MATHEMATICS EXAMPLES
SPECIAL EDUCATION ASSESSMENT ALIGNMENT
DEPTH-OF-KNOWLEDGE LEVELS & STAGES

Level 1-Stage 1:   Responding to Mathematical Features

Level 1-Stage 1 requires the ability to respond to, indicate or acknowledge mathematical features.

Examples of Standards

3rd Grade Mathematics Standard: Recognize place value of ones, tens, and hundreds columns.

General Mathematics Standard: Point to a number versus other graphics (select numbers from other symbols such as letters, shapes, pictures lines)

General Mathematics Standard: Interact with objects related to mathematical activities

These standards represent Stage 1 because students are tasked to respond to math symbols or visuals and nothing more.

Examples of Items

Student is able to recognize that there is a difference in patterns.

Student responds to math ideas using appropriate vocabulary.

These items display Level 1-Stage 1 characteristics because students are asked to reply or respond to math concepts.

Level 1-Stage 2:   Reproduce Mathematical Features

Level 1-Stage 2 requires the ability to copy, replicate, repeat, re-enact, mirror, or match mathematical features.

Examples of Standards

3rd Grade Mathematic Standard: matches three-dimensional shapes and/or manipulatives

General Mathematic Standard: Match numerals to pictures representing the same number of objects

General Mathematic Standard: Match numeral to numeral

These standards reflect Level 1-Stage 2 since students reproduce or match requested math-related activities.

Examples of Items

Student will write numbers accurately in a variety of contexts.

Student accurately sorts basic shapes into groups.

Student is able to accurately identify location terms when prompted
(i.e., next to, between, over, under).

These items are Stage 2 because students are doing more than just acknowledging math concepts they are matching or reproducing them.

Level 1-Stage 3:   *Recalls Information about Mathematical Features*

Level 1-Stage 3 requires students to recall or observe facts, definitions, terms. Involves simple one-step procedures. Involves computing simple algorithms (e.g., sum, quotient).

Examples of Standards

General Mathematics Standard: Determine area and perimeter using concrete materials.

8th Grade Mathematics Standard: Student is able to tell time with some type of time-keeping device.

General Mathematics Standard: Read and label three digit numbers

These standards are Stage 3 because students recall or recite math concepts which they have learned.

Examples of Items

Student locates a pattern in order to solve a problem.

Student measures using feet and yards.

Student uses a calculator or concrete objects to add and subtract.

The above items ask students to recall mathematical features to which they have been exposed.

Level 2-Stage 4:   *Basic Reasoning*

Level 2-Stage 4 requires students to make decisions of how to approach a problem. Requires students to compare, classify, organize, estimate or order data. Typically involves two-step procedures.

Examples of Standards

Grade 7 Standard: Construct two-dimensional patterns for three-dimensional models, such as cylinders and cones.

This objective is an example of Level 2-Stage 4. Although recognizing and drawing a two-dimensional pattern or a regular cylinder may be a level 1, building a representation of a three-dimensional model would not be routine. It would require at least two steps: first recognizing the shape, second drawing a two-dimensional object to reflect the shape in three-dimensions.

Examples of Items

A car odometer registered 41,256.9 miles when a highway sign warned of a detour 1,200 feet ahead. What will the odometer read when the car reaches the detour? (5280 feet = 1 mile)

> (a) 42,456.9   (b) 41,279.9   (c) 41,261.3   (d) 41,259.2   (e) 41,257.1

If each of the counting numbers from 1 though 10 is multiplied by 13, how many of the resulting numbers will be even?

> (a) One   (b) Four   (c) Five   (d) Six   (e) Ten

Both of these items require students to move beyond recall. The first item requires students to think about what operation(s) to use and how to apply it/them to find the correct mileage. The second requires students to use properties of multiplication and odd and even numbers. Although for some students this may be routine, the item requires students to consider more than one concept.

Level 3-Stage 5:   Complex Reasoning

Level 3-Stage 5 requires reasoning, planning or use of evidence to solve problems or algorithms. May involve activity with more than one possible answer. Requires conjecture or restructuring of problems. Involves drawing conclusions from observations, citing evidence and developing logical arguments for concepts. Uses concepts to solve non-routine problems.

Examples of Standards

Grade 8 Standard: Solve two-step linear equations and inequalities in one variable over the rational numbers, interpret the solution or solutions in the context from which they arose, and verify the reasonableness of results.

The expectation expressed here is that students will not only solve a two-step linear equation, but will also interpret the solution and verify the results. This will require students to do some reasoning in order to interpret the solution and could be fairly complex depending on the context. If students were only required to solve linear equations and verify solutions, then the expectation would be Level 2-Stage 4.

Examples of Items

This question refers to shapes N, P and Q.

> In Mr. Bell's classes, the students voted for their favorite shape for a symbol. Here are the results.

	Class 1	Class 2	Class 3
Shape *N*	9	14	11
Shape *P*	1	9	17
Shape *Q*	22	7	2

Using the information in the chart, Mr. Bell must select one of the shapes to be the symbol. Which one should he select and why?

The shape Mr. Bell should select: _____, Explain:

Sam can purchase his lunch at school. Each day he wants to have juice that costs 50¢, a sandwich that costs 90¢, and fruit that costs 35¢. His mother has only $1.00 bills. What is the least number of $1.00 bills that his mother should give him so he will have enough money to buy lunch for 5 days?

The first item is for 8th graders, and the second is for 4th graders. Both items reflect more than a two step process. To successfully solve the first problem, students are must consider different ways that votes could be counted (total votes or votes by class). The student must then give a rationale for what response is selected. The student is required to reason and consider alternate solutions. Likewise to successfully respond to the second item, 4th graders need to reason how they would develop a solution and develop a method for this solution. Both items reflect Level 3-Stage 5 activities.

Level 4-Stage 6:   *Extended Reasoning*

Level 4-Stage 6 requires complex reasoning, planning, developing and thinking. Typically requires extended time to complete problem, but time spent not on repetitive tasks. Requires students to make several connections and apply one approach among many to solve the problem. Involves complex restructuring of data, establishing and evaluating criteria to solve problems.

Examples of Standards

Grade 8 Standard (from NEAP Math Framework): Design a statistical experiment to study a problem and communicate the outcomes.

This standard requires students to plan statistical experiments. Students must define a problem (research question) and develop a procedure for solving it. This involves identifying the correct statistical model, applying the model to data, and communicating the outcome of the selected model. Students must interpret findings and make reasonable and rationed inferences from obtained data. This represents complex, multi-step reasoning and reflects a Level 4-Stage 6 task.

Examples of Items

This question requires you to show your work and explain your reasoning. You may use drawings, words, and numbers in your explanation. Your answer should be clear enough so that another person could read it and understand your thinking. It is important that you show all of your work.

Month	Daily Ridership
October	14,000
November	14,100
December	14,100
January	14,200
February	14,300
March	14,600
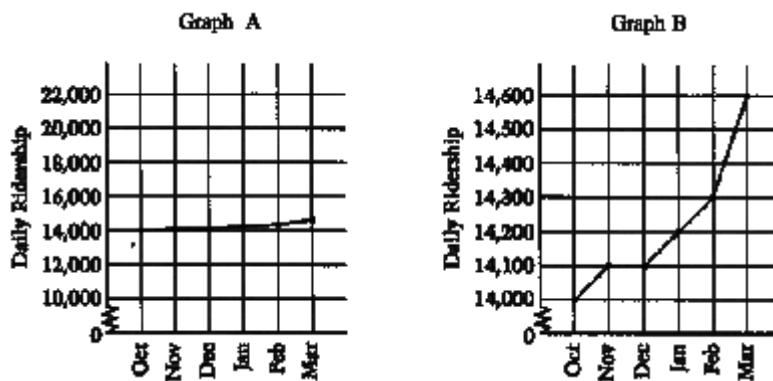
Graph A

Graph B

The data in the table above has been correctly represented by both graphs shown below.

Which graph would be best to help convince others that the Metro Rail Company made a lot more money from ticket sales in March than in October?

Explain your reasons for making this selection.

Why might people who thought that there was little difference between October and March ticket sales consider the graph you chose to be misleading?

This task requires students to relate a table of numbers to two graphs of the same information displayed differently. Students must then decide which of the two graphs will convince others of increased sales. Students are required to explain their answer. Following this students are asked to take the opposite position and argue why the graph they is misleading. The task requires extended time to complete, involves complex restructuring of data, and requires students to oppose views of the same information. This is activity is at a Level 4-Stage 6.