Increasing Area
Case Overview

Background on the Classroom Lesson
This video comes from a 9th-grade class using an integrated curriculum. Previously, students examined the area of a square town that initially had side lengths of two miles, and its side length grew by 0.5 miles every year. They investigated the area of the town after 1, 4, and 5 years. The students explored what happened to the total area as the sides grew by 0.5 miles each year.

Student Activity
Suppose that in a certain "base year," each side of the square town was X miles, and that the sides were increased by a half a mile in the next year. Find an expression using X that gives the amount by which the area of the town increased.

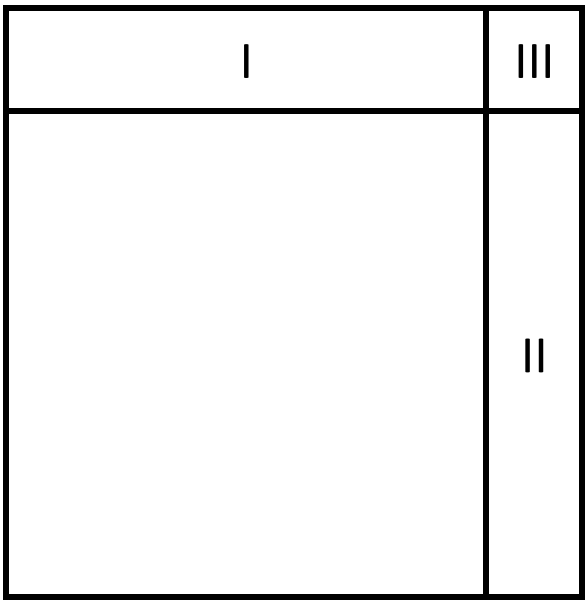

Diagram of town separated into the "base year" size and the additions the next year.

Overview of the Video
In the video, a group of students work on a related problem involving the area of a square town of (X + 0.5) miles per side. The group considers different ways to represent the increase in area from the original town size of X miles per side. Before the video starts, students are asked to make a diagram of the area of the town after its first year of growth, breaking up the increase in area into the same three parts they used the day before. When watching (or re-watching), focus on the different methods the students use to find the increase in area. Be sure to discuss the different expressions for the increase in area that students explore.

Questions to Consider about Student Thinking
We think some of the richest student thinking in this video involves the different ways in which students come up with the expression for the increase in area. In what follows, we provide sets of questions about Neal, Mikaela, and the group's ideas about the expression for the area.

1. Neal’s Idea:
    a. What expression does Neal propose to the group?
    b. What area does Neal think his expression represents?

2. Mikaela's Idea:
    a. What expression does Mikaela propose to the group?
    b. What area does Mikaela think her expression represents?

3. The Group’s Negotiation:
    a. What expressions do group members propose for the areas of Sections I and II?
    b. How do students use the diagram to help them reason about the increase in area?