# Comparing Areas of Rectangles

Activity Overview

In this activity, students discover the relationship between a change in the dimensions of a rectangle and the change in the corresponding area.

Topic: Problem Solving

- Understand measurable attributes of objects and the units, systems, and processes of measurement
- Understand relationships among units and convert from one unit to another within the same system

Teacher Preparation and Notes

- For Part 3, students should be familiar with the greatest common factor. The **gcd(** feature will be used to find a common side in two figures.
- **To download the student worksheet, go to education.ti.com/exchange/caor**

NORMAL FLOAT AUTO REAL RADIAN MP
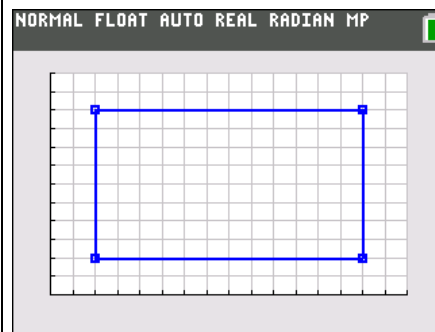
This activity utilizes MathPrint^{TM} functionality and includes screen captures taken from the TI-84 Plus C Silver Edition. It is also appropriate for use with the TI-83 Plus, TI-84 Plus, and TI-84 Plus Silver Edition but slight variances may be found within the directions.

Compatible Devices:
- TI-84 Plus Family
- TI-84 Plus C Silver Edition

Associated Materials:
- Comparing_Areas_Of_Rectangles_Student.pdf
- Comparing_Areas_Of_Rectangles_Student.doc

Tech Tips:
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials
- Any required calculator files can be distributed to students via handheld-to-handheld transfer.

Part 1 – Wide and Long

Questions 1–3

In the first set of exercises, students can either count the
squares or count the length of the sides and multiply.
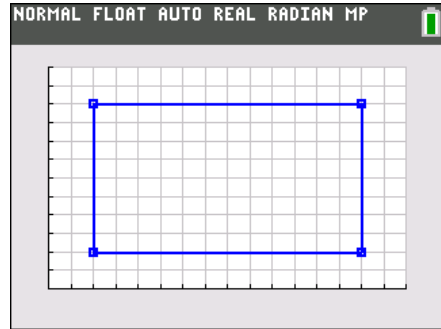
Questions 4–7

Students should recognize the pattern between the relationship of the side lengths to the area.
However, they may need to see more patterns. In that case, you can create your own problems on grid
paper or use the StatPlot on the TI-84-Plus.

For Example:

Press [STAT] [1], clear out any lists if necessary and enter L1
and L2 as shown. The first and last entries of the lists are
the same so that the line graph will be a closed figure.

Next, setup the StatPlot by pressing [2nd][STAT PLOT] and
configure as shown.

To show the GridLines on a TI-84 Plus C Silver Edition
(GridDot on a TI-84 Plus) press [2nd] [FORMAT] and configure
as shown.

Select an appropriate window by pressing WINDOW. One such window is shown.

```
NORMAL FLOAT AUTO REAL RADIAN MP
WINDOW
 Xmin=0
 Xmax=10
 Xscl=1
 Ymin=0
 Ymax=10
 Yscl=1
 Xres=■
 ΔX=.03787878787878
 TraceStep=.07575757575757
```
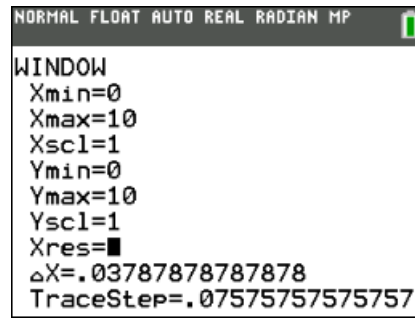
Press GRAPH to view the rectangle.

To double the sides of this rectangle, go back to the window settings and change the Xscl and Yscl to .5. Pressing GRAPH will display a rectangle whose dimensions have been doubled.
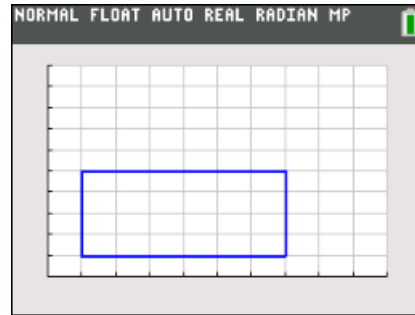
Students can create their own rectangles.

Part 2 – Making Predictions

<u>Questions 8–10</u>

In this problem set, students should use the pattern identified in Part 1 to find the unknown areas without a figure. Students may want to draw a figure to determine what each side is multiplied by to get the new dimensions.

Part 3 – Finding the Missing Sides

<u>Questions 11–15</u>

In this problem set, students bring several different ideas together to solve problems. First, they should realize that if the figures share a side, one dimension will be the same for both figures.

```
NORMAL FLOAT AUTO REAL RADIAN MP
gcd(90,72)
                              18
```

Next, students should realize that the shared side is a factor of both areas. The greatest common factor, or **gcd(** on the TI-84 Plus, will determine what the largest possible side is that the two figures can share.

To find the greatest common factor, press MATH ► and select gcd(. Then enter the first number, ⌨, the second number, and ⌨ ENTER.
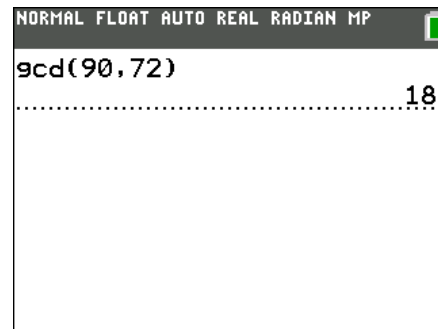
Solutions – Student Worksheet

Part 1

1. **Answer: Length, 3; width 2; area 6 sq units**

2. **Answer: Length, 6; width 4; area 24 sq units**

3. **Answer: Length, 12; width 8; area 96 sq units**

4. How do the dimensions of Rectangle 1 compare to Rectangle 2? The area?

    Answer: The sides are double and the area is 4 times larger.

5. How do the dimensions of Rectangle 2 compare to Rectangle 3? The area?

    Answer: The sides are double and the area is 4 times larger.

6. How do the dimensions of Rectangle 3 compare to Rectangle 1? The area?

    Answer: The sides are four times and the area is 16 times larger.

7. What happens to the area of a figure when the length and width double? Why is this true?

    Answer: Because each side is 2 times larger, you multiply the original area by 2 twice. (for each side) Or, you multiply the original area by 2^2, or 4.

Part 2

8. A rug has an area of 15 square feet. What is the area of the rug measured in square inches?

    Answer: **multiply both sides by 12 inches per foot, or multiply the area by 12^2. 2,160 sq inches**

9. Joseph is building a new storage building. He thinks the current size, 9' × 6' does not have enough area inside. What will the area be if he doubles the length of the sides?

    Answer: The area will quadruple, from 54 sq ft to 216 sq ft.

10. Shelia created a blanket that is 3 feet by 4 feet. Her mom asked what the area is in square inches instead of feet.

    Answer: 1,728 sq inches; multiply 12 sq ft by 12 inches per side.

Part 3

11. Figure 1: 90 sq inches   **Answer: 18 in × 5 in**

    Figure 2: 72 sq inches   **Answer: 18 in × 4 in**

12. Figure 1: 25 sq feet   **Answer: 5 ft × 5 ft**

    Figure 2: 15 sq feet   **Answer: 5 ft. × 3 ft.**

13. Figure 1: 140 sq yds   **Answer: 28 yds × 5 yds**

    Figure 2: 84 sq yds   **Answer: 28 yds × 3 yds**

14. Figure 1: 100 sq cm   **Answer: 20 cm × 5 cm**

    Figure 2: 80 sq cm   **Answer: 20 cm × 4 cm**

15. Figure 1: 225 sq feet   **Answer: 25 ft × 9 ft**

    Figure 2: 75 sq feet   **Answer: 25 ft × 3 ft.**