

Introduction to Area and Perimeter

Project Interactivate

Name: Wilson Burgos

Grade level(s)/Subject taught: Mathematics 7 – 12

Essential Questions

- How do I calculate the area of a 2-dimensional figure?
- How do I calculate the perimeter of a 2-dimensional figure?
- Can two figures with the same perimeter have different areas?
- Can two figures with the same area have different perimeters?

Goals and Objectives

Students will:

- use interactive Java applets from Project Interactivate to produce figures using specific parameters;
- calculate area and perimeter for these figures;
- make conjectures about the relationships between area and perimeter.

Mathematical Concept or “key idea” that modeling will be used to teach:

Students will:

- use visualization and spatial reasoning to analyze characteristics and properties of geometric shapes;
- identify and justify geometric relationships, formally and informally;
- build new mathematical knowledge through problem solving;
- make and investigate mathematical conjectures;
- communicate and reason mathematically.

Materials: Project Interactivate, graph paper

Overview

In this lesson, students will be introduced to the concepts of area and perimeter without using any formulas or memorizing any rote procedures. We will consider area as the number of square units inside a 2-dimensional figure and perimeter as the number of units needed to surround or enclose the figure. The lesson involves using two Java applets on the Project Interactivate Website (see screenshots that follow). First, students calculate the area of different irregular shapes with a fixed perimeter. Second, they calculate the perimeter of different shapes with a fixed area.

Procedure

The lesson will begin with an introduction to perimeter and area to determine what students know about these concepts and help build on their prior knowledge. Students will be taught how to use the Java applets that will be used during the lesson. Questions will be raised that may have to be left unanswered until students find their own solutions through inquiry and investigation. Students will work in pairs in the computer lab as the teacher walks around to monitor students' progress and address misconceptions. At the conclusion, students will present their findings and compare them to other students' findings.

Part 1: Area Explorer

Each pair of students will be given a different perimeter to work with. They are to find different figures with the specified perimeter. Students will sketch the figure on their own grid paper and calculate its area. Students can input their solution and the Java applet will let them know if they are correct. The goal is to get several figures with the same perimeter but different areas.

Part 2: Perimeter Explorer

The activity is similar to the first, but students have to find several figures with different perimeters but the same area. Upon completing both activities, they will answer a series of questions and be given the opportunity to pose questions of their own.

Sample Problem and Questions:

1. Using the Area Explorer applet, create a figure with a perimeter of 10 units. Sketch the figure on your own grid paper. Calculate the area of this figure and verify if your solution is correct using the applet. What method did you use to calculate the figure's area?
2. Repeat step one to create at least two more figures with the same perimeter but different areas. Why is it possible for these figures to have the same perimeter but different areas?
3. Using the Perimeter Explorer applet, create a figure with area of 16 units. Sketch the figure on your own grid paper. Calculate the perimeter of this figure and verify if your solution is correct using the applet. What method did you use to calculate the figure's perimeter?
4. Repeat step three to create at least two more figures with the same area but different perimeters. Do you think it's possible to have two *different* figures with the same area and same perimeter?

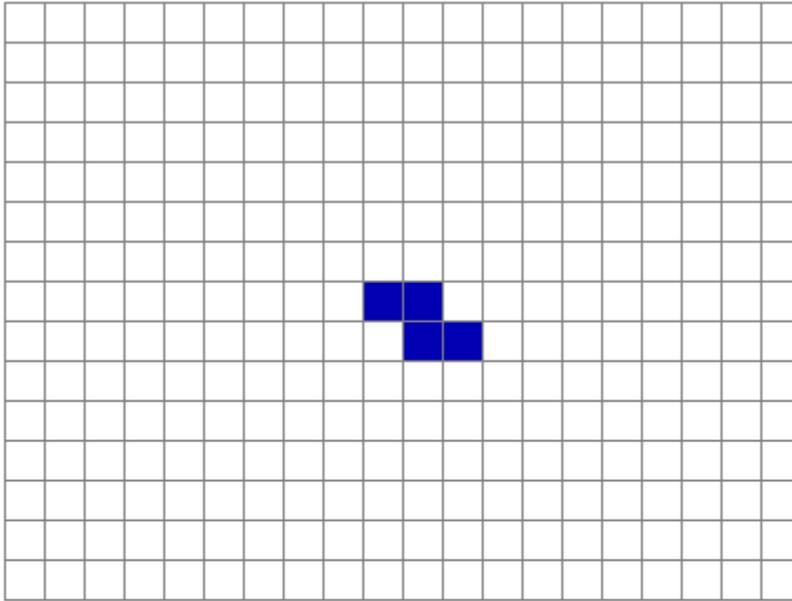
Assessment (Rubric)

Category	1	2	3
----------	---	---	---

Use of Java applets	Did not use the technology to complete the problem.	Applets were used but the solution was incorrect or incomplete.	The applets were used effectively, including appropriate calculations.
Accuracy of Results	Many flaws in calculations, data are not organized, or shows no understanding of the task.	Conclusions are inaccurate; data could be better organized, or shows partial understanding of the task.	Calculations are accurate, well organized, and demonstrates full understanding of the task.
Application and understanding of geometric concepts	Does not show any understanding of the concepts of area and perimeter.	Partial understanding of the concepts being studied and the implications of the activity.	Fully understands the concepts, is able to make generalizations, and can apply the results of the activity.

Expected Screenshots of Student Work

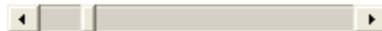
Area Explorer:



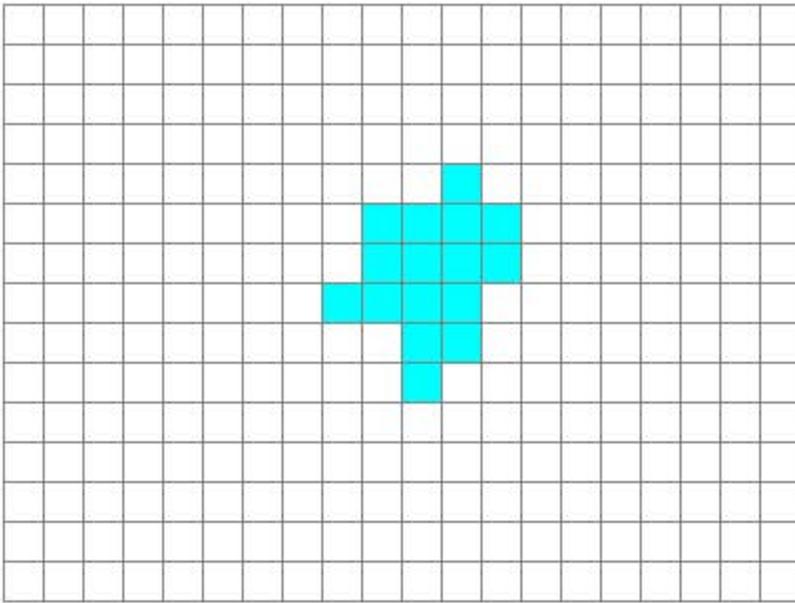
What is the shape's area? Right!

This shape's perimeter is: units Only Draw Rectangular Shapes

Adjust Perimeter:



Perimeter Explorer:



What is the shape's perimeter? Right!

This shape's area is: square units Only Draw Rectangular Shapes

Adjust Area:



