

Lesson plan

Sharing in a ratio

1. Lesson objectives

- Understand how ratios correspond with real-world situations
- Use ratio reasoning to solve whole-to-part and part-to-part simple problems
- Simplify ratios
- Use bar model representations to provide insights into solving problems

2. GCSE curriculum

Ratio, proportion and rates of change

R4 use ratio notation, including reduction to simplest form

R5 divide a given quantity into two parts in a given part : part or part : whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)

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 ratio Assessment of prior learning	5	Introduce the objectives of the lesson. This starter activity is designed to address the misconception that a ratio is the same as a fraction i.e. a part to whole and not part to part relationship. Show learners Slide 2. Is Paul correct?	Slide 2
Explore 1	Collaborative exploration and using chocolate chunks to develop the construction/use of bar models to write a ratio	20	In pairs learners will calculate how many chunks of chocolate each group receives and attempt to write their answer in the form of a ratio. This activity highlights how ratios can be the same if the whole is in the same proportion. Learners reduce a ratio to its simplest form. Both groups, despite having a different number of chocolate chunks can have the same ratio, which can be reduced to the ratio 1 : 1. The diagrams learners draw to work out this question can be used as a scaffold to reduce the ratio to its simplest form in one or more steps.	Slide 3 Handout 1: Sharing in a ratio
Discuss 1	Discussion of problem-solving approaches using bar models	10	Groups feedback on how they calculated the ratios. Tutor can model, using the bar models either on the whiteboard or using Slides 4 and 5.	Slides 4, 5

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Model	Learners move out of the concrete context of chocolate into the abstract context of a utility bill	5	Scaffolded utility bill question as the bar model diagram is shown on Slide 6. Learners can draw this on the handout and use it to find the missing values.	Slide 6 Handout 2: Utility bill
Practice	It aims to deepen learners' understanding using bar models	20	Learners complete the rest of the handout in pairs. Whilst learners are working, pay particular attention to any thinking about what the problem 'looks like' and encourage them to draw diagrams to help explain their calculations. Note that the final challenge is that they make up their own bar model questions which can be swapped with those individual learners who work at a faster pace.	Handout 2: utility bill Slides 7–9
Review	Discuss the approaches and answers to the bar model practice	10	The tutor draw out the answers from learner pairs and the tutor invites learners to share some of the stories that were made into questions.	Slides 7–9
Practice	Securing understanding of ratio/dialogic learning approach	10	Learners work independently. Depending on time and the ability of learners in the group, you may choose to do only one of the two questions for the class. When the exercise has been completed, ask learners whether they have used a different approach to that used prior to the lesson when solving ratio problems. How has their thinking changed? What have they learned about multiplicative structure? Discuss where else this approach might work. Where have they used it before? Where would they use it in future?	Slides 10, 12 Handout 3: Practice question Slides 11, 13,14 Handout 4: Practice question – calculator Mini whiteboards

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Review	Summarise learning, to capture ways of thinking and to clarify the concept of proportional reasoning	10	<p>Once all groups have attempted both questions, draw them together to summarise the learning.</p> <ul style="list-style-type: none"> • Clarify the concept of these kinds of ratio problems. • Capture the ways of thinking for each of the problems of various pairs. (You may use the bar models in the PowerPoint presentation or draw one on the main whiteboard.) <p>It is important to make sense of and to capture learners' ways of thinking – not to prescribe a best method.</p>	Slide 15