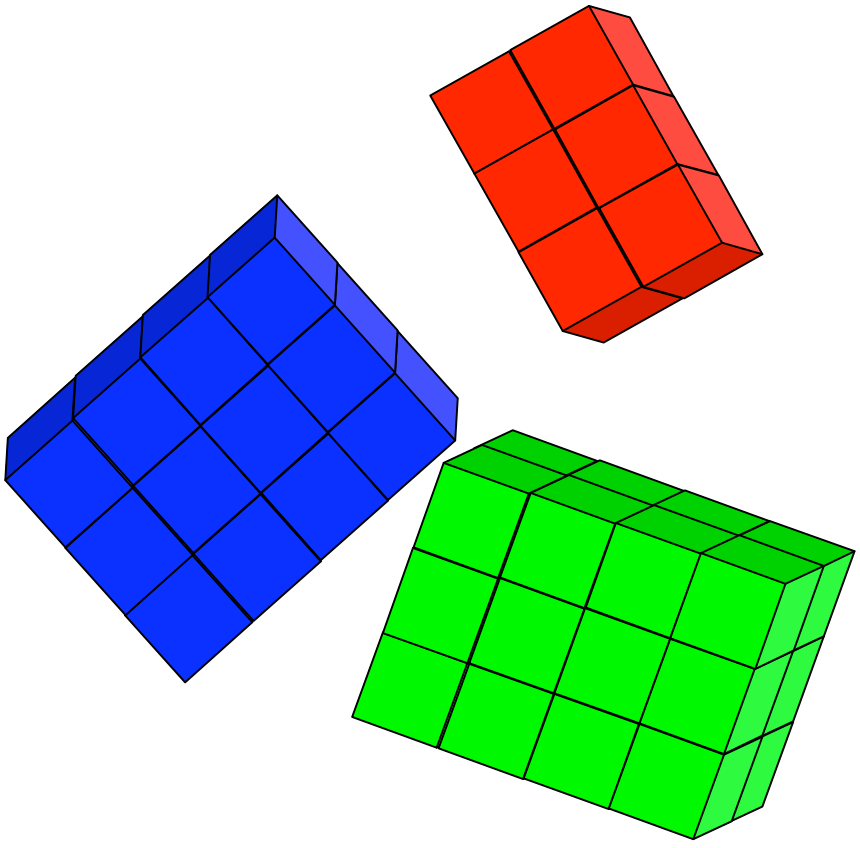
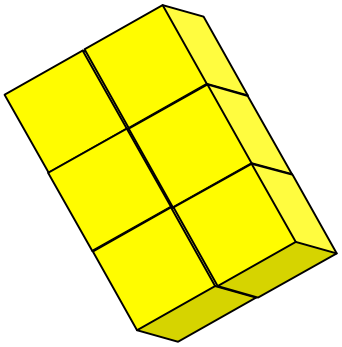
Developing Geometric Reasoning Part 6 Focus on 3-Dimensions

Math Teacher Leader Seminar
Milwaukee Mathematics Partnership
June 4 & 7, 2007

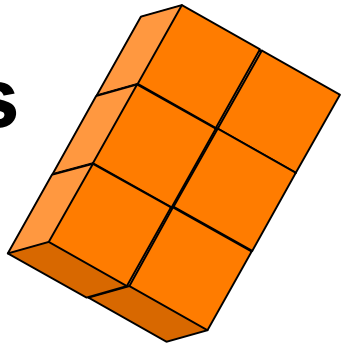


Henry Kepner
Kevin McLeod
DeAnn Huinker
Connie Laughlin
Karen Corlyn
Lee Ann Pruske
Paige Richards
Mary Mooney

Prepared for the *Milwaukee Mathematics Partnership* (MMP). This material is based upon work supported by the National Science Foundation under Grant No. 0314898.



Session Goals



- To deepen our understanding of volume and surface area.
- To understand volume as filling; measuring in non-standard units.
- To improve visualization skills.
- To explore and understand nets.

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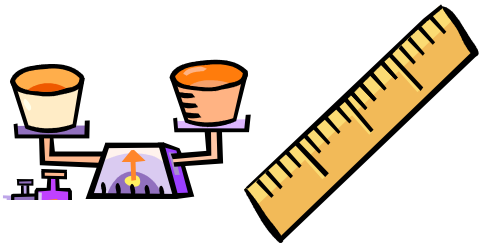
Measurement

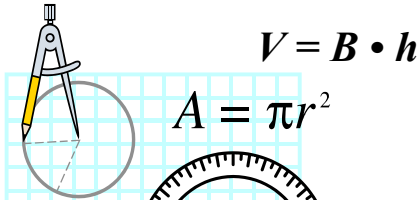
Wisconsin Mathematics Standard

Direct Measurement

Sub-skill Areas

Indirect Measurement





Measurable Attributes

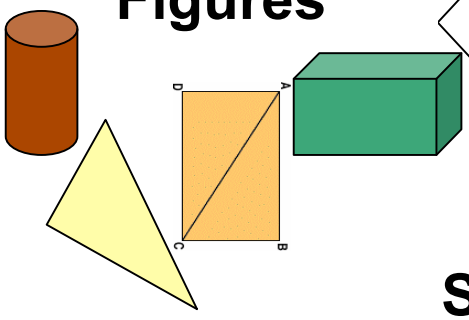
Geometry

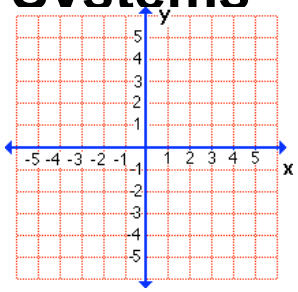
Wisconsin Mathematics Standard

Describing Figures

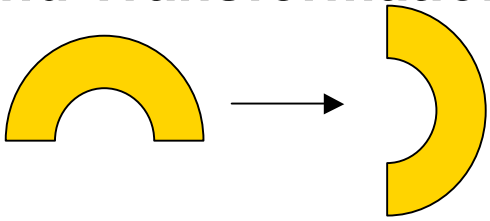
Sub-skill Areas

Coordinate Systems





Spatial Relationships and Transformations



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Volume as Filling

Is the volume of the pyramid (cone) the same as that of the cube (cylinder)?

Estimate how much larger the cylinder is than the cone (the cube than the pyramid).

Use the rice on your table to compare the volumes (use level scoops, not heaping).

Keep track of how many pyramid containers fill the cube container and how many cone containers fill the cylinder.

What relationships appear to exist between the volumes of the shapes?

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Visualizing Volume

Examine the “net” and estimate the number of cubes needed to fill the box.

Cut out the net and tape the box together.

Fill the box with cubes.

Compare your estimate to the results.

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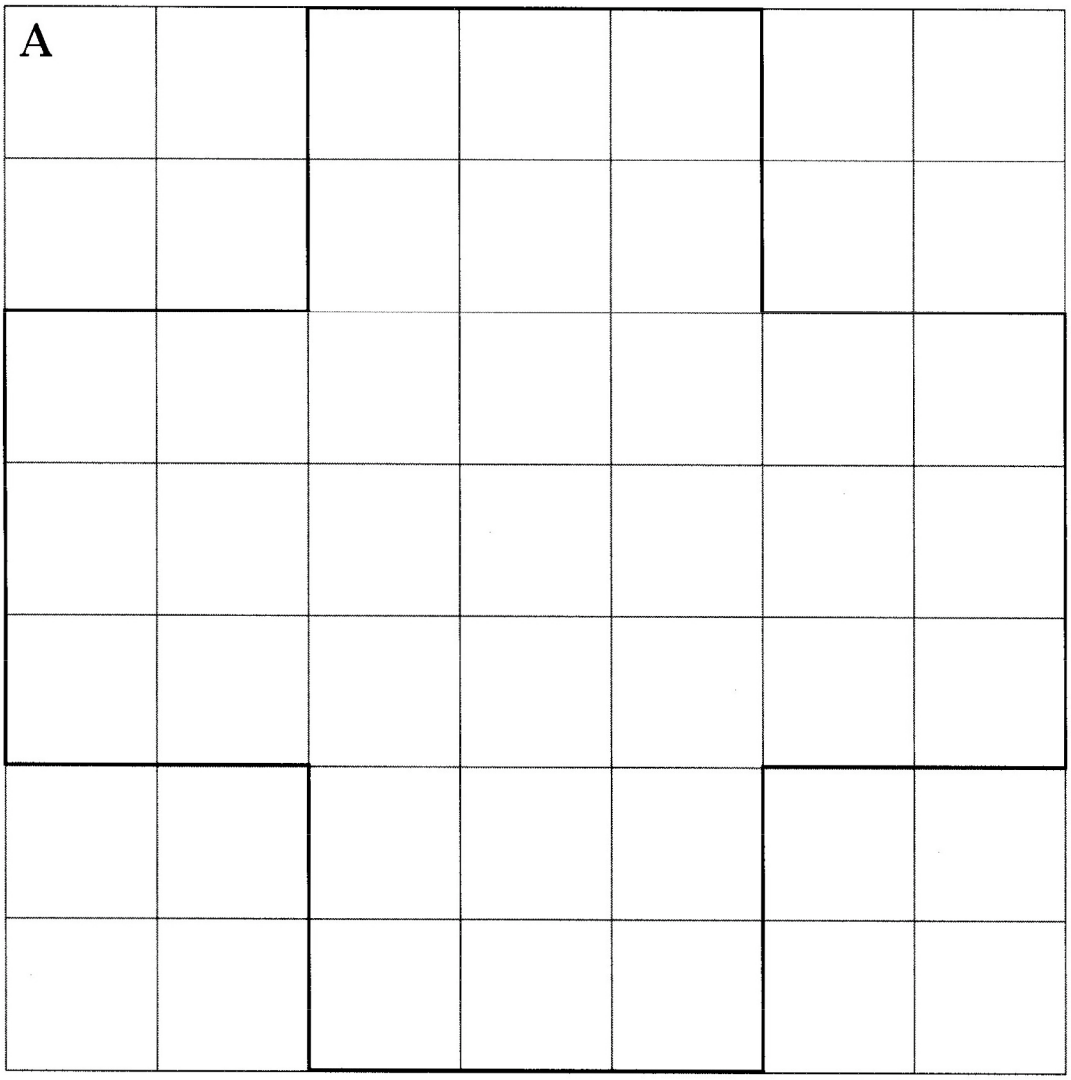
Make a rectangular box without a top. How many cubes do you predict will fit in the box?



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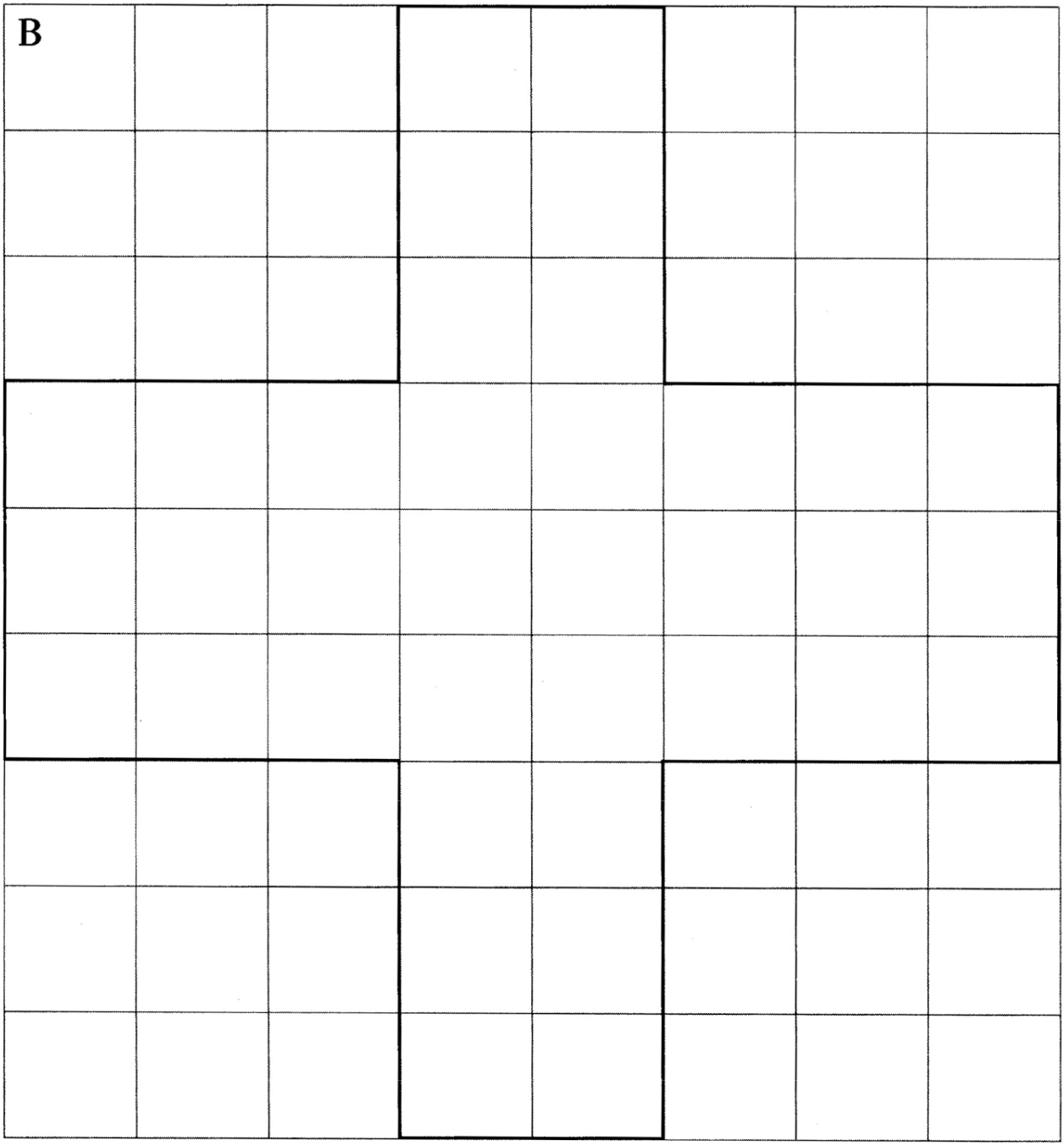

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Visualizing Surface Area

Draw the sides of the footprint.

Explain your justification to your neighbor.

Check the volume using snap cubes.
NO CUTTING!

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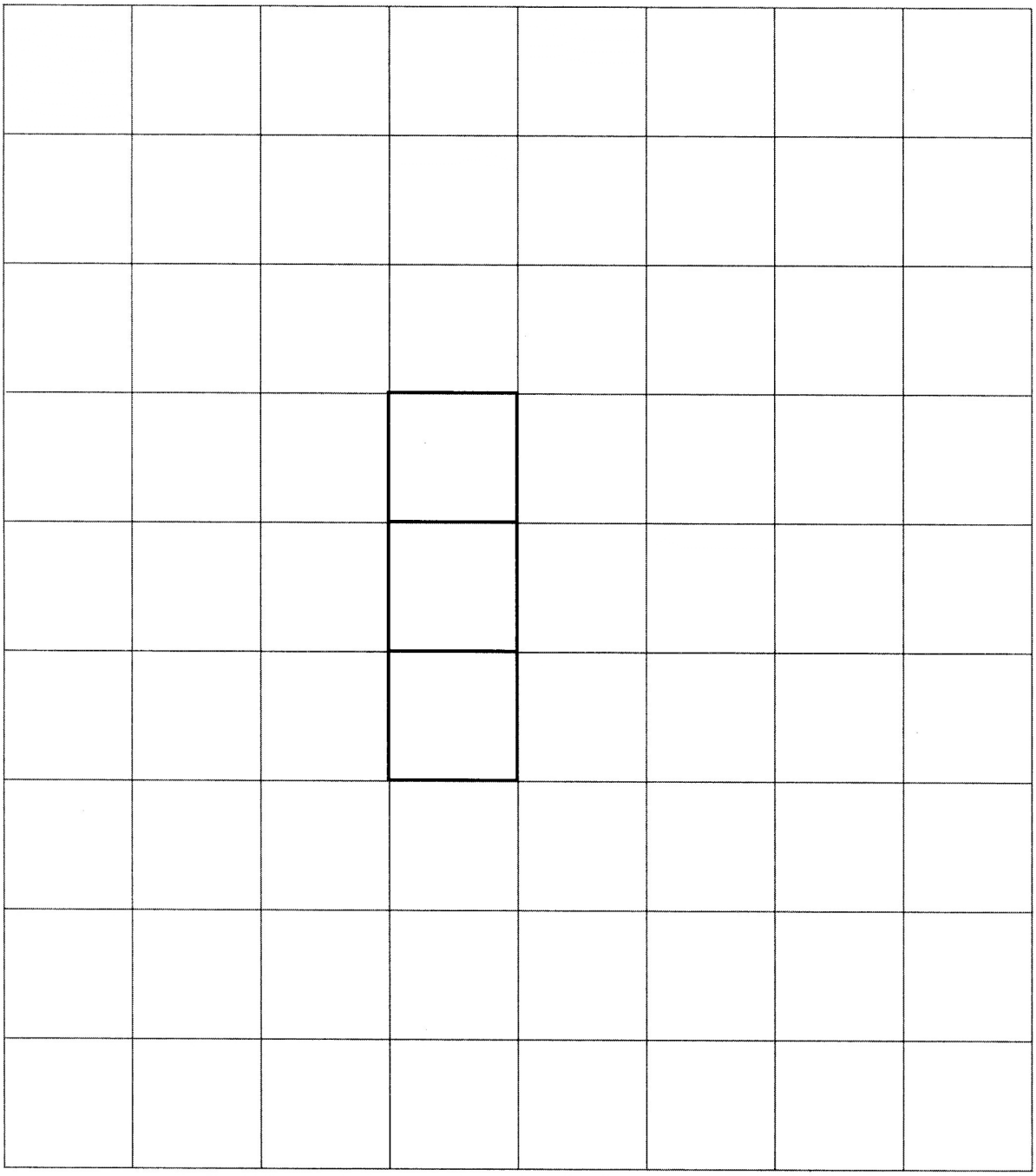
The dark squares make the bottom of a rectangular box that contains exactly 9 cubes. Draw the sides to finish the pattern for the box. Next, take the blank sheet of grid paper to make the top.



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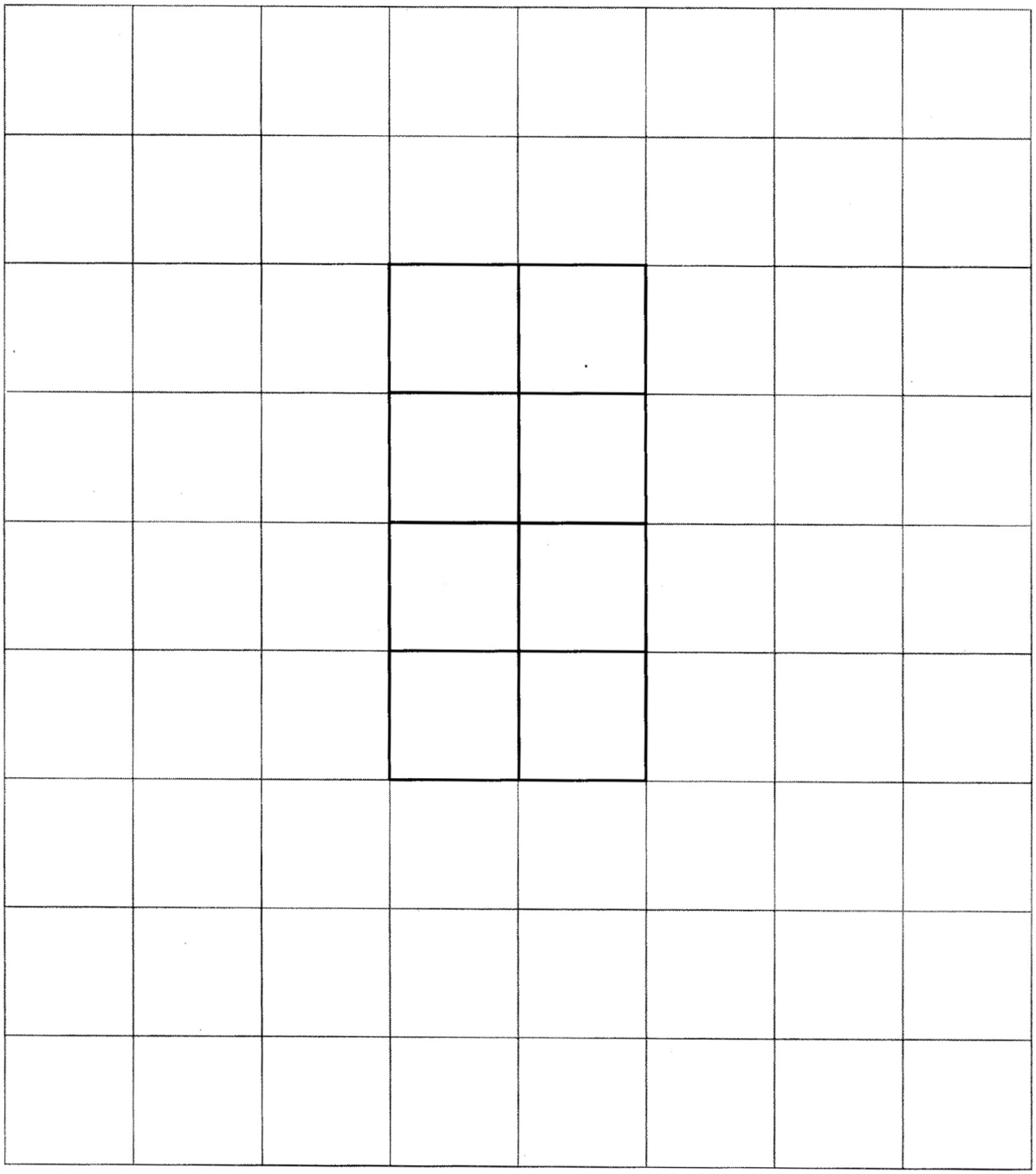
The dark squares make the bottom of a rectangular box that contains exactly 16 cubes. Draw the sides to finish the pattern for the box. Next, take the blank sheet of grid paper to make the top.



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Add a rectangle to your net so that you have a net for a closed figure. Use the extra material on your table to make the lids.

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2-D vs 3-D

Characteristics	Items to be compared	
	2-D	3-D
Examples of Shape / Figures		
Measure of Size		
Measurement Unit(s)		
Measure of size of boundary		
Measurement Technique/ Procedure		

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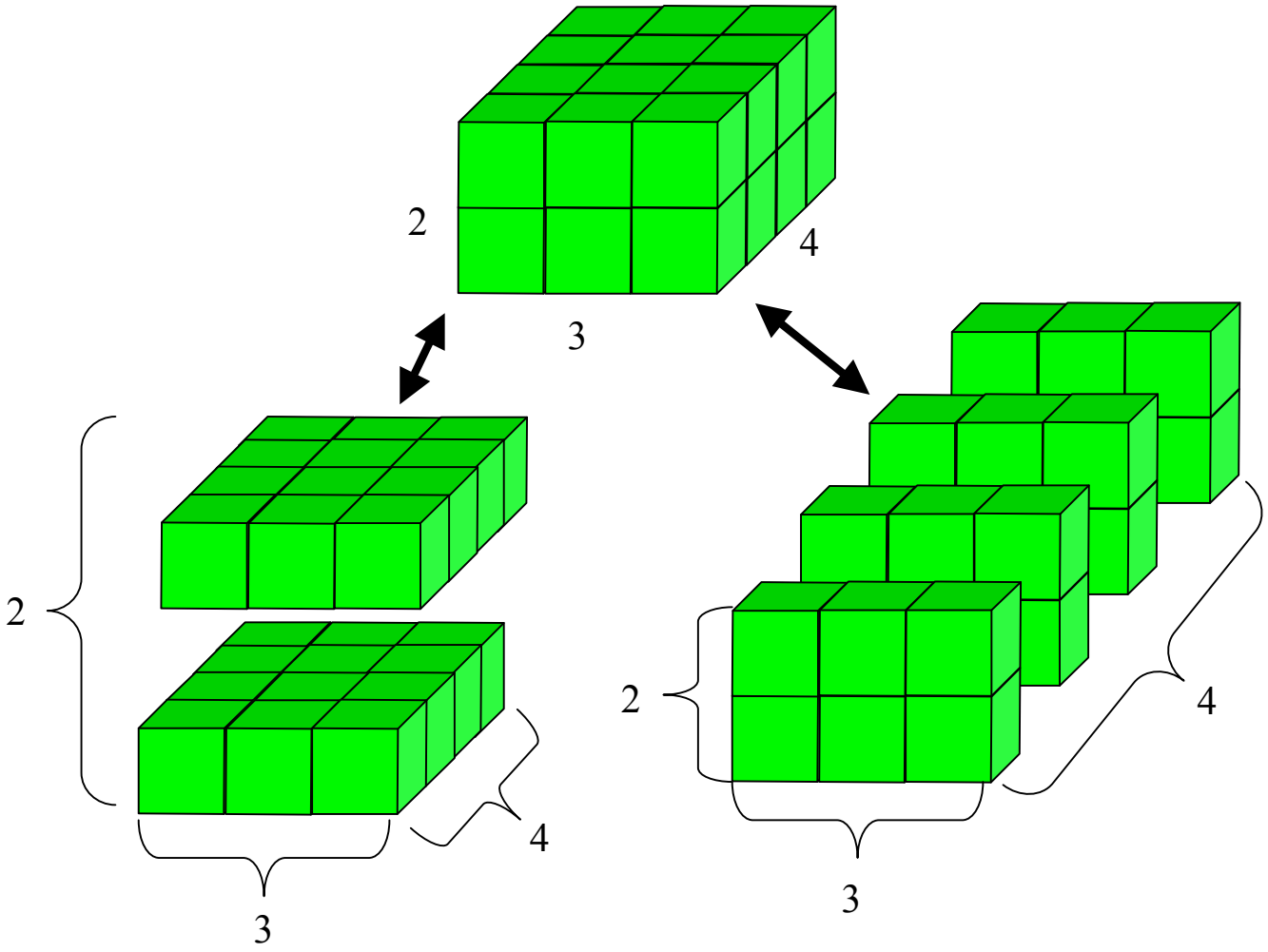

$$2 \times (3 \times 4) = (2 \times 3) \times 4$$

Associative Property

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Big Ideas

Volume is filling.

Surface area is to volume as perimeter is to area.

There are connections between geometry and algebra.

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