desmos

Unit 7.7, Unit Facilitation Guide

Overview

Prior Learning	Math 7, Unit 7	Future Learning
Math 6 • Area and surface area • Volume of rectangular prisms Math 7 • Solving equations • Properties of circles	• Angle relationships • Building and drawing triangles with given conditions • Volume and surface area of non-rectangular prisms	Math 8, Units 1 and 5 • Congruence • Volume of cylinders, cones, and spheres High School • Triangle congruence theorems

Big Ideas

Angle Relationships (Lessons 1–4)

- Determine unknown angle measures using facts about complementary, supplementary, and vertical angles.
- Write and solve equations for unknown angles in a diagram.

Drawing Triangles (Lessons 5–8)

- Draw triangles given three measures of side lengths or angles.
- Determine whether it is possible to draw a unique triangle, more than one triangle, or no triangle given a set of measurements.

Solid Geometry (Lessons 9–13)

- Describe, compare, and contrast cross sections of prisms and pyramids.
- Solve problems involving the volume and surface area of right prisms.

Key Math Practice Standards

- **MP3:** Reason about how the placement of an angle affects the shape of a triangle. Compare strategies for calculating the surface area of a prism.
- **MP5:** Use reference angles to estimate or calculate unknown angle measurements. Use physical and digital tools to draw triangles.
- **MP6:** Describe cross sections of solids with precision.

Unit Cool-Downs

Unit 7.7 Cool-Downs

Lessons by Standard

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

Section 1: Angle Relationships (Lessons 1–4)

Students use facts about complementary, supplementary, and vertical angles to determine unknown angle measures. They also build on their work from Unit 6 to write and solve equations for unknown angles in a diagram.

Lesson	Title	Purpose	Vocabulary	Notes
1	Pinwheels	Students recall what they know about angles and how to estimate the measure. Then they reason about angle measurements around a circle.	right angle straight angle	This lesson is optional.
2	Friendly Angles	Students learn formal ways to describe two specific angle relationships, complementary angles and supplementary angles, and they connect angle diagrams to equations.	adjacent angles complementary angles supplementary angles	This lesson includes a Paper Supplement.
3	Angle Diagrams	Students apply what they've learned to understand the relationship between vertical angles. They write and solve equations representing diagrams to determine unknown angle measures.	vertical angles	
4	Missing Measures	Students solve multistep problems and determine missing angle measures.		

Section 2: Drawing Triangles (Lessons 5–8)

Students build and draw triangles given three measures of side lengths or angles, and then determine whether it is possible to draw one unique triangle, more than one triangle, or no triangle with these measurements.

Lesson	Title	Purpose	Vocabulary	Notes
5	Can You Build It?	Students notice that not all combinations of three sides create a triangle, and they reason about characteristics of side lengths that do and do not create triangles.		
6	Is It Enough?	Students make connections between side lengths and circles, and use those circles to create triangles with specific side lengths.		
7	More Than One?	Students recognize that two triangles with two angle measures and one side length in common (or two side lengths and one angle measure in common) are not necessarily identical copies.		
8	Can You Draw It?	Students use rulers and protractors to draw triangles given three measurements and consider information needed to make identical copies of triangles.		
Practice	Practice Day 1			

Section 3: Solid Geometry (Lessons 9–13)

Students solve problems involving the volume and surface area of right prisms. They also describe, compare, and contrast cross sections of prisms and pyramids.

Lesson	Title	Purpose	Vocabulary	Notes
9	Slicing Solids	Students explore and describe possible cross sections of solids, including prisms and pyramids.	cross section base prism pyramid	
10	Simple Prisms	Students build on what they know about the volume of rectangular prisms to calculate the volume of triangular prisms using base area and height.	volume	This lesson is optional.
11	More Complicated Prisms	Students calculate the volume of more complicated prisms. They use a variety of strategies to determine the areas of complicated bases.		
12	Surface Area Strategies	Students build on the work they have done calculating surface area of rectangular prisms in Math 6 in order to calculate the surface area of more complicated prisms.	surface area	This lesson includes Teacher Presentation Screens.
13	Popcorn Possibilities	Students apply their knowledge of surface area and volume to solve a complex problem.		This lesson includes a Paper Supplement.
Practice	Practice Day 2			This lesson is optional.

Suggestions for Consolidation or Omission

- **Lesson 1:** This lesson surfaces what students know about angles and their measures, setting up ideas for the rest of the unit. These ideas will be addressed in more depth in upcoming lessons. If most students demonstrate a strong understanding of angles and their measures in Problems 1 and 2 of the Readiness Check, this lesson may be omitted.
- **Lesson 4:** This lesson gives students an opportunity to practice solving multistep problems to determine angle measures. If students show a strong understanding of writing and solving equations to determine unknown angle measures in earlier lessons, this lesson may be omitted.
- **Lesson 11:** This lesson supports students in developing fluency calculating the volume of more complicated prisms. If students show a strong understanding of calculating volume in earlier lessons, this lesson may be omitted. If omitted, be sure to discuss how their understanding of volume of simple prisms applies to more complicated prisms elsewhere in the unit.
- **Lesson 13:** This lesson gives students an opportunity to apply their knowledge of surface area and volume to solve a complex problem. 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:

- Describing and estimating angle measures. **(4.G.A.1, 4.MD.C.5, 4.MD.C.6)**
- Calculating the area of triangles and non-rectangular quadrilaterals. **(6.G.A.1)**
- Calculating the surface area and volume of right rectangular prisms. **(6.G.A.2, 6.G.A.4)**

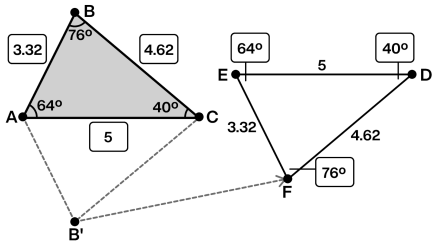
Connections to Future Learning

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

Congruence (8.G.A, 8.G.A.3)

In this unit, students consider whether two triangles are identical or not when they decide how many triangles can be built with a set of conditions. In Math 8, Unit 1, students will learn to use the term *congruent* to describe these types of figures.

One figure is *congruent* to another if it can be moved with translations, rotations, and reflections to fit exactly over the other. Triangle EFD is congruent to triangle ABC because you can reflect triangle ABC across a horizontal line and then translate to fit it on top of triangle EFD.

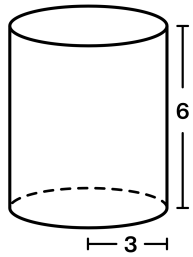


Volume of Cylinders, Cones, and Spheres (8.G.C.9)

In this unit, students calculate the volume and surface area of non-rectangular prisms. In Math 8, Unit 5, students will use similar strategies to calculate the volumes of cylinders, cones, and spheres.

The volume of a cylinder is also the area of the base multiplied by the height ($V = B \cdot h$).

The volume of this cylinder is $V = \pi r^2 \cdot h = \pi \cdot (3)^2 \cdot (6) = 9 \cdot 6 \cdot \pi = 54\pi$ cubic units.



Triangle Congruence Theorems (HSG.CO.B.7, HSG.CO.B.8)

In this unit, students use rigid transformations to understand what it means for two polygons to be congruent. In high school, students will use rigid transformations to prove theorems for identifying conditions for triangle congruence. In the example, two pairs of corresponding sides and the angle between them are congruent. This turns out to be enough information to know that the triangles are congruent, which means that *all* corresponding sides and angles have the same measures.