Lesson plan
Adding and subtracting fractions

1. Lesson objectives

- Adding and subtracting fractions with common denominators
- Adding and subtracting fractions with different denominators using array representations
- Recognising equivalent fractions using array representations
- Simplifying fractions

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

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	Introduction to the concept of using arrays to "see" fractions, using the context of a flapjack traybake Assessment of prior learning	5	Introduce the objectives and the context of the lesson. If five pieces are sold from **one** tray, what fraction of flapjack is left in the tray? Encourage learners to draw a 3 × 2 array of one tray of flapjack and promote discussion of fractions. Establish their understanding of the mathematical language that will be helpful to them in this lesson. What is a numerator, a denominator etc?	Slide 2
Explore 1	Collaborative exploration and use of flapjack traybake to develop deeper thinking about what a fraction is and how it can be represented	5	In pairs learners will, using the flapjack tray handout, work out how many pieces of flapjack are left after a shift in the café and express their answer as a fraction of a whole tray. This activity is an important building block in the understanding of fractions and the concept of each tray representing one whole.	Slide 3 Handout 1: Flapjack in tray Mini whiteboards
Discuss 1	Exploration of problem-solving approaches using arrays	10	Discuss the approaches that were used. Establish the key ideas and encourage learners to record these in their workbooks.	Slides 4, 5

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Explore 2	Learner sample thinking. Kaleb is wrong, can you explain why?	10	In pairs learners will discover the two flapjack trays are not cut into equal pieces this time, and the story presented represents different denominators. Learners find strategies for visualising how they might find the sum of $\frac{1}{2} + \frac{1}{3}$. If learners jump to the abstract to find the LCM, ask them to explain why they think this works. using the array representation. Make sure that learners explain their approach to their partner, working together to agree on a solution and to develop their own understanding. If you notice that one learner is dominating, or they are not working collaboratively, ask a learner to explain a question that has been answered by their partner.	Slide 6 Handout 2: Learner sample thinking
Discuss 1	Exploration of problem-solving approaches using arrays	5	Discuss the approaches that were used. Establish the key ideas and encourage learners to record these in their workbooks.	Slides 7-11
Modelling	Introduction of using arrays for subtraction	5	Tutor models subtraction by cutting the flapjack tray into three rows and four columns corresponding to the denominators of the two fractions $\left(\frac{2}{3} \text{ and } \frac{1}{4}\right)$.	Slides 12, 13

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Explore 3	Exploration of problem-solving approaches using arrays and making connections to percentages	20	This is the final exploration activity which summarises the learning for adding and subtracting simple fractions and makes the connection with percentages. Learners first match the answers to the questions and only then are provided with the arrays cards and asked to match these to their calculations. At this point they may change their answers and work on them until they are satisfied that they have correctly found all seven solutions. The tutor will refer to a misconception answer sheet they can refer to. This will help guide questioning by the tutor as they walk around the groups, listening to their discussions.	Handout 3: Card matching activity Handout 4: Fractions, arrays and percentage cards Handout 5: Card matching activity: answers and misconceptions
Review	Review of card matching	10	The tutor shows the matches. This is followed by class discussion and key ideas are reviewed. What did learners notice – equivalent/simplified fractions. Did learners complete calculations without the arrays? How easily did the learners match the percentage cards?	Slide 14

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Practice	Securing understanding of adding and subtracting fractions using an array approach	10	Learners will work independently on one GCSE question. When completed, ask learners whether they have used a different approach to that used prior to the lesson when adding and subtracting simple fraction problems. How has their thinking changed? What have they learned about arrays? Did this help? Discuss where else this approach might work. Where have they used it before? Where would they use it in future?	Slides 15-22 Handout 6: Exam question Mini whiteboards
Review	Summarise learning, to capture ways of thinking and to clarify the concept of proportional reasoning	10	Once all groups have attempted the GCSE question, draw them together to summarise the learning. • Clarify the concept of adding and subtracting simple fraction problems. • Capture the ways of thinking about arrays. It is important to make sense of and to capture learners' ways of thinking – not to prescribe. They must use the best method to help them remember how to answer questions like these in an exam situation.	Slide 23