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Unit 6.1, Unit Facilitation Guide

Overview

Prior Learning	Math 6, Unit 1	Future Learning
Grades 3–5 ● Area of rectangles ● Classifying quadrilaterals ● Parallel and perpendicular lines ● Volume of rectangular prisms	● Area (parallelograms, triangles, and polygons) ● Surface area	Math 7 ● Area and circumference of circles ● Volume and surface area of prisms Math 8 ● Volume of cylinders, cones, and spheres

Big Ideas

Area (Lessons 1–8)
● Calculate the area of parallelograms and triangles.
● Calculate the area of polygons by decomposing into rectangles and triangles, or surrounding and subtracting.

Surface Area (Lessons 9–13)
● Connect polyhedra with nets that represent them.
● Calculate the surface area of polyhedra made up of rectangles and triangles.

Key Math Practice Standards

● **MP3:** Compare strategies for calculating the area of parallelograms, triangles, and the surface area of prisms and pyramids.

● **MP6:** Precisely describe polyhedra and their nets, and choose lengths of parallelograms and triangles to measure to determine its area.

● **MP8:** Use repeated reasoning to develop a formula for the area of a parallelogram and triangle.

Unit Cool-Downs

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Lessons by Standard

Standard	6.EE.A.2.A	6.EE.A.2.C	6.G.A.1	6.G.A.4
Lessons	3, 6	4, 7	2, 3, 4, 5, 6, 7, 8	9, 10, 11, 12, 13

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Section 1: Area (Lessons 1–8)

Students develop strategies for calculating the area of parallelograms, triangles, and polygons, including generalizing and using formulas.

Lesson	Title	Purpose	Vocabulary	Notes
1	Shapes on a Plane	Students develop strategies for determining the area of non-rectangular shapes.	area	This lesson is designed for 35 minutes. There is a paper version of this lesson if devices are not available. This lesson is optional.
2	Letters	Students develop and name strategies for calculating the area of more complex shapes.		There is a paper version of this lesson if devices are not available.
3 ⬜	Exploring Parallelograms	Students develop strategies for calculating the area of a parallelogram, and generalize and apply a formula for the relationship between the base, height, and area of all parallelograms.	base height parallelogram quadrilateral	This lesson is designed for 90 minutes and may take multiple class periods to complete. This lesson includes Teacher Presentation Screens.
4	Off the Grid	Students calculate the areas of parallelograms without a grid.		
5 ⬜	Exploring Triangles	Students generate, discuss, and apply several different strategies for calculating the areas of triangles on a grid.		This lesson includes Teacher Presentation Screens.

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Lesson	Title	Purpose	Vocabulary	Notes
6	Triangles and Parallelograms	Students make connections between the areas of triangles and the areas of parallelograms.		Activity 1 includes a paper supplement.
7	Off the Grid Part 2	Students calculate the areas of triangles without a grid.		
8	Pile of Polygons	Students apply what they have learned about calculating the areas of parallelograms and triangles to a new category of shapes: polygons.	polygon	This lesson contains an optional Polygraph activity.
◻	Practice Day 1			
	Quiz			

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Section 2: Surface Area (Lessons 9–13)

Students make connections between three-dimensional polyhedra and nets that represent them, then use those nets to calculate the surface area.

Lesson	Title	Purpose	Vocabulary	Notes
9	Renata's Stickers	Students develop a conceptual understanding of the meaning of surface area.	surface area volume	This lesson is optional.
10	Plenty of Polyhedra	Students begin to visualize three dimensional objects known as polyhedra.	face net polyhedron prism pyramid	This lesson contains a Polygraph.
11 ⬜	Nothing but Nets	Students are introduced to the names of polyhedra and practice identifying polyhedra from their nets.	base	
12	Face Value	Students calculate the surface areas of prisms and pyramids.		
13 ⬜	Take It To Go	Students use their creativity, personal experiences, and the concepts they learned in this unit to design a take-out container.		This lesson includes Teacher Presentation Screens. This lesson is optional.
⬜	Practice Day 2			
	End-Unit Assessment			

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Suggestions for Consolidation or Omission

- **Lesson 1:** This lesson supports students in developing strategies for determining the area of non-rectangular shapes, which will be addressed in more depth in upcoming lessons. If most students demonstrate a strong understanding of area in Problems 1 and 2 of the Readiness Check, this lesson may be omitted.

- **Lesson 3**: This is an important lesson to support students in developing strategies for calculating the area of a parallelogram. While it is intended to take two class periods, this lesson could be condensed into one class period by only completing Activities 1 and 3.

- **Lesson 8:** If time runs short, the optional polygraph activity may be omitted.

- **Lesson 9:** This lesson supports students in developing a conceptual understanding of surface area, which will be addressed in more depth in upcoming lessons. If students show a strong understanding of volume in Problems 6 and 7 of the Readiness Check and time is spent in other lessons discussing the differences between surface area and volume, this lesson could be omitted.

- **Lesson 13:** This lesson gives students an opportunity to use their creativity and personal experiences to apply the concepts they learned in this unit to design a take-out container. There is no new content introduced in this lesson.

Connections to Prior Learning

The following concepts from previous grades may support students in meeting grade-level standards in this unit:

- Calculating areas of rectangles. **(3.MD.C, 3.MD.C.6, 3.MD.C.7.B, 4.MD.A.3, 5.NF.B.4.B)**
- Classifying shapes such as right triangles and parallelograms. **(4.G.A.2, 5.G.B.4)**
- Calculating the volume of a rectangular prism. **(5.MD.C.4)**

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Connections to Future Learning

The content in this unit supports the following concepts in later units and courses:

Area and Circumference of Circles (7.G.B.4)

In this unit, students determine the area of triangles, quadrilaterals, and other polygons. In Math 7, Unit 3, they will extend their understanding of area to circles. For example, this circle's area would be a little more than $3 \cdot 4^2 = 48$ square units. The relationship between the radius and area of a circle is exactly $A = \pi r^2$. The area of this circle is $\pi(4)^2 = 16\pi \approx 50.27$ square units.
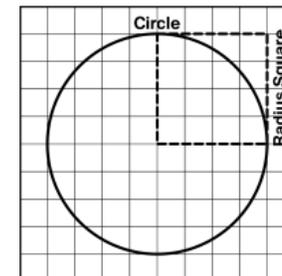

Volume and Surface Area of Prisms (7.G.B.6)

In this unit, students connect the surface area of a prism to the sum of the areas of its net. In Math 7, Unit 7, students will calculate the surface area (without a net) and the volume of prisms.

Volume: Multiply the area of the base by the height. In this prism, the bases are right triangles.

$$\text{Volume} = \text{Area of Base} \cdot \text{Height} = \frac{1}{2}(5 \cdot 12) \cdot 14 = 30 \cdot 14 = 420 \text{ cubic inches}$$
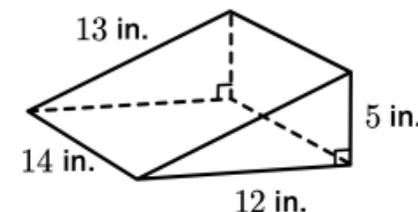
Surface Area: The sum of the area of each face. This prism has two triangular faces and three rectangular faces.

$$\text{Surface Area} = 30 + 30 + 70 + 168 + 182 = 480 \text{ square inches}$$

Volume of Cylinders, Cones, and Spheres (8.G.C.9)

In this unit, students determine the volume of rectangular prisms. In Math 7, students will determine the volume of other polyhedra and in Math 8, students will determine the volumes of cylinders, cones, and spheres. For example, the volume of this cylinder is:

$$V = B \cdot h = \pi r^2 \cdot h = \pi \cdot (3)^2 \cdot (6) = 9 \cdot 6 \cdot \pi = 54\pi \text{ cubic units.}$$