LESSON 2

Green Area

In this lesson, students apply geometric reasoning to determine if a number of solar panels can fit inside a specific roof area.

INSTRUCTIONAL FOCUS

- Apply area and perimeter formulas for rectangles to solve problems.
- Find the areas of triangles, quadrilaterals, and polygons.
- Solve problems involving scale drawings of geometric figures.
- Solve problems involving area, volume, and surface area of 2- and 3-dimensional objects.

LANGUAGE SUPPORT

MATH TERMS

area
the measurement of the surface that an object occupies

dimensions
the measurements that describe the shape and size of an object

ACADEMIC LANGUAGE

scale blueprint
proportional drawing of a building or structure

solar panels
panels that generate energy from sunlight

SET UP

Introduce Chapter 3 from *Math Meets Homebuilding*.

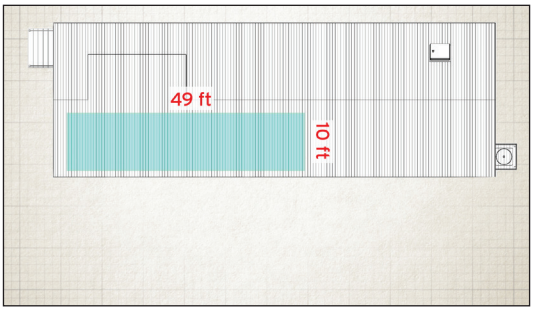
Ask questions to review Lesson 1 and connect to Lesson 2.

For example: ***How did we use math in the last lesson to determine the number of solar panels needed?*** (We used unit conversions to find the amount of energy each solar panel could produce per month, and then divided to find how many panels a sustainable home needed.)

Review the definitions of *area* and *dimensions*.

In the last lesson, we calculated that the home needed 36 solar panels to generate enough energy. Today, we'll see if the 36 panels fit within the roof area.

Play Chapter 3: Green Area.



[Pause at 0:36.]

PLAN

Create a plan to solve the problem.

We want to place 36 solar panels on a 10-foot by 49-foot area of the roof. The dimensions of each solar panel are 5 feet by 2.5 feet. Solar panels cannot be cut. Will all 36 solar panels fit in this area?

Read the problem aloud to students.

Guide students to see that they can estimate and use proportional reasoning to check if their answers are reasonable.

For example: ***How can we find the area of a rectangle?*** (area = length × width) ***What is the roof area?*** (490 sq ft) ***The area of one solar panel?*** (12.5 sq ft) ***How many panels could fit in this area?*** (39 panels)

Point out to students that they must analyze the shape as well as the size of the surfaces.

Since the panels and the roof area are different shapes, we need to make sure that the solar panels will fit on this area.

LESSON 2

Green Area, *continued*

MATHEMATICAL THINKING	Attend to Precision	Model With Mathematics
	Students use precise language to describe the measurement units and evaluate their estimates.	Students use a scale model grid to model and compare the quantities in the problem.

SOLVE

Have student pairs solve the problem as you circulate.

Encourage students to come up with multiple strategies and represent the problem situation in different ways. Guide students to work backwards to check their work.

SUPPORT

Ask questions based on common errors to support student understanding.

- ***How many panels fit vertically? How many panels fit horizontally? How do you know?***
- ***Does the direction of the panels matter? Why or why not?***
- ***If you were able to cut the solar panels, how would that change your answer?***

EXTEND

Ask questions to encourage students to extend their thinking.

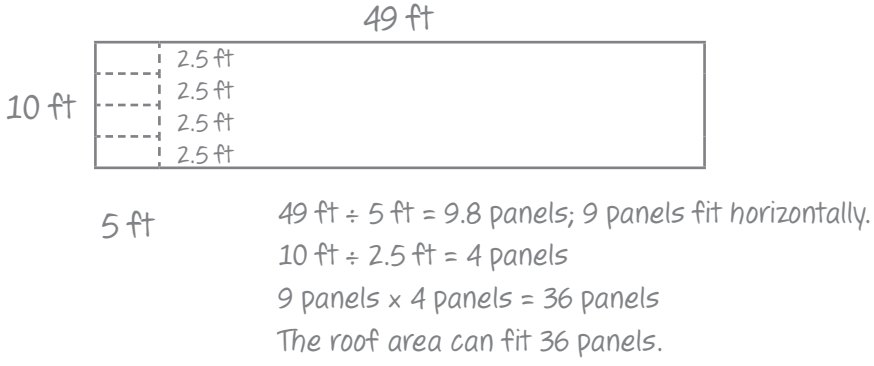
- ***Imagine there is a circular roof with an area of 490 square feet. Will it fit more, less, or the same number of panels?***
- ***Can you create a shape with an area of 490 square feet that fits 39 panels? Why or why not? What would it look like?***

SHARE

Have students present their solutions.

Ask students from each pair to explain their solutions to the class. Show at least two different approaches to solving the problem and one incorrect solution. To extend classroom discussion, call on students to explain the reasoning of the student who is presenting.

Possible student work:



Play the Chapter 3 Solution from *Math Meets Homebuilding*.
Have students complete the Practice and Reflect sections on Student Page 2.

HOMEWORK IDEAS

Have students create a blueprint!

Students choose a room they would like to design.

- *What are the dimensions of the room? Of the furniture?*
- *What furniture does the room need to have?*
- *Did you include enough space to move around?*

Your Name _____

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PLAN

Create a plan to solve the problem with your partner.

SOLVE

Use your plan to solve the problem.

Your Name _____

LESSON 2

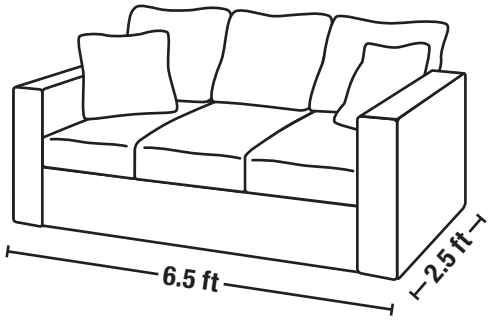
Green Area, *continued*

PRACTICE

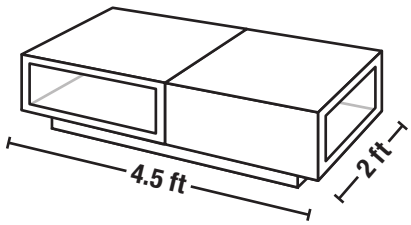
Apply your skills to solve another problem.

You are designing a living room. It must include at least one couch, coffee table, and armchair. Use the space below to create a scale blueprint. You can add any other items that fit. If you can, research or measure actual dimensions. Be creative!

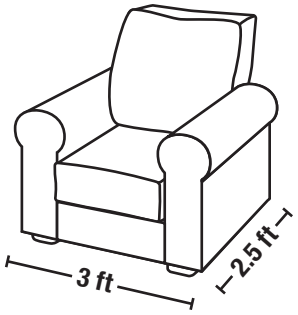
Couch



Coffee Table



Armchair



REFLECT

Explain how you made sense of the math.

How did you use number sense to choose the layout of the panels?

I used number sense to choose the layout of the panels by _____

_____

_____

Is the shape of a space as important as its area?

The shape of a space is / is not as important as its area because _____

_____

_____

SCORE 0 1 2 3