



Making Perfect Rectangles Grades 3-12

Introduction

This activity allows students to explore ways to create rectangles using perfect squares, visually. Students can think creatively about designing rectangles using as many squares and as few repeats as possible.

Agenda

Activity	Time	Description/Prompt	Materials
Mindset Message	5 min	Play the mindset video.	Mindset video
Explore	35 min	<ul style="list-style-type: none"> Introduce the problem. Share the idea of perfect rectangles <ul style="list-style-type: none"> Challenge students to find perfect rectangles or imperfect rectangles. Show and tell students about the supply table and the available materials. Give students time to make rectangles. Prepare for the discussion. <ul style="list-style-type: none"> Have students create a visual to share during the class discussion. 	<ul style="list-style-type: none"> Making Perfect Rectangles Handout Maths journal Pencils Colored pencils or pens Grid paper Different sized paper squares with side length 1-20 Spreadsheet Technology Poster paper Blank white paper
Discuss	10 min	Invite students to share their rectangles, patterns, and conjectures	
Debrief Mindset Messages	5 min	Debrief the mindset messages for this activity.	Maths journal

Before the Activity

Before doing this activity with students prepare materials for a supply table. Some materials we encourage are colored pencils or pens, grid paper, paper squares, computer technology, and so on. We encourage computer technology so students can use google sheets to make really large squares. When preparing the paper squares decide if you want to make sets for groups or make a set for the supply table for the class to share. We encourage you to make sets of 4 copies of each square using



paper clips or envelopes so students can pick up sets of squares with side length 1-20 from the supply table.

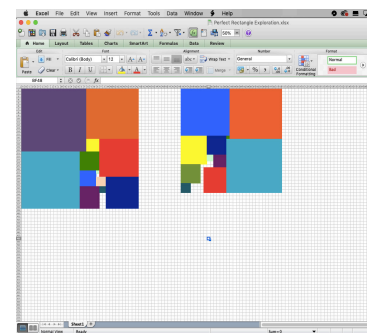
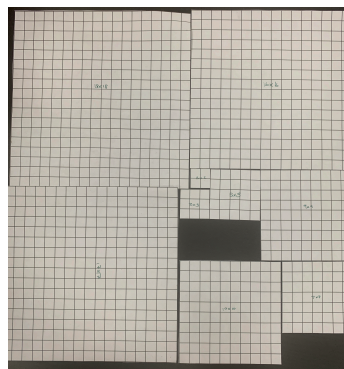
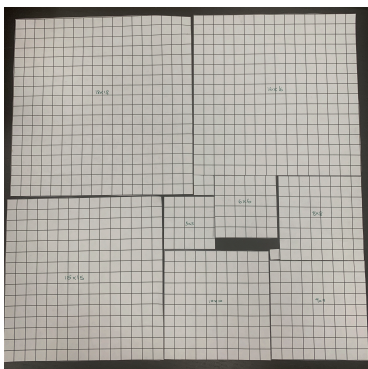
Activity

Watch the mindset video before class. At the beginning of the class share the video and the mindset messages.

Share the activity with the class. Tell them about perfect rectangles, they are rectangles made of perfect squares with no square the same size, or congruent, used more than once. Add that imperfect rectangles are made up of squares where squares of the same size can be used more than once. For more information about perfect rectangles here are some links: <http://mathworld.wolfram.com/PerfectRectangle.html> and <http://www.squaring.net/sq/sr/sr.html>

Challenge students to create their own rectangles using only squares. Show and tell them about the supply table of materials available for them to use. Share with students that as they should keep track of the rectangles they create, patterns they notice, and conjectures they make to share during the class discussion. Distribute the activity handout and have students explore making rectangles.

While students explore encourage them to use a variety of materials from the supply table. Share with them the idea that when we look at mathematics using different materials we can learn more about it and get a deeper understanding.



Have students identify one of their rectangles, patterns, or conjectures to share during the class discussion. Let them know that any ideas they want to share will contribute to the class's sense making about perfect rectangles. Encourage students to create a visual they can share with the class.



Invite students to share rectangles, patterns, and conjectures. Make space for students to share whatever they like. Ask questions that encourage students to explain and others to make sense of the ideas shared.

Extension

- Decide if the rectangle with dimensions 98×86 is perfect. What about 115×81 ?
- There are 6 different perfect rectangles that contain 10 squares. Create a visual for each perfect rectangle of order 10 you find.



Making Perfect Rectangles Handout

Using only squares, make a rectangle without leaving any open spaces?

Can you make one only repeating squares of one size four times or fewer? Three times or fewer? Two times or fewer? With no repeats?

Create a visual of each of your rectangles.

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