Lesson plan

Division and estimation

1. Lesson objectives

- 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

2. GCSE curriculum

Number
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

N3 recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals)

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
Recap	Recap what learners have learned about multiplication to address any remaining misconceptions	10	Ask learners to answer questions.	Mini whiteboards Slide 2
Explore 1	Highlight any potential misconceptions	10	Learners attempt eight division questions chosen to highlight any misconceptions. Ask learners to work in pairs and answer on mini-whiteboards.	Slide 3 Mini whiteboards
Discuss 1	Reinforce that division is the inverse of multiplication and introduce the use of the area diagram for division	15	Recap the use of arrays from previous lesson and then quickly transition to area diagrams. Ensure throughout discussion that correct vocabulary is reinforced, including the terms ‘factor’, ‘multiple’ and ‘product’. This is extended to include decimals and the idea of portioning the numbers to make division questions easier to answer. Engage learners in further discussion on using the ‘bus stop’ method when dealing with a remainder, as a whole and as a decimal.	Slides 4–16

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Explore 2	Ensure learners are able to check that their answers are sensible	10	Show learners a question on and two different ways to estimate the answer. Ask which is correct (think/pair/share). There are two examples shown, one involving whole numbers only and one involving decimals. Show learners the three questions on slide 19 and ask them to estimate the answers.	Slides 17–20 Mini whiteboards
Explore 3	Apply the concepts learned to a real-life scenario	5	Introduce real-life scenario: planning a party for a friend. Show learners the two questions and ask them to answer on mini whiteboards, using a formal and informal method.	Slide 21 Mini whiteboards Multilink cubes
Explore 4	Investigate whether a chosen method works for a 3-digit number	5	Give learners a few minutes to solve the division questions that involve 3-digit numbers before asking them to share their answers. Slide 22 shows the answer using a ratio table with a part– whole model if needed.	Slides 22–23 Mini whiteboards
Explore 5	Understanding the meaning of a remainder in context	5	This example involves an answer with a remainder. Allow learners to answer using whichever method they are comfortable with. Ask if learners notice anything different about the question; i.e. the remainder and lead a discussion on the meaning of the remainder in this context.	Slide 24 Mini Whiteboards
Discuss 2	Checking understanding by spotting misconceptions	15	Ask learners to work in pairs to spot the errors.	Slide 25 ‘Misconceptions’ handout

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Explore 6	Introduce division involving decimals	5	Lead a discussion on ensuring the units are appropriate. Ensure students are aware that £1 = 100p and how they can use this. Slides 27 to 34 are editable slides showing suggested solutions including using a ratio table. Slides 35 and 36, which show the compensation method, can be used as extension.	Slides 26–36 Mini whiteboards
Practice question	Learners check and consolidate their understanding by answering exam questions.	10	Ask students to answer the exam questions and after a few minutes discuss their thinking.	Slide 37–40 ‘Practice questions’ handout