Grade 7 Math · Lesson 7 — The Community Center Plan

Area, Perimeter, Circles and Angles · ages 11 to 14 · 45 minutes · the workbook, one screen, this page, a pencil and paper

At a Glance

- **The book:** 7th Grade Math Workbook: Real-World Problem Solving, Chapter 7 (The Architect), by Dr. Gene A Constant.
- **Free tool:** Geometry Quest (perimeter, area and angles), free, no login, plays in the browser: globalsovereignuniversity.org/geometry-quest.
- **Free class:** Lesson 7 of the free Grade 7 Mathematics class: globalsovereignuniversity.org/grade-7-math-class#lesson-7.
- **Ages and time:** Grade 7 · ages 11 to 14 · 45 minutes.
- **Prep (5 min):** read the Teaching Creed and have the workbook open to Chapter 7. Find a round plate and a piece of string at least as long as the plate is around.

Why this lesson

Architects need three numbers they can trust: the distance around, the space inside and the angles. Measuring a real plate shows a child where π comes from instead of asking them to take it on faith.

What the learner will be able to do

- Find the perimeter of a polygon
- Find the circumference of a circle
- Find the area of rectangles, triangles and circles
- Use angle relationships to find missing angles
- Find the area of composite shapes

The 45-Minute Climb

How to read this: the gold box in each step is your lesson, word for word. Run it as written. The notes beneath are optional support. "The group" means your family; "host" means you.

1 · The Hook (5 min)

"Wrap a string around a round plate, then lay it straight next to the plate's width. About how many widths long is the string?"

Say it like this: let your child do it with real objects if you can, then ask how they know their answer is right before you check it.

2 · Work It Together (15 min)

Open the workbook to the worked example Fencing a Round Pond (Section 7.1) together: The garden pond is a circle with a radius of 15 feet. Use $C = 2\pi r$: $C = 2 \times 3.14 \times 15$. $2 \times 3.14 = 6.28$, and $6.28 \times 15 = 94.2$. The pond's edge is 94.2 feet around. Then read A Round Reading Room (Section 7.2) together: The reading room is a circle 40 feet across, so its radius is 20 feet. Use $A = \pi r^2$: $A = 3.14 \times 20^2$. $20^2 = 400$, and $3.14 \times 400 = 1{,}256$. The floor is 1,256 square feet.

Read each step aloud and let your child say the next step before you read it. Then play one round of Geometry Quest.

3 · The Talk (8 min)

1. Why does every circle use the same π? 2. What is the difference between perimeter and area? 3. How do you find the area of an odd shape?

You are not fishing for one right answer. You are listening for understanding:

- Q1: Every circle is the same shape at a different size, so the distance around is always a little more than three diameters.
- Q2: Perimeter is the distance around and is measured in feet. Area is the space inside and is measured in square feet.
- Q3: Break it into rectangles, triangles and circles, find each area, and add or subtract them.

4 · Solo Climb (12 min)

Five problems on your own, with your work shown.
1. The main hall is a rectangle 125 feet long and 85 feet wide. How much fencing goes around it?
2. A garden bed is a right triangle with a base of 60 feet and a height of 40 feet. What is its area?
3. A straight wall makes a 180° angle. A light on the wall lights 115° to the left. What angle is left on the right?
4. A rotating sprinkler covers a full circle in 4 equal parts. What angle does each part cover?
5. A square tool shed has an area of 400 square feet. Railing costs $12 a foot. What does railing all the way around cost?

Why solo: a test, a job and real life ask you to work alone. Five problems rehearse exactly that. The answers are at the end of this plan.

Keep It Fresh (5 min, the next day)

Two review problems from the book's Extra Practice.
1. Solve: 7 − 2x = 19
2. Solve and describe the answer: −5x > 35

Ready to move on? Four of the five Solo Climb problems right, with work shown, means this skill is solid. If not, reread the worked examples together and try two more problems from the chapter before the next lesson. Short review of old skills keeps them from fading.

5 · The Takeaway (5 min)

"Perimeter goes around; area covers. For a circle, the radius is half the distance across." · Homework: Measure one room at home. Find its perimeter and its floor area, then work out how many 1-foot square tiles would cover the floor.

The badge moment: finishing all five steps earns the Bronze ring of this lesson's badge, The Planner's Eye. Mark it on the Climber's Passport now; the homework is how Silver and Gold are earned during the week.

Common Mistakes to Watch For

- Using the diameter where the formula needs the radius.
- Writing area in feet instead of square feet.
- Adding the angles of a triangle to 360° instead of 180°.

The Teaching Creed

You are not the expert; the book and the method are. Your job is to ask "how do you know?" one more time than feels natural, and to celebrate wrong answers out loud. In here, a wrong answer is where the lesson lives.

GENO, GSU's free tutor, can explain any step a second way, any hour, in 83 languages, with no login: globalsovereignuniversity.org/free-tutor. A prompt for the host: Ask GENO: "My child mixes up radius and diameter. Help them see the difference with a real circle, without giving the answer."

Adapt It and Measure It

Differentiation

- Struggling: measure real circles with string for every circumference problem.
- Ahead: draw a floor plan of one room with a round rug and find all three numbers.
- Large co-op: each team designs one room of the community center and the group adds the areas.
- Reluctant: let the child measure a bike wheel or a ball and find how far it rolls in one turn.

Evidence of learning (no exam)

Look for three things. Tried: finished all five Solo Climb problems with work shown. Noticed: can name the mistake in Common Mistakes that they almost made. Changed: the next day, solves one new problem from the same chapter without help. Those three words are the whole rubric, and they match the badge tiers below.

Gamify It — The Campus Climb

Every GSU lesson is one badge on the Climber's Passport, earned at four depths: Bronze, Silver, Gold and Platinum.

LESSON 7 BADGE — The Planner's Eye · Bronze — The Climb: finished the 45-minute lesson, all five steps. · Silver — The Try: did the homework and explained it to the host. · Gold — The Proof: completed the chapter's Action Report in the workbook with every answer checked against the Answer Key. · Platinum — The Teacher: ran this lesson as host for someone else. The harvest of a teacher is teachers.

Answers for the Host

1. 420 feet (125 + 125 + 85 + 85)
2. 1,200 square feet (½ × 60 × 40)
3. 65° (180 − 115)
4. 90° (360 ÷ 4)
5. $960 (side 20 ft; perimeter 80 ft; 80 × 12)

Keep It Fresh: 1. x = −6 · 2. x < −7

Every answer above comes from the workbook's own Answer Key. The book behind this lesson: 7th Grade Math Workbook: Real-World Problem Solving, Chapter 7 (The Architect).

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