



About the Lesson

Students will explore the ratio of perimeter and area in two-dimensional figures. As a result, students will:

- Find ratio of perimeter and area.

Vocabulary

- ratio
- perimeter
- area

Teacher Preparation and Notes

- This activity was written to be explored with the Cabri™ Jr. app on the TI-84 Plus family.
- Before beginning this activity, make sure that all students have the Cabri™ Jr. application, and the Cabri™ Jr. files *FIG1*, *FIG2*, *FIG3*, and *FIG4* loaded on their TI-84 calculators.

Activity Materials

- Compatible TI Technologies:

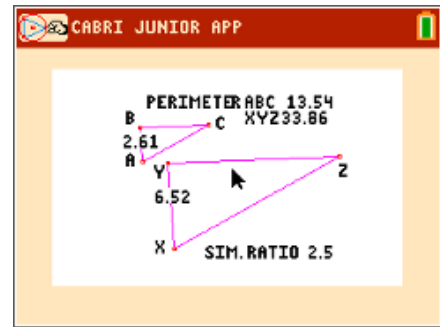
TI-84 Plus*

TI-84 Plus Silver Edition*

 TI-84 Plus C Silver Edition

 TI-84 Plus CE

* with the latest operating system (2.55MP) featuring MathPrint™ functionality.



Tech Tips:

- This activity includes screen captures taken from the TI-84 Plus CE. It is also appropriate for use with the rest of the TI-84 Plus family. Slight variations to these directions may be required if using other calculator models.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- 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.

Lesson Files:

- Ratios_of_Similar_Figures_Student.pdf
- Ratios_of_Similar_Figures_Student.doc
- FIG1.8xv
- FIG2.8xv
- FIG3.8xv
- FIG4.8xv



Tech Tip: Before beginning the activity, the files FIG1.8xv, FIG2.8xv, FIG3.8xv, and FIG4.8xv need to be transferred to the students' calculators via handheld-to-handheld transfer or transferred from the computer to the calculator via TI-Connect™ CE Software.

Problem 1 – Similar Triangles

Students will begin this activity by looking at similar triangles. Students are given two triangles that are similar. They are also given the perimeter or area of the triangle. They will discover that the ratio of perimeters of similar figures is $a:b$ and the ratio of areas of similar figures is $a^2:b^2$.

Students will be asked to collect data by moving point A. Students are asked several questions about the relationships of the triangle.

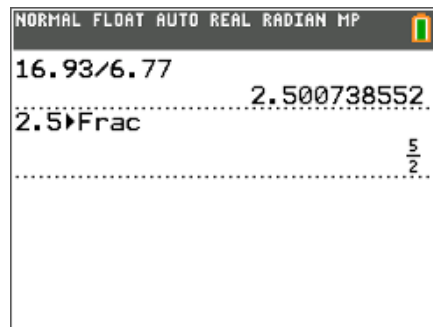
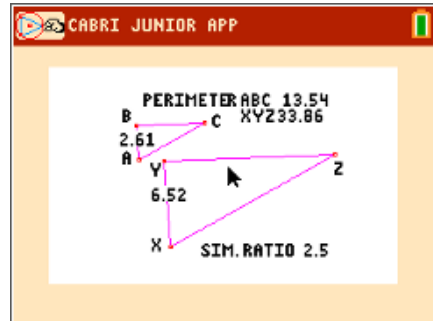
Students will need to use the calculator to find the ratios. They should round their answers for the ratio of the perimeters to the nearest hundredth and then write the ratio as a fraction. They may need to use the \blacktriangleright Frac command (MATH \blacktriangleright Frac \langle enter \rangle). Students will need to round their ratios to get the correct answers and teachers will have to lead them to the correct answer because of the lack of precision of the Cabri™ Jr. application.

Note: For the area ratios, students are asked to round their answers to the nearest hundredth.

1. Move point A to four different positions and collect the data in the table below. Calculate the ratios of the perimeter of $\triangle XYZ$ to the perimeter of $\triangle ABC$ for each position. Record the calculation in the table below. Round your answer for each ratio to the nearest hundredth.

Sample Answers:

Position	AB	XY	Perimeter of XYZ	Perimeter of ABC	Ratio of Perimeters
1	1.30	3.26	16.93	6.77	2.50
2	1.01	2.51	15.85	6.34	2.50
3	1.70	4.26	18.46	7.39	2.50
4	1.46	3.64	16.80	6.72	2.50





2. What is the similarity ratio of the two triangles written in the form $a:b$?

Answer: 5:2

3. What is the ratio of the perimeters of the two triangles in the form $a:b$?

Answer: 5:2

4. How are the similarity ratio and the ratio of the perimeters related?

Answer: They are the same.

5. Move point A to four different positions and collect the data in the table below. Calculate the ratios of the area of $\triangle XYZ$ to the area of $\triangle ABC$ for each position. Record the calculation in the table below. Round your answer for each ratio to the nearest hundredth.

Sample Answers:

Position	AB	XY	Area of XYZ	Area of ABC	Ratio of Areas
1	1.30	3.26	10.59	1.69	6.26
2	1.90	4.76	15.47	2.47	6.26
3	2.66	6.64	20.03	3.21	6.24
4	4.72	11.79	21.56	3.45	6.25

6. What is the ratio of the areas of the two triangles in the form $a:b$?

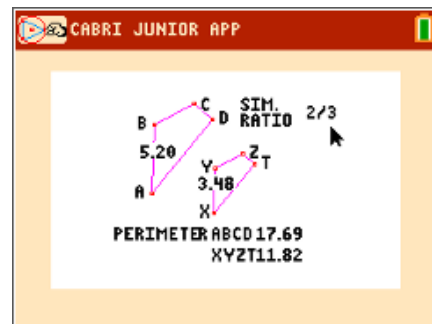
Answer: about 25:4 (Students may need help rounding their answers to 6.25 or $\frac{25}{4}$.)

7. How are the similarity ratio and the ratio of the areas related?

Answer: The ratio of the areas is the square of the similarity ratio of the triangles.

Problem 2 – Similar Figures

In Problem 2, students will be asked to repeat the exercise for Problem 1 with similar quadrilaterals. The ratios of the perimeters and areas should be rounded to the nearest hundredth.





8. Move point A to four different positions and collect the data in the table below. Calculate the ratios of the perimeter of quadrilateral $XYZT$ to the perimeter of quadrilateral $ABCD$ for each position. Record the calculation in the table below. Round your answer for each ratio to the nearest hundredth.

Sample Answers:

Position	AB	XY	Perimeter of $XYZT$	Perimeter of $ABCD$	Ratio of Perimeters
1	2.60	1.74	5.91	8.85	0.67
2	2.20	1.47	5.44	8.15	0.67
3	2.31	1.54	5.18	7.76	0.67
4	1.22	0.81	4.19	6.28	0.67

9. What is the similarity ratio of the two quadrilaterals written in the form $a:b$?

Answer: about 2:3 (Students may need help rounding their answers to 0.67 or $\frac{2}{3}$.)

10. What is the ratio of the perimeters of the two quadrilaterals in the form $a:b$?

Answer: 2:3

11. How are the similarity ratio and the ratio of the perimeters related?

Answer: They are the same.



12. Move point A to four different positions and collect the data in the table below. Calculate the ratios of the area of quadrilateral $XYZT$ to the area of quadrilateral $ABCD$ for each position. Record the calculation in the table below. Round your answer for each ratio to the nearest hundredth.

Sample Answers:

Position	AB	XY	Area of $XYZT$	Area of $ABCD$	Ratio of Areas
1	2.60	1.74	1.60	3.58	0.44
2	2.30	1.54	1.45	3.25	0.44
3	1.87	1.25	1.23	2.76	0.44
4	2.73	1.79	1.02	2.29	0.44

13. What is the ratio of the areas of the two triangles in the form $a:b$?

Answer: about 4:9 (Students may need help rounding their answers to 0.44 or $\frac{4}{9}$.)

14. How are the similarity ratio and the ratio of the areas related?

Answer: The ratio of the areas is the square of the similarity ratio of the quadrilaterals.

15. If the similarity ratio of two similar figures is $a:b$, then the ratio of the perimeters is what?

Answer: $a:b$

16. If the similarity ratio of two similar figures is $a:b$, then the ratio of the areas is _____.

Answer: $a^2:b^2$