some wordy problems to solve using multiplication.	Slides 22–23 Handout 3 Practice multiplication question

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Discuss 3	Appreciate and select a method	5	Learners are asked to reflect on the different models and methods they have used, which they like best, and whether they might use different models & methods for different situations. They then consider how many ways they can come up with to multiply 1650 by 19.	Slides 24–25
Review and practice questions	Consolidate learning	10	A selection of exam questions for learners to practice and consolidate their multiplication skills. Afterwards, discuss answers and methods used when answering exam questions. Have the learners changed their approach based on the lesson?	Slides 26–27 Handout 4 Practice questions