## Lesson 2: Finding Area by Decomposing and Rearranging

### 2.1: What is Area?

You may recall that the term **area**tells us something about the number of squares inside a two-dimensional shape.

1. Here are four drawings that each show squares inside a shape. Select **all** drawings whose squares could be used to find the area of the shape. Be prepared to explain your reasoning.
* 
1. Write a definition of area that includes all the information that you think is important.

### 2.2: Composing Shapes

Your teacher will give you one square and some small, medium, and large right triangles. The area of the square is 1 square unit.

1. Notice that you can put together two small triangles to make a square. What is the area of the square composed of two small triangles? Be prepared to explain your reasoning.
2. Use your shapes to create a new shape with an area of 1 square unit that is not a square. Trace your shape.
3. Use your shapes to create a new shape with an area of 2 square units. Trace your shape.
4. Use your shapes to create a *different* shape with an area of 2 square units. Trace your shape.
5. Use your shapes to create a new shape with an area of 4 square units. Trace your shape.

#### Are you ready for more?

Find a way to use all of your pieces to compose a single large square. What is the area of this large square?

### 2.3: Tangram Triangles

Recall that the area of the square you saw earlier is 1 square unit. Complete each statement and explain your reasoning.

1. The area of the small triangle is \_\_\_\_\_\_\_\_\_ square units. I know this because . . .
2. The area of the medium triangle is \_\_\_\_\_\_\_\_\_ square units. I know this because . . .
3. The area of the large triangle is \_\_\_\_\_\_\_\_\_ square units. I know this because . . .

### Lesson 2 Summary

Here are two important principles for finding **area**:

1. If two figures can be placed one on top of the other so that they match up exactly, then they have the *same area*.
2. We can **decompose** a figure (break a figure into pieces) and **rearrange** the pieces (move the pieces around) to find its area.

Here are illustrations of the two principles.



​

* Each square on the left can be decomposed into 2 triangles. These triangles can be rearranged into a large triangle. So the large triangle has the *same area* as the 2 squares.
* Similarly, the large triangle on the right can be decomposed into 4 equal triangles. The triangles can be rearranged to form 2 squares. If each square has an area of 1 square unit, then the area of the large triangle is 2 square units. We also can say that each small triangle has an area of $\frac{1}{2}$ square unit.



© CC BY Open Up Resources. Adaptations CC BY IM.