youcubed®

Hollow Squares
Community College

Introduction

This activity is an opportunity to investigate symmetrical hollow squares. Students create their own pathways during this investigation to discover patterns and make conjectures about symmetrical hollow squares.

Agenda

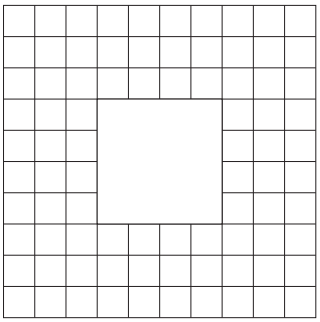
Activity	Time	Description/Prompt	Materials
Mindset Message	10 min	Play the mindset video.	Mindset Video
Launch	10 min	• Project the symmetrical hollow square with an outside square with side length 10 and an inside square with side 4. • Lead a number talk with Hollow Square Number Talk visual.	Hollow Square Number Talk
Investigate	30 min	• Students create some examples of symmetrical hollow squares. What patterns do you notice? • How many different ways can you make symmetrical hollow square figures where the number of squares in the figure totals 864? What if the number of squares in the figure totals 996? • What figure totals correspond with multiple symmetrical hollow squares?	• Hollow Squares handout • Graph paper • Maths journals • Pencils • Colored pencils (optional)
Discuss		• Share conjectures about symmetrical hollow squares. • Share symmetrical hollow squares with figure totals 864 and then 996. • Share conjectures about figure totals having multiple symmetrical hollow squares.	
Debrief Mindset Message	5 min	Debrief the mindset messages for this activity.	

Adapted from nrich.maths.org

youcubed®

Activity

Open this activity with a number talk about the symmetrical hollow square image with an outside square of side length 10 and an inside square of side length 4. Ask students why this hollow square is considered symmetrical and add ideas to further define the idea of symmetry as needed. Focus on the different ways students have for determining the number of squares and how they see it.



There are many strategies for counting the number of squares in this shape. Collect all of these, recording them with diagrams and number expressions. Remind students of the importance of seeing visuals in multiple ways and that each way of seeing helps to understand something different about the visual.

Next, transition students to explore the questions on the Hollow Squares handout. As they work, encourage them to explore a variety of symmetrical hollow squares. Invite them to discuss and share the patterns they see and conjectures they make with each other.

Invite students to a class conversation about patterns and conjectures. Start the discussion by asking students to share the patterns they discovered when creating examples of symmetrical hollow squares. Then invite them to share the figures that have 864 total squares. Encourage them to discuss the figures and make conjectures about how many figures have 864 total squares, and then 996. Move the discussion to making conjectures about how to decide which figure totals have symmetrical hollow squares.

Extensions

- What if these were rectangles instead of squares?

Adapted from nrich.maths.org

youcubed®

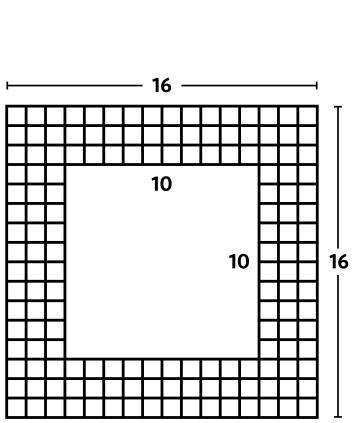
Hollow Square
Number Talk

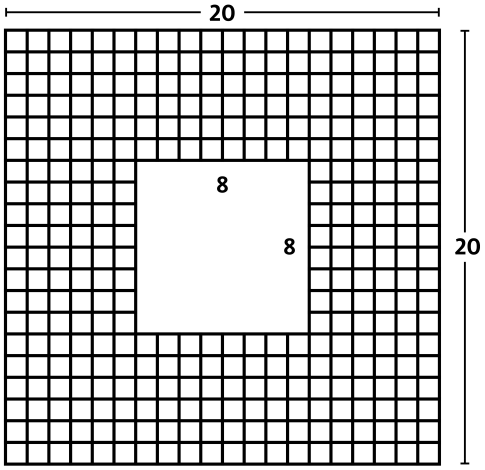
Adapted from nrich.maths.org

youcubed®

Hollow Squares

Study these two examples of symmetrical hollow squares:





1. Create some more examples of symmetrical hollow square figures. What patterns do you notice?

2. How many different ways can you make symmetrical hollow square figures where the number of squares in the figure totals 864? What if the number of squares in the figure totals 996?

3. What figure totals correspond with multiple symmetrical hollow squares?

Adapted from nrich.maths.org