



# Framing Rectangles

## Grades 3-5

### Introduction

In this activity students get creative with making rectangles out of square tiles. This activity makes space for our young mathematicians to count, describe shapes, explore ideas, build with square tiles, investigate conjectures, organize findings, add and takeaway square tiles, and record ideas with visuals.

### Video

<https://youcubed.org/weeks/week-3-grade-3-5/>

### Agenda for the activity

Activity	Time	Description	Materials
Mindset Message	5 min	Play the mindset video, <i>Mistakes are Powerful</i> , <a href="https://youcubed.org/weeks/week-3-grade-3-5/">https://youcubed.org/weeks/week-3-grade-3-5/</a>	<ul style="list-style-type: none"> <li>Mindset Video day 5, <i>Mistakes are Powerful</i></li> </ul>
Square tiles playtime (Optional)	10-15 min	<ol style="list-style-type: none"> <li>Play.</li> <li>Share some of what students create.</li> </ol>	Square paper tiles, Framing Rectangles Handouts attached, or a square tile manipulative
Framing Rectangles	45 min	<ol style="list-style-type: none"> <li>What number between 1 and 30 would have the most unique rectangles that represents that number as an area?</li> <li>Create a rectangle with a border that has the same number of square tiles as the rectangle's area. Find as many rectangles that work as you can. Draw each of your rectangles on grid paper.</li> <li>Create a rectangle with a border that has double the number of square tiles. Find as many rectangles that work as you can. Draw each of your rectangles on grid paper.</li> </ol>	<ul style="list-style-type: none"> <li>Square paper tiles, Framing Rectangles Handout (pg 5 and 6), or a square tile manipulative</li> <li>Framing Rectangles Handout on pg 4 (Optional)</li> <li>Math journals (Optional)</li> </ul>



Debrief Mindset Message	5 min	Ask students to reflect on the video they watched and of the value of struggles they went through, or mistakes they made. If they struggled or made mistakes in this lesson, point out to students that their brains have grown and new pathways have formed!	Math journal (Optional)
-------------------------	-------	---	-------------------------

### Activity

Set students up to work in groups. Give each table enough squares for all the challenges they will do in this activity. The more square tiles you give the more likely students will feel free to explore.

Give students time to play with the square tiles before you start the activity. Use this time to observe what students are building.

You will want to think ahead of doing the activity if you will pose each challenge to the whole class, by group as they go, or give all the challenges at one time using the Framing Rectangles Challenge Handout included. Also, think about whether you will bring the class together after each challenge to discuss each other's findings or if you want to have the discussions at the end of the exploration time.

Give groups enough time to explore each challenge until they feel that they have exhausted all of their thinking. Encourage them to think deeply by being a skeptic and insisting they find multiple examples that confirm their thinking.

As groups are working, a question that might come up during this challenge is: Are a  $2 \times 3$  rectangle and a  $3 \times 2$  rectangle the same rectangle? The prompt for the challenges leaves it open for students to interpret. This is also something you all can decide on as a maths community. You might pull together the class to have a short conversation about whether or not you all think a  $2 \times 3$  and a  $3 \times 2$  counts as one rectangle or two.

When starting each discussion you might want to use a format similar to a dot/number talk by inviting students to share their answers and then share strategies. Something powerful about this format is accepting and discussing every answer students' offer. When students are sharing strategies encourage them to describe their thinking visually.



During the discussion(s), give time for students to think deeply about each other's reasons and justification. If after the sharing of strategies there are still different answers, ask students if this is the kind of problem that has one answer or multiple answers. Then have them share what they think and together decide if they think they should agree or if they are okay with multiple answers.

### Extensions

- If you have a border with 14 square tiles, what could be the dimensions of the rectangle? Is there only one rectangle with a border of 14 square tiles?
- How would you describe the relationship between the number of squares in the center and border?

### Materials

- Square paper tiles (Framing Rectangles Handouts, pg 5 and 6) or Square tile manipulatives
- Poster paper (optional)
- Glue (optional)
- Framing Rectangles Challenge Handout pg 4 (optional)

## Framing Rectangles Challenge Handout



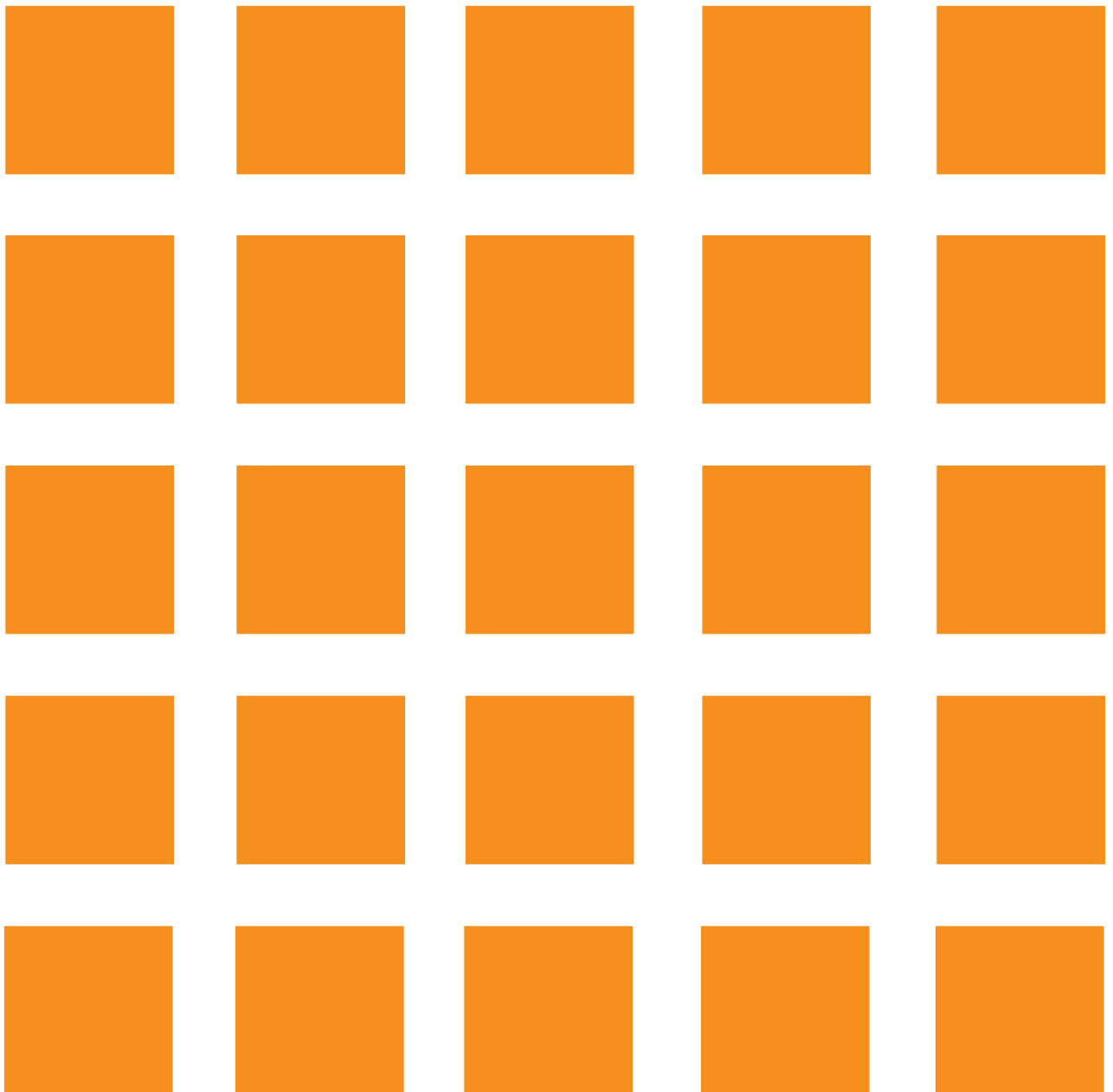
Work collaboratively with your group to explore each rectangle challenge.

**Challenge 1:** What number between 1 and 30 would have the most unique rectangles that represents that number as an area?

**Challenge 2:** Create a rectangle with a border that has the same number of square tiles as the rectangle's area. Find as many rectangles that work as you can. Record each of your rectangles.

**Challenge 3:** Create a rectangle with a border that has double the number of square tiles. Find as many rectangles that work as you can. Record each of your rectangles.

# Framing Rectangles Handout



# Framing Rectangles Handout

