

NAME \_\_\_\_\_

DATE \_\_\_\_\_

PERIOD \_\_\_\_\_

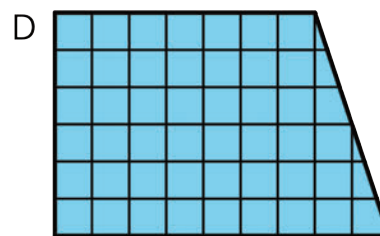
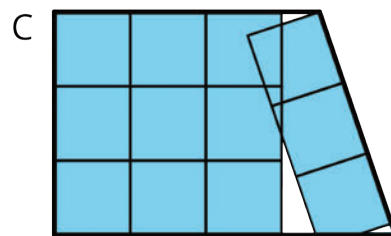
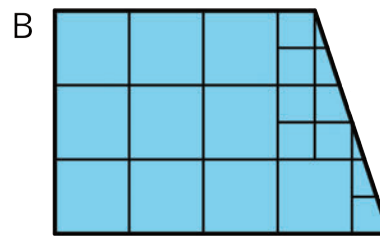
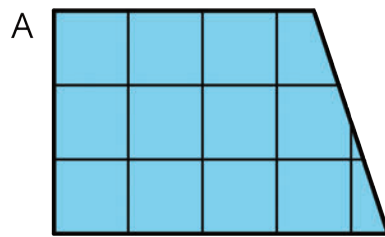
# Unit 1, Lesson 2: Finding Area by Decomposing and Rearranging

Let's create shapes and find their areas.

## 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.

- 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.



- Write a definition of area that includes all the information that you think is important.

NAME

DATE

PERIOD

## 2.2: Composing Shapes

[m.openup.org/1/6-1-2-2](https://m.openup.org/1/6-1-2-2)

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.

NAME

DATE

PERIOD

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?

NAME

DATE

PERIOD

## 2.3: Tangram Triangles

[m.openup.org/1/6-1-2-3](https://m.openup.org/1/6-1-2-3)

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 . . .

NAME

DATE

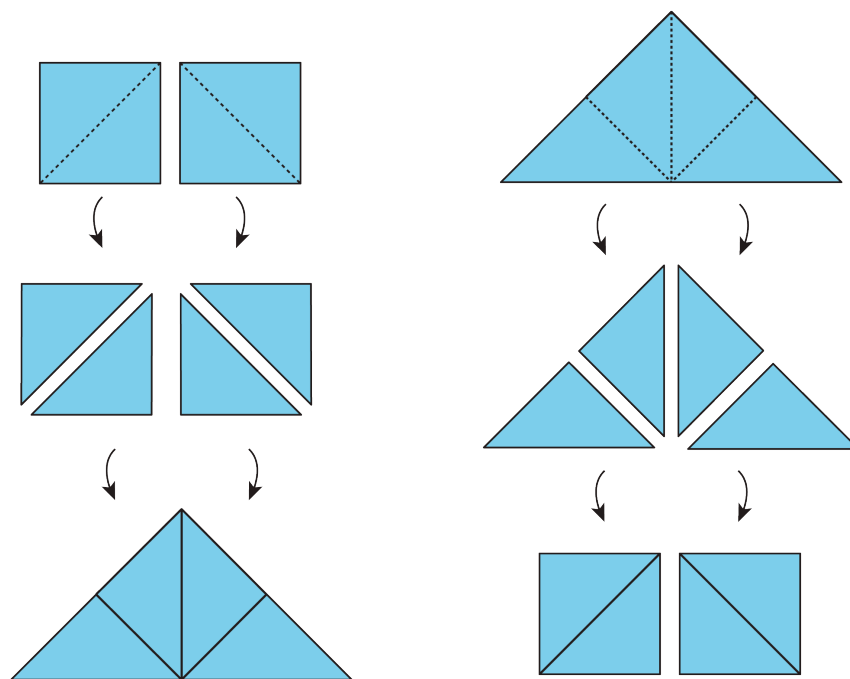
PERIOD

## 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.

## Lesson 2 Glossary Terms

- area

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NAME

DATE

PERIOD

- rearrange
- compose/decompose

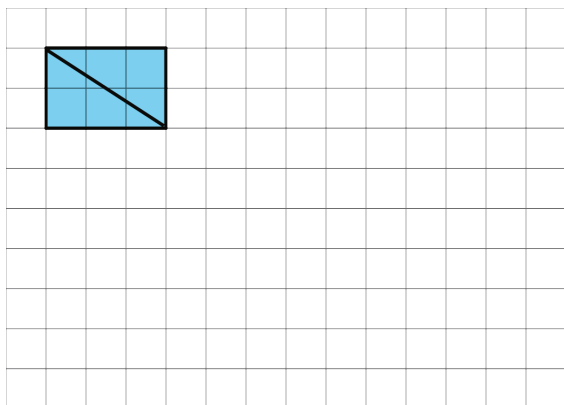
NAME \_\_\_\_\_

DATE \_\_\_\_\_

PERIOD \_\_\_\_\_

# Unit 1, Lesson 2: Finding Area by Decomposing and Rearranging

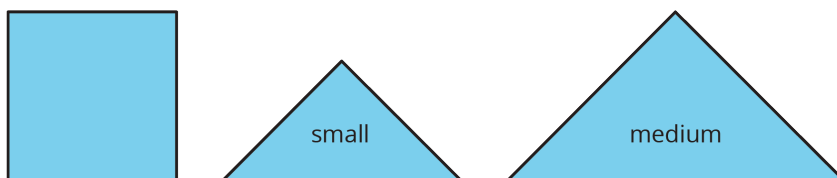
1. The diagonal of a rectangle is shown.



- a. Decompose the rectangle along the diagonal, and recompose the two pieces to make a *different* shape.
- b. How does the area of this new shape compare to the area of the original rectangle? Explain how you know.

2.

The area of the square is 1 square unit. Two small triangles can be put together to make a square or to make a medium triangle.

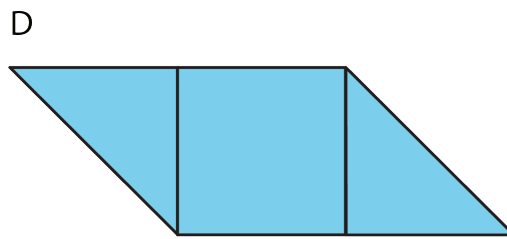
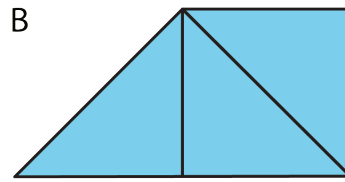
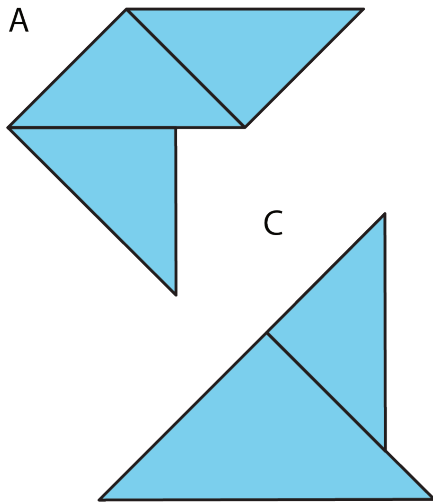


Which figure also has an area of  $1\frac{1}{2}$  square units? Select **all** that apply.

NAME \_\_\_\_\_

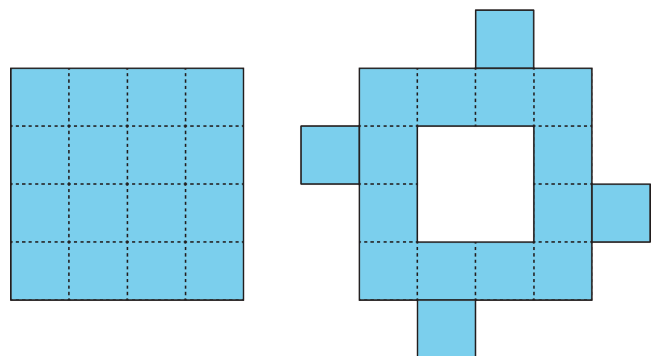
DATE \_\_\_\_\_

PERIOD \_\_\_\_\_



3. Priya decomposed a square into 16 smaller, equal-size squares and then cut out 4 of the small squares and attached them around the outside of original square to make a new figure.

How does the area of her new figure compare with that of the original square?



- A. The area of the new figure is greater.
- B. The two figures have the same area.
- C. The area of the original square is greater.
- D. We don't know because neither the side length nor the area of the original square is known.

4. The area of a rectangular playground is 78 square meters. If the length of the playground is 13 meters, what is its width?

(from Unit 1, Lesson 1)

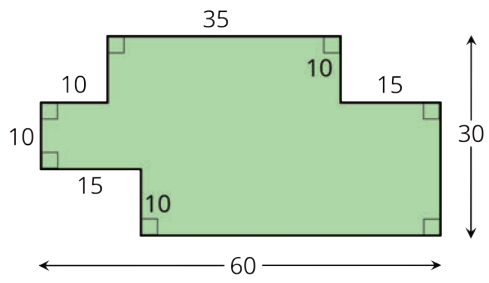
5. A student said, "We can't find the area of the shaded region because the shape has many different measurements, instead of just a length and a width that we could multiply."



NAME

DATE

PERIOD



Explain why the student's statement about area is incorrect.

(from Unit 1, Lesson 1)