

DMT COMPANION

Insight 42 · 2026 · for teachers, coaches, and school leaders



TEACHING AREA AND PERIMETER THROUGH DIMENSIONS, UNITS, AND TOOLS

A Companion to DMT Insight 42, Grades K–8

How to Use This

This Companion is for teachers, coaches, and school leaders working with DMT Insight 42. It uses dimensions to help students identify what they are measuring, which unit is appropriate, and how to use the units. Consider the three questions that follow as you examine your current practice and student work.

Three Guiding Questions

1. Can students identify the attribute being measured and explain whether it requires linear, square, or cubic units?
2. How do your lessons help students distinguish the length of a square tile's edge from the area of its face?
3. Can students explain what each number in an area or perimeter formula represents?

Identifying the Attribute and Unit Being Measured

Students need opportunities to distinguish what they are measuring. Perimeter is the total length of a figure's boundary, measured in linear units. Area is the amount of surface covered, measured in square units. Teachers can use questions, models, and measurement tools to help students identify these attributes and explain how the units are used.

For younger students, ask: "Are we measuring the length around the figure or the surface it covers?" Older students can also answer: "What dimension are we measuring?"

Dimensions provide the mathematical background for these questions. They organize measurement; they are not a sequence every student must follow.

Dimension	What it represents	What we can measure	Units and tools
0D: point	A location with no length, area, or volume	Location, not a measurement of extent	Points, vertices, coordinates
1D: linear	Length along a line, segment, or path	Length, height, width, distance, perimeter	Inches, centimeters, meters, feet; rulers, string, tape measures
2D: surface	Extent across two dimensions	Area of rectangles, triangles, and composite figures	Square inches, square centimeters; square tiles, grids
3D: space	Extent across three dimensions	Volume of solids	Cubic inches, cubic centimeters; unit cubes

0 Dimensions (0D): Points

A point has location only, no length or area.

A point has no measurable extent, but it marks where a measurement begins and ends.

Classroom language: “A point tells us where, not how much.”

Vertices identify locations on a figure; they are not measurement units.

1 Dimension (1D): Length and Perimeter

One-dimensional measurement answers: How long is it? Length, width, height, distance, and perimeter are all one-dimensional measurements.

Units: linear units, such as inches, centimeters, meters, and feet

Teacher definition: perimeter is the total length of the boundary of a figure, measured in linear units.

Questions to ask students

“Where could we begin measuring the boundary? How do we know when we have measured its entire length?”

“What unit is repeating?”

“If I trace the outline, what am I measuring?”

Tools to use

- String
- Stir sticks or toothpicks
- Rulers
- Tape measures
- Tracing the outline with a finger or pencil

A ruler measures one-dimensional length, even when measuring the length, width, or height of a two- or three-dimensional object.

Square tiles and grids • When using square tiles or grids, distinguish the square unit used to measure area from the linear unit used to measure perimeter. The same representation can support both measurements when students understand which attribute and unit they are using.



Area (2D)

Count the square units that cover the surface.

Perimeter (1D)

Measure the lengths of the boundary segments in linear units.

The same tile can support both, when the unit is named.

The face of a square tile represents a square unit; its edge represents a linear unit.

2 Dimensions (2D): Area

Two-dimensional measurement answers: How much surface is covered?

Area is a 2D quantity: the amount of surface covered.

Units: square units, such as square inches and square centimeters

Teacher definition:

Area is the amount of surface covered, measured in square units. Square units can be arranged to cover a surface without gaps or overlaps.

Questions to ask students

“What part of the shape are we covering?”

“What counts as one unit?”

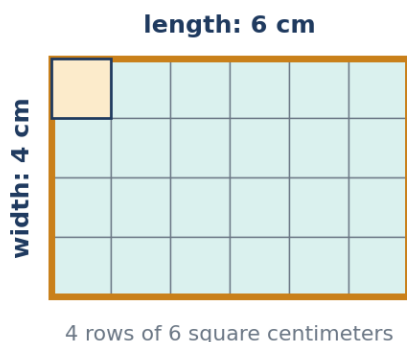
“Are there any gaps or overlaps?”

Tools to use

- Square tiles
- Sticky notes
- Grid paper
- Transparent grids

Tiling and grids • Tiling and grid representations can help students see how square units cover a surface without gaps or overlaps. Teachers can connect these experiences to counting, arrays, multiplication, and area formulas through explicit instruction and practice to build accuracy and efficiency.

For a rectangle 6 cm long and 4 cm wide, the length and width are measured in centimeters. The perimeter is $6 + 4 + 6 + 4 = 20$ cm. The area is represented by 4 rows of 6 square units, with each square unit measuring 1 cm^2 . The area is 24 cm^2 .



1D

Length and width

6 cm and 4 cm (linear units)

1D

Perimeter: the boundary

$6 + 4 + 6 + 4 = 20$ cm

2D

Area: the surface covered

$4 \times 6 = 24 \text{ cm}^2$ (square units)



one square centimeter (1 cm^2)

Length, width, and perimeter are measured in linear units; area is measured in square units.

3 Dimensions (3D): Volume

Three-dimensional measurement answers: How much space is filled?

Units: cubic units

Volume is not the focus here, but naming it helps students see how the unit changes with the dimension:

- length is measured in linear units, such as centimeters;
- area is measured in square units, such as square centimeters;
- volume is measured in cubic units, such as cubic centimeters.

Using Dimensions to Identify What Is Being Measured

Questions to ask students

"What attribute are we measuring?"

"Is the measurement linear, square, or cubic?"

"What represents one unit?"

"How are the units iterated or structured?"

"How does the unit determine how we record the measurement?"

Developing and Connecting Area and Perimeter

Perimeter and area can be developed in related lessons. Make the distinction between the attributes clear; the order can vary with the curriculum and the students.

Developing Perimeter (1D)

Instructional focus

- Iterating linear units
- Adding side lengths
- Tracing boundaries

Suggested tasks

- Find the perimeter of rectangles and composite figures.
- Walk the perimeter of classroom objects.
- Use string to compare which boundary is longer.

Goal: Students can explain the total length of a boundary and the linear unit used to measure it.

Developing Area (2D)

Instructional focus

- Covering surfaces
- Counting square units
- Structuring arrays (rows and columns)

Suggested tasks

- Tile rectangles and composite shapes.
- Examine how square units can be counted individually or structured into rows and columns to determine the area.
- Ask how counting could be made more efficient, and connect rows and columns to multiplication.

Goal: Students can explain area as the number of square units covering a surface and use rows and columns to determine it efficiently.

Comparison Tasks

Fixed Area, Changing Perimeter

- Give students 24 square tiles.
- Build different rectangles using all 24 tiles.
- Record the perimeter each time.

Dimensions	Area	Perimeter
1 × 24	24 square units	50 units
2 × 12	24 square units	28 units
3 × 8	24 square units	22 units
4 × 6	24 square units	20 units

Questions

“What quantity stayed the same?”

“What changed in the dimensions? How did the perimeter change?”

“Why does having the same area not require the same perimeter?”

Fixed Perimeter, Changing Area

- Give students a string 24 units long. The string represents the total boundary length.
- Form rectangles whose sides are whole numbers of the same length unit.
- Record the area each time.

Dimensions	Perimeter	Area
1×11	24 units	11 square units
2×10	24 units	20 square units
3×9	24 units	27 square units
4×8	24 units	32 square units
5×7	24 units	35 square units
6×6	24 units	36 square units

Questions

“What stayed the same? What changed?”

“Which rectangle has the greatest area? Why?”

“What patterns do you notice?”

These tasks let students see how rectangles can have the same area with different perimeters, or the same perimeter with different areas.

Connecting Units, Models, and Formulas

Formulas provide efficient ways to determine measurements. For a rectangle, the perimeter formula represents the sum of its side lengths, while the area formula represents the number of square units organized into rows and columns. Students should learn to use these formulas accurately and explain the quantities and relationships they represent.

- Perimeter: $P = 6 + 4 + 6 + 4 = 2(6 + 4) = 20$ cm combines the four side lengths.
- Area: $A = 4 \times 6 = 24$ cm² counts 4 rows of 6 square centimeters.

A useful check: can students explain what each number in the formula represents?

Language That Supports Dimensional Thinking

Use questions that help students identify the measurement attribute, unit, and relationship.

Instead of	Ask
"Go around the shape."	"Measure the total length of the boundary."
"Find the area."	"How many square units cover this surface?"
"It's bigger."	"Larger in what way: a longer boundary or more surface?"

Also ask:

"What is the unit, and how many units are being measured?"

"How could we compose or decompose this figure to determine its area or perimeter?"

Instructional Considerations

- Identify the attribute and the unit being measured.
- Develop unit iteration and the structure of linear and square units.
- Connect diagrams, tools, language, and equations.
- Compare figures with equal areas and different perimeters, and equal perimeters and different areas.
- Develop and practice efficient formulas while connecting them to the quantities represented.
- Extend reasoning by composing and decomposing composite figures.

These considerations do not form a required sequence. Explicit instruction, feedback, and practice support each one.

Extending to Grades 6–8

The same dimensional reasoning applies as the numbers and figures become more complex.

- Fractional side lengths: a rectangle 2.5 cm by 4 cm has a perimeter of 13 cm and an area of 10 cm^2 .
- Composite figures: decompose an L-shaped figure into two rectangles to find its area. The perimeter is the length of the outside boundary only.
- Expressions: a rectangle with side lengths x and $x + 3$ has a perimeter of $2x + 2(x + 3) = 4x + 6$ and an area of $x(x + 3)$.
- Scaling: doubling each side length of a rectangle doubles the perimeter and multiplies the area by 4.

For Coaches

Coaches can examine student work with teachers to identify how students are using linear and square units, what mathematical relationships are represented, and which tasks may help develop those relationships.

Questions for a coaching conversation:

- How does the lesson help students distinguish the dimension being measured, identify the appropriate unit, and explain how the units are used?
- What do students' drawings and explanations show about linear and square units?
- Which comparison task would help students examine the relationship between area and perimeter?
- What evidence in students' representations or explanations suggests they understand the difference between measuring a boundary and measuring a surface?
- What would you change in the next lesson based on the student work?

For School Leaders

Leaders can support coherent measurement instruction by protecting time for teachers to plan together, providing measurement tools such as rulers, string, square tiles, grid paper, and unit cubes, and supporting analysis of student work across grade levels.

Final Teacher Takeaway

Students should be able to identify the attribute being measured, determine the appropriate unit, select an efficient strategy, and explain how the numbers and units in their calculations represent the figure.

Read DMT Insight 42 at mathsuccess.io/dmtinsights.