

Core Content

Cluster Title: Solve real-world and mathematical problems involving area, surface area, and volume.

Standard 4: Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

MASTERY Patterns of Reasoning

Conceptual:

The surfaces of three-dimensional shapes are composed of two dimensional faces.
Understanding surface area using nets can be used in real-world contexts (e.g., wrapping presents, packaging).

Procedural:

The area of two-dimensional shapes can be used to find the surface area of the three-dimensional shape.
Transitioning from three dimensions to two dimensions requires spatial reasoning.

Representational:

Use a net to represent a 3-D figure.
Use a net to find the surface area of a 3-D figure made up of rectangles and triangles (polyhedron).
Compose and decompose a polyhedron using rectangles and triangles.

Supports for Teachers

Critical Background Knowledge

Conceptual:

Area is covering the surface of a two-dimensional shape.
Area is measured with square units.

Procedural:

Find the area of a rectangle and triangle.

Representational:

Polygons can be decomposed.

Academic Vocabulary	
Net, three-dimensional figures, surface area, vertices, face, edge, length, width, base, height, polyhedron, prism, pyramid	
Instructional Strategies Used	Resources Used
<p>Make polyhedrons from given nets. Recognize the rectangles and triangles that compose the polyhedron. Find the area of each polygon and add together to find the total surface area of the polyhedron.</p> <p>Have nets on graph paper to aid in finding the area of polyhedrons.</p> <p>Mathematical Task: Use the real-world problem at Figure This: Real World Application (paper version attached). Give the students three small ice blocks and an ice block the equivalent to the size of all three smaller blocks. Have the students find the surface area of the block and each cube. Have them create a hypothesis about which will melt faster—the intact ice block or the cubes. Have the students perform the experiment by observing and measuring the time it takes for the block to melt and for all three cubes to melt. How does the melting time compare to the surface area exposed? Generalize the relationship.</p> <p>Extension: Can you create a formula to show the relationship?</p>	<p>Interactive Nets: 3D Nets and Surface Area Nets and Surface Area (scroll to page 106)</p> <p>Graph Paper Nets: Shodor Interactive Surface Area</p>
Assessment Tasks Used	
Skill-based Task: Find the surface area.	Problem Task: Belinda had two boxes to wrap for a birthday party. Box A has a length of 12 in, width of 8 in, and height of 6 in. Box B has a length of 11 in, width of 9 in, and height of 7 in. Which box will require the least amount of wrapping paper?

