

Ne'epapa Ka Hana 2.0
Sixth-Grade Mathematics Resources
STEMD² Book Series

STUDENT ACTIVITIES

LET'S GO FROM

MAUKA TO MAKAI

STEMD² Research & Development Group
University of Hawai'i at Manoa



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<http://stemd2.com/>

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Ne'epapa Ka Hana Sixth-Grade Mathematics Resources

Let's Go from Mauka to Makai
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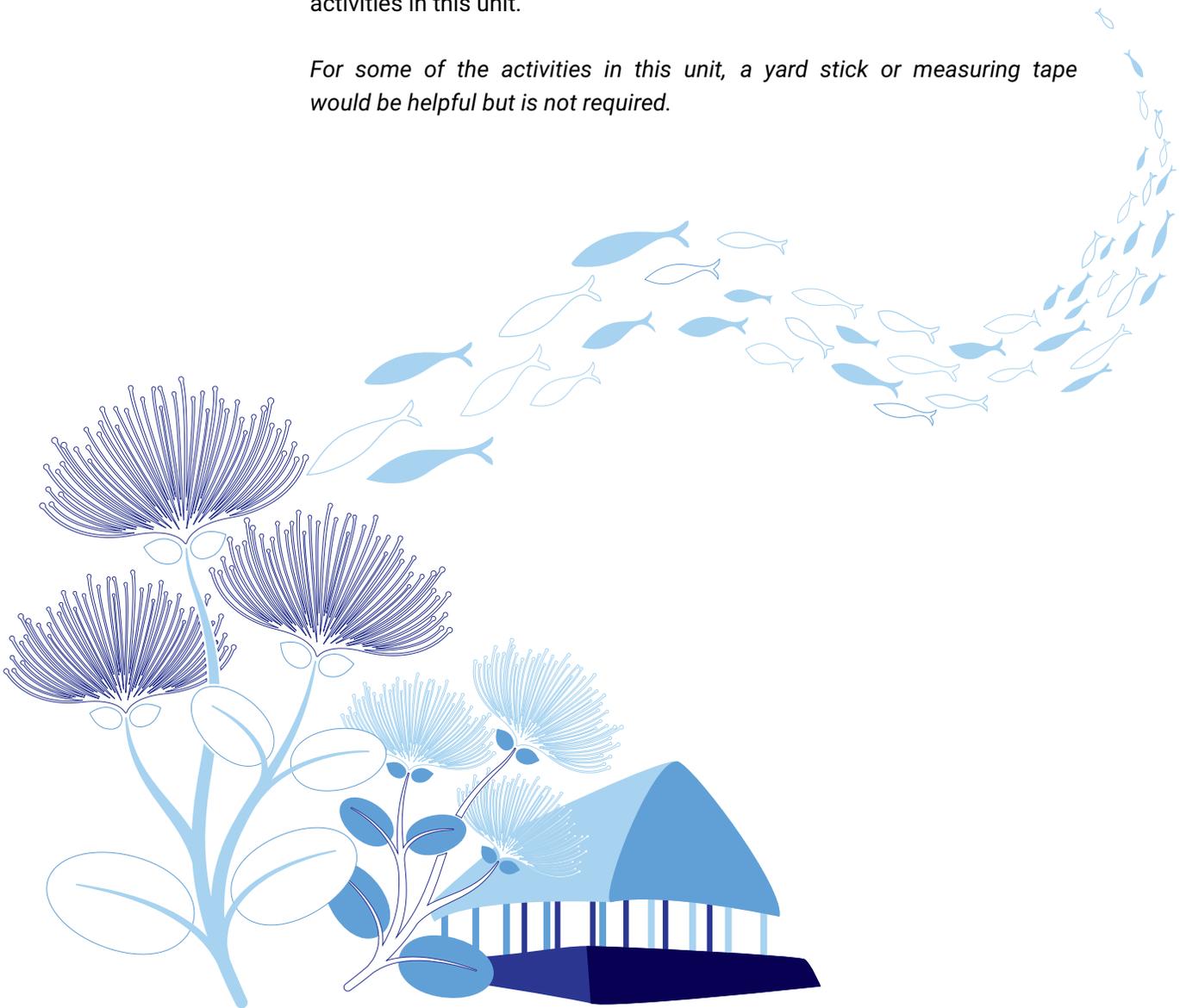
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Unit 6: Relationships in Geometry

In this unit, we'll learn how to draw shapes on a grid and calculate length, area, and surface area through surveying Hawaiian land, exploring the lengthy process of kapa making, and building a hale. There are four activities in this unit. *Module 13* involves helping a land surveyor with the use of area and polygons. *Module 14* focuses on distance and area in the coordinate plane to help wahine make kapa. *Module 15* explores how to build a hale with the help of surface area and volume of solids. The final activity is cumulative and incorporates concepts from each of the previous activities in this unit.

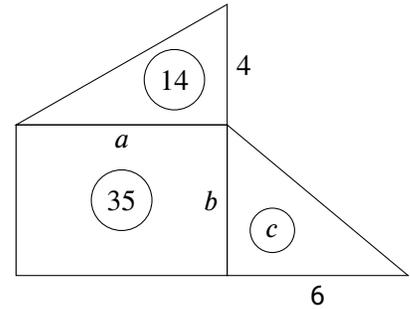
For some of the activities in this unit, a yard stick or measuring tape would be helpful but is not required.



Module 13: Area and Polygons Activity

A land surveyor is a person who measures and maps out the details of a piece of land. Let's survey two pieces of land.

The first piece of land is from the ahupua'a of Wai'anae. We made it easier to measure the land by breaking it up into right triangles and rectangles. Some of the sides and areas (the numbers in a circle) have been measured.



1. Find the two missing sides and then the missing area.

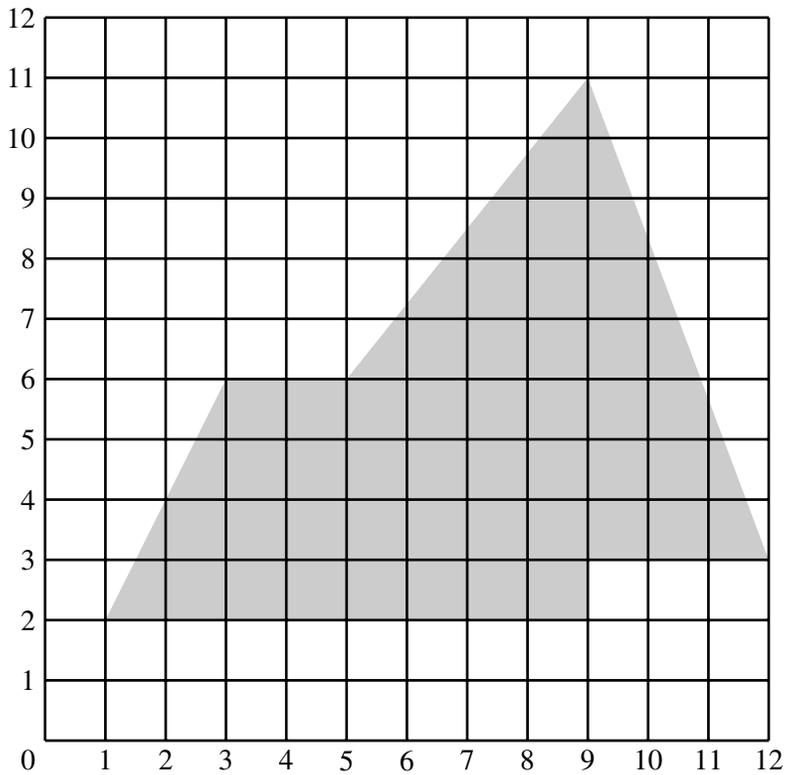
(a) Side a :

(b) Side b :

(c) Area c :

2. Find the total area of the land in Wai'anae.

Here is a piece of land from the ahupua'a of Waiau.



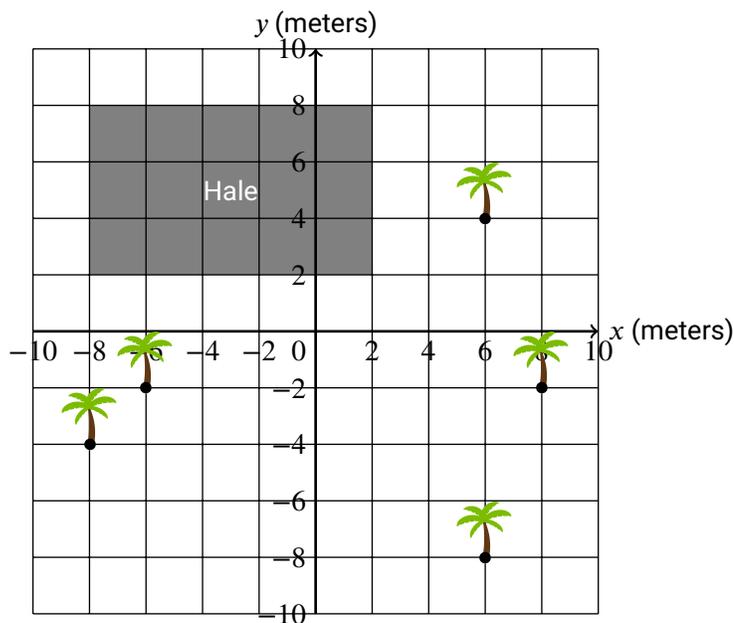
3. Break up the Waiau land into right triangles and rectangles.
4. Find the total area of the land in Waiau.
5. Which piece has a larger total area, Wai'anae or Waiau?

Module 14: Distance and Area in the Coordinate Plane Activity

Kapa is a cloth made from the wauke (paper mulberry) plant. It takes a lot of hard work to make kapa. In old Hawai'i, Hawaiians gathered strips of young wauke bark and repeatedly battered it until the fabric was soft. Then they had to forage for more pieces, line them up next to each other, and pound the edges until the different strips connected. It would take a very long time to make a large piece that was soft, strong, flat, and had the same thickness throughout. After the pieces were beaten together, they had to be dried in the sun before being made into clothing, furniture, or wraps.

The making of kapa was very important to the ancient Hawaiians. It was said that the demi-god, Maui, threw a hook into the Sun to slow it down so that his mom, Hina, could dry her kapa that she had worked so hard to make.

A wahine in our village is making kapa and she needs a place to dry it in the sun. However, we need to build a fence to keep animals and kolohe kids away from the kapa while it is drying.

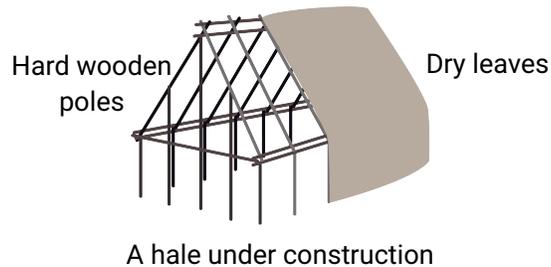


1. Draw a triangle connecting the three points on the map above: $(2, 2)$, $(8, -2)$, and $(6, -8)$.
2. Let's find the area of this triangle by drawing simple shapes around it. Draw a rectangle by connecting the following points: $(2, 2)$, $(8, 2)$, $(8, -8)$, and $(2, -8)$. You should see four triangles: the original one and three right triangles.
3. Use the rectangle and the three right triangles in part 2 to find the area of the original triangle in part 1. Show your work below.

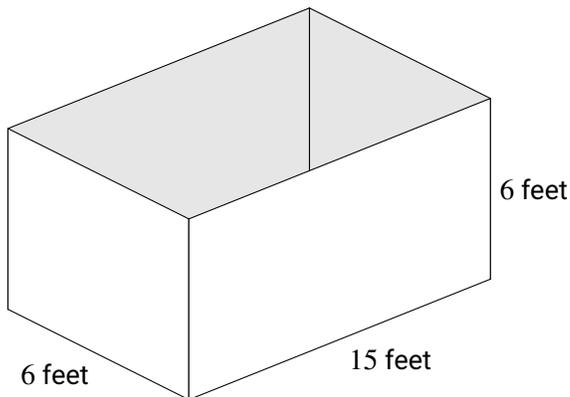
Module 15: Surface Area and Volume of Solids Activity

A yard stick or measuring tape could be helpful in this activity.

In parts of Hawai'i that stay warm all year long, the ancient Hawaiians rarely spent much time in their hale. The doors on hale were often made very small to keep pets and pests out, and the insides of the hale were often very warm and dark. The hale was mostly used for storage and rituals, except for cold and rainy weather or special occasions.

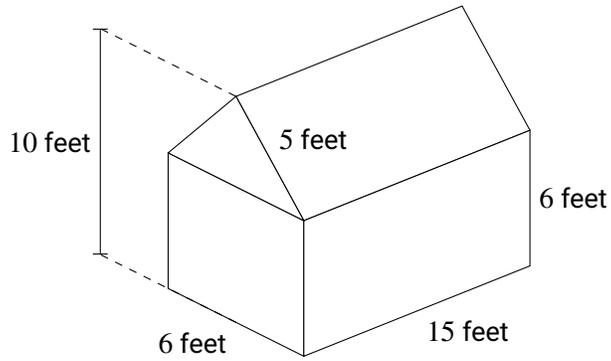


We are building a hale. Let's first look at it without a roof.



1. Find the volume of the rectangular prism.
2. How many of your classmates do you think can fit in a hale of this size? Discuss with a friend. Walking around the classroom with a yard stick or measuring tape while imagining a space this size can also help.
3. Divide your answer in part 1 by your answer in part 2 to find out how much space each of your classmates would take up in this hale. Round to the nearest tenth.

Now let's look at the hale with its roof.



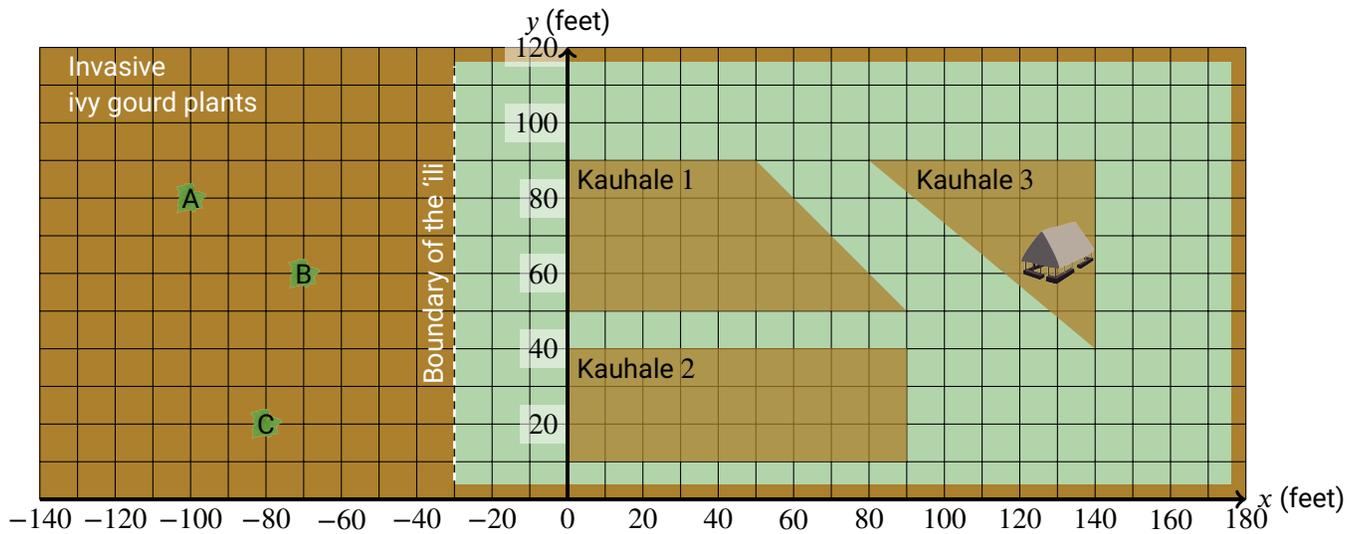
4. Sketch the four walls and the four sides of the roof as a geometric net. Label each edge with its length. You only need to use triangles, squares, and rectangles.

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5. We need to cover the four walls and the four sides of the roof with thick leaves. Find the total surface area of these eight pieces.

6. When a hale needs to be built, many people must come together to build it. When was the last time you built something with your hands? What did you make?

Unit 6: Cumulative Activity

Ivy gourd is an invasive vine that covers and kills other plants. A bird pooped in a field next to your 'ili (neighborhood) and three ivy gourd plants are starting to grow from the seeds in the bird poop.

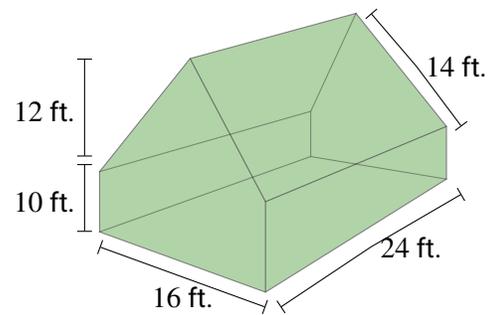
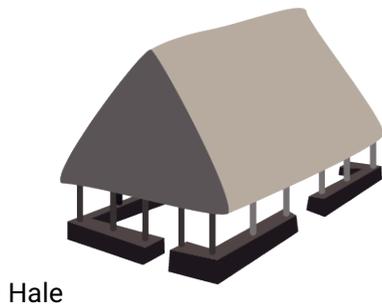


- How far away is each plant from the boundary of the 'ili?
 - Plant A:
 - Plant B:
 - Plant C:

- Look at the coordinates of each ivy gourd plant. If we changed the signs of each x-coordinate to its opposite, would the plant be moved into a kauhale? If so, which kauhale would it be in?
 - Plant A:
 - Plant B:
 - Plant C:

3. After the ivy gourd plants enter your 'ili, they quickly cover the three kauhale, where the hale (houses) are built. What is the **total** area of the three kauhale?

4. In kauhale 3, the ivy gourd is invading a hale. First, it covers the floor of the hale, then the walls and the roof. What is the surface area of the covered hale?



Hint: The front and back walls is a triangle on top of a rectangle. The roofs, side walls, and floor are rectangles.

5. Most plants are good for the environment and good for people, but certain plants, when grown in wrong places, can cause a lot of trouble. Describe a plant in your neighborhood or school that you think is out of place. Describe why you think it might be bad for your neighborhood. You may also find or draw a picture of it. Please share with your partner or in the online comment section.  (If sharing online, please don't post pictures of people's faces or anything that can be used to find a personal address.)

