

CLIL LESSON PLAN

Perimeter & Area: Scale Drawings and Ratios

 LESSON OVERVIEW

Subject(s)	Arithmetic · Geometry
Age Group	11–14 years old
Duration	45 minutes
CEFR Level	B1

 LEARNING OBJECTIVES

Content Objectives

- Students will be able to understand and apply the concept of scale: interpreting a given scale ratio and converting between real measurements and drawing measurements.
- Students will be able to produce a scale drawing of a rectangle given its real dimensions and a specified scale (e.g., 1:5).
- Students will be able to calculate the perimeter and area of the scale drawing, applying the correct formulas.
- Students will be able to explain the relationship between scale, ratio and proportion in a geometric context.
- Students will be able to solve word problems requiring conversion from scale measurements to real measurements and vice versa.

Language Objectives

- Students will be able to use academic vocabulary related to scale and proportion accurately: scale, ratio, proportion, drawing length, real length, scale factor. Key vocabulary is displayed on a poster throughout the lesson; pronunciation is modelled and practised chorally before the main activity.
- Students will be able to describe the scale conversion process using structured explanations: 'The drawing length is calculated by dividing the real length by the scale factor.'; 'According to the scale 1:5, 1 cm on the drawing represents 5 cm in real life.'
- Students will be able to justify their calculations: 'I divided by 5 because the scale is 1:5.'; 'The real length is larger than the drawing because the scale reduces the measurements.'
- Students will be able to use comparative language: 'The real size is bigger than the drawing.'; 'This value is smaller because the scale reduces the measurements.'

 COMMUNICATION SKILLS

Reading:

- Read word problems involving scale, identifying the scale ratio and the given measurement.
- Interpret scale drawings and extract measurements from labelled diagrams.
- Understand scale notation written in academic language (e.g., Scale 1:5 → 1 cm on paper = 5 cm in real life).

Listening:

- Understand the teacher's explanation of scale and ratio using worked examples on the board.
- Follow multi-step instructions for the scale drawing activity.
- Listen to a partner's reasoning during pair work and identify any errors in the conversion steps.

Writing:

- Write the scale conversion calculation step by step, specifying the scale used, the operation applied and the final measurement with correct units.
- Complete a scale drawing on grid paper, labelling the drawing dimensions.
- Write a short justification of the calculation: 'I divided by ___ because the scale is 1:___.'

Speaking:

- Explain the scale conversion process: 'First I identify the real length. Then I divide by the scale factor. Finally I get the drawing length.'
- Justify the result: 'The drawing is smaller than the real object because the scale reduces the measurements.'
- Compare drawing and real measurements with a partner.

 GRAMMAR, VOCABULARY & PRONUNCIATION**Language of Learning (CALP)**

Geometry and scale vocabulary: perimeter, area, length, width, square, rectangle, scale, ratio, proportion, drawing, measurement, scale factor, real length, drawing length.

Arithmetic vocabulary: multiply, divide, total, result, formula, units.

Academic structures for describing scale:

- 'The scale is 1:5, which means 1 cm on the drawing represents 5 cm in real life.'
- 'The drawing length is calculated by dividing the real length by the scale factor.'
- 'The real length is found by multiplying the drawing length by the scale factor.'

Explaining cause and reason:

- 'I divided by 5 because the scale is 1:5.'
- 'The drawing is smaller because the scale reduces all measurements proportionally.'

Sequencing steps:

- 'First I identify the scale. Then I apply the conversion. Finally I check that my answer is reasonable.'

Comparisons:

- 'The real size is bigger than the drawing.'
- 'This value is smaller because the scale reduces the measurements.'

Language for Learning (BICS)

All BICS phrases are displayed on the board and on a reference card throughout the lesson.

Pair-work and verification phrases:

- 'What scale did you use?'
- 'I agree / I disagree with your conversion.'
- 'Let's check our steps.'

Classroom phrases:

- 'Can you repeat, please?'
- 'I don't understand this step.'
- 'How do you say ___ in English?'

Self-correction phrases:

- 'I made a mistake. Let me try again.'
- 'I think the real length should be...'

Language Through Learning (not planned)

- Questions about scale in familiar contexts students bring to the lesson (e.g., maps, model cars, architectural plans, video game maps).
- Vocabulary related to units of measurement and their equivalences across different systems.
- Emergent problem-solving language: 'What if the scale is different?'; 'Can I use a different scale for the same drawing?'

 COGNITION**LOTS — Remembering, Understanding, Applying**

- What does a scale of 1:5 mean?
- Use the scale 1:10. What is the real length of a 3 cm drawing?
- Use the scale 1:2. What is the drawing length for a real measurement of 12 cm?
- Apply the scale to calculate the drawing dimensions of a rectangle with real length 20 cm and width 10 cm.
- Calculate the perimeter and area of the completed scale drawing.

HOTS — Analysing, Evaluating, Creating

- How does changing the scale affect the drawing dimensions? What stays the same and what changes? (Analysing)
- A student used scale 1:5 and got a drawing length of 8 cm. Is this result reasonable for a real length of 40 cm? Justify your answer. (Evaluating)
- Design a scale drawing of your classroom or bedroom. Choose your own scale and justify

why it is appropriate for the size of paper you are using. (Creating)

GUIDING QUESTIONS FOR TEACHERS

Pre-lesson and in-lesson self-reflection:

- Have I activated students' prior knowledge of ratio and proportion before introducing scale — and have I checked whether they can recall the perimeter and area formulas from the previous session?
- Have I displayed the scale notation clearly on the board (Scale 1:5 → 1 cm = 5 cm in real life) with a worked example before asking students to convert independently?
- Have I modelled both directions of the conversion — real to drawing (divide) and drawing to real (multiply) — so that students can handle both types of problem in the evaluation task?
- Is the grid paper I have provided appropriate for the scale dimensions students will be drawing (i.e., the drawing fits on the page without being too large or too small)?
- Have I checked that students understand what the scale drawing activity requires before they begin — specifically, that they must calculate the drawing dimensions first and then draw?
- After the lesson, do the completed scale drawings and the written justifications provide sufficient evidence that students can apply a given scale correctly, calculate drawing dimensions and explain the relationship between scale, ratio and real size?

CULTURE

Scale in maps and cartography: Scale drawings are used in maps worldwide. Students are invited to consider familiar maps they have seen and reflect on what the scale tells them about real distances. Examples from different countries and regions illustrate that cartography is a universal application of ratio and proportion.

Scale in architecture and design: Architectural plans, engineering drawings and interior design layouts all use scale to represent real spaces on paper. Students explore how the same mathematical concept appears in the design of homes, public spaces and infrastructure across different cultural contexts.

Measurement systems across cultures: A brief mention that different countries use different measurement systems (metric vs. imperial) reinforces the importance of specifying units and provides a concrete example of why scale ratios must always include the unit of measurement.

Model-making traditions: Scale models — of buildings, vehicles, cities — are produced in many cultural contexts, from traditional craft to modern design. Students are invited to share examples of scale models they have encountered (toys, architectural models, museum displays) to connect the mathematical concept to familiar objects.

Life skills: Understanding scale is a practical skill used in everyday life: reading a map, following a floor plan, interpreting a technical drawing. The lesson connects this mathematical reasoning to real-world decision-making.

★ 21ST-CENTURY SKILLS

BICS-Related Skills

Communication: Students explain the scale conversion process to a partner step by step using the structured sentence frames on the board, and justify the direction of the conversion (divide or multiply).

Collaboration: Students work in pairs during the guided conversion practice, checking each other's steps and identifying errors in the scale application before producing the final drawing.

Time Management: Students must complete the scale conversion calculations, produce the scale drawing on grid paper and write the justification within the allocated time.

Social & Cross-Cultural Skills: The Culture section invites students to share examples of scale drawings and maps from their cultural backgrounds, acknowledging that ratio and proportion are universal mathematical tools with diverse real-world applications.

CALP-Related Skills

Critical Thinking: Students must determine the direction of the conversion (divide for real-to-drawing; multiply for drawing-to-real) and verify whether their result is reasonable given the scale ratio — a genuine analytical judgement.

Problem-solving: The evaluation task presents two conversion problems with different scales (1:10 and 1:2), requiring students to apply the same principle in both directions and check their results against the scale constraint.

Productivity & Accountability: Students are responsible for producing an accurate scale drawing with labelled dimensions and a written justification. The self-assessment form requires them to verify their conversion steps against specific, observable criteria.

Creativity (Academic): The HOTS Creating task asks students to design a scale drawing of their own classroom or bedroom, choosing an appropriate scale and justifying their choice — an open-ended application of the concept in a personally meaningful context.

📄 METHODOLOGY

Duration	Lesson Flow	Activities	Materials Needed	AI Tools Integration
5'	Warm-up Activities	Is This the Real Size? The teacher shows a small drawing of a rectangle and asks: 'Is this the real size of the object, or a smaller version of it?' Students respond. The teacher introduces the concept of scale: 'A scale drawing represents a real object using smaller (or larger) measurements, keeping the same proportions.' The teacher writes the scale notation on the board and models the meaning:	Small drawing of a rectangle (projected or printed). - Board / markers. - Vocabulary poster: scale, ratio, proportion, drawing length, real length.	CANVA Image Bank: Scale drawing visuals and diagram cards: https://www.canva.com/design/DAHBgQHxGv4/edit

Duration	Lesson Flow	Activities	Materials Needed	AI Tools Integration
		- Scale 1:5 → 1 cm on the drawing = 5 cm in real life. - Worked example: Drawing length 4 cm → Real length = $4 \times 5 = 20$ cm. L1 elicitation: 'Do you know this concept in your language?' L1 equivalents of scale and ratio are written alongside the English terms. Pronunciation of SCALE, RAtion, proPORTion is modelled and practised chorally.		
25'	Main Activities	Guided Scale Conversion Practice (10') The teacher models the two directions of scale conversion on the board: - Real → Drawing: 'Real length 20 cm, scale 1:5 → Drawing length = $20 \div 5 = 4$ cm' - Drawing → Real: 'Drawing length 3 cm, scale 1:10 → Real length = $3 \times 10 = 30$ cm' ICQs: 'When do you divide? When do you multiply? Why?' Students answer before moving to pair practice. In pairs, students solve two conversion problems: - Problem 1: Real length 15 cm, width 10 cm, scale 1:5. Find the drawing dimensions. - Problem 2: Drawing length 4 cm, width 2 cm, scale 1:10. Find the real dimensions. Sentence frames on the board: 'I divided by ___ because the scale is 1:___'; 'The real length is ___ because I multiplied the drawing length by ___.' Scale Drawing Activity (15') Each student produces a scale drawing on grid paper using the following data: - Real size: Length 20 cm, Width 10 cm. - Scale: 1:5. Students must: - Step 1: Calculate the drawing length ($20 \div 5 = 4$ cm) and drawing width ($10 \div 5 = 2$ cm). - Step 2: Draw the rectangle on grid paper using a ruler, labelling both drawing dimensions. - Step 3: Calculate the perimeter of the drawing ($2 \times (4 + 2) = 12$ cm).	Grid paper (one sheet per student). - Ruler. - Worksheet with scale problems (one per student). - Sentence frames displayed on the board. - Calculator (optional).	Liveworksheets: Interactive scale practice: liveworksheets.com/worksheet/en/math/1447511 Additional worksheets: 15worksheets.com (scale drawing PDFs)

Duration	Lesson Flow	Activities	Materials Needed	AI Tools Integration
		- Step 4: Calculate the area of the drawing ($4 \times 2 = 8 \text{ cm}^2$). - Step 5: Write one sentence justifying the calculation: 'I divided by 5 because the scale is 1:5.' The teacher circulates and uses reformulation to address errors in the conversion direction.		
5'	Wrap-Up & Sharing	Connecting Ratios, Arithmetic and Geometry The teacher opens a brief discussion: 'How do ratios connect arithmetic and geometry?' Students respond using the sentence frames on the board. Two or three volunteers share their scale drawings and explain their conversion steps. The teacher closes with the key message: 'A scale drawing uses ratio to represent a real object proportionally. The same mathematical relationship — divide to make smaller, multiply to make larger — connects arithmetic and geometry in every technical drawing.' Key vocabulary is reviewed: scale, ratio, proportion, drawing length, real length, scale factor.	Board with scale notation and key vocabulary (still displayed). Student scale drawings for sharing.	—
10'	Evaluation & Feedback	Teacher Assessment (Observation) - Correct application of the scale ratio in both directions (real to drawing and drawing to real). - Accurate scale drawing on grid paper with labelled dimensions. - Correct calculation of the perimeter and area of the scale drawing. - Written justification using the target sentence frame: 'I divided by ___ because the scale is 1:___.' Exit Problems (individual) Students solve two conversion problems independently: - Scale 1:10 → Drawing length 3 cm. What is the real length? (Answer: 30 cm) - Scale 1:2 → Real length 12 cm. What is the drawing length? (Answer: 6 cm)	Teacher observation checklist. - Exit problem sheet (one per student). - Student self-assessment sheet.	—

Duration	Lesson Flow	Activities	Materials Needed	AI Tools Integration
		The teacher collects the exit problems to check accuracy and identify any students who have confused the direction of the conversion. Student Self-Assessment • I can explain what a scale of 1:5 means. • I can convert a real measurement to a drawing measurement by dividing by the scale factor. • I can convert a drawing measurement to a real measurement by multiplying by the scale factor. • I produced a correct scale drawing with labelled dimensions. • I can explain why the drawing is smaller than the real object.		