

DMT COMPANION

Insight 44 · 2026 · for teachers, coaches, and school leaders



UNDERSTANDING DEPTH OF KNOWLEDGE IN MATHEMATICS

Classifying mathematical tasks by the reasoning they require

How to Use This

This Companion is for teachers, coaches, and school leaders working with DMT Insight 44. It uses multiplication examples to show that a task's Depth of Knowledge (DOK) level depends on what students must do, not on the size of the numbers or the task's length. Use it when planning lessons, reviewing curriculum materials, and examining student work.

Key Idea • A task's DOK level depends on the reasoning students must do and how familiar the task is. Recall, practice, application, representation, and justification all have a purpose.

Three Guiding Questions

Consider these questions as you examine your current lessons, tasks, and student work.

1. What are students actually being asked to do in this task: recall, calculate, interpret, represent, or justify?
2. Have students already practiced this exact task, model, or explanation?
3. Across a sequence of lessons, how are students developing procedural fluency, representing mathematical relationships, and justifying their reasoning?

The Levels in Multiplication

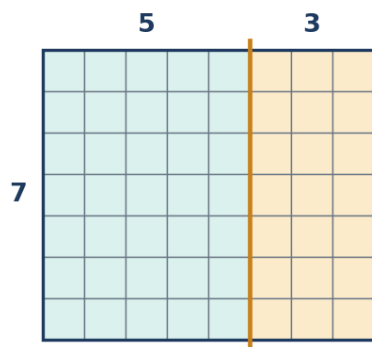
Webb's framework has four levels. DMTI distinguishes two forms of work within DOK 2; these are instructional distinctions, not separate Webb levels.

Level	What students do	Multiplication example	Note
DOK 1	Recall facts; carry out routine procedures	Compute 7×8 . Multiply 36×25 with a practiced algorithm.	Essential for fluency
DOK 2: context	Interpret quantities and select an operation or strategy	A situation in which students must determine how the quantities are related	A practiced problem type may be routine
DOK 2: representation	Represent a relationship with a model and explain it	Draw an area model for 7×8 and explain the rows, columns, and product	Explaining a familiar model is often DOK 2
DOK 3	Develop and defend a claim; reason strategically.	Investigate whether reversing the factors always preserves the product, and justify the conclusion.	Requires strategic reasoning and justification
DOK 4	Plan and carry out an extended investigation across conditions	Investigate rectangles with whole-number side lengths and an area of 48, form a conjecture about perimeter, and test it with other areas	DOK 3 or DOK 4, depending on what the investigation requires

Worked Examples

Example 1 • the same fact, different work: 7×8

Recalling $7 \times 8 = 56$ is DOK 1. Asking students to represent 7×8 with an area model, decompose it, and explain what each part represents asks for more: students identify the factors, partition the array, and explain how the two partial products compose the total product.



$$7 \times 8 = (7 \times 5) + (7 \times 3)$$

$$= 35 + 21$$

$$= 56$$

7 rows of 8 square units, partitioned into two arrays: 7 rows of 5 (35 square units) and 7 rows of 3 (21 square units)

$$7 \times 8 = (7 \times 5) + (7 \times 3) = 35 + 21 = 56$$

Questions to ask:

“What do the 7 and the 8 represent in your model?”

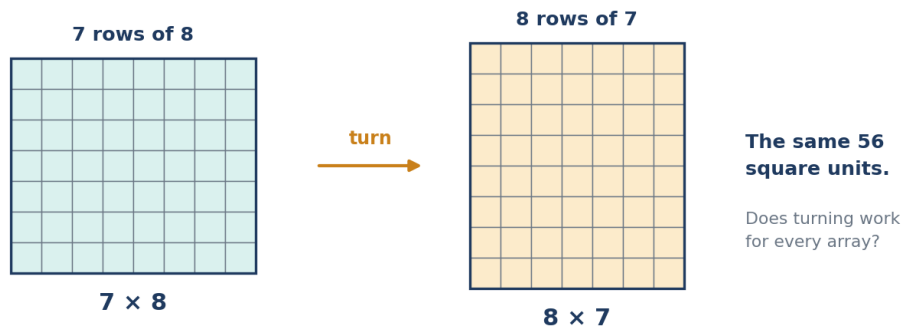
“What quantity does each part of the array represent?”

“Where are 7×5 and 7×3 in the model?”

“If you forgot 7×8 , which facts could you use to find it?”

Example 2 · from describing an array to justifying a property

Describing how a 7×8 array turns into an 8×7 array is often DOK 2. The task becomes DOK 3 when students must decide whether reversing the factors always gives the same product and explain why the relationship holds for every array, not only for the examples they tried.



Turning the array changes rows and columns, not the number of square units.

Questions to ask:

“Does this work for every pair of factors? How do you know?”

“What stays the same when the array is turned?”

“How could you convince someone who has not seen the array?”

Example 3 • an extended investigation: rectangles with an area of 48

Students investigate rectangles with whole-number side lengths and an area of 48 square units. They generate the rectangles, organize them systematically, and compare their perimeters. Depending on what students are required to do, the investigation may involve DOK 3 or DOK 4. It reaches DOK 4 when students form a conjecture about side lengths and perimeter, test it with other fixed areas (such as 36), and support or revise their conclusion.

Dimensions	Area	Perimeter
1 × 48	48 square units	98 units
2 × 24	48 square units	52 units
3 × 16	48 square units	38 units
4 × 12	48 square units	32 units
6 × 8	48 square units	28 units

Questions to ask:

“How do you know you have found every rectangle with whole-number side lengths?”

“What happens to the perimeter as the side lengths get closer together?”

“Does the same pattern hold for an area of 36? How could you test it?”

Key Idea • The same numbers can support different levels of work. Classify the task by what students must do, and plan for each kind of work.

Classifying a Task

Before assigning a level, ask:

- What must students do to complete the task?
- Is the relationship given, or must students determine it?
- Have students already practiced this exact problem type, model, or explanation?
- Does the task ask for a general claim, or an explanation of one example?
- Does the task require planning and investigation across related cases?

Questions That Extend Mathematical Reasoning

Questions can extend the reasoning a task requires. The DOK level still depends on what students must do in response.

Instead of only	Also ask
“What is 6×4 ?”	“If you forgot 6×4 , how could you find it from a fact you know?”
“Draw an array.”	“What does each row, column, and square represent?”
“Is your answer right?”	“What mathematical property supports your conclusion?”
“Use the strategy we practiced.”	“Which strategy is more efficient for 36×25 ? Why?”

Across the Grades

The same distinctions apply across grade levels—the mathematics changes.

Grade band	Recall or routine (DOK 1)	Represent (often DOK 2)	Justify (DOK 3)
Grades K–2	Recall $5 + 5 = 10$	Represent $8 + 5$ using a ten-frame or another model. Explain how the quantities can be composed to make 13	Is the sum of two odd numbers always even? Explain why
Grades 3–5	Recall $7 \times 8 = 56$	Represent 7×8 with an area model and decompose it	Does reversing the factors always give the same product? Justify
Grades 6–8	Evaluate $3(x + 4)$ when $x = 2$	Represent $3(x + 4)$ with an area model	Are $3(x + 4)$ and $3x + 4$ equivalent for all values of x ? Justify

For Coaches

Coaches can work with teachers to examine the mathematical demands of tasks, consider how students responded, and determine what instruction should follow. The goal is not to increase the DOK level of every task. The goal is to ensure students have opportunities to develop fluency, apply mathematical relationships, and justify their reasoning.

Questions for a coaching conversation:

- What were students required to do in each task, and how familiar was that work?
- Where in the lesson did students develop fluency, and where did they justify a claim?
- What evidence in students' work shows the reasoning the task required?
- What task or question would extend students' reasoning in the next lesson?
- What mathematical relationships do students need to understand, and how will the next lesson help them develop those relationships?

For School Leaders

Leaders can support balanced instruction by reviewing curriculum and assessments for the kinds of mathematical work they require, protecting time for teachers to plan tasks together, and avoiding the assumption that a higher DOK level always means a better task.

Read DMT Insight 44 at mathsuccess.io/dmtinsights.