CENTRES FOR EXCELLENCE IN MATHS

FE centre resource

Pearson

Lesson plan
Benchmark percentages and equivalent fractions & decimals

1. Lesson objectives

- Work with fractions, decimals and percentages using multiple representations
- Use benchmark percentages and bar models to solve non calculator percentage problems

2. GCSE curriculum

Number
N10 work interchangeably with terminating decimals and their corresponding fractions

Ratio, proportion and rates of change
R9 define percentage as ‘number of parts per hundred’; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics

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 fraction, decimal and percentage equivalence	5	Lead a discussion on how to identify what is wrong with Yaima's statement. How do the learners know it is wrong? How can they prove it?	Slide 2 Mini whiteboards
Discuss 1	Introduce the 100-grid representation for percentages, fractions and decimals	10	Introduce the 100-grid, where 50% is modelled as five-tenths i.e. five lines of 10 small squares. Ask learners to link fractions out of 100 to percentages, and explore other equivalent fractions and decimals, before asking for other multiples of tenths, e.g. 30%. What would that look like? Slide 4 shows tenths and hundredth. Ask learners to think about the value of 12 hundredths or one tenth and two hundredths, and its equivalent decimal and percentage, i.e. 0.12 and 12%. Ask learners to complete the 'true or false' task on slides 5 and 7 as a think-pair-share activity, then discuss with the class.	Slides 3–8 Mini whiteboards

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Explore 1	Collaborative exploration to develop thinking and reasoning skills for fractions, decimals and percentages	15	This task checks learners' understanding of fractions, decimals and percentages, especially where they are not able to recall the exact values. Learners will have the opportunity to use their reasoning and thinking skills. Learners work in pairs and are given 48 cards to create 12 squares with 4 equivalent values. This activity is an important building block for the construction of knowledge for fractions, percentages, decimals, and allows learners to practise problem-solving and calculation skills that they will need for the non-calculator paper.	Slide 9 Card sort handout
Discuss 2	Exploration of problem-solving approaches to find match equivalent fractions, decimals and percentages	5	Show students the completed puzzles. Ask pairs to share their reflections on the task. How did they work on the task? What did they find challenging?	Slide 10
Explore 2	Collaborative exploration to develop the use of bar models by matching bar models to the appropriate question (procedural variation)	15	Learners will use the given simplified fractions, decimals and percentages shown in a bar model. Learners use the values in the bubble, and additional values of their choice, to draw simple bar models with values that add to 1. Ask learners to work in pairs. The focus of this task is on sketching bar models to represent their calculations.	Slide 11–12 Flip chart paper, marker pens

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Discuss 3	Deepen learners' understanding of using bar models	10	Use the diagrams to explore learners' thinking and reasoning. Look for any misconceptions, particularly regarding the equivalence of $\frac{1}{5}$, $\frac{1}{8}$ and $\frac{1}{20}$ to percentages. Emphasise place value when drawing the bar models. Slides 14–15 allows the tutor to model two problems with contexts where bar models could be used to help find the solution. Slide 16 explore the connection between the fraction of an amount and the percentage the amount by showing that $\frac{1}{5}$ is the same as 20%.	Slides 14–16
Explore 3	Using bar models to solve word problems using fraction, decimal and percentage equivalence	15	Ask learners to work in pairs to complete the questions, which have been constructed to provide procedural variation. Do not prompt unnecessarily; allow learners to try and work through the problems for themselves as much as possible.	Slide 17 Problem-solving with bar models handout
Discuss 4	Deepen learners' understanding of equivalence	5	Ask learners for feedback on the task and go through the answers with them. Ask learners to share which questions they found difficult and why.	Slides 18–24

Activity	Purpose of this activity	Time (min)	Guidance	Materials
Practice question	Learners check and consolidate their understanding by answering exam questions	5	Give learners time to work independently on the questions. Depending on the time and the ability of the learners in the group, you may choose to focus only on the more straightforward questions on slide 25. After learners have had enough time to attempt the questions, ask them whether they have used a different approach, to that used prior to the lesson. How has their thinking changed? What have they learned? When might they use this approach again in the future?	Slides 25–26 Practice questions handout
Review	Summarise learning, capture ways of thinking and clarify the concept of expanding and factorising	5	Summarise the learning. • Clarify the concept of equivalence for fractions, decimals and percentages. • Capture the ways of thinking for problem-solving. Draw on the examples from the earlier slides on the main whiteboard. Would they use bar models in the future? It is important to make sense and capture learners' ways of thinking – not to prescribe a best method. The lesson should have helped learners understand why bar models can be helpful in these types of question. The purpose of this lessons was to give them new ways of thinking so that they can answer harder problem-solving questions under the pressure of an exam.	Slide 27