

Exploring the Effects of Changing Dimensions on Area

Objective: Students will determine the effect changing one or two dimensions will have on the area of rectangles.

Background Knowledge: Students should be able to calculate the area of rectangles.

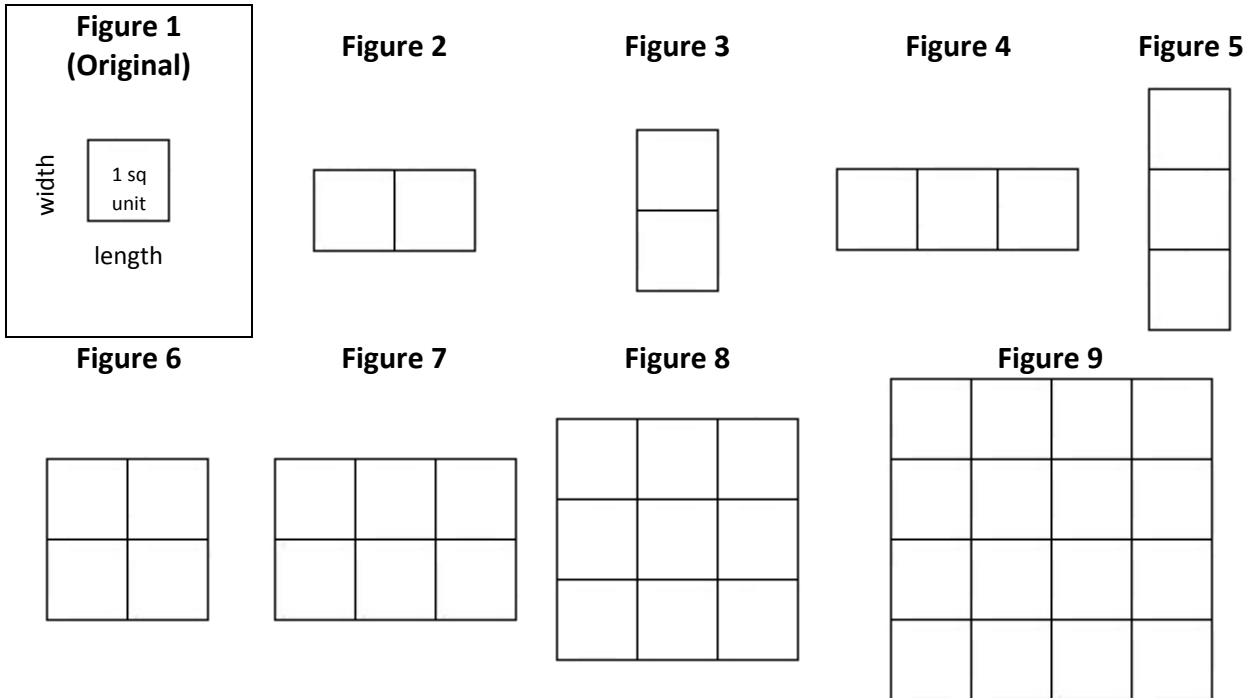
Materials: Exploring the Effects of Changing Dimensions on Area worksheets, pencils

Directions:

1. Review how to calculate the area of a rectangle. Discuss how the two dimensions used to determine the area of a rectangle are the length and the width and that one or both of these dimensions can be changed to create a new rectangle.
2. Distribute worksheets to students and go over instructions. Discuss Figure 2 whose changes have already been recorded in the table.
3. Allow students ample time to complete the worksheet.
4. Discuss their results as a class. Generalize the effect that changing one or two dimensions has on the area of a rectangle.

Exploring the Effects of Changing Dimensions on Area

As the dimensions of a polygon change, how does the area change? The dimensions of Figure 1 have been changed to make eight new shapes. Complete the table below to explore how different dimension changes affect the area of a square.



Complete the table below using the figures above.

Figure	Dimension Changes			How many times larger is the area of the new figure? (How many times would the original figure fit in the new figure?)
	length scale factor	width scale factor		
2	2	---	→	2 times larger
3			→	
4			→	
5			→	
6			→	
7			→	
8			→	
9			→	

Use your table to help you answer the following questions.

- Changing One Dimension –

1. What effect does doubling one dimension have on the area of a figure? (Refer to figures 2 and 3)
2. What effect does tripling one dimension have on the area of a figure? (Refer to figures 4 and 5)
3. What do you think would happen to the area of a figure if one of its dimensions is quadrupled?
4. What do you think would happen to the area of a figure if one of its dimensions is multiplied by 5?
5. What do you think would happen to the area of a figure if one of its dimensions is multiplied by 10?

- Changing Two Dimensions –

6. What effect does doubling both dimensions have on the area of a figure? (Refer to figure 6)
7. What effect does tripling both dimensions have on the area of a figure? (Refer to figure 8)

Name _____

8. What do you think would happen to the area of a figure if both dimensions are quadrupled?

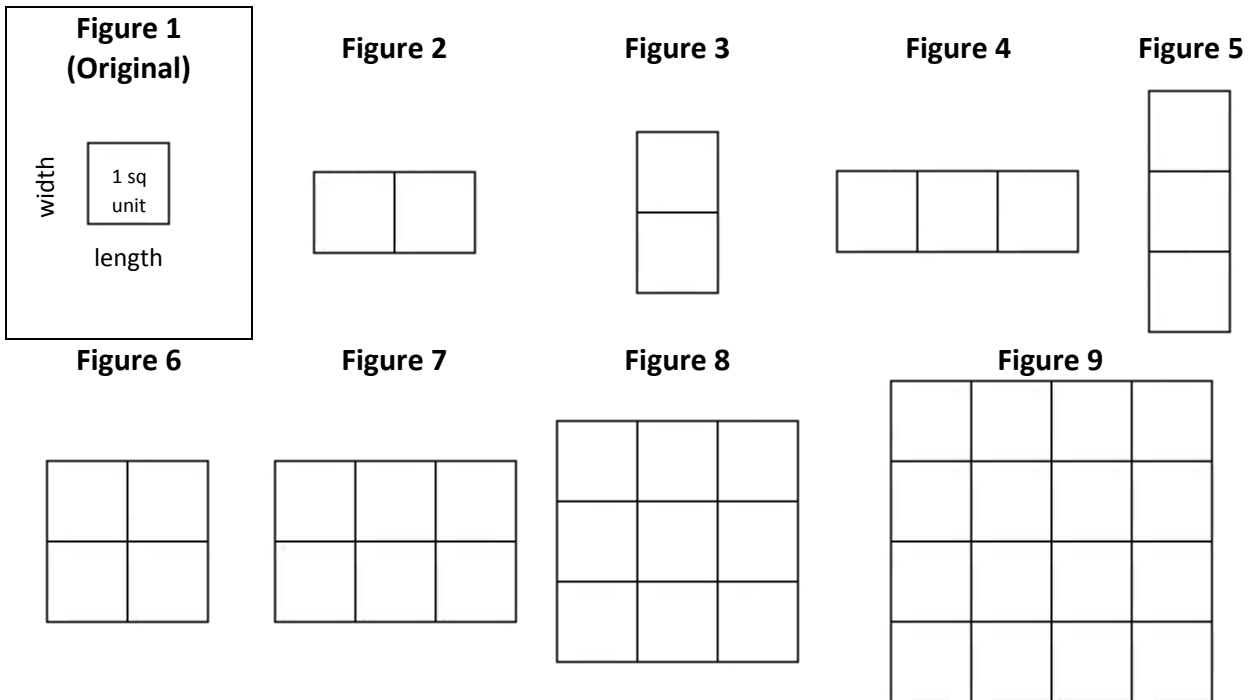
9. What do you think would happen to the area of a figure if one dimension is tripled and one dimension is quadrupled? (You may want to refer to figure 7 to help you with this one)

10. What do you think would happen to the area of a figure if one dimension is multiplied by 5 and the other dimension is multiplied by 7?

Write a general rule to describe how the area of a polygon changes if its dimensions are changed by a scale factor(s).

Exploring the Effects of Changing Dimensions on Area - KEY -

As the dimensions of a polygon change, how does the area change? The dimensions of Figure 1 have been changed to make eight new shapes. Complete the table below to explore how different dimension changes affect the area.



Complete the table below using the figures above.

Figure	Dimension Changes			How many times larger is the area of the new figure? (How many times would the original figure fit in the new figure?)
	length scale factor	width scale factor		
2	2	---	⇒	2 times larger
3	---	2	⇒	2 times larger
4	3	---	⇒	3 times larger
5	---	3	⇒	3 times larger
6	2	2	⇒	4 times larger
7	3	2	⇒	6 times larger

Name _____

8	3	3	⇒	9 times larger
9	4	4		⇒

Use your table to help you answer the following questions. - **KEY** -

- **Changing One Dimension** -

1. What effect does doubling one dimension have on the area of a figure? (Refer to figures 2 and 3)

The area doubles.

2. What effect does tripling one dimension have on the area of a figure? (Refer to figures 4 and 5)

The area triples.

3. What do you think would happen to the area of a figure if one of its dimensions is quadrupled?

The area is quadrupled.

4. What do you think would happen to the area of a figure if one of its dimensions is multiplied by 5?

The area would be multiplied by 5.

5. What do you think would happen to the area of a figure if one of its dimensions is multiplied by 10?

The area would be multiplied by 10.

- **Changing Two Dimensions** -

6. What effect does doubling both dimensions have on the area of a figure? (Refer to figure 6)

The area is quadrupled.

7. What effect does tripling both dimensions have on the area of a figure? (Refer to figure 8)

The area is multiplied by 9.

8. What do you think would happen to the area of a figure if both dimensions are quadrupled?

The area would be multiplied by 16.

9. What do you think would happen to the area of a figure if one dimension is tripled and one dimension is quadrupled? (You may want to refer to figure 7 to help you with this one)

The area would be multiplied by 12.

10. What do you think would happen to the area of a figure if one dimension is multiplied by 5 and the other dimension is multiplied by 7?

The area would be multiplied by 35.

Name _____

Write a general rule to describe how the area of a polygon changes if its dimensions are changed by a scale factor(s). _____