

DMT COMPANION

Insight 22 · 2026 · for teachers, coaches, and school leaders



UNDERSTANDING STATE MATHEMATICS ASSESSMENTS: WHAT THEY MEASURE AND HOW TEACHERS CAN USE THEM

Examining the mathematics, the cognitive demand, and the evidence in an assessment task

How to Use This

This Companion provides examples and questions teachers, coaches, and school leaders can use when examining mathematics assessment tasks. It focuses on the mathematical knowledge being assessed, the thinking required, and what students' responses reveal about their understanding.

Key Idea • Ask three questions about any task: What mathematical knowledge does it assess? What thinking does it require? What can we learn from the student's response?

Examining an Assessment Task

Consider these questions as you examine an assessment task or a set of results.

1. What mathematical relationships does this task assess?
2. What decisions and reasoning does the task require, and what DOK level does that suggest?
3. What do students' responses and explanations show about how they understand the mathematics?

What Are We Examining?

DMTI assessment categories, Webb's Depth of Knowledge, and student responses provide different information. Each helps us examine an assessment task and make instructional decisions.

Question	Framework or source	What it tells you
What mathematical knowledge is assessed?	DMTI assessment categories	Whether the task examines procedural skill, contextual problem solving, conceptual understanding, or reasoning and justification
What cognitive demand is required?	Webb's Depth of Knowledge	The thinking the task requires, not its difficulty or length
What does the response show?	Student work and explanations	How the student interpreted the task and the mathematics, as evidence to investigate
How is the content sampled on the state test?	State assessment blueprint	Reporting categories, item types, and scoring for a specific program and year, not evidence of an individual student's understanding

Worked Examples

Example 1 • assessing place value in four ways

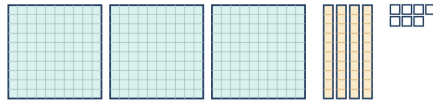
The following tasks use third-grade place value to illustrate DMTI's four assessment categories. Each examines a different aspect of students' mathematical knowledge.

DMTI category	Task
Level 1: Skill/Recall	What is the value of the 4 in 347?
Level 2 Problem Solving (L2P)	A school has 347 pencils, packaged in boxes of 100, packs of 10, and single pencils. If one box of 100 pencils is opened and repackaged into packs of 10, how many boxes, packs, and single pencils are there now? Explain how you know the total has not changed.
Level 2 Conceptual (L2C)	Represent 347 using hundreds, tens, and ones. Show another way to compose 347 by regrouping one hundred into ten tens. Explain why the total remains the same.
Level 3: Reasoning and Justification	One student says, "If I trade one hundred for ten tens, I have more because I have more pieces." Another says, "The number of pieces changes, but the quantity stays the same." Evaluate their reasoning and justify your conclusion.

Example 2 • regrouping one hundred as ten tens

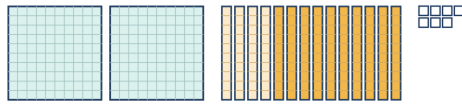
In the Level 2 Conceptual task, students decompose 100 into 10 tens. The representation changes from 3 hundreds, 4 tens, and 7 ones to 2 hundreds, 14 tens, and 7 ones. Both represent 347.

3 hundreds, 4 tens, 7 ones



$$300 + 40 + 7 = 347$$

2 hundreds, 14 tens, 7 ones



$$200 + 140 + 7 = 347$$

One hundred is regrouped as ten tens (darker). The number of pieces changes; the quantity stays 347.

$$3 \text{ hundreds} + 4 \text{ tens} + 7 \text{ ones} = 2 \text{ hundreds} + 14 \text{ tens} + 7 \text{ ones} = 347$$

Questions to ask:

“What unit did you decompose? Into how many of the next smaller unit?”

“If we compose as many tens as possible from 347, how many tens would we have? What would remain?”

“Why does the total stay the same when the number of pieces changes?”

Example 3 • classifying DOK by the thinking required

The DOK level depends on the mathematical thinking required by the task. A model, explanation, or multiple steps does not necessarily indicate a higher level of cognitive demand.

Task	Possible DOK	Why
Identify the value of the 4 in 347.	DOK 1	Recall of a place-value fact
Represent 347 in two ways and explain the equivalence.	DOK 2	Decisions about how to represent the relationship
Explain the steps of a familiar regrouping procedure.	DOK 1 or 2	An explanation alone does not make a task DOK 3
Determine whether a general claim about regrouping is always true and justify it.	DOK 3	Nonroutine reasoning and justification

Key Idea • A model, a context, or an explanation does not raise the DOK level by itself. The mathematical decisions and reasoning do.

What Student Responses Can Show

Student responses provide evidence of their mathematical thinking. When a response is unclear, ask students to explain their strategy or show another representation before deciding what instruction is needed.

Student response	What to investigate	Possible teacher response
Says the value of the 4 in 347 is 4	Whether the student distinguishes the digit from its place value	Ask what unit the 4 counts, and how many ones 4 tens represent
Writes 3,047 for the pencil problem	How the student is combining hundreds, tens, and ones	Ask the student to show each unit with blocks or a drawing
Agrees that ten tens is more than one hundred	Whether the student attends to the number of pieces or the quantity	Ask the student to count both by tens and compare
Answers L1 items correctly but cannot regroup	Whether the place-value facts are connected to units	Ask the student to show 347 another way and explain

Using State Results Alongside Classroom Evidence

State results identify patterns worth investigating. Classroom tasks and student explanations show what the patterns mean.

Instead of only	Also ask
"Our scores in Number and Operations were low."	"Which mathematical relationships do our classroom tasks show students still developing?"
"Practice more items like the test."	"Which standards and relationships do the items sample, and where do we teach them?"
"This student is below basic."	"What do this student's explanations show about place value?"
"The blueprint says this is a priority."	"What do the grade-level standards and learning progressions say students need?"

Across the Grades

Across grade levels, the content changes. The three questions stay the same.

Grade band	Content	Conceptual task	Reasoning task
Grades K–2	Composing ten	Show 13 using ten and ones. Compose or decompose the units to show another representation of 13	Is $8 + 5$ the same as $10 + 3$? Justify
Grades 3–5	Composing and decomposing place-value units	Compose 347 by regrouping a hundred	Evaluate a claim about regrouping
Grades 6–8	Equivalent ratios	Show 2:3 and 4:6 in a ratio table	A student claims that adding the same number to both quantities in a ratio produces an equivalent ratio. Is the claim always true? Use examples and reasoning to justify.

For Coaches

Coaches can use assessment tasks and student work to help teachers examine what students understand mathematically and where they may need additional instruction. Comparing DMTI assessment categories with Webb’s DOK can also help teachers consider whether their tasks give students opportunities to demonstrate different aspects of mathematical knowledge.

Questions for a coaching conversation:

- Which DMTI categories do our classroom tasks assess, and which are missing?
- Where did we assign a DOK level because of a model or context rather than the thinking required?
- What do students’ explanations add to what the state results show?
- Which relationships will the next lesson develop?

For School Leaders

School leaders can support this work by giving teachers time to examine assessment results, student work, and instructional tasks together. Grade-level standards and mathematical learning progressions should guide these conversations, with state assessment results providing additional evidence about student achievement.

Read DMT Insight 22 at mathsuccess.io/dmtinsights.