

**Deforestation at Scale****Goals**

- Calculate the area of forested land from a map.
- Describe the result of deforestation and reforestation on a model of development.
- Make simplifying assumptions to solve problems about estimating quantities.

**Lesson Narrative**

In this optional lesson, students use maps to compare the forested area of a location at two different times. They begin by remembering strategies to calculate the area of a polygon. They then are presented with two maps of the same location, before and after development. Students compare the forested areas in each map and discuss the deforestation and reforestation in the area. Students make sense of the problem by making a plan for how to find the area of the forested land. They construct and critique arguments when comparing plans and solutions. This lesson relies on skills developed in Unit 1 but can be approached in more ways if taught after later units.

**Student Learning Goal**

Let's compare the forested area over time.

**Lesson Timeline****15**  
min

Activity 1

**10**  
min

Activity 2

**20**  
min

Activity 3

**Access for Students with Diverse Abilities**

- Engagement (Activity 3)

**Access for Multilingual Learners**

- MLR7: Compare and Connect (Activity 1)

**Instructional Routines**

- MLR7: Compare and Connect
- Poll the Class

Activity 1

Scaling a Room

15 min

Activity Narrative

The goal of this activity is to refresh students’ understanding of scale drawings. Depending on how recently the students worked with scale drawings, it may be beneficial to discuss different approaches to this problem before they begin.

Monitor for students who use these different strategies:

- Decompose the region into shapes to find the area
- Enclose the region with a rectangle and then subtract the missing parts
- Find each actual length and then use those to determine the area of the actual room
- Find the area of the scale drawing and then multiply by the (scale factor)<sup>2</sup> to find the area of the actual room

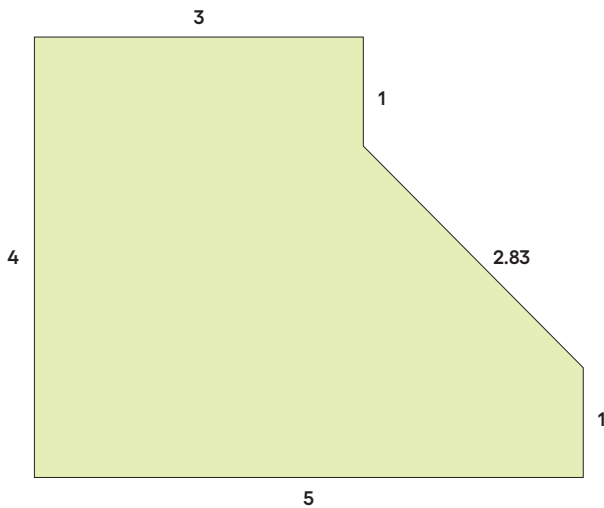
Launch

Give students 5–7 minutes of quiet work time, then follow with a whole-class discussion.

Select work from students with different strategies, such as those described in the activity narrative, to share later.

Student Task Statement

Here is a scale drawing of a room. The drawing has the following scale: 1 unit in the drawing represents 4 feet in the actual room. Calculate the area of the actual room. Be prepared to explain your reasoning.



**256 square feet**  
Sample reasoning: I split the room into 3 rectangles and 1 triangle, multiplied the side lengths of the shapes by 4, found the area of each shape, and added them together.

Instructional Routines

**MLR7: Compare and Connect**

[ilclass.com/r/10695592](https://ilclass.com/r/10695592)  
Please log in to the site before using the QR code or URL.

Access for Multilingual Learners (Activity 1, Narrative)

**MLR7: Compare and Connect**  
This activity uses the *Compare and Connect* math language routine to advance representing and conversing as students use mathematically precise language in discussion.

Student Workbook

**LESSON 8**

**Deforestation at Scale**  
Let's compare the forested area over time.

**1 Scaling a Room**

Here is a scale drawing of a room. The drawing has the following scale: 1 unit in the drawing represents 4 feet in the actual room. Calculate the area of the actual room. Be prepared to explain your reasoning.

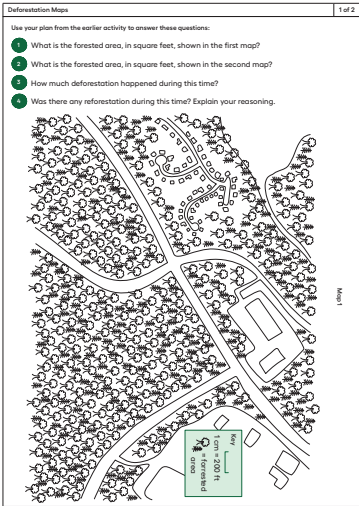
Student Workbook

**2 Making a Plan**

Your teacher will give you two maps of the same place at different times. Work with your partner to make a plan of how you could decompose each map to find the area of forested land.

Note: while the maps are to scale, the trees are not.

Student Workbook



Activity Synthesis

The goal of this discussion is to highlight different approaches for determining the area of the actual room, including different ways to decompose the region and how to use the scale.

After all strategies have been presented, display 2–3 approaches from previously selected students for all to see. Use *Compare and Connect* to help students compare, contrast, and connect the different approaches. Here are some questions for discussion:

- “What do the approaches have in common? How are they different?”
- “How does the scale factor show up in each method?”
- “Why do the different approaches lead to the same outcome?”

Activity 2

Making a Plan

10 min

Activity Narrative

In this activity, students compare two maps of the same location from different points in time. They create a plan to measure the difference in forested area. Students make sense of problems when making a plan to calculate area.

Launch

Arrange students in groups of 2. Introduce the terms “deforestation,” “reforestation,” and “forested land.” Give groups 2–3 minutes to brainstorm reasons for deforestation and the impact it has, followed by a whole-class discussion. Then display the two scale maps. As students work, look for groups that use these different approaches:

- Decompose the region into shapes to find the area
- Enclose the region with a rectangle and then subtract the missing parts
- Find each actual length and then use those to determine the area of the actual region
- Find the area of the scale drawing and then multiply by the (scale factor)<sup>2</sup> to find the area of the actual region

Student Task Statement

Take a look at the two maps of the same place at different times in your student workbook. Work with your partner to make a plan of how you could decompose each map to find the area of forested land.

Note: while the maps are to scale, the trees are not.

Answers vary.

Activity Synthesis

The goal of this discussion is to highlight the different plans groups have made and how different approaches could impact their final answers. Consider asking:

- “What is your plan for finding the area? Is there a group with a different plan?”  
Decompose parts of the map into regions to find the area. Yes, a different group plans to find the area of the entire region and remove the area of the parts without trees.
- “Do you expect to have the exact same answer as other groups? How close do you expect to be?”  
No, our answers will not be exactly the same. We expect to be within 100,000 square feet.
- “What are factors that could make your answer more or less accurate?”  
how we round our measurements, how we decompose our regions

Activity 3  
Deforestation and Reforestation

20 min

Activity Narrative

In this activity students carry out their plans for finding the forested area in each map. Students reason abstractly and quantitatively when finding the area of each shape. While it is expected that groups end up with similar answers, differences in measurement can lead to different responses. Students construct arguments and critique the reasoning of others when discussing whether or not deforestation and reforestation occur.

Launch


Keep students in the same groups.

Instructional Routines

Poll the Class

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Please log in to the site before using the QR code or URL.



Access for Students with Diverse Abilities (Activity 3, Student Task)

**Engagement: Develop Effort and Persistence.**

Check in and provide each group with feedback that encourages collaboration and community. For example, identify creative ways of finding area for the group to discuss.

*Supports accessibility for: Social-Emotional Functioning, Organization*

## Student Workbook

## Deforestation and Reforestation

Use your plan from the earlier activity to answer these questions:

1. What is the forested area, in square feet, shown in the first map?

2. What is the forested area, in square feet, shown in the second map?

3. How much deforestation happened during this time?

4. Was there any reforestation during this time? Explain your reasoning.

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## Student Task Statement

Use your plan from the earlier activity to answer these questions:

1. What is the forested area, in square feet, shown in the first map?

**Sample response: about 6,250,000 square feet**

2. What is the forested area, in square feet, shown in the second map?

**Sample response: about 3,355,00 square feet**

3. How much deforestation happened during this time?

**Sample response: About 2,895,000 square feet of forested land was removed during this time.**

4. Was there any reforestation during this time? Explain your reasoning.

**Sample reasoning:**

- No, there was no reforestation in this area because all of the forested areas in the second map were also forested areas in the first map.
- Yes, there was reforestation because construction often takes up more space than the finished buildings, so more trees were removed and new ones were planted in the same place.

## Activity Synthesis

The purpose of this discussion is to highlight the variability in the answers, including how different answers can still be reasonable and how to decide if an answer is so different it would not be a reasonable solution. It is expected that students' answers for the areas should be similar but not exactly the same.

First, poll the class on their answers to the area of forested land in each map. Record and display the responses for each area for all to see. Consider asking:

“Why do different groups have different answers?”

*“Is there a significant difference between the area of forested land in each map? How do you know?”*

*“What could you have done differently to make your answer more exact? Explain your reasoning.”*

*“Did your group change your approach from what you planned?”*

*“Was it easier to find the whole area and subtract areas without trees or find the areas with trees and add them together? Explain your reasoning.”*

*“Do you think reforestation balances out deforestation? Explain your reasoning.”*

If time allows after discussing students' answers, consider displaying a map from Global Forest Change, [im612.org/GlobalForestChange](https://im612.org/GlobalForestChange). Focus on your local area or any other example of deforestation or reforestation, such as the wildfires near Los Angeles. Use the settings on the side of the webpage to compare what the forests looked like over time. Consider discussing:

“Does this area show any evidence of deforestation?”

*“Does this area show any evidence of reforestation?”*

*“Did those changes occur naturally or through human actions?”*

*“Why should communities care about deforestation in their area?”*