CENTRES FOR EXCELLENCE IN MATHS

FE centre resource

Pearson

Lesson plan

Scales, Maps and Units

1. Lesson objectives

- To be able to convert metric units of measurement
- To be able to use a scale to find lengths
- To be able to represent a proportional situation in a ratio table.

2. GCSE curriculum

Measures and accuracy
N13 Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate.

Ratio, proportion and rates of change
R1 Change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts.
R2 Use scale factors, scale diagrams and maps.

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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 different metric units of length	5	Launch the activity by telling learners that having a basic understanding of different measurements is very useful in everyday life. Give examples, e.g. telling your hairdresser how much you want cut off if you are having a trim, buying the correct screws for a DIY job etc. Learners recap on metric measurements mm, cm, m, km choosing the most appropriate measurement of choices provided.	Slide 2 Handout: Find the measurements
Model	To introduce the concept of measurement and how to change freely between different units using ratio tables	5	Tutor models reading a scale on a ruler and then how to change between cm and mm and cm to metres. Tutor shows learners ratio tables to support converting metric units of lengths which are then used to explain their thinking.	Slide 3
Explore 1	Collaborative exploration to develop the concept of scale using rulers to measure	5	In pairs, learners explore how to represent the lengths in different measurement units, carefully reading the scales on the rulers.	Slide 4 Handout: Reading scales and converting metric units

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Activity	Purpose of this activity	Time (min)	Guidance	Materials
Discuss 1	The discussion aims to deepen learners' understanding of how to use a ruler to measure distances	5	Groups feedback on the measurement exploration and confirm their answers. How to explore different graduation scales is addressed.	Slides 5
Misconception slide Explore 2	Misconception – not knowing when to divide or multiply before problem solving task	5	Independently at first, and then in pairs, learners look at Rahima's mistake. Can they explain why she is not correct? Can they use ratio tables to explain their thinking?	Slides 6 Handout: Rahima's mistake
Discuss	The discussion aims to deepen learners' understanding of how to use ratio tables to convert between units	5	Tutors ask learners for their feedback. Slides can be used to model the answer is required.	Slides 7

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Activity	Purpose of this activity	Time (min)	Guidance	Materials
Introduction to Explore 3 activity	Introduction to reading scales on maps that then leads on the activity	5	Introduce the next activity and show learners the picture of the park and an example of how to find the distance between two points. Discuss the context of maps which usually have scale in the form 1:*n*. Allow learners to use a calculator and work through this example of using the scale of 1:5000 to convert 9.8 cm on the map to actual real distance between two points. Remind learners of the start of this lesson and what measurement unit they think is a suitable choice for this measurement. Discuss with learners whether there is anything they need to consider when calculating a real-life route around a location. Point out that they cannot always use a direct route as the park ranger will not be able to move directly across bodies of water, for example.	Slides 8
Explore 4	Collaborative exploration to develop the use of scales given in the form 1:*n* to problem solve the actual distance between points	15	In pairs, learners use the map of the park and find the best route for the park ranger between four points on the map and convert the route to actual distances to find the actual distance between each point and the total distance. Encourage learners to use ratio tables to convert between units which will help explain their thinking during the follow up discussion.	Slide 9 Handout: Park ranger

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Activity	Purpose of this activity	Time (min)	Guidance	Materials
Discuss 3	The discussion aims to deepen learners' understanding of how to use scales given in the form 1:*n* to measure distances using ratio tables to convert between units	5	Tutor asks for feedback to explore learner thinking and reasoning. Look for misconceptions with conversion between units, that they successfully multiply and divide by powers of 10 depending on the units being converted.	Slide 10
Maps and Technology	The discussion aims to deepen learners' understanding of how to use scales given in the form 1:*n* to measure distances using ratio tables to convert between units	5	Finish the discussion with a look at scale using an interactive map on their phones while demonstrating on the interactive whiteboard. Choosing two fixed points to travel between tutor asks learners: • Can you see the scale? • How is this different to the scales we have seen so far? What happens to the scale when you zoom in or out?	Slide 11

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Activity	Purpose of this activity	Time (min)	Guidance	Materials
Explore 5	Collaborative exploration to freely change between metric units for different lengths of car	15	In pairs learners work through a series of car lengths and scales to match them up. There are blank cards for both the scale and car length which they must also try and complete.	Slides 12 and 13 Handout: Models and scales
Discuss	The discussion aims to deepen learners' understanding of metric conversion	5	Tutors ask learners for feedback and their use of ratio tables to explain their thinking. Sample answer slides provided if required. How did they do? What questions were difficult and why?	Slides 14–18
Exam questions	Exam questions	5	Learners will work independently. Depending on time and ability of learners in the group, you may choose only one of the two questions for the class. When completed, ask learners whether they have used a different approach to that used prior to the lesson. How has their thinking changed? What have they learned about expanding and factorising? Would or when might they use this approach again in the future?	Slides 19–22 Handout: Exam questions

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Activity	Purpose of this activity	Time (min)	Guidance	Materials
Review	Summarise learning, to capture ways of thinking and to clarify the concept of reading and interpreting scale, maps and units	5	Summarise the learning. • Clarify the concept of measurement and the use of ratio tables • Capture the ways of thinking about measurement. Draw on the examples from the slide on the main whiteboard. 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 how to apply the rules of conversion in stages using ratio tables and given them a way of thinking to be able to answer these sorts of questions under the pressure of an exam even if they cannot remember how to convert e.g. from mm to metres in one step.	Slide 23

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