Chapter 7

Solve Problems Involving Geometry

Curriculum Expectations

Applications of Geometry

Solving Problems Involving Geometry

D2.1 gather and interpret information about real-world applications of geometric shapes and figures in a variety of contexts in technology-related fields (e.g., product design, architecture), and explain these applications (e.g., one reason that sewer covers are round is to prevent them from falling into the sewer during removal and replacement)

Sample problem: Explain why rectangular prisms are often used for packaging.

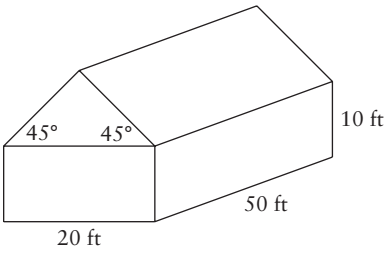
D2.2 perform required conversions between the imperial system and the metric system using a variety of tools (e.g., tables, calculators, online conversion tools), as necessary within applications

D2.3 solve problems involving the areas of rectangles, parallelograms, trapezoids, triangles, and circles, and of related composite shapes, in situations arising from real-world applications

Sample problem: Your company supplies circular cover plates for pipes. How many plates with a 1-ft radius can be made from a 4-ft by 8-ft sheet of stainless steel? What percentage of the steel will be available for recycling?

D2.4 solve problems involving the volumes and surface areas of spheres, right prisms, and cylinders, and of related composite figures, in situations arising from real-world applications

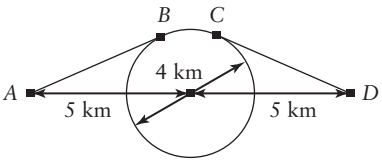
Sample problem: For the small factory shown in the following diagram, design specifications require that the air be exchanged every 30 min. Would a ventilation system that exchanges air at a rate of 400 ft^3/min satisfy the specifications? Explain.



D3.1 recognize and describe (i.e., using diagrams and words) arcs, tangents, secants, chords, segments, sectors, central angles, and inscribed angles of circles, and some of their real-world applications (e.g., construction of a medicine wheel)

D3.2 determine the length of an arc and the area of a sector or segment of a circle, and solve related problems

Sample problem: A circular lake has a diameter of 4 km. Points *A* and *D* are on opposite sides of the lake and lie on a straight line through the centre of the lake, with each point 5 km from the centre. In the route *ABCD*, *AB* and *CD* are tangents to the lake and *BC* is an arc along the shore of the lake. How long is this route?

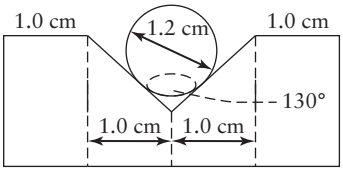


D3.3 determine, through investigation using a variety of tools (e.g., dynamic geometry software), properties of the circle associated with chords, central angles, inscribed angles, and tangents (e.g., equal chords or equal arcs subtend equal central angles and equal inscribed angles; a radius is perpendicular to a tangent at the point of tangency defined by the radius, and to a chord that the radius bisects)

Sample problem: Investigate, using dynamic geometry software, the relationship between the lengths of two tangents drawn to a circle from a point outside the circle.

D3.4 solve problems involving properties of circles, including problems arising from real-world applications

Sample problem: A cylindrical metal rod with a diameter of 1.2 cm is supported by a wooden block, as shown in the following diagram. Determine the distance from the top of the block to the top of the rod.



Chapter 7 Planning Chart

Section	Study Guide and Exercise Book Pages	Teacher's Resource Blackline Masters	Assessment	Tools
7.1 Area of Two-Dimensional Objects	129–134	• G–1 Grid Paper • T–2 *The Geometer's Sketchpad®* 4 • BLM 7–1 Chapter 7 Prerequisite Skills • T7–1 How to Do Section 7.1 #2 to 5 Using TI-83 Plus/TI-84 Plus and TI-Nspire™ CAS • T7–2 How to Do Section 7.1 #20 Using *The Geometer's Sketchpad®*	• BLM 7–2 Chapter 7 Self-Assessment Checklist • A–1 Problem Solving • A–2 Reasoning and Proving • A–3 Reflecting • A–4 Selecting Tools and Computational Strategies • A–5 Connecting • A–6 Representing • A–7 Communicating	• poster board or large sheets of paper • markers • grid paper • cardstock or cardboard • scissors • utility knife • scientific calculator • graphing calculator • computer with dynamic geometry software • computer with Internet connection
7.2 Surface Area of Three-Dimensional Objects	135–138	• G–1 Grid Paper		• three-dimensional shapes • grid paper • cardstock • scissors • tape • poster paper • markers • computer with dynamic geometry software • scientific calculator • graphing calculator
7.3 Volume of Three-Dimensional Objects	139–143	• G–1 Grid Paper • T–4 The TI-Nspire™ CAS Calculator • T7–1 How to Do Section 7.1 #2 to 5 Using TI-83 Plus/TI-84 Plus and TI-Nspire™ CAS • T7–3 How to Do Section 7.3 #18 Using *The Geometer's Sketchpad®*		• different-shaped prisms • grid paper • cardboard • scissors • beakers and water • computer with dynamic geometry software • scientific calculator • graphing calculator • computer algebra system
7.4 Properties of Circles	144–147	• G–1 Grid Paper • G–2 Placemat • T7–4 How to Do Section 7.4 Example Using *The Geometer's Sketchpad®*		• geometry set • grid paper • computer with dynamic geometry software • graphing calculator • computer algebra system
7.5 Investigating Properties of Circles	148–151	• G–1 Grid Paper • T7–5 How to Do Section 7.5 #14 Using *The Geometer's Sketchpad®*		• geometry set • grid paper • scientific calculator • graphing calculator • computer with dynamic geometry software
7.6 Solving Problems Involving Properties of Circles	152–154	• G–1 Grid Paper • BLM 7–3 Chapter 7 Review • BLM 7–4 Chapter 7 Practice Test • BLM 7–5 Chapter 7 Case Study • T7–6 How to Do Section 7.6 #4 Using *The Geometer's Sketchpad®*		• geometry set • grid paper • computer with dynamic geometry software

Chapter 7 Blackline Masters Checklist

	BLM	Title	Purpose
7.1 Area of Two-Dimensional Objects			
	G–1	Grid Paper	Student Support
	T–2	*The Geometer's Sketchpad*® 4	Technology
	BLM 7–1	Chapter 7 Prerequisite Skills	Practice
	BLM 7–2	Chapter 7 Self-Assessment Checklist	Assessment
	T7–1	How to Do Section 7.1 #2 to 5 Using a TI-83 Plus/84 Plus and TI-Nspire™ CAS	Technology
	T7–2	How to Do Section 7.1 #20 Using *The Geometer's Sketchpad*®	Technology
	A–1	Problem Solving	Assessment
	A–2	Reasoning and Proving	Assessment
	A–3	Reflecting	Assessment
	A–4	Selecting Tools and Computational Strategies	Assessment
	A–5	Connecting	Assessment
	A–6	Representing	Assessment
	A–7	Communicating	Assessment
7.2 Surface Area of Three-Dimensional Objects			
	G–1	Grid Paper	Student Support
7.3 Volume of Three-Dimensional Objects			
	G–1	Grid Paper	Student Support
	T–4	The TI-Nspire™ CAS Calculator	Technology
	T7–1	T7–1 How to Do Section 7.1 #2 to 5 Using TI-83 Plus/TI-84 Plus and TI-Nspire™ CAS	Technology
	T7–3	How to Do Section 7.3 #18 Using *The Geometer's Sketchpad*®	Technology
7.4 Properties of Circles			
	G–1	Grid Paper	Student Support
	G–2	Placemat	Student Support
	T7–4	How to Do Section 7.4 Example Using *The Geometer's Sketchpad*®	Technology
7.5 Investigating Properties of Circles			
	G–1	Grid Paper	Student Support
	T7–5	How to Do Section 7.5 #14 Using *The Geometer's Sketchpad*®	Technology
7.6 Solving Problems Involving Properties of Circles			
	G–1	Grid Paper	Student Support
	BLM 7–3	Chapter 7 Review	Practice
	BLM 7–4	Chapter 7 Practice Test	Practice
	BLM 7–5	Chapter 7 Case Study	Practice
	T7–6	How to Do Section 7.6 #4 Using *The Geometer's Sketchpad*®	Technology
	BLM 7–6	Chapter 7 BLM Answers	Answers